

How to
Master Skills for the

TOEFL[®] iBT

Reading

Advanced

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Introduction

A. Information on the TOEFL® iBT

1. The Format of the TOEFL® iBT

Section	Number of Questions	Timing	Score
Reading	<ul style="list-style-type: none"> • 3~5 Passages <ul style="list-style-type: none"> – approximately 700 words each – 12~14 questions per passage 	60~100 min.	30 points
Listening	<ul style="list-style-type: none"> • 2~3 Conversations <ul style="list-style-type: none"> – 12~25 exchanges each (3 min.) – 5 questions per conversation • 4~6 Lectures <ul style="list-style-type: none"> – 500~800 words each (3~5 min.) – 6 questions per lecture 	60~90 min.	30 points
BREAK		10 min.	
Speaking	<ul style="list-style-type: none"> • 2 Independent Tasks (preparation: 15 sec. / response: 45 sec.) <ul style="list-style-type: none"> ❶ 1 personal experience ❷ 1 personal choice/opinion • 2 Integrated Tasks: Read-Listen-Speak (preparation: 30 sec. / response: 60 sec.) <ul style="list-style-type: none"> ❶ 1 campus situation topic <ul style="list-style-type: none"> – reading: 75~100 words (45 sec.) – conversation: 150~180 words (60~80 sec.) ❷ 1 academic course topic <ul style="list-style-type: none"> – reading: 75~100 words (45 sec.) – lecture: 150~220 words (60~90 sec.) • 2 Integrated Tasks: Listen-Speak (preparation: 20 sec. / response: 60 sec.) <ul style="list-style-type: none"> ❶ 1 campus situation topic <ul style="list-style-type: none"> – conversation: 180~220 words (60~90 sec.) ❷ 1 academic course topic <ul style="list-style-type: none"> – lecture: 230~280 words (90~120 sec.) 	20 min.	30 points
Writing	<ul style="list-style-type: none"> • 1 Integrated Task: Read-Listen-Write (20 min.) <ul style="list-style-type: none"> – reading: 230~300 words (3 min.) – lecture: 230~300 words (2 min.) – a summary of 150~225 words • 1 Independent Task (30 min.) <ul style="list-style-type: none"> – a minimum 300-word essay 	50 min.	30 points

2. What Is New about the TOEFL® iBT?

- (1) The TOEFL® iBT is delivered through the Internet in secure test centers around the world at the same time.
- (2) It tests all four language skills and is taken in the order of Reading, Listening, Speaking, and Writing, with a 10-minute break in the middle.
- (3) The test is 4.0~4.5 hours long, and all of the four test sections will be completed in one day.
- (4) Note taking is allowed throughout the entire test, including the Reading section. At the end of the test, all notes are collected and destroyed at the test center.
- (5) Compared with the computer-based test (CBT) and paper-based test (PBT), the TOEFL® iBT has no Structure section. Grammar is tested indirectly on questions and tasks in each section.
- (6) In the Listening section, one lecture may be spoken with a British or Australian accent.
- (7) There are integrated tasks requiring test takers to combine more than one language skill in the Speaking and Writing sections.
- (8) In the Speaking section, test takers wear headphones and speak into a microphone when they respond. The responses are recorded and transmitted to ETS's Online Scoring Network.
- (9) In the Writing section, test takers must type their responses. Handwriting is not possible.
- (10) Test scores will be reported online. Test takers can see their scores online 15 business days after the test and will also receive a copy of their score report by mail.

B. Information on the Reading Section

The Reading section of the TOEFL® iBT measures test takers' ability to understand university-level academic texts. This section has 3~5 passages, and the length of each passage is about 700 words. Some passages may have underlined words or phrases in blue. Test takers can click on them to see a definition or explanation. Test takers have to answer 12~14 questions per passage. 60~100 minutes are given to complete this section, including the time spent reading the passages and answering the questions.

1. Types of Reading Passages

- (1) Exposition – Material that provides an explanation of a topic
- (2) Argumentation – Material that presents a point of view about a topic and provides evidence to support it
- (3) Historical narrative – An account of a past event or of a person's life, narrated or written by someone else

Basic Comprehension Questions

- (1) Vocabulary (3~5 questions per set)
 - _ This type of question asks you to identify the meanings of words and phrases in the reading passage.
- (2) Reference (0~2 questions per set)
 - _ This type of question asks you to identify the referential relationship between the words in the passage.
- (3) Factual Information (3~6 questions per set)
 - _ This type of question asks you to identify specific information that is explicitly stated in the passage.
- (4) Negative Factual Information (0~2 questions per set)
 - _ This type of question asks you to check what information is NOT mentioned in the passage.
- (5) Sentence Simplification (0~1 question per set)
 - _ This type of question asks you to choose the sentence that best paraphrases the essential information in the highlighted sentence.
 - _ This is a new type of question introduced in the TOEFL® iBT.

Inference Questions

- (6) Inference Questions (0~2 questions per set)
 - _ This type of question asks you to identify an idea that is not explicitly stated in the passage.
- (7) Rhetorical Purpose Questions (0~2 questions per set)
 - _ This type of question asks you why the author uses particular words, phrases, or sentences.
- (8) Insert Text Questions (0~1 question per set)
 - _ This type of question provides an example sentence and asks you to decide where the best place for that sentence would be in the passage.

Reading to Learn Questions

- (9) Prose Summary (1 question per set)
 - _ This type of question asks you to complete a summary chart with major ideas from the passage.
 - _ This question is worth up to 2 points, and partial credit is given.
 - _ This type of question does not occur with a Fill in a Table question in a same passage.
 - _ This is a new type of question introduced in the TOEFL® iBT.

(10) Fill in a Table (1 question per set)

- _ This type of question asks you to identify and organize the major ideas of the passage into table categories.
- _ This question is worth up to 3 points for tables with 5 correct answers and 4 points for tables with 7 correct answers. Partial credit is given.
- _ This type of question does not occur with a Prose Summary question in one passage.
- _ This is a new type of question introduced in the TOEFL® iBT.

2. Question Formats

There are three question formats in the Reading section:

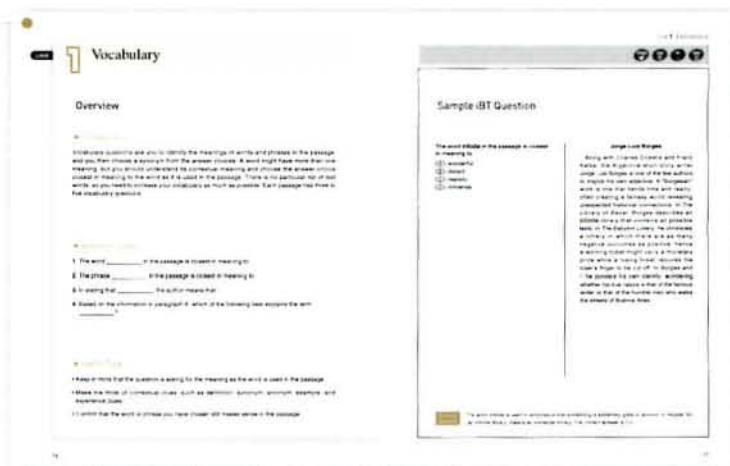
- (1) Four-choice questions with a single answer in traditional multiple-choice format
- (2) Four-choice questions with a single answer that ask test takers to insert a sentence where it fits best in a passage
- (3) "Reading to learn" questions with more than four choices and more than one answer

How to Use This Book

How to Master Skills for the TOEFL® iBT Reading Advanced is designed to be used either as a textbook for a TOEFL® iBT reading preparation course or as a tool for individual learners who are preparing for the TOEFL® test on their own. With a total of 10 units, this book is organized to prepare you for the test with a comprehensive understanding of the test and thorough analysis of every question type. Each unit consists of 6 parts and provides a step-by-step program that provides question-solving strategies and the development of test-taking abilities. At the back of the book are two actual tests of the Reading section of the TOEFL® iBT.

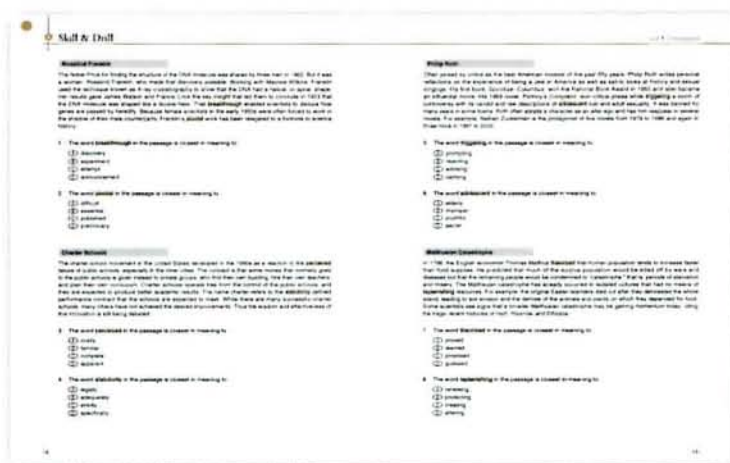
1 Overview

This part is designed to prepare you for the type of question the unit covers. You will be given a full description of the question type and its application in the passage. You also will be given some useful tips as well as an illustrated introduction and sample.



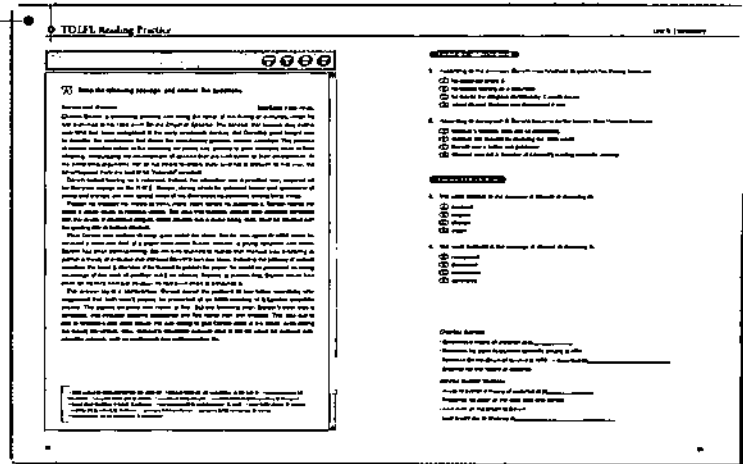
2 Skill & Drill

The purpose of this section is to ensure that you understand the new types of questions that were described in the overview. You will be given a chance to confirm your understanding in brief texts before starting on the practice exercises. You will read some simple passages and answer questions of a particular type. This part will help you learn how to deal with each type of question on the Reading section of the TOEFL® iBT.



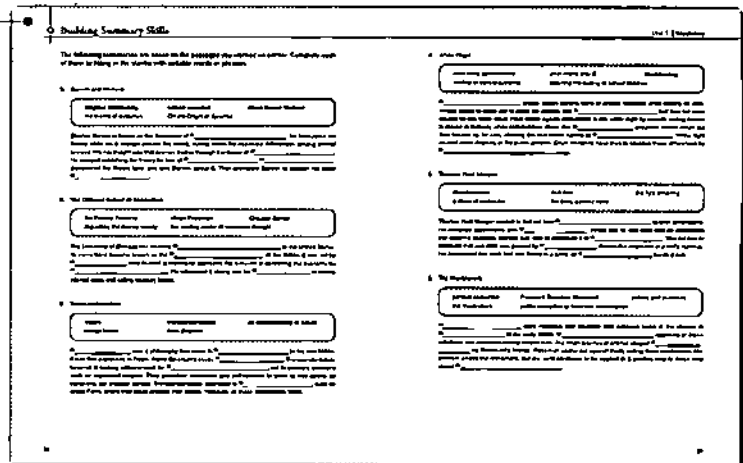
③ TOEFL Reading Practice

This section allows you to practice reading TOEFL® passages. Six long passages are provided, and a time limit is given for reading each passage. You first read the passage within a time limit and then solve general comprehension questions and the questions of the type that is mainly dealt with in the unit. A glossary of important words is listed in each passage to help increase your understanding. Also, clear notes are provided to help you grasp the overall organization of each passage and understand important points.



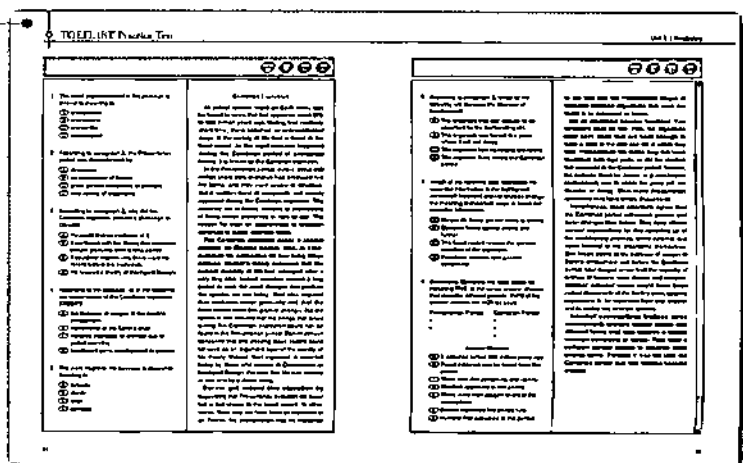
④ Building Summary Skills

The purpose of this part is for you to understand the previous long passages thoroughly by completing the summaries of them. This will also help you enhance your paraphrasing skills, which are strongly recommended to those who are preparing for the TOEFL® IBT.



⑤ TOEFL iBT Practice Test

This part gives you a chance to experience an actual TOEFL® IBT test in a shortened form. You will be given two passages with 8 questions each. The topics are similar to those on the actual TOEFL® test, as are the questions.



6 Vocabulary Review

This part offers you a chance to review some of the words you need to remember after finishing each unit. Vocabulary words for each unit are also provided at the back of the book to help you prepare for each unit.

Vocabulary Review

20) Choose the word with the closest meaning to each underlined word in phrases.

1. Not all members accepted the director's plan.
 (A) strategy (B) objective (C) method (D) outcome

2. The group was unanimous in approving the new plan.
 (A) unanimous (B) unanimous (C) unanimous (D) unanimous

3. He was the sole member of the club.
 (A) only (B) alone (C) single (D) one

4. The group discussed the problem for hours.
 (A) discussed (B) talked (C) talked (D) talked

5. He was convinced by the speaker's words.
 (A) convinced (B) convinced (C) convinced (D) convinced

6. The group discussed the problem for hours.
 (A) discussed (B) talked (C) talked (D) talked

7. He was convinced by the speaker's words.
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 (A) discussed (B) talked (C) talked (D) talked

Unit 1 - Vocabulary

1. Plan A. Goal B. Method C. Objective D. Outcome

2. Unanimous A. Unanimous B. Unanimous C. Unanimous D. Unanimous

3. Sole A. Only B. Alone C. Single D. One

4. Discuss A. Discuss B. Talk C. Talk D. Talk

5. Convince A. Convince B. Convince C. Convince D. Convince

6. Discuss A. Discuss B. Talk C. Talk D. Talk

7. Convince A. Convince B. Convince C. Convince D. Convince

8. Discuss A. Discuss B. Talk C. Talk D. Talk

9. Convince A. Convince B. Convince C. Convince D. Convince

10. Discuss A. Discuss B. Talk C. Talk D. Talk

7 Actual Test

This part offers two full practice tests that are modeled on the Reading section of the TOEFL® iBT. This will familiarize you with the actual test format of the TOEFL® iBT.

Actual Test 01

1. The group was unanimous in approving the new plan.
 (A) unanimous (B) unanimous (C) unanimous (D) unanimous

2. He was the sole member of the club.
 (A) only (B) alone (C) single (D) one

3. The group discussed the problem for hours.
 (A) discussed (B) talked (C) talked (D) talked

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10. Discuss A. Discuss B. Talk C. Talk D. Talk

PART

1

Basic Comprehension

In this part, the reading comprehension questions include: vocabulary, reference, factual information, negative factual information, and sentence simplification. The learning objectives of these reading comprehension questions are to identify individual words, referential relations between the words in the passage, factual information, and essential sentences.

- **Unit 1 Vocabulary**

Biology / Sociology / Literature

- **Unit 2 Reference**

Science / History / Economics

- **Unit 3 Factual Information**

Art / Geography / Politics

- **Unit 4 Negative Factual Information**

Culture / Astronomy / Chemistry

- **Unit 5 Sentence Simplification**

Ecology / Biology / Geology

Unit

1

Vocabulary

1 Vocabulary

Overview

■ Introduction

Vocabulary questions ask you to identify the meanings of words and phrases in the passage, and you then choose a synonym from the answer choices. A word might have more than one meaning, but you should understand its contextual meaning and choose the answer choice closest in meaning to the word as it is used in the passage. There is no particular list of test words, so you need to increase your vocabulary as much as possible. Each passage has three to five vocabulary questions.

■ Question Types

1. The word _____ in the passage is closest in meaning to _____.
2. The phrase _____ in the passage is closest in meaning to _____.
3. In stating that _____, the author means that ~ _____.
4. Based on the information in paragraph X, which of the following best explains the term _____?

■ Useful Tips

- Keep in mind that the question is asking for the meaning as the word is used in the passage.
- Make the most of contextual clues, such as definition, synonym, antonym, example, and experience clues.
- Confirm that the word or phrase you have chosen still makes sense in the passage.



Sample iBT Question

The word infinite in the passage is closest in meaning to

- (A) wonderful
- (B) distant
- (C) realistic
- (D) immense

Jorge Luis Borges

Along with Charles Dickens and Franz Kafka, the Argentine short-story writer Jorge Luis Borges is one of the few authors to inspire his own adjective. A “Borgesian” work is one that bends time and reality, often creating a fantasy world revealing unexpected historical connections. In *The Library of Babel*, Borges describes an infinite library that contains all possible texts. In *The Babylon Lottery*, he chronicles a lottery in which there are as many negative outcomes as positive; hence a winning ticket might carry a monetary prize while a losing ticket requires the loser’s finger to be cut off. In *Borges and I*, he ponders his own identity, wondering whether his true nature is that of the famous writer or that of the humble man who walks the streets of Buenos Aires.

Correct Answer

The word *infinite* is used to emphasize that something is extremely great in amount or degree. So “an infinite library” means an immense library. The correct answer is (D).

Rosalind Franklin

The Nobel Prize for finding the structure of the DNA molecule was shared by three men in 1962. But it was a woman, Rosalind Franklin, who made that discovery possible. Working with Maurice Wilkins, Franklin used the technique known as X-ray crystallography to show that the DNA had a helical, or spiral, shape. Her results gave James Watson and Francis Crick the key insight that led them to conclude in 1953 that the DNA molecule was shaped like a double helix. That breakthrough enabled scientists to deduce how genes are passed by heredity. Because female scientists in the early 1950s were often forced to work in the shadow of their male counterparts, Franklin's pivotal work has been relegated to a footnote to science history.

1. The word breakthrough in the passage is closest in meaning to
 - (A) discovery
 - (B) experiment
 - (C) attempt
 - (D) announcement
2. The word pivotal in the passage is closest in meaning to
 - (A) difficult
 - (B) essential
 - (C) published
 - (D) preliminary

Charter Schools

The charter-school movement in the United States developed in the 1990s as a reaction to the perceived failure of public schools, especially in the inner cities. The concept is that some money that normally goes to the public schools is given instead to private groups, who find their own building, hire their own teachers, and plan their own curriculum. Charter schools operate free from the control of the public schools, and they are expected to produce better academic results. The name charter refers to the statutorily defined performance contract that the schools are expected to meet. While there are many successful charter schools, many others have not achieved the desired improvements. Thus the wisdom and effectiveness of this innovation is still being debated.

3. The word perceived in the passage is closest in meaning to
 - (A) costly
 - (B) familiar
 - (C) complete
 - (D) apparent
4. The word statutorily in the passage is closest in meaning to
 - (A) legally
 - (B) adequately
 - (C) strictly
 - (D) specifically

Philip Roth

Often picked by critics as the best American novelist of the past fifty years, Philip Roth writes personal reflections on the experience of being a Jew in America as well as satiric looks at history and sexual longings. His first book, *Goodbye, Columbus*, won the National Book Award in 1960 and later became an influential movie. His 1969 novel, *Portnoy's Complaint*, won critical praise while triggering a storm of controversy with its candid and raw descriptions of adolescent lust and adult sexuality. It was banned for many years in some towns. Roth often adopts a character as an alter ego and has him reappear in several novels. For example, Nathan Zuckerman is the protagonist of five novels from 1979 to 1986 and again in three more in 1997 to 2000.

5. The word triggering in the passage is closest in meaning to
- (A) prompting
 - (B) rejecting
 - (C) advising
 - (D) calming
6. The word adolescent in the passage is closest in meaning to
- (A) elderly
 - (B) improper
 - (C) youthful
 - (D) secret

Malthusian Catastrophe

In 1798, the English economist Thomas Malthus theorized that human population tends to increase faster than food supplies. He predicted that much of the surplus population would be killed off by wars and diseases but that the remaining people would be condemned to "catastrophe," that is, periods of starvation and misery. The Malthusian catastrophe has already occurred in isolated cultures that had no means of replenishing resources. For example, the original Easter Islanders died out after they deforested the whole island, leading to soil erosion and the demise of the animals and plants on which they depended for food. Some scientists see signs that a broader Malthusian catastrophe may be gaining momentum today, citing the tragic recent histories of Haiti, Rwanda, and Ethiopia.

7. The word theorized in the passage is closest in meaning to
- (A) proved
 - (B) learned
 - (C) proposed
 - (D) guessed
8. The word replenishing in the passage is closest in meaning to
- (A) renewing
 - (B) protecting
 - (C) creating
 - (D) altering



A Read the following passage, and answer the questions.

Darwin and Wallace

Time Limit: 3 min. 40 sec.

Charles Darwin is commonly credited with being the father of the theory of evolution, which he first explained in his 1859 book *On the Origin of Species*. The concept that species may evolve over time had been recognized in the early nineteenth century. But Darwin's great insight was to describe the mechanism that drives the evolutionary process: natural selection. The process of natural selection refers to the tendency for plants and animals to pass desirable traits to their offspring, encouraging the development of species that are well suited to their environment. At the same time, organisms that do not inherit favorable traits tend not to prosper. In that way, the advantageous traits are said to be "naturally" selected.

Darwin lacked training as a naturalist. Indeed, his education was a practical one, acquired on his five-year voyage on the *H.M.S. Beagle*, during which he collected fossils and specimens of plants and animals and took careful notes of the differences he observed among living things.

Though he finalized his theory in 1844, many years before he published it, Darwin feared the storm it would cause in religious circles. The idea that humans evolved from primates conflicted with the tenets of traditional religion, which insisted that a divine being, God, must be credited with the guiding role in human creation.

Thus Darwin was content to keep quiet about his ideas. But he was upset in 1858 when he received a letter and draft of a paper from Alfred Russel Wallace, a young naturalist with whom Darwin had been corresponding. Darwin was stunned to realize that Wallace was preparing to publish a theory of evolution that mirrored Darwin's own key ideas, including the primacy of natural selection. He faced a dilemma: if he hurried to publish his paper, he would be perceived as taking advantage of the work of another; but if he allowed Wallace to publish first, Darwin would lose credit for his life's work just because he had been afraid to announce it.

The answer lay in a compromise. Darwin posed the problem to two fellow scientists, who suggested that both men's papers be presented at an 1858 meeting of a London scientific society. The papers attracted little notice at first. But the following year, Darwin's book was a sensation, and evolution became associated with him rather than with Wallace. This was due in part to Wallace's own good nature. He was willing to give Darwin most of the credit, even calling the theory Darwinism. Also, Wallace's reputation suffered later in his life when he pursued non-scientific subjects such as spiritualism and extraterrestrial life.

- well suited to (phr) appropriate for; right for • inherit (v) to be left something; to fall heir to • advantageous (a) beneficial • acquire (v) to get; to obtain • specimen (n) a sample • conflict (v) to be incompatible; to disagree
- tenet (n) a doctrine; a belief; a principle • correspond (v) to communicate; to write • stun (v) to shock; to amaze
- mirror (v) to reflect; to illustrate • primacy (n) importance • perceive (v) to recognize; to notice
- compromise (n) an agreement; a settlement

General Comprehension

1. According to the passage, Darwin was reluctant to publish his theory because
 - (A) he could not prove it
 - (B) he lacked training as a naturalist
 - (C) he feared the religious controversy it would cause
 - (D) Alfred Russel Wallace had discovered it first
2. According to paragraph 5, Darwin became better known than Wallace because
 - (A) Wallace's theories were not as convincing
 - (B) Wallace lost respect by studying the spirit world
 - (C) Darwin was a better self-promoter
 - (D) Wallace was not a member of London's leading scientific society

On the TOEFL Test

3. The word prosper in the passage is closest in meaning to
 - (A) succeed
 - (B) migrate
 - (C) change
 - (D) adapt
4. The word pursued in the passage is closest in meaning to
 - (A) recognized
 - (B) dismissed
 - (C) researched
 - (D) continued

Charles Darwin

- Completed a theory of evolution in (1) _____
- Presented his paper to a London scientific society in 1858
- Published *On the Origin of Species* in 1859 - > describes (2) _____
- Credited for the theory of evolution

Alfred Russel Wallace

- Ready to publish a theory of evolution in (3) _____
- Presented his paper at the same time with Darwin
- Gave most of the credit to Darwin
- Lost credit due to studying (4) _____

B Read the following passage, and answer the questions.

The Chicago School of Economics

Time Limit: 3 min. 40 sec.

Over the past century, the University of Chicago's Department of Economics has been the preeminent source of economic thought in the United States. Its influence has been so pervasive that its theoretical approaches have come to be known in academic circles as the Chicago School, referring not only to the university department but also to a broader economic worldview. Adherents of the Chicago School may be found in many universities and governmental institutions around the world.

The Chicago School has passed through several historical stages, each characterized by its own unique perspective. It began in the 1920s with Frank H. Knight and Jacob Viner, who rejected the reigning empirical approach of economics, which derived conclusions by analyzing data about the performance of economic indicators. Knight and Viner denounced economic imperialism, which viewed all social forces as having an economic explanation, and they were suspicious of a *laissez-faire* approach, arguing instead for activist governmental policies to avoid recessions. But they rejected a full-scale Keynesian policy that would grant government a role in all phases of economic life. Rather, they were confident in the ability of neoclassical paradigms, with their focus on individual and group choices to maximize self-interest, to solve all economic problems.

The second great flowering of the Chicago School began in the 1960s under George J. Stigler and Milton Friedman. The Second Chicago School adhered to neoclassical economics and rejected a Keynesian exaltation of government regulation. In the macroeconomic sphere, it is best known for its stress on monetarism, as developed by Milton Friedman, with whom the Chicago School became most closely associated. Friedman's view, borrowed from the nineteenth-century "quantity of money" theory, was that price levels are directly related to the amount of money in circulation. Unlike Keynesianism, monetarism eschews direct government control by means of taxation and spending in favor of imposing limits on the nation's money supply. Friedman espoused a dominant role for the Federal Reserve, which can raise or lower interest rates as needed to put the brakes on inflation or to stimulate a stagnant economy. Another tool is the sale of United States treasury bonds, by which the government can obtain funds by selling bonds to citizens at stated interest rates.

On the microeconomic level, the Chicago School was led by George Stigler, who argued for preserving the neoclassical paradigm while extending it to new areas whenever possible. Resulting innovations in the microeconomic sphere include search theory, human capital theory, and property rights/transaction cost theory.

The Chicago School's continued embrace of neoclassicism has led to criticisms that it encourages an imperialist view, in which all social and political phenomena are seen in terms of economic forces.

- preeminent [a] leading • adherent [n] a supporter; an advocate; a follower • perspective [n] a point of view
- reigning [a] dominant • empirical [a] experiential • denounce [v] to criticize; to attack • paradigm [n] a model
- suspicious [a] doubtful • adhere to [phr] to follow; to stick to • regulation [n] control; direction • espouse [v] to support; to advocate
- stagnant [a] motionless • preserve [v] to keep; to maintain • extend [v] to widen • embrace [n] acceptance; adoption

General Comprehension

1. According to the passage, a difference between monetarism and Keynesian economics is that
 - (A) Keynesian economics was taught in the Chicago School
 - (B) monetarism preaches the merits of government regulation
 - (C) monetarism favors controls over the money supply
 - (D) Keynesian economics would limit the role of government
2. According to the passage, which of the following did Milton Friedman favor as a means of regulating the economy?
 - (A) selling United States treasury bonds
 - (B) raising and lowering taxes
 - (C) raising and lowering government spending
 - (D) fixing prices of consumer goods

On the TOEFL Test

3. The word pervasive in the passage is closest in meaning to
 - (A) harmful
 - (B) celebrated
 - (C) frequent
 - (D) widespread
4. The word eschews in the passage is closest in meaning to
 - (A) avoids
 - (B) favors
 - (C) preaches
 - (D) involves

The Chicago School of Economics

- First stage (1920s)
 - Frank H. Knight & Jacob Viner
 - against economic imperialism, a (1) _____ approach, and a full-scale Keynesian policy
 - for (2) _____ → the focus on individual and group choices to maximize self-interest
- Second stage (1960s)
 - Milton Friedman & George J. Stigler
 - adhered to neoclassical economics
 - Macroeconomics → (3) _____: emphasis on the role of Federal Reserve
 - Microeconomics → extended the neoclassical paradigm to areas such as search theory, (4) _____, and property rights/transaction cost theory

C Read the following passage, and answer the questions.

Transcendentalism

Time Limit: 3 min. 40 sec.

Transcendentalism was a philosophy at the core of the American cultural renaissance of the mid-1800s. Centered in New England, the transcendental movement was signaled by Ralph Waldo Emerson's 1836 essay *Nature*, in which he wrote what was to be the rhetorical rallying cry of the new philosophy: "We will walk on our own feet; we will work with our own hands; we will speak our own minds ... A nation of men will for the first time exist because each believes himself inspired by the Divine Soul which also inspires all men."

Also in 1836, Emerson and his other transcendentalists sought a forum for their ideas by forming the Transcendental Club in Cambridge, Massachusetts. In 1840, the group began to publish their philosophy in a journal, *The Dial*.

The term transcendentalism was derived from a concept of the German philosopher, Immanuel Kant, who said that knowledge was "transcendent" when it was concerned not with reality but with the mode of knowing reality. By meditating and communing with nature, through work and art, we can transcend our senses and arrive at an understanding of truth and beauty. The doctrine rejects the idea that we can rely on our senses and experiences to attain knowledge; rather, we must look to our inner, spiritual essence as guideposts to the true nature of things.

The transcendentalists believed that the path to truth lay within ourselves. Society was a necessary evil, one that gave humans useful goods and the means of physical survival. But in order to lead a just life, people must ignore custom and social convention and rely on their own reason. Organized religion was an obstacle to this process, they believed, by interfering with one's personal relationship with God.

Transcendentalism exercised a profound influence on American literature and intellectual history. In his essays, such as *Self Reliance*, Emerson became the leading exponent of the movement. Henry David Thoreau's *On Walden Pond* insisted on humankind's ability to survive and prosper outside the constraints of society. The poets Walt Whitman and Emily Dickinson revealed the universal truths that could be uncovered by studying nature.

Emerson conceded that a true transcendental life was impossible to attain. Nonetheless, the movement spawned utopian communities like the one at Brook Farm near Boston. Founded by George Ripley in 1841, Brook Farm was inspired by the socialist views of George Fourier, who believed that people of like beliefs could live together in harmony, sharing their material goods and growing food for all. But the farm was situated on poor soil that was not productive for agriculture. More successful were its schools, which gave the community its only income. A fire to the main building doomed the experiment, which ended in 1847.

• core (n) the center • rallying cry (phr) a slogan to gather support • divine (a) godlike; sacred; holy • transcend (v) to rise above • meditate (v) to contemplate; to reflect • commune (v) to communicate • attain (v) to achieve; to obtain; to reach • obstacle (n) a hindrance; a barrier • interfere with (phr) to hinder; to harm • profound (a) deep; heavy • prosper (v) to thrive; to flourish • constraint (n) a restriction; a limitation • exponent (n) a promoter; an advocate • doom (v) to destroy

General Comprehension

1. According to the passage, the event that started the transcendental movement was
 - (A) the American cultural renaissance
 - (B) Emerson's essay *Nature*
 - (C) the formation of the Transcendental Club
 - (D) the publication of *The Dial*
2. According to the passage, transcendentalism's view of the physical senses is that
 - (A) we achieve all knowledge through our senses
 - (B) our senses lead to sinful behavior
 - (C) we cannot rely on our senses to understand nature
 - (D) senses can lead to understanding only when guided by organized religion

On the TOEFL Test

3. The word signaled in the passage is closest in meaning to
 - (A) indicated
 - (B) noted
 - (C) foretold
 - (D) declared
4. The word spawned in the passage is closest in meaning to
 - (A) discovered
 - (B) inspired
 - (C) described
 - (D) produced

Transcendentalism

- The term – derived from a philosophical concept of (1)_____
- A central philosophy of American cultural renaissance of the mid-1800s in New England
 - physical senses do not lead to understanding of nature
 - (2)_____ and reject organized religion
 - rely on oneself and seek personal connection to God
- Important publications and literature
 - *Nature* and *Self Reliance* by (3)_____
 - *The Dial*, the journal published by the Transcendental Club
 - *On Walden Pond* by Henry David Thoreau
 - poems written by Walt Whitman and Emily Dickinson
- (4)_____ founded by George Ripley in 1841 and burned down in 1847



D Read the following passage, and answer the questions.

White Flight

Time Limit: 3 min. 40 sec.

America's large cities were founded and populated by whites. After the Civil War, blacks began moving to the northern cities for jobs in the factories. This black influx increased during World War II, as blacks came seeking jobs in the war industries. A tight housing market resulted, and the birth of the Civil Rights Movement caused increased racial tension in the white-controlled cities. Whites with the economic means began moving away from these social problems into nearby suburban communities, a phenomenon known as white flight.

Americans traditionally had lived either in cities or on farms. But the spike in demand for post-World War II housing created the suburbs—residential communities, often built on former farmland, from which people commuted by automobile to their jobs in the cities. The suburbs were perceived by some whites as a peaceful haven, free from the urban turmoil caused by poor blacks and the decline of city schools.

Real estate agents played a crucial role in fostering white flight, often preying upon whites' negative attitudes toward blacks. The most pernicious technique used by realtors was blockbusting. Real estate agents would secretly sell a house in a white neighborhood, either buying the house themselves or using a white proxy and then reselling the house to a black family. When white homeowners saw a black family moving in, they would panic, thinking that the value of their homes would decline if the neighborhood were overtaken by blacks. Their fears were self-fulfilling; as soon as more homes were put on the market, the prices would decline. Often the only willing buyers were the real estate agents, who would then resell the homes at higher prices to new black families. In that way the realtors would reap not only their sales commissions but also the profits on their briefly owned houses.

In addition to altering the racial composition of cities, white flight has profoundly impacted public education. In 1954, the Supreme Court ordered that public schools be desegregated so that schools would no longer be mostly black or mostly white. That order triggered social upheaval, especially in the South, which had a long tradition of requiring separate schools for blacks. To overcome this resistance, later court decisions mandated the busing of students, so blacks might be bused many miles to a formerly white school and white students many miles to a black school.

White parents balked at having their children waste time riding on buses to a school that might not be as good as the one nearby. Their solution was to enroll their children in private schools, which, because they received no tax money, were free to operate without being subject to racial apportionment.

- populate [v] to inhabit; to live in
- influx [n] arrival
- phenomenon [n] an event; an occurrence
- haven [n] a safe place
- decline [n] deterioration; falling
- crucial [a] very important; critical
- prey [v] to take advantage of
- pernicious [a] harmful
- proxy [n] a substitute; a surrogate
- overtake [v] to outstrip
- trigger [v] to cause
- alter [v] to change
- desegregate [v] to integrate
- upheaval [n] a disruption
- mandate [v] to command; to require
- balk at [phr] to stop; to be unwilling to continue

General Comprehension

1. According to paragraph 1, what event prompted a sudden increase in migration to the north?
 - (A) the Civil War
 - (B) the Civil Rights Movement
 - (C) the Second World War
 - (D) white flight
2. According to the passage, blockbusting included which of the following?
 - (A) using a white representative to buy a house
 - (B) demolishing old houses and building new ones
 - (C) advertising to whites only
 - (D) offering less than the value of a house

On the TOEFL Test

3. The word turmoil in the passage is closest in meaning to
 - (A) pollution
 - (B) poverty
 - (C) agitation
 - (D) calm
4. The word apportionment in the passage is closest in meaning to
 - (A) allocation
 - (B) segregation
 - (C) discrimination
 - (D) controversy

White Flight

- Refers to the phenomenon of whites moving out into (1) _____ to avoid living with blacks
- Triggered by an increasing number of blacks moving into white cities during World War II
- Fostered by realtors using the (2) _____ " technique to sell houses at high prices
- Resulted in change in (3) _____ of cities
- Led to segregation in public schools
 - courts ordered desegregation and (4) _____ regardless of their races
 - white parents sent their children to private schools



E Read the following passage, and answer the questions.

Thomas Hunt Morgan

Time Limit: 3 min. 40 sec.

In the early part of the twentieth century, scientists were struggling to discover the physical basis of heredity. They knew that traits were inherited, but they did not know the mechanism by which the traits were passed to later generations. One candidate was the chromosome, the thread-like structure in the nucleus of a cell that had been discovered in 1888. But no one had performed the experiments needed to demonstrate the precise role of chromosomes in conveying genetic information.

A geneticist at Columbia University, Thomas Hunt Morgan, chose a tiny fly as the subject of his quest to understand the chromosome. Fruit flies, formally called the *Drosophila melanogaster*, were ideal for Morgan's project because 1) they were inexpensive to keep and feed, 2) they could be bred in large numbers in a small space, 3) they became adults in just ten days, and 4) they had only four chromosomes, which made them easy to study.

Working out of a small laboratory at Columbia, appropriately called the Fly Room, Morgan and his team began breeding fruit flies by the millions. The process was a painstaking one, as each fly had to be captured with tweezers and examined under a magnifying glass for any variations in inherited traits. Morgan tried to produce variations, also called mutations, by exposing the flies to radiation, growing them in either bright light or total darkness, spinning them in centrifuges, and baking them in ovens. Morgan worked diligently for six years, but he had no success in finding mutations that he could try to reproduce in a fly's offspring.

Just as he was about to give up, in 1910, he found a fly with white eyes instead of the usual red ones. That mutation reappeared in later generations, implying that it had been passed by inheritance. Morgan learned how to track traits from generation to generation, allowing him to show how particular traits were linked to particular chromosomes. In this way, he finally established that chromosomes were the carriers of hereditary factors. Those factors were later determined to be genes, or chain-like molecules of nucleic acid.

Morgan's results led him to explain sex-linked inheritance, meaning that some traits pass only to one or the other sex. He also discovered that genes are arranged on a chromosome in a fixed linear order, occupying a specific place on the chromosome. His insights made possible the recent success of the Human Genome Project, which, when completed, will map out the sequence and location of all human genes. Armed with that knowledge, scientists will be able to identify the genes that carry certain diseases, and they may be able to remove the defective genes and replace them with healthy ones.

- trait (n) a feature; a characteristic
- mechanism (n) a means; a process
- convey (v) to carry; to send
- quest (n) search; pursuit
- appropriately (ad) aptly; properly
- breed (v) to reproduce
- capture (v) to catch; to take
- variation (n) a change
- inherited (a) received; handed down
- offspring (n) children
- track (v) to follow; to chase
- linear (a) arranged in a straight line
- sequence (n) an order; an arrangement
- defective (a) flawed; imperfect

General Comprehension

1. According to the passage, all of the following were reasons why Morgan chose to experiment with fruit flies EXCEPT:
 - (A) They had four chromosomes.
 - (B) They did not require a large breeding area.
 - (C) They were available in his laboratory at Columbia.
 - (D) They did not cost much to care for.
2. According to the passage, the appearance of a mutation that was passed to later generations resulted in what key insight by Morgan?
 - (A) Most fruit flies have red eyes.
 - (B) Chromosomes carry hereditary traits.
 - (C) Mutations last for only one generation.
 - (D) A mutation is caused by an absence of genes.

On the TOEFL Test

3. The word painstaking in the passage is closest in meaning to
 - (A) harmful
 - (B) violent
 - (C) boring
 - (D) precise
4. The word implying in the passage is closest in meaning to
 - (A) suggesting
 - (B) proving
 - (C) announcing
 - (D) guessing

Thomas Hunt Morgan's Search for the Basis of Heredity

- Experimented with (1) _____
 - inexpensive to keep and feed
 - can be bred in large numbers in a small space
 - become adults in just (2) _____
 - have only (3) _____, making them easy to study
- Succeeded in causing (4) _____ in 1910
 - white eyes passed to later generations by chromosomes
- Led to Human Genome Project



F Read the following passage, and answer the questions.

The Muckrakers

Time Limit: 3 min. 30 sec.

In the late 1800s and early 1900s, magazine writers and newspaper reporters began to write reports exposing the abuses and corruption in politics and business. Among their targets were child labor, unsafe practices in food processing plants, fraudulent claims by drug companies, prostitution, labor racketeering, and inhumane prison conditions.

One of the most famous of these reformers was the novelist Upton Sinclair, who, in *The Jungle*, dramatizes the unsanitary conditions in the meat-packing industry. Another was Jacob Riis, a newspaper reporter and photographer who revealed the misery in the slums of New York City.

The public's enthusiasm for these reports was inspired mainly by a 1903 series in *McClure's Magazine*, which published investigations of corruption in city government by Lincoln Steffens and of the Standard Oil Company by Ida M. Tarbell.

This brand of socially conscious journalism was originally embraced by President Theodore Roosevelt. He persuaded Congress to pass reform laws such as the Pure Food and Drugs Act and the Meat Inspection Act. But in 1906, David Graham Phillips wrote a series of articles in *Cosmopolitan* magazine that alleged political corruption by some of Roosevelt's allies. Roosevelt fought back. In a speech, he compared some of the journalists to the character in John Bunyan's *Pilgrim's Progress* who worked with a muck-rake, always looking down into the muck, or animal dung, and never looking up at the world around him. While praising writers who showed a genuine concern for correcting injustices, he condemned those who were interested only in uncovering filth and sensationalizing the misbehavior they had found. He called them muckrakers.

Responsible investigative journalists felt betrayed by Roosevelt's unsavory label. Lincoln Steffens, one of the reformers respected by Roosevelt, was furious with the speech. The day after he told Roosevelt, "Well, you have put an end to all these journalistic investigations that have made you."

In fact, Roosevelt's verbal attack did lead to the demise of what was generally considered to be a positive movement, one that had drawn attention to and cured many of society's ills. Nonetheless, while it flourished, especially between 1900 and 1915, the muckraking movement achieved important successes, including dissolving corporate monopolies, ending child labor, adopting workers' compensation laws, and improving food-processing safety.

Later in the twentieth century, the term muckraker became associated with any author or filmmaker who focused on the public dangers that the politicians were unwilling to confront. Recent muckrakers include Ralph Nader, the author of an exposé on unsafe automobiles, Bob Woodward and Carl Bernstein, the chroniclers of the Watergate scandal, and Morgan Spurlock, the maker of a film about the fast-food industry.

- **expose** (v) to uncover; to reveal
- **corruption** (n) dishonesty; illegal behavior
- **fraudulent** (a) fake; phony
- **racketeering** (n) threatening
- **inhumane** (a) cruel; brutal
- **enthusiasm** (n) a strong interest
- **embrace** (v) to welcome; to adopt
- **genuine** (a) real
- **condemn** (v) to criticize; to blame
- **betray** (v) be disloyal; be treacherous
- **demise** (n) end; death
- **flourish** (v) to prosper; to thrive
- **dissolve** (v) to end; to break up
- **monopoly** (n) complete control
- **exposé** (n) an exposure; disclosure
- **chronicler** (n) a storyteller; a reporter

General Comprehension

1. According to the passage, public interest in muckraking reports was attracted by which of the following?
 - (A) the election of Theodore Roosevelt
 - (B) poor prison conditions
 - (C) a series of magazine articles in 1903
 - (D) reform laws passed by Congress
2. According to the author, why did the muckraking movement end?
 - (A) It succeeded in curing the problems it uncovered.
 - (B) President Roosevelt criticized the muckrakers.
 - (C) It lost the support of the big corporations.
 - (D) World War I made people lose interest.

On the TOEFL Test

3. The word unsanitary in the passage is closest in meaning to
 - (A) dangerous
 - (B) unclean
 - (C) miserable
 - (D) startling
4. The word unsavory in the passage is closest in meaning to
 - (A) unfavorable
 - (B) unsettled
 - (C) unstable
 - (D) unreasonable

Muckrakers

- Reporters & novelists in (1)_____
 - Upton Sinclair → his novel, *The Jungle*
 - Jacob Riis → a newspaper reporter and photographer
 - Lincoln Steffens & Ida M. Tarbell → articles in (2)_____
 - David Graham Phillips → articles in *Cosmopolitan* magazine
- Targets of muckrakers
 - drug companies, child labor, (3)_____, prison conditions, and labor racketeering
- First approved by President Roosevelt but fell into decline due to his later verbal attack
 - a negative allusion to the character in (4)_____ who raked animal waste
- Muckrakers in the 20th century - authors or filmmakers who focus on the public dangers
 - Ralph Nader, Bob Woodward and Carl Bernstein, and Morgan Spurlock

● Building Summary Skills

The following summaries are based on the passages you worked on earlier. Complete each of them by filling in the blanks with suitable words or phrases.

1. Darwin and Wallace

religious controversy
the theory of evolution

natural selection
On the Origin of Species

Alfred Russel Wallace

Charles Darwin is known as the discoverer of ⁽¹⁾ _____. He formulated his theory while on a voyage around the world, during which he observed differences among animal species. His key insight was that species evolve through a process of ⁽²⁾ _____. He delayed publishing the theory for fear of ⁽³⁾ _____. ⁽⁴⁾ _____ discovered the theory later and told Darwin about it. That prompted Darwin to publish his book ⁽⁵⁾ _____.

2. The Chicago School of Economics

the Federal Reserve
regulating the money supply

Milton Friedman
the leading center of economic thought

Chicago School

The University of Chicago has become ⁽¹⁾ _____ in the United States. Its views have become known as the ⁽²⁾ _____. In the 1960s, it was led by ⁽³⁾ _____, who favored a monetarist approach. He believed in controlling the economy by ⁽⁴⁾ _____. He advocated a strong role for ⁽⁵⁾ _____ in setting interest rates and selling treasury bonds.

3. Transcendentalism

Nature
design towns

transcendentalism
New England

an understanding of nature

⁽¹⁾ _____ was a philosophy that arose in ⁽²⁾ _____ in the mid-1800s. It was first expressed in Ralph Waldo Emerson's essay ⁽³⁾ _____. Transcendentalists believed in looking within oneself for ⁽⁴⁾ _____, not in society's creations such as organized religion. They preached meditation and self-reliance in order to rise above, or transcend, our physical senses. Transcendentalists attempted to ⁽⁵⁾ _____, such as Brook Farm, where they could practice their beliefs. However, all these experiments failed.

4. White Flight

earn more commissions	after World War II	blockbusting
decline in school systems	ordering the busing of school children	

(1) _____, blacks began moving north in greater numbers while looking for jobs. Whites began to move out to avoid the poverty and (2) _____ that they felt were caused by this black influx. Real estate agents cooperated in this white flight by secretly selling homes to blacks in formerly white communities. Once this (3) _____ occurred, whites would put their houses up for sale, allowing the real estate agents to (4) _____. White flight caused racial disparity in the public schools. Court decisions have tried to equalize these differences by (5) _____.

5. Thomas Hunt Morgan

chromosomes	fruit flies	the fly's offspring
a chain of molecules	the body passed traits	

Thomas Hunt Morgan wanted to find out how (1) _____ to later generations. He designed experiments with (2) _____. When one fly was born with an uncommon eye color—a mutation, Morgan was able to reproduce it in (3) _____. This led him to conclude that eye color was passed by (4) _____, thread-like structures in a cell's nucleus. He determined that each trait was linked to a gene, or (5) _____ inside a cell.

6. The Muckrakers

political corruption	President Theodore Roosevelt	politics and business
the muckrakers	public corruption or business misbehavior	

(1) _____ were reporters and novelists who exposed some of the abuses in (2) _____ in the early 1900s. (3) _____ approved of these reformers and endorsed several reform laws. But when a series of articles alleged (4) _____ by Roosevelt's friends, Roosevelt spoke out against them, calling them muckrakers. His criticism ended the movement. But the term continues to be applied in a positive way to those who reveal (5) _____.



1. The word unprecedented in the passage is closest in meaning to
 - (A) unexpected
 - (B) unwelcome
 - (C) uneventful
 - (D) unexampled
2. According to paragraph 2, the Precambrian period was characterized by
 - (A) dinosaurs
 - (B) an abundance of fossils
 - (C) great genetic complexity in animals
 - (D) little variety of organisms
3. According to paragraph 3, why did the Cambrian explosion present a challenge to Darwin?
 - (A) He could find no evidence of it.
 - (B) It conflicted with his theory that evolution occurs gradually over a long period.
 - (C) It could not explain why there were no fossils before the explosion.
 - (D) He favored a theory of Intelligent Design.
4. According to the passage, all of the following are explanations of the Cambrian explosion EXCEPT:
 - (A) the increase of oxygen in the Earth's atmosphere
 - (B) movements of the Earth's crust
 - (C) massive extinction of animals due to global warming
 - (D) insufficient gene development in animals
5. The word fragile in the passage is closest in meaning to
 - (A) delicate
 - (B) sturdy
 - (C) large
 - (D) complex

Cambrian Explosion

All animal species found on Earth today can be traced to forms that first appeared about 570 to 530 million years ago. During that relatively short time, there occurred an unprecedented surge in the variety of life that is found in the fossil record. As this rapid evolution happened during the Cambrian period of geological history, it is known as the Cambrian explosion.

In the Precambrian period, before about 600 million years ago, evolution had produced few life forms, and they were simple in structure. But a sudden burst of complexity and variety appeared during the Cambrian explosion. The evidence lies in fossils, remains or impressions of living things preserved in rock or soil. The reason for such an acceleration in evolution continues to puzzle scientists today.

The Cambrian explosion posed a special problem for Charles Darwin, who, in 1859, published his explanation for how living things evolved. Darwin's theory proposes that the current diversity of life had emerged after a very long time. Natural selection needed a long period to work the small changes that produce the species we see today. That idea required that evolution occur gradually and that the fossil record show this gradual change. But the record in fact showed that the beings that arose during the Cambrian explosion could not be found in the Precambrian period. Darwin himself conceded that this missing fossil record could be used as an argument against the validity of his theory. Indeed, that argument is asserted today by those who believe in Creationism or Intelligent Design, the view that life was created at one time by a divine being.

Darwin got around this objection by suggesting that Precambrian evolution did occur but is not shown in the fossil record. In other words, there may not have been an explosion at all. Rather, the phenomenon may be explained



6. According to paragraph 5, which of the following will increase the chances of fossilization?
- (A) The organism was soft enough to be absorbed by the surrounding dirt.
 - (B) The organism was buried in a place where it will not decay.
 - (C) The organism had no natural predators.
 - (D) The organism lived before the Cambrian period.
7. Which of the following best expresses the essential information in the highlighted sentence? *Incorrect* answer choices change the meaning in important ways or leave out essential information.
- (A) Simple life forms are not ready to evolve.
 - (B) Complex forms cannot evolve any further.
 - (C) The fossil record reveals the genetic structure of the organism.
 - (D) Fossilized animals lack genetic complexity.
8. Directions: Complete the table below by matching FIVE of the seven answer choices that describe different periods. TWO of the answer choices will NOT be used.

Precambrian Period	Cambrian Period
.	.
.	.
.	.

Answer Choices

- (A) It occurred before 600 million years ago.
- (B) Fossil evidence can be found from this period.
- (C) There was little complexity and variety.
- (D) Shellfish appeared in this period.
- (E) There were high oxygen levels in the atmosphere.
- (F) Darwin explained this period fully.
- (G) Humans first appeared in this period.

by the fact that the Precambrian stages of evolution involved organisms that were too fragile to be preserved as fossils.

Not all organisms become fossilized. Two conditions must be met. First, the organisms must have parts that are hard enough to leave a trace in the rock and dirt in which they died. Precambrian life forms may not have developed such rigid parts, as did the shellfish that appeared in the Cambrian period. Second, the remains must be buried in a non-hostile environment, one in which the parts will not dissolve or decay. Thus many Precambrian specimens may have simply disappeared.

Nonetheless, most scientists agree that the Cambrian period witnessed greater and faster changes than before. They have offered several explanations for this speeding up of the evolutionary process, some external and some internal to the organisms themselves. One theory points to the increase of oxygen in Earth's atmosphere just before the Cambrian period. Low oxygen levels limit the capacity of animals to become more diverse and complex. Another external cause might have been radical movements of the Earth's crust, causing populations to be separated from one another and to evolve into different species.

Internal explanations include gene development; animals cannot evolve into different forms until they achieve a certain minimum complexity of genes. They need a sufficient genetic toolbox to generate more diverse forms. Perhaps it was not until the Cambrian period that this toolbox became effective.

9. The word coined in the passage is closest in meaning to
- (A) invented (B) spread
(C) minted (D) explained
10. Why does the author mention the New York Times Magazine in the passage?
- (A) To show the origin of the term Beat
(B) To identify when the term Beat Generation became widely known
(C) To name the *New York Times* as a Beat newspaper
(D) To give information about John Clellon Holmes
11. According to paragraph 3, all of the following were members of the original Beat group EXCEPT:
- (A) Jack Kerouac
(B) Lawrence Ferlinghetti
(C) Allen Ginsberg
(D) William S. Burroughs
12. The word acquitted in the passage is closest in meaning to
- (A) admitted (B) honored
(C) arrested (D) cleared
13. According to the passage, which of the following is true of *On the Road*?
- (A) It portrays the reckless lifestyle of American youngsters in the late 1950s.
(B) It was completed in a short time while Jack Kerouac was on drugs.
(C) It made Neal Cassady an important symbol of a libertine lifestyle.
(D) It is based on two characters taking a road trip around North America.

The Beat Movement

The Beat Generation is a label applied to a non-conformist social movement begun in New York City in the 1950s. Its message was carried by a group of writers who used stream-of-consciousness forms to express the insights and longings of those who rejected the mainstream values of the times. Although the Beat writers produced few lasting works, their attitudes inspired rock music artists and social movements of the 1960s and beyond.

The term beat was coined in 1946 by Herbert Huncke. He meant it to be a synonym for tired or down and out. In 1948, the word was used by Jack Kerouac in his phrase Beat Generation, by which he changed the reference to mean upbeat or beatific. The phrase finally entered public consciousness in 1952 with John Clellon Holmes's article in the New York Times Magazine called "This is the Beat Generation."

The original Beats were a group of friends from New York City who met in the mid-1940s. They included Jack Kerouac, Allen Ginsberg, Neal Cassady, and William S. Burroughs. That core group moved to San Francisco, where they were joined by the poet Lawrence Ferlinghetti and many others.

The first famous work of Beat literature was the long poem, *Howl*, by Allen Ginsberg. In 1955, Ginsberg read the poem aloud at a gallery in San Francisco, causing a stir with its portrayal of drug use and homosexuality. Its fame was fueled by the obscenity trial of Lawrence Ferlinghetti, who sold the poem in his bookstore. But Ferlinghetti was acquitted when the judge ruled that the work did have "redeeming social importance" and thus was not obscene.

The most successful Beat novelist was Jack Kerouac. In his best novel, *On the Road*, published in 1957, Kerouac described an automobile trip around the United States by a character based on himself, Sal Paradise, and



14. The word interrupt in the passage is closest in meaning to

(A) suspend (B) introduce
(C) express (D) exclaim

15. According to the passage, Beat literature can best be described as

(A) being banned by the courts
(B) having little lasting influence
(C) addressing personal feelings, often in rebellion against society
(D) expressing the conservative views of the 1950s

16. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not in the passage or are minor ideas in the passage.

The major writers of the Beat Movement created works that were very influential.

•
•
•

Answer Choices

- (A) The word beat originated in the *New York Times Magazine*.
(B) The first major work was *Howl* by Allen Ginsberg.
(C) Lawrence Ferlinghetti read *Howl* in his art gallery.
(D) Jack Kerouac was the leading Beat novelist.
(E) William S. Burroughs told of his addictions in *Naked Lunch*.
(F) Most members of the Beat Generation were drug addicts and homosexuals.

Dean Moriarty, based on Kerouac's friend Neal Cassady. The novel made Cassady into a cultural icon known for his irresponsible lifestyle, womanizing, amorality, and lust for life.

On the Road became known as much for how Kerouac wrote it as for its content. Kerouac allegedly was high on pills while he wrote it, and he typed it on a continuous scroll of paper so that he would not have to interrupt his thoughts by changing paper. He is said to have believed that "the first thought is the best thought," and he claimed that he never revised what he wrote. Though he said that he wrote the book in just three weeks, the truth is that he had been planning the novel for years and that he wrote several drafts.

Also influential was a novel by William S. Burroughs, *Naked Lunch*, which also survived an obscenity trial. In that work, Burroughs, who was a drug addict himself, tells of his drug-induced fantasies and his travels among addicts and criminals.

In the 1960s, those who followed Beat philosophy became known as hippies or yippies. Their culture was centered in San Francisco, which became a center of rock music, drug culture, and protest against the war in Vietnam.

The Beat Generation's lasting contribution to literature is that it encouraged writing on more personal topics, including those showing the unpleasant sides of human nature and of society. It validated expression through informal, conversational language and made profanity a permissible tool for revealing human feelings.

● Vocabulary Review

A Choose the word with the closest meaning to each highlighted word or phrase.

1. Not all members accepted the church's tenets.
 (A) hymns (B) doctrines (C) sermons (D) demands
2. The father and mother reached a compromise over the custody of their daughter.
 (A) argument (B) deadlock (C) agreement (D) controversy
3. He was the preeminent expert in his field.
 (A) leading (B) famous (C) domineering (D) veteran
4. The child always adhered to the teacher's rules.
 (A) questioned (B) heard (C) repeated (D) followed
5. At the news conference, he signaled the start of his election campaign.
 (A) revoked (B) announced (C) recorded (D) denied
6. The time constraints prevented the student from finishing the test on time.
 (A) periods (B) clocks (C) signals (D) limits
7. Divorce can have a pernicious effect on children.
 (A) harmful (B) helpful (C) lasting (D) liberating
8. Natural selection is the mechanism by which living things change over time.
 (A) impact (B) process (C) product (D) order
9. The offer of a free vacation was fraudulent.
 (A) tempting (B) unexpected (C) gratifying (D) fake
10. A shortage of funds led to the demise of the program.
 (A) revision (B) restriction (C) end (D) demonstration

B Match each word with the correct definition.

- | | | |
|-----------------|---|----------------------------------|
| 1. advantageous | • | • a. a point of view |
| 2. correspond | • | • b. a feature; a characteristic |
| 3. perspective | • | • c. disruption |
| 4. flourish | • | • d. an order; an arrangement |
| 5. trait | • | • e. beneficial |
| 6. exponent | • | • f. to rise above |
| 7. transcend | • | • g. an occurrence |
| 8. phenomenon | • | • h. to prosper; to thrive |
| 9. sequence | • | • i. a promoter; an advocate |
| 10. upheaval | • | • j. to communicate; to write |

Unit **2**

Reference

2 Reference

Overview

■ Introduction

Reference questions ask you to understand the relationship between a pronoun and the word to which the pronoun refers. Usually, personal pronouns such as *it*, *its*, *they*, *their*, and *them* are tested on the TOEFL® iBT. Sometimes other reference words such as *which*, *this*, *one*, *the former*, and *the latter* are also asked.

■ Question Types

1. The word _____ in the passage refers to
2. The phrase _____ in the passage refers to

■ Useful Tips

- The referent (the word to which a pronoun refers) usually appears before the pronoun in the same sentence or shows up in an earlier sentence. Sometimes, however, the referent might be found after the pronoun.
- Substitute your answer for the highlighted word or words in the passage.
- Make sure that your answer is the same number (singular or plural), gender (male or female), and case (first, second, or third person) as the highlighted pronoun.



Sample iBT Question

The word others in the passage refers to

- (A) characteristics
- (B) particles
- (C) waves
- (D) conditions

The Wave Theory of Light

In 1666, Isaac Newton proposed that light consists of particles traveling only straight lines. But experiments showed that light can travel away from a source in all directions as well as around corners. So Robert Hooke and Christian Huygens proposed an opposing theory that light is a wave moving up and down in all directions through some substance, like when a stone is dropped into water. Until the twentieth century, scientists did not know which theory was correct because light demonstrated characteristics of both particles and waves. Finally, in 1909, Albert Einstein reasoned that light has a double nature. It behaves like a particle under some conditions and like a wave under others. This insight led in the 1920s to an understanding of how electrons behave in the nucleus of an atom, creating a new field in physics known as quantum mechanics.

**Correct
Answer**

The highlighted word *others* corresponds to the phrase "some conditions" in the same sentence. So it can be easily noticed that *others* means other conditions. The correct answer is (D).

The French and Indian War

In the mid-1700s, the Ohio Country, the land west of the thirteen colonies, was disputed by both the British and French, each of whom had settled parts of that territory by constructing trading posts and forts. Both countries ignored the claims of the first inhabitants, the Native American Indians. In 1753, the British sent George Washington, then a 21-year-old major, to negotiate with the French, who refused Washington's demand that they abandon their ownership claims. In 1754, the British launched an attack on the French in what was the first battle of the French and Indian War. Both sides enlisted the aid of Indian tribes, who sought to preserve their own rights to the land. The war continued until 1763, when a treaty was signed that granted all of Canada to England, gave Louisiana to Spain, and limited France's rights to some islands in the Caribbean and near Newfoundland.

1. The phrase that territory in the passage refers to
 - (A) Ohio Country
 - (B) the thirteen colonies
 - (C) the British and French
 - (D) trading posts and forts
2. The word their in the passage refers to
 - (A) the first inhabitants
 - (B) the Native American Indians
 - (C) the British
 - (D) the French

Development Economics

Development economics is the branch of economics that focuses on the special economic problems faced by poor and undeveloped countries. Unlike classical economics, development economics studies the social and political factors that affect economic growth. It addresses the problem of Third World debt and the role of the World Bank and International Monetary Fund in continuing that debt with strict repayment rules. Scholars in the field have proposed that the best long-term solution is to excuse much of the debt. Debtor nations also must be helped to establish stable governments and self-sustaining economies. The goal is to help them become trading partners with creditor nations. An important means to that end is to encourage the growth of a strong middle class. Some ways to do that include guaranteeing education for all, allowing free trade, and providing medical care. Governments must allow for elected representatives and independent court systems.

3. The word it in the passage refers to
 - (A) classical economics
 - (B) development economics
 - (C) economic growth
 - (D) Third World debt
4. The word them in the passage refers to
 - (A) debtor nations
 - (B) stable governments
 - (C) self-sustaining economies
 - (D) creditor nations

The Panic of 1873

The years following the Civil War saw a boom in railroad construction. But excessive investment by speculators and overbuilding by the railroads caused chaotic, uncontrolled growth. In that era, the federal government lacked the power to curb the abuses of the private railroad owners. At the same time President Grant's restriction on the money supply made it harder for investors to borrow the funds needed, to finance the growth. The crisis culminated in the Panic of 1873, when the leading investment banking firm declared bankruptcy. That had a domino effect, causing railroads to close, unemployment to soar, and the New York Stock Exchange to plummet, ushering in a six-year depression. By 1877, wage cuts and poor working conditions prompted workers to go on strike. When a railroad strike stopped the trains from running, President Hayes sent in federal troops to end the work stoppage.

5. The phrase that era in the passage refer to

- (A) the years
- (B) the Civil War
- (C) a boom in railroad construction
- (D) chaotic, uncontrolled growth

6. The word that in the passage refers to

- (A) the crisis
- (B) the Panic of 1873
- (C) bankruptcy
- (D) a six-year depression

Lev Vygotsky's Theory of Zone of Proximal Development

Two competing theories have been advanced to explain how a child develops. One theory holds that a child is a product of his inherited traits—nature. The other maintains that a child is defined by environment—nurture. The Russian psychologist Lev Vygotsky reconciled these approaches by proposing the theory of Zone of Proximal Development (ZPD). ZPD represents the gap between a child's current, actual level of ability and his or her potential level. The baseline of ZPD is the child's ability to solve problems or perform tasks without help. The upper boundary of ZPD is the level the child can reach with aid from a teacher or adult. Vygotsky proposed that a child rises through the zone by a process called scaffolding, in which a mentor provides guided, step-by-step instruction. In that way, a child's ZPD constantly changes, as his independent capacity improves and his potential capacity increases.

7. The phrase the other in the passage refers to

- (A) a child
- (B) theory
- (C) nature
- (D) environment

8. The word which in the passage refers to

- (A) a child
- (B) the zone
- (C) scaffolding
- (D) instruction



A Read the following passage, and answer the questions.

The Mechanics of Flight

Time Limit: 3 min. 40 sec.

An airplane can fly because of its ability to coordinate four forces: lift, weight, thrust, and drag. The first force, and the one that enables a plane to take off and remain airborne, is lift. Lift is explained by Newton's third law of motion: every action produces an equal and opposite reaction. As an airplane wing traverses the air, its angle can be adjusted to push down on the air flowing past. According to Newton's law, that downward push produces an equivalent upward push, creating an upward force, or lift, that makes the plane rise.

Lift also can be understood by using Bernoulli's Principle, which states that a faster moving fluid, like air, has lower pressure than a slower moving one. Because the top side of an airplane wing is curved, air has a greater distance to cover than air passing by the flat bottom side of the wing. But the air on both sides reaches the rear of the wing at the same time, meaning that the air passing the top side moves faster than it does past the flat bottom side, lowering the pressure on the top and causing the wing to elevate.

A second force acting on a plane is weight. Weight offsets lift, moving the plane in the opposite direction. A plane cannot fly if its weight is greater than its lift. The challenge for airplane designers is to build a wing strong enough to lift the plane and yet streamlined enough to fly at high speeds for long distances.

Another force is thrust, the force that propels a plane forward, which is supplied either by a propeller or a jet engine. Without sufficient thrust, air would stop moving over and under the wings, negating the lift and causing the plane to fall.

Finally, airplanes must overcome the force of drag. When a plane moves through the air, it pushes air out of its way, creating friction when the metal contacts the air. That friction becomes the drag, which tends to slow down the plane. To counteract drag, high-speed planes and missiles must have thin wings, which minimize drag, while slow-moving planes, like crop dusters, can have thick wings because lift is more important than drag.

All four forces must be precisely managed during a flight. The pilot manipulates his controls when he wants to take off, alter direction and speed, or land. The plane accelerates when thrust is greater than drag and climbs when lift is greater than weight. It slows when the pilot reduces thrust and increases drag by lowering landing gear or raising the wing flaps. By retracting landing gear and flaps, the pilot can make the plane climb or increase its speed.

- coordinate [v] to harmonize • traverse [v] to pass through; to move across • equivalent [a] equal; corresponding
- state [v] to say; to assert • offset [v] to counterbalance; to counteract; to neutralize • counteract [v] to neutralize;
- to offset • precisely [ad] exactly • manipulate [v] to control; to handle • accelerate [v] to speed up • reduce [v]
- to decrease • gear [n] equipment • retract [v] to withdraw

General Comprehension

1. According to paragraph 1, Newton's third law describes which force?
 - (A) weight
 - (B) drag
 - (C) thrust
 - (D) lift
2. According to the passage, drag is caused by friction from
 - (A) metal moving through the air
 - (B) the spinning propeller
 - (C) thrust
 - (D) downward pressure

On the TOEFL Test

3. The word one in the passage refers to
 - (A) lift
 - (B) fluid
 - (C) air
 - (D) pressure
4. The word it in the passage refers to
 - (A) speed
 - (B) plane
 - (C) thrust
 - (D) lift

The Forces of Airplane Flight

- Lift - enables a plane to take off
 - Newton's third law of motion → a downward push on the air produces an upward force
 - (1) _____ → a wing elevates due to low pressure above it
- Weight - (2) _____, forcing a plane down → requires very strong wings
- Thrust - (3) _____
 - keeps the plane in the air by making air flowing over and under the wings
- Drag - slows down a plane due to the (4) _____
 - requires thin wings to ensure speed



B Read the following passage, and answer the questions.

Furniture in Colonial America

Time Limit: 3 min. 40 sec.

Arriving in the New World during the 1600s, early American settlers had little resources for or interest in elaborate furniture. They were satisfied with a few benches, a table, and some mattresses on the floor. After they overcame some basic survival problems, such as growing food and dealing with sometimes hostile Indians, they turned their attention to making their homes more comfortable. Living in the midst of uncut forests of maple, cherry, walnut, and oak, the colonists were able to use the best quality wood for their furniture. Indeed, the use of that prime wood is what makes furniture from the colonial period so desirable to antique collectors today.

Maple, for example, is strong and long-lasting, and it can be worked without being damaged. And because it is hard, maple wood can be brought to a highly polished finish. Cherry is not as hard as maple, but it has a fine grain and smooth feel and is also easy to work with.

Early American furniture often was handmade by the settlers themselves. Those settlers who did their own work excelled in carving. One of the most popular forms of carving was the maple-leaf theme. Soon skilled cabinetmakers came from Europe, and they copied the English custom of using heavy pieces with straight lines and little ornamentation. Designs were kept simple out of necessity since colonial homes were small with low ceilings and tiny windows. Stools were more practical than chairs. Tabletops were solid timber boards with square legs made from logs.

Colonial home life was centered around the fireplace, which provided the only source of warmth in the bitterly cold winters. Furniture took shapes such as high-backed chairs and baby cradles with hoods that would serve as shields against the cold.

The leading stylistic influence during the 1700s was the work of Thomas Chippendale, an English furniture maker. Chippendale published a book in 1754 that introduced his highly original work to America. He invented many new designs, including bookcases with doors, high chests of drawers, kettle stands, and drop-leaf tables. American designers such as William Savery in Philadelphia adopted the Chippendale style and used it to make the Chippendale highboy, a chest of drawers with richly decorated trim.

The craftsmanship of American furniture makers is considered to be superior to that of European artisans of the time, another factor making these pieces much in demand as antiques. But the demand exceeds supply, making early American furniture expensive and hard to find. To satisfy some of the demand, manufacturers make reproductions using the same woods and techniques as the originals. Early American furniture remains a popular choice among homeowners in the twenty-first century.

- elaborate (a) fancy; decorated
- hostile (a) unfriendly; aggressive
- antique (n) old furniture
- polished (a) glossy; refined
- excel (v) to perform at a high level
- ornamentation (n) a decoration
- shield (n) protection; a guard
- original (a) creative
- adopt (v) to use; to employ
- decorate (v) to adorn; to ornament
- superior (a) better
- exceed (v) to surpass; to outdo

General Comprehension

1. According to paragraph 1, why is colonial furniture popular today?
 - (A) It is very comfortable.
 - (B) It is inexpensive.
 - (C) It has unusual designs.
 - (D) It is made of the best wood.
2. According to the passage, furniture designs in colonial America were simple because
 - (A) the heavy wood was difficult to work with
 - (B) homes were small
 - (C) American furniture makers lacked the skill for more complicated designs
 - (D) Chippendale favored plain designs

On the TOEFL Test

3. The word their in the passage refers to
 - (A) early American settlers
 - (B) survival problems
 - (C) Indians
 - (D) antique collectors
4. The word that in the passage refers to
 - (A) Chippendale style
 - (B) Chippendale highboy
 - (C) craftsmanship
 - (D) another factor

Furniture in Colonial America

- Early Americans did not need fancy furniture – just had simple furnishings
 - needed to focus on (1) _____
- Kinds of wood – maple → strong and (2) _____
 - cherry → smooth and easy to work with
- Most settlers made their own furniture
- Some cabinetmakers came from England
- (3) _____ – English furniture maker
 - published book on work in America
 - had many new designs
- American furniture workers developed good reputation – considered better than (4) _____
 - are popular items today

C Read the following passage, and answer the questions.

The Renminbi

Time Limit: 3 min. 40 sec.

The official currency of the People's Republic of China is the renminbi, which means the "people's currency." Its common abbreviation is RMB. The base unit of the RMB is the *yuan*, which in Chinese means "round," a reflection of the traditionally round shape of Chinese coins. Each *yuan* is divided into 10 *jiao*, and each *jiao* into 10 *fen*. So 6.35 *yuan* would be referred to as 6 *yuan*, 3 *jiao*, and 5 *fen*.

The largest denomination of the renminbi is the 100-*yuan* note, and the smallest is the one-*fen* coin or note. As prices increase, the *fen* and *jiao* are becoming increasingly unnecessary. Because sales tax is included in the listed prices for retail products, prices are stated in whole numbers, such as 10 *yuan* instead of 9.95 *yuan*.

Renminbi notes contain words in several languages. The words "China People's Bank" and the denomination are given not only in Chinese but also in Mongol, Uyghur, Zhuang, and Tibetan.

The RMB was first issued in 1949 just before the communists took over mainland China. Because of hyperinflation, the communist government decreed a reevaluation of the RMB, and reevaluations have occurred many times since then. During the period when the communist government placed tight restrictions on the economy, the value of the currency was set unrealistically low relative to western currencies. When the economy opened up in 1978, a dual track system was instituted. The RMB was used domestically while foreign transactions were conducted with foreign exchange certificates. The artificially low domestic exchange rate prompted a black market in currency at rates that more closely reflected true market values.

In the late 1980s and early 1990s, the People's Bank of China abolished the dual track system and allowed the exchange rate to rise to realistic levels. But full convertibility of RMB and foreign currency has not yet been attained. Though convertibility is a prominent goal of the government, the Asian Financial Crisis of 1998 raised questions as to whether the Chinese financial system could handle an influx of foreign currency.

Five series of RMB banknotes and coins were issued between 1948 and 2005. The first three series are no longer legal tender, but the fourth and fifth series are still used. The picture of Mao Zedong, the leader of the 1949 Communist revolution, along with various kinds of flowers, adorns all banknotes still in circulation.

The fifth series incorporated new security features designed to prevent counterfeiting. Most banknotes have a metallic strip, some numbers change colors when viewed from certain angles, fiber threads have been removed, and raised-ink printing has been used.

- currency (n) money; a medium of exchange • reflection (n) an image • denomination (n) the name of a unit of paper money • decree (v) to order • dual (a) twofold; double • institute (v) to start; to introduce • prompt (v) to give rise to; to cause • black market (n) the illegal selling of goods or currency • attain (v) to achieve • prominent (a) obvious; noticeable • adorn (v) to decorate • incorporate (v) to add

General Comprehension

1. According to the passage, how many *jiao* are in 6.35 *yuan*?
 - (A) 3
 - (B) 10
 - (C) 6
 - (D) 5
2. According to paragraph 4, what effect did the dual track system have?
 - (A) It resulted in tight restrictions on the economy.
 - (B) It caused an influx of foreign currency.
 - (C) It permitted frequent reevaluations of the RMB.
 - (D) It led to a black market in domestic exchange rates.

On the TOEFL Test

3. The word its in the passage refers to
 - (A) the official currency
 - (B) China
 - (C) the renminbi
 - (D) base unit
4. The word then in the passage refers to
 - (A) 1949
 - (B) 1978
 - (C) 1998
 - (D) 2005

Renminbi

- Official currency of China
 - *Yuan* (base unit) → 1 *yuan* = 10 *jiao*
→ 1 *jiao* = 10 *fen*
- Largest bill is (1) _____
- Smallest coin is 1 *fen*
- Renminbi has been reevaluated multiple times
- China used (2) _____ for transactions
 - use renminbi for domestic exchanges
 - use foreign currency for foreign exchanges
- Abolished dual-track system in (3) _____
- New series of currency has (4) _____

D Read the following passage, and answer the questions.

Hydrogen Technology

Time Limit: 3 min. 40 sec.

An economy dependent on fossil fuel for energy has an uncertain future. Oil, coal, and natural gas supplies are not replaceable once consumed. The burning of fossil fuels produces emissions that pollute the air all over the world, not just where the fuel is burned.

One solution is the accelerated development of hydrogen technology, which avoids some of the problems that accompany fossil fuels. First, hydrogen reduces pollution. Hydrogen combined with oxygen in a fuel cell produces electric energy, which can be used to power engines and produce heat to warm buildings. The key benefit of hydrogen and oxygen combinations is that no greenhouse gases or other pollutants are produced. The only byproducts are heat and water.

A second advantage of hydrogen-based energy is that it can be produced locally as opposed to having to be imported from other countries, and it can be acquired from multiple sources, such as methane, gasoline, biomass, coal, or water. At but water, however, cause their own forms of pollution.

Third, when the hydrogen source is water, the result is a sustainable production system. Water can be separated into hydrogen and oxygen by the process of electrolysis, in which an electric current is passed through water. That electric current can be produced from renewable energy sources like wind, solar, and tidal energy, sources which are not dependent on oil and are nonpolluting. A disadvantage of those sources, however, is that they are not always available. Wind may die down, the sun may be obscured by clouds, and tidal power has not yet been fully developed. Hydrogen energy offers an answer in that, once the hydrogen is produced through electrolysis, it can be stored in a fuel cell to produce enough electricity to supply power during the periods that the renewable sources are not producing.

Besides electrolysis, hydrogen production can also be achieved by a chemical reaction in aluminum waste. That process yields hydrogen and alumina, which can be recycled to make aluminum. A Canadian company holds the patent on that process.

Critics of hydrogen technology warn of the dangers inherent in hydrogen, which is a highly combustible gas. New and costly technologies will have to be invented in order to ensure the safe handling of hydrogen during its production. Hydrogen-powered cars will be unaffordable for many years. By one estimate, the cost of a fuel cell for such a vehicle in 2012 will be \$100,000.

In 2003, the U.S. government announced a \$1.2 billion Hydrogen Fuel Initiative to reverse American's dependence on foreign oil by investing in hydrogen-powered fuel cells. Those cells would replace internal combustion engines in cars and trucks. Congress has appropriated funds to pay for this initiative.

- emission (n) release; discharge • accelerated (a) speeded up; quickened • accompany (v) to come with; to follow
- as opposed to (phr) rather than • acquire (v) to obtain • sustainable (a) supportable; endurable • obscure (v) to conceal; to hide
- yield (v) to produce • recycle (v) to reuse; to use again • inherent (a) intrinsic; natural
- combustible (a) flammable • ensure (v) to make certain; to confirm • appropriate (v) to approve; to assign

General Comprehension

1. According to the passage, one advantage of hydrogen technology is that
 - (A) it is inexpensive
 - (B) it can be used to power cars by 2012
 - (C) it does not have to be imported
 - (D) it is not combustible
2. According to the passage, a disadvantage of hydrogen technology is that
 - (A) its patent is held by Canada
 - (B) it will be too expensive for many years
 - (C) it cannot be stored in a fuel cell
 - (D) it causes almost as much pollution as fossil fuels

On the TOEFL Test

3. The word all in the passage refers to
 - (A) hydrogen-based energy
 - (B) countries
 - (C) multiple sources
 - (D) biomass
4. The word they in the passage refers to
 - (A) hydrogen and oxygen
 - (B) renewable energy sources
 - (C) clouds
 - (D) periods

Hydrogen Technology

- Is different from fossil fuels
 - reduces pollution
 - does not produce (1) _____ or other pollutants
- Can be produced (2) _____
 - does not need to import from other countries
 - comes from many different sources → methane, gasoline, biomass, coal, or water
- Can be (3) _____
 - wind, solar, and tidal energy
- Is somewhat dangerous
 - highly (4) _____
 - very expensive

E Read the following passage, and answer the questions.

The Rise of the Roman Empire

Time Limit: 3 min. 40 sec.

Rome was established about 1000 B.C. In 509 B.C. the Roman Republic was constituted after the citizens of Rome overthrew the ruling Etruscans. Throughout the next 200 years, Rome expanded over most of the Italian peninsula, offering citizenship to the cities it conquered and demanding in exchange that the cities supply Rome with more soldiers for its army. By 275 B.C. Rome dominated the Italian peninsula.

Rome's crusade toward becoming an empire occurred during the last 200 years B.C. Rome's principal competitor was Carthage, a sea power on the northern coast of Africa against whom Rome battled in a series of three wars called the Punic Wars. Rome ultimately prevailed, gaining control of the coasts of Africa and Spain and mastery of the shipping and trade routes of the Mediterranean Sea. Rome also expanded toward the east, acquiring Greece, Macedonia, and Turkey by 133 B.C.

Two reasons explain Rome's success in overcoming its enemies. Rome's alliances with cities in Italy provided a source of manpower with which it could maintain its military might, and Rome established efficient governmental institutions that allowed it to govern effectively, allowing Romans to develop pride and certainty of the justice of their expansionist goals.

The Republic began to falter from within, as the victories abroad were not matched by successes in supporting its own citizens at home. Rich Romans called patricians profited while the poor and commoners, called plebians, shared in none of the newly found wealth. Conflicts at home and abroad led to internal military conflicts, resulting in a series of dictators who attempted to quell the chaos, including Julius Caesar, who defeated Gaul in 57 B.C. and declared himself sole Roman leader in 45 B.C.

A group who favored the restoration of the Republic assassinated Caesar in 44 B.C. After years of internal battles for control of the Rome, in 27 B.C., Caesar's adopted son Octavian became the first Roman Emperor, taking the name of Augustus, which means exalted in Latin. His assumption of power ushered in 200 years of peace known as the *Pax Romana*.

Augustus fortified defenses along the borders of the Roman Empire and maintained control of the foreign provinces, facilitated by a strong civil service that was staffed by administrators who governed effectively. During his reign, called by historians the Augustan Age, art and literature flourished. He ruled until A.D. 14, succeeded by a series of able emperors who presided over the height of the empire's power. Beginning around 160, however, Rome was under continual attack by Germanic tribes from the north and the Parthians from the east. The enormous size of the empire made it increasingly difficult to defend, setting the stage for its eventual collapse in 476.

- constitute (v) to create; to establish • overthrow (v) to topple; to overturn • dominate (v) to rule; to govern; to control • prevail (v) to win; to triumph • alliance (n) an agreement; a partnership • falter (v) to fail; to stumble
- quell (v) to subdue; to suppress • assassinate (v) to kill • exalt (v) to praise; to acclaim • internal (a) domestic
- fortify (v) to strengthen; to reinforce • facilitate (v) to help; to aid • flourish (v) to prosper; to thrive • preside (v) to direct; to rule

General Comprehension

1. According to paragraph 1, Rome's army grew because
 - (A) it overthrew the Etruscans
 - (B) it dominated the Italian peninsula
 - (C) it demanded soldiers in return for citizenship
 - (D) it was founded in 1000 B.C.
2. According to the passage, the Roman Republic failed because
 - (A) it could not support its own citizens
 - (B) it could not defend itself against Carthage
 - (C) Julius Caesar could not defeat Gaul
 - (D) it expanded too fast

On the TOEFL Test

3. The word whom in the passage refers to
 - (A) Carthage
 - (B) Africa
 - (C) Spain
 - (D) Greece
4. The word their in the passage refers to
 - (A) its enemies
 - (B) cities in Italy
 - (C) government institutions
 - (D) Romans

The Rise of the Roman Empire

- Rome established in 1000 B.C.
 - becomes (1) _____
 - begins to dominate the Italian peninsula
- Rival was Carthage
 - fought (2) _____ against it
 - finally defeated the Carthaginians
- Republic begins to falter
 - did not support its own citizens → rich people succeeded, but poor did not
- Caesar is assassinated in (3) _____
- Octavian becomes the Emperor Augustus
- Roman Empire is successful but ultimately falls in (4) _____



F Read the following passage, and answer the questions.

John Maynard Keynes

Time Limit: 3 min. 40 sec.

Before the Great Depression in the 1930s, classical economics preached a theory of *laissez faire*. That theory was that the government should take no role in the economy. It predicted that unregulated market forces would steer the economy in the direction of full employment, high wages, and low inflation. But the crash that began in 1929 demonstrated the inadequacy of such a hands-off approach. It was the British economist, John Maynard Keynes, who overturned classical theories on how the economic world works. His innovation was to stress the role of governmental control of the economy. That perspective led to a new field called macroeconomics, which looks at the total performance of a nation's economy.

Before Keynes, economic performance was measured on a local level, focusing on the behavior of individual consumers and companies. Keynes showed how such a narrow focus ignores the often more influential role of total spending, investment, and government regulations.

In his 1936 masterpiece, *General Theory of Employment, Interest, and Money*, Keynes analyzed the causes of depressions. He concluded that governments should take an active role to avoid them. His premise was that the rate of economic growth depends on aggregate demand for goods, which is measured by the total spending by consumers, businesses, and government. When consumers save more and spend less, business income declines, prompting companies to reduce their own spending and investment. This reduction in total spending can sink an economy into a depression. An increase in spending is needed to trigger a recovery.

To prevent depressions, Keynes suggested that governments should spend more money and lower interest rates. Businesses and consumers would find it easier to borrow money, which in turn would allow them to spend more. The resulting heightened demand for consumer goods would encourage investment and increase employment.

Another governmental policy to stimulate demand and increase employment, Keynes suggested, was for the government to hire people to work on public-works projects. That idea is considered to be a philosophical source of President Franklin Roosevelt's New Deal. A key element of that program was the federally funded construction and cultural programs that put depression-scarred Americans back to work.

Keynesian economics remains the governing policy of modern-day economics. But some of Keynes's assumptions have proved to be wrong. He assumed that labor productivity decreases as employment expands. But empirical findings show that the opposite relationship is true. He also wrongly predicted that real wages decrease as employment increases. And he thought that inflation would occur only near full employment. But history has seen that inflation sometimes can rise even in times of high unemployment, a condition known as stagflation.

• preach (v) to teach; to promote • inadequacy (n) insufficiency • overturn (v) to cancel; to invalidate • premise (n) an assumption • aggregate (n) a total • trigger (v) to cause; to prompt • sink (v) to submerge; to lower • stimulate (v) to provoke; to activate • empirical (a) experiential; observed

General Comprehension

1. According to paragraph 1, the event that exposed the weakness of the *laissez faire* theory was
 - (A) the invention of macroeconomics
 - (B) the work of John Maynard Keynes
 - (C) the prosperity of the 1920s
 - (D) the Great Depression
2. According to the passage, Keynes believed that depressions could be avoided by
 - (A) increasing government spending
 - (B) raising interest rates
 - (C) lowering taxes
 - (D) decreasing government regulation

On the TOEFL Test

3. The word which in the passage refers to
 - (A) his premise
 - (B) rate of economic growth
 - (C) aggregate demand
 - (D) goods
4. The word if in the passage refers to
 - (A) prevent depressions
 - (B) spend more money
 - (C) lower interest rates
 - (D) borrow money

John Maynard Keynes

- Changed the way people looked at economics
 - introduced (1) _____ → looks at nation's overall economy
- Wrote *General Theory of Employment, Interest, and Money*
 - looked at causes of depressions
 - thought governments should be involved in economy
 - spend (2) _____
 - lower interest rates
 - hire people on (3) _____
- Keynesian economics
 - many governments use today → President Roosevelt's (4) _____
 - has some wrong ideas

● Building Summary Skills

The following summaries are based on the passages you worked on earlier. Complete each of them by filling in the blanks with suitable words or phrases.

1. The Mechanics of Flight

moves the plane forward	take off and stay in the air	four forces
slows the plane down	keep the plane in flight	

(1) _____ combine to make airplane flight possible. Lift enables a plane to (2) _____. Weight offsets lift and must be overcome by lift in order to (3) _____. Thrust (4) _____. Drag is air resistance that (5) _____. The pilot must precisely manage each force in order to take off, change direction and speed, or land.

2. Furniture in Colonial America

the small colonial houses	Thomas Chippendale	early American settlers
expensive and in great demand	the finest quality wood	

(1) _____ had to focus on survival, leaving no time for furniture design. As they prospered, they turned to making plainly designed furniture that was suited to their small homes. Colonial furniture is valued today because it was made from (2) _____. It was handmade with simple designs that would fit in (3) _____. Many artisans were influenced by the work of an English furniture maker, (4) _____. Today colonial furniture is (5) _____, creating a market in reproductions.

3. The Renminbi

the <i>yuan</i>	metallic strips and raised-ink printing	1949
the communists	the People's Republic of China	

The *renminbi* is the official currency of (1) _____. It was first issued in (2) _____ and has been reevaluated many times since (3) _____ took control. It is not yet fully convertible with foreign currency. The latest series of banknotes have many security features, such as (4) _____. The base unit is (5) _____, which is equal to 10 *jiao*, which in turn equals 10 *fen*.

4. Hydrogen Technology

fuel cells	hydrogen-powered fuel cells	fossil fuels
hydrogen technology	less pollution	

Hydrogen technology may be a good replacement for ⁽¹⁾ _____ as a source of energy. It causes ⁽²⁾ _____, can be produced locally, and can be stored in ⁽³⁾ _____. Sources of hydrogen include water, methane, gasoline, coal, or wind and solar energy, but ⁽⁴⁾ _____ is expensive and will not be affordable for many years. In 2003, the U.S. government announced a plan to invest in ⁽⁵⁾ _____.

5. The Rise of the Roman Empire

476	the Mediterranean Sea	an efficient system of government
27 B.C.	the Roman Republic	

⁽¹⁾ _____ was born in 509 B.C. It extended its control over the Italian peninsula and eventually the major powers bordering ⁽²⁾ _____. Its initial success was due to its ability to use the cities it conquered as a source of manpower for its armies. And it held onto power by establishing ⁽³⁾ _____. But it declined when it was unable to govern its own citizens. The unrest led to the start of the Roman Empire in ⁽⁴⁾ _____, with Augustus as the first emperor. The empire lasted until ⁽⁵⁾ _____.

6. John Maynard Keynes

the Great Depression	Franklin Roosevelt	take more active roles
lower unemployment	increasing spending and lowering interest rates	

John Maynard Keynes proposed that governments should ⁽¹⁾ _____ in the economy. He believed that governments could avoid depressions by ⁽²⁾ _____. He also favored public-works projects to ⁽³⁾ _____. President ⁽⁴⁾ _____ used that strategy to help America out of ⁽⁵⁾ _____. Keynes's belief that inflation occurs only in times of high employment has been proved incorrect.

1. The word accounts in the passage is closest in meaning to
 - (A) performances
 - (B) records
 - (C) explanations
 - (D) occurrences
2. According to paragraph 3, the *New England Courant* was important because
 - (A) it was the first newspaper to include political and social commentary
 - (B) it was edited by Benjamin Franklin's older brother
 - (C) it contained news from London
 - (D) it included letters from other colonies
3. The word many in the passage refers to
 - (A) friends
 - (B) satirical essays
 - (C) current events
 - (D) readers
4. According to paragraph 6, all of the following are true of apprentices EXCEPT:
 - (A) They were male.
 - (B) They sometimes ran away.
 - (C) They became apprentices at age ten.
 - (D) They were apprentices until age twenty-one.
5. The word them in the passage refers to
 - (A) owners
 - (B) apprentices
 - (C) newspapers
 - (D) ads
6. Which of the following best expresses the essential information in the highlighted sentence? *Incorrect* answer choices change the meaning in important ways or leave out essential information.
 - (A) Newspapers were a driving force in winning support for the Constitution
 - (B) Newspapers played an important role in expressing the colonists' desire for independence.
 - (C) The Declaration of Independence was announced in newspapers.
 - (D) The British did not permit freedom of the press.

Newspapers in the American Colonies

The first newspaper in the American colonies was published in Boston in 1690. It was called *Publick Occurrences, Both Foreign and Domestick*. But it was closed down by the British after just one issue. Fourteen years passed before the second newspaper appeared, a weekly paper called the *Boston News-Letter*.

Early newspapers contained little more than items taken from other papers, especially those from London. As a result, most of the "news" was many months old since editors had to wait for ship captains to bring papers from Europe. Those captains also were occasional sources of news as they could provide eyewitness accounts of natural disasters or secondhand descriptions of faraway events. Some news was also received from letter writers around the colonies, who would describe events occurring in their regions.

James Franklin was the first editor to see the newspaper as a means of expressing social and political commentary. Franklin, who was the older brother of Benjamin Franklin, published the *New England Courant*. He and his friends wrote humorous and satirical essays about current events and local society, angering many but turning newspapers into entertainment.

But editors in the early eighteenth century did not yet enjoy freedom of the press. For example, when James Franklin printed an editorial criticizing the British government, he was put in prison. When he was released, he was banned from publishing any more newspapers. But his thirteen-year-old brother, Benjamin, took over production and delivery of the paper and soon became its editor in his brother's place.

Franklin left to run his own newspaper in Philadelphia, *The Pennsylvania Gazette*, which Franklin bought in 1729. Franklin used the paper as an outlet for his wit and satire, creating fictitious characters offering their funny and



7. The author mentions the Federalist Papers in paragraph 8 in order to

- (A) give an example of how newspapers were used to influence public opinion
- (B) show where the Declaration of Independence was published
- (C) describe articles published in the *Philadelphia Evening Post*
- (D) note a pamphlet that appeared in a newspaper

8. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not in the passage or are minor ideas in the passage.

Newspapers in colonial America grew slowly but became very influential in society.

-
-
-

Answer Choices

- (A) The second newspaper appeared fourteen years after the first.
- (B) Newspapers received letters from around the colonies.
- (C) Newspapers became popular when they began to print social and political commentary.
- (D) The newspaper industry was sustained by an apprentice system.
- (E) Wood printing presses could make 200 impressions per hour.
- (F) Newspapers were crucial in supporting the move toward independence from Britain.

sometimes cutting observations about daily life.

In colonial times, a newspaper office usually consisted of just two people: the owner and an apprentice. The apprentice would live and work with the owner in order to learn the trade. The apprenticeship usually lasted from ages twelve to twenty-one. Owners often considered their apprentices to be their personal property and treated them cruelly. Newspapers of the time were filled with ads offering rewards for runaway apprentices. When an apprentice turned twenty-one, and if he had saved enough money, he would open his own newspaper office. No females were allowed to be apprentices.

Printing presses had not improved much since their invention by Gutenberg in 1440. Newspapers in the colonies were printed on wood presses with a lever-operated screw to lower the platen to the bed of the press. An apprentice would apply ink to the wooden type with a wool ball on a stick. Each lowering of the platen had to be performed manually, with a top speed of about 200 impressions per hour.

By the middle of the 1750s, newspapers were starting to play an important role in giving voice to the growing antagonism toward British rule and in stirring up the drive toward independence. Opinions that formerly were distributed in pamphlets began to find a home in newspapers. The Declaration of Independence, signed on July 4, 1776, appeared two days later in the *Philadelphia Evening Post*. Some of the leaders of the Constitutional Convention in 1789, James Madison, Alexander Hamilton, and John Jay, attempted to win public support for their views by publishing the Federalist Papers in two newspapers.

9. The word nomadic in the passage is closest in meaning to
- (A) primitive
 (B) searching
 (C) industrious
 (D) wandering
10. According to paragraph 1, why does pottery provide information about the lives of ancient Indians?
- (A) Pottery displays pictures of Indians' houses.
 (B) The Indians left no written history.
 (C) Pottery was used to carry agricultural products.
 (D) Pottery does not decay over time.
11. The word they in the passage refers to
- (A) pottery remnants
 (B) clues
 (C) ancient Indians
 (D) artifacts
12. Why does the author mention cloth baskets in the passage?
- (A) To show that they had discovered weaving
 (B) To tell how they carried mud
 (C) To explain how the Indians discovered pottery
 (D) To note how they cooked corn
13. Look at the four squares [■] that indicate where the following sentence could be added to the passage.
- Scholars have proposed many explanations.
 Where would the sentence best fit?

The Pottery of Ancient Indians in Arizona

The American Indians of what today is the state of Arizona first arrived in North America about 25,000 B.C. They came from Asia, crossing the Bering Strait in Alaska and gradually moving down the coast to modern-day California, Arizona, and Mexico. The tribes were nomadic until about 2,000 years ago, when they began to use agriculture. Once they settled in one place, they developed the skill of making pottery. Pottery remnants provide important clues to the age and lifestyle of ancient Indians because they are often the only artifacts still intact. Fired clay does not deteriorate over time.

We do not know for sure how or why Indians discovered pottery. **A** The most accepted theory is that the discovery was an accident. **B** Indians covered their woven baskets with mud clay. **C** They would put the baskets over the fire to dry the corn and other grains that were inside. **D** The heating process caused the clay to harden. Thus the Indians realized that they could mold clay into shapes and make them permanent by heating them over fire and then cooling them. Support for this theory can be found in the texture marks on many ancient pots, indicating that they may have been molded around cloth baskets.

The earliest pottery was used for chores, with no attempt to make them works of art. The rise of agriculture created a need for vessels to store seeds and grains and to carry food. They also were used as cooking pots, as they could not be destroyed by exposure to fire. These early pieces were plain and unsymmetrical. Eventually, however, the ancient Indians of Arizona began to decorate their pottery with symbols and artwork.

The meaning of the decorative designs is not always clear to modern scholars. Indians



14. The word them in the passage refers to

- (A) designs
- (B) scholars
- (C) Indians
- (D) traditions

15. According to the passage, all of the following are true about the ancient Indians of Arizona EXCEPT:

- (A) They derived paint from plants and rocks.
- (B) They used a potter's wheel.
- (C) They came to Arizona from Asia.
- (D) The Anasazi tribe used black-and-white designs.

16. Directions: Complete the table below by matching FIVE of the seven answers below that describe functions of pottery. TWO of the answer choices will NOT be used.

Pottery as art	Pottery as tools
.	.
.	.
.	.

Answer Choices

- (A) Pots were used to store seeds.
- (B) Some subjects were animals.
- (C) Pottery was discovered when clay was heated.
- (D) Religious ceremonies were shown.
- (E) People carried food in pottery containers.
- (F) Indians used the coiling and pinching method.
- (G) Some works displayed history and traditions.

were not willing to explain them to outsiders. We do know that the artwork reflected Indian traditions, history, rituals, and legends. Common subjects include birds, deer, buffalo, humans, and gods. Pottery was commonly used during religious ceremonies and burials.

Though the Indians had discovered the benefits of the wheel, which they used for transportation and tools, they did not create a potter's wheel. They crafted their pots by the painstaking method of coiling and pinching. One theory is that they intentionally did not use a wheel because they preferred the experience of doing the work by hand, a process more in tune with nature.

The Arizona Indians obtained their clay from secret ancestral sources. Completed pots were smoothed and then painted with pigments made from boiled plants or finely ground rocks. Brushes were made from the chewed ends of twigs.

One of the first Arizona tribes to embrace pottery-making was the Hohokam, beginning in about 200 A.D. Their work is known by its red and buff coloring, geometric shapes, and abstract pictures of snakes, fish, and ceremonial dancing. Another tribe, the Anasazi, used black-and-white designs. Their style is recognized by their symmetry, distinctive forms, and mathematical repetition of features. The Anasazi pottery tradition lasted from 400 to 1500.

Around 950, the Mimbres Indians adopted an unusual, less realistic style, representing a significant change in the artistic methods of the Arizona tribes. The Mimbres would combine human and animal figures into one in order to describe their myths, legends, and history, often resulting in humorous scenes that scholars still cannot decipher.

Vocabulary Review

A Choose the word with the closest meaning to each highlighted word or phrase.

1. The play begins precisely at 8:00.
 (A) approximately (B) usually (C) exactly (D) hopefully
2. You should wear a hat to shield you from the sun.
 (A) protect (B) distract (C) uncover (D) distance
3. She attained the highest grade in the class.
 (A) approached (B) achieved (C) desired (D) wrote
4. The moon was obscured by the clouds.
 (A) revealed (B) outlined (C) hidden (D) submerged
5. Hydrogen is a highly combustible gas.
 (A) reactive (B) fluid (C) motionless (D) flammable
6. Research into hydrogen technology was facilitated by money from Congress.
 (A) aided (B) terminated (C) followed (D) preceded
7. After starting out in the lead, he began to falter near the finish line.
 (A) sicken (B) slow down (C) celebrate (D) accelerate
8. He had his own inadequacy to blame for being fired.
 (A) poverty (B) personality (C) appearance (D) insufficiency
9. We collected an aggregate amount of \$200 for a retirement gift.
 (A) insufficient (B) unexpected (C) total (D) ample
10. The president decreed that no more money would be spent on missile defense.
 (A) wished (B) denied (C) ordered (D) argued

B Match each word with the correct definition.

- | | | |
|-----------------|---|---|
| 1. negate | • | • a. fancy; decorated |
| 2. alliance | • | • b. to subdue; to suppress |
| 3. elaborate | • | • c. the name of a unit of paper money |
| 4. coordinate | • | • d. an assumption |
| 5. black market | • | • e. to harmonize |
| 6. denomination | • | • f. speeded up; quickened |
| 7. antique | • | • g. an agreement; a partnership |
| 8. quell | • | • h. the unofficial or illegal selling of goods or currency |
| 9. premise | • | • i. old furniture |
| 10. accelerated | • | • j. to nullify; to cancel |

Unit **3**

Factual Information

3 Factual Information

Overview

■ Introduction

Factual Information questions ask you to identify facts, details, or other information that is explicitly mentioned in the passage. The information is often found in just one or two paragraphs of the passage. So you can find the correct answer without even reading the whole passage. You just need to quickly find the right spot in the passage that has the information about which the question asks. This is one of the most frequent question types on the TOEFL® iBT.

■ Question Types

1. According to the passage, which of the following is true of _____?
2. According to paragraph X, who [when, where, what, how, why] _____?
3. According to the passage, X did Y because _____.
4. The author's description of X mentions which of the following?

■ Useful Tips

- Read the questions first to know what exactly is being asked.
- Scan the passage to find out where the relevant information is in the passage.
- Remove the choices that are not relevant to the passage.
- Do not choose an answer just because it is mentioned in the passage.



Sample iBT Question

According to the passage, the English upper class began using wallpaper because

- (A) It was cheaper than tapestries
- (B) they started using wood walls
- (C) tapestries were no longer fashionable
- (D) tapestries could no longer be imported

The History of Wallpaper

In the Middle Ages, the wealthy covered their walls with large tapestries, which not only provided color but also insulated the cold stone walls. But only the very rich could afford them, and they were often unavailable during times of war, when international trade was difficult. In England, tapestries had to be imported from France, but after Henry III was thrown out of the Catholic Church in 1645, trade with Europe dried up. The upper classes began using wallpaper instead. By the eighteenth century, England was the leading manufacturer in Europe. When the steam-powered printing press was invented in 1813, British manufacturers were able to mass-produce wallpaper, causing its price to fall. Suddenly, it was affordable to the working classes as well. In the twentieth century, wallpaper was accepted as a cheap and effective way of brightening the dark rooms of working class homes.

Correct Answer

Choice (D) is the correct answer. The third and fourth sentences of the passage show that the upper classes in England had to use wallpaper because imported French tapestries were no longer available after Henry III's excommunication from the Catholic Church.

John Smith and the Jamestown Colony

In 1606, King James I of England sent a group of three ships to colonize Virginia. The king had two purposes: to search for treasure and to spread Christianity among the Native American Indians. When the ships arrived in Virginia in 1607, the settlers chose Jamestown as their colony, and John Smith was named by the king to be one of its leaders. The Jamestown colony struggled for survival because it was located on swampy ground with impure water. About two-thirds of the 105 settlers died of malaria, malnutrition, and dysentery. Smith's strong leadership held the colony together for a time. But the colonists were at continuous warfare with the Indians, and in 1609, Smith was injured in a battle and was forced to return to England. The colonists survived throughout the 1600s by learning to produce their own food and by discovering tobacco as a cash crop.

1. According to the passage, why did Jamestown find it difficult to survive?
 - (A) John Smith was an ineffective leader.
 - (B) It was located by a swamp with dirty water.
 - (C) John Smith was injured and returned to England.
 - (D) Tobacco could not be grown there.
2. According to the passage, the colony survived because
 - (A) the colonists learned how to grow their own crops
 - (B) the weaker settlers died of malaria and other diseases
 - (C) the settlers found a source of clean water
 - (D) the Indians taught the settlers how to farm crops

Progressive Taxation

Taxes on income can be either progressive or flat. A flat tax is proportional to the amount one earns, and so the tax rate is the same for all levels of income. With a progressive tax, however, the rate increases with income. The justification for the higher rate is to avoid the inequity of a flat tax. This occurs because, when everyone pays the same rate, the wealthy pay a smaller percentage of their income than do lower income earners. That is because the less well-off have to use a greater share of their income for necessities such as food, housing, and clothing. Once the richer taxpayers pay for the same necessities, they have a larger portion of their income left over for savings, luxuries, and leisure. The theory behind a progressive income tax is that it places a greater burden on those better able to afford it.

3. According to the passage, the problem with a flat tax is that
 - (A) it takes too much from high income people
 - (B) it decreases as income goes down
 - (C) the rich pay a smaller share than the poor
 - (D) the poor cannot afford luxuries
4. The author's description of the progressive tax mentions which of the following?
 - (A) It puts a greater burden on those able to afford it.
 - (B) It increases as income goes down.
 - (C) It is not mentioned in the Constitution.
 - (D) It makes luxuries affordable for low-income people.

Ancient Egyptian Painting

Egyptian painting began about 5,000 years ago, arising out of the advanced civilization centered in the fertile Nile Valley. Because of the extremely dry climate, many ancient Egyptian paintings survive today. Paintings were intended to provide company for the dead in the afterlife, so they were placed in the tombs in which the dead were buried. Artists tried accurately to portray the time in which the person lived so that the deceased would always feel the comfort of seeing the people and places that he knew. Subjects also included journeys through the afterworld and the gods to be found there. Because Egyptian society was very religious, many paintings depict gods and goddesses as well as pharaohs, their rulers, who were also treated as gods. The artistic style was to use clear and simple lines and shapes in order to achieve a sense of order.

5. According to the passage, the purpose of Egyptian paintings was to
- (A) entertain the ruling class
 - (B) decorate the pharaohs' homes
 - (C) give offerings to the gods
 - (D) comfort the dead
6. The author's description of subjects of paintings mentions which of the following?

Click on 2 answers.

- [A] soldiers
- [B] gods
- [C] priests
- [D] pyramids
- [E] Egyptian rulers

Australia and the Theory of Continental Drift

Two hundred million years ago, all land on Earth was joined as a single mass called Pangaea. Studies of geology show that, about 180 to 160 million years ago, the Earth's crust broke into separate plates that moved in different directions. This process of dividing the Earth into continents is called continental drift. About 65 million years ago, Australia started to separate from the southern half of the land mass, along with Antarctica, South America, and Africa. Over the next 100 million years, Australia stayed connected to the other two continents. But about 45 million years ago, it broke off from the others. Australia's isolation from other land masses has caused its unique animal and plant life. Its varied land features—dry plains and mountains—also resulted from its upheaval during its drift. Australia continues to move today. It is drifting north at a rate of about 10 millimeters per year.

7. According to the passage, continental drift was the cause of
- (A) Australia's unusual animals
 - (B) Australia's waterfalls
 - (C) Antarctica's connection to Australia
 - (D) Africa's dry plains
8. According to the passage, what happened about 65 million years ago?
- (A) Australia separated from the other continents.
 - (B) The Earth's crust broke into moving plates.
 - (C) Australia began to move away from the southern land mass.
 - (D) Australia began drifting north.



A Read the following passages, and answer the questions.

Dadaism

Time Limit: 3 min. 40 sec.

Dadaism was a cultural protest movement that began in Zurich, Switzerland, in 1916. It was conceived as a rebellion against traditional social values, especially reason and logic, which the Dadaists saw as being morally bankrupt and which had led the world into the destructiveness of World War I. Their answer was to embrace anarchy and the irrational. By seeking the destruction of a flawed value system, they believed they could build a new one guided by a more humane outlook.

The movement began in 1916 when Hugo Ball recited the first Dadaist manifesto at the Café Voltaire in Zurich. They declared that they had lost confidence in culture and vowed to destroy the existing order and reconstruct it. The Dadaists embarked on their crusade by trying to shock the public by constructing offensive or outrageous works of art and literature. They expressed themselves with creations that were "anti-art," meaning that they ignored aesthetics, had no underlying meaning, and sought to offend.

In the peak years of the movement, 1916 to 1920, Dadaism spread throughout Europe, inspiring many periodicals that served as outlets for Dadaist views. The most influential Dadaist artist was the French sculptor Marcel Duchamp. He exhibited what he called ready-mades, or common objects that he would submit as works of art, such as bicycle wheels or a birdcage. His intent was to ridicule the idea that art had to convey some profound message. Duchamp's most famous work was *Fountain*, a urinal. It was rejected by the art community when Duchamp first showed it in 1917. But it later became celebrated as a brilliant reflection of the Dadaist movement. In 2004, it won a British prize as "the most influential work of modern art."

New York hosted many Dadaists after World War I, including Duchamp, who joined a group that included the American artist Man Ray. Much of their work was photographed by the famous New York photographer Alfred Stieglitz. The New York branch of the movement, unlike the more serious European branch, used humor and irony to express its rejection of traditional values.

By the mid-1920s, the Dadaist movement had lost its uniqueness and was absorbed by other cultural strains, including surrealism and socialist realism. During World War II, many European Dadaists moved to the United States. Others were killed in Hitler's concentration camps. Hitler condemned their work as "degenerate art."

The word Dada has an uncertain origin. Some say it is simply a nonsense word. Others say it was borrowed from the Romanian words *da, da*, meaning "yes, yes." And another view is that the founders chose it from a French dictionary: *dada* is the French word for hobby-horse, a child's riding toy.

- conceive [v] to think; to believe • embrace [v] to accept • anarchy (n) chaos; disorder • irrational [a] unreasonable
- manifesto [n] a public declaration; a policy statement • aesthetics [n] the study of the idea of beauty • exhibit [v] to display
- submit [v] to present; to put forward • profound [a] deep; esoteric • uniqueness [n] singularity; remarkableness
- absorb [v] to assimilate; to incorporate • condemn [v] to criticize; to blame • degenerate [a] corrupt; immoral; low

General Comprehension

1. In stating that the Dadaists saw traditional social values as being morally bankrupt, the author means that
 - (A) traditional social values had lost their moral basis
 - (B) the Dadaists rejected traditional values
 - (C) traditional society celebrated anarchy
 - (D) the Dadaists were socially destructive
2. The word others in the passage refers to
 - (A) other cultural strains
 - (B) surrealism and socialist realism
 - (C) European Dadaists
 - (D) the United States

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3. According to paragraph 2, the Dadaists expressed their views with artwork that
 - (A) was conservative
 - (B) aimed to offend
 - (C) strove for beauty
 - (D) was abstract
4. According to the passage, when Dadaism lost its influence, its ideas were expressed in
 - (A) socialist realism
 - (B) degeneration
 - (C) communism
 - (D) anarchism

Dadaism

- Began in Zurich, Switzerland, in 1916
- Was a cultural protest movement – rebelled against traditional social values
 - against (1) _____
- Hugo Ball initiates movement – wanted to show loss of faith in society
 - wanted to destroy society and start over
- Peaked from (2) _____
- (3) _____ was most influential Dadaist
- Movement went to America later
- Became absorbed by other genres such as (4) _____ and socialist realism



B Read the following passages, and answer the questions.

Geysers

Time Limit: 3 min. 40 sec.

A geyser is a special kind of hot underground spring. It periodically ejects streams of hot water and steam into the air. Geysers are very rare because they require a unique combination of geology that exists in only a few places on Earth. Only about 1,000 can be found today, with half of them in Yellowstone National Park in the United States.

Hot springs are formed when surface water seeps down through the ground until it reaches rock that has been heated by magma, which is volcanic melted rock. The hot water rises up to the surface through spaces between the underground rock layer. The water becomes part of a geyser if the rising water is constricted into a narrow passageway that connects the underground water to the surface. The water cools as it escapes to the surface, causing it to exert downward pressure on the hotter water below. The hot water has no place to go, being blocked by the solid layer of underground rock. As a result, the pressure and heat rises on the water, superheating it to temperatures around 95.6 degrees Celsius.

The boiling water surges through the vent leading to the surface. This escape reduces the pressure on the water below, causing the superheated water to burst out the vent into the air, resulting in a spray that we see as the end product of the geyser. The spray may continue for several minutes. Eventually, this release in pressure causes the remaining water to cool below the boiling point, and the eruption ends, with the groundwater again seeping back into the ground. The cycle repeats itself at predictable intervals.

There are two types of geysers. Fountain geysers erupt from pools of water, usually in a series of violent bursts. Cone geysers emanate from mounds of mineral deposits known as geyserite. They form steady sprays lasting from a few seconds to several minutes.

The most famous geyser is a cone geyser at Yellowstone National Park known as Old Faithful. It derives its name from its regularity. It erupts about every 74 minutes on average. Each eruption lasts between 1.5 and 5 minutes. The height of the eruption varies between 100 and 180 feet.

The rarity of geysers is attributable to the unusual conditions necessary to produce them. The volcanic rock must be dissolvable in hot water in order to form mineral deposits that line and strengthen the walls of the passageway leading to the surface. Any interference with the vent can destroy the geyser. For example, many geysers have died from litter and debris thrown into them by people. And others have succumbed when nearby power plants have diverted water away from them.

• eject [v] to throw out; to expel • seep [v] to leak; to permeate • exert [v] to use; to apply • surge [v] to flow; to gush • emanate [v] to arise; to originate • derive [v] to get; to gain; to obtain • erupt [v] to explode; to blow up; to burst out • be attributable to (phr) be caused by • dissolvable [a] decomposable; perishable • vent [n] an opening; an outlet • debris [n] waste; remains • succumb [v] to fail; to break down • divert [v] to redirect; to switch

General Comprehension

1. The word constricted in the passage is closest in meaning to
 - (A) heated
 - (B) lowered
 - (C) compressed
 - (D) accelerated
2. The word them in the passage refers to
 - (A) geysers
 - (B) litter and debris
 - (C) people
 - (D) power plants

On the TOEFL Test

3. According to paragraph 1, which of the following is true about geysers?
 - (A) They are common in the United States.
 - (B) They are underground springs.
 - (C) There are about 1,000 in Yellowstone National Park.
 - (D) They are parts of volcanoes.
4. According to paragraph 6, the author's description of why geysers are rare mentions which of the following?
 - (A) The passageway is strengthened by litter.
 - (B) Power plants heat the water.
 - (C) Hot water dissolves the rock.
 - (D) The vent is opened by a volcanic eruption.

Geysers

- A hot (1) _____ that shoots hot water into the air
- Are only 1,000 in the world
- Hot springs - form by surface water going down to (2) _____
 - water then rises to the surface because of pressure
 - becomes very hot and shoots up into the air
- Two types of geysers - fountain geysers
 - (3) _____
- Old Faithful - most famous geyser
 - found in Yellowstone National Park
 - erupts every (4) _____

C Read the following passage, and answer the questions.

Works Projects Administration

Time Limit: 3 min. 40 sec.

During the Great Depression in the United States in the 1930s, factories were forced to close, putting millions out of work. The unemployed had to depend on public relief money. In 1935 President Franklin D. Roosevelt established the Works Progress Administration, which was designed to provide government-funded jobs for those on relief. The agency, later renamed the Works Projects Administration (WPA), was the largest agency in Roosevelt's New Deal, his program for economic recovery.

The first head of the agency was Harry L. Hopkins. He estimated that 3.5 million people would be eligible to work in the WPA and that he would need \$1,200 per year for each worker. Congress approved \$4 billion to begin. Wages were set at different levels according to the region of the country, the local market wage, and the skill required. In order to maximize the number of workers, each person was limited to no more than thirty hours a week.

Reflecting the culture of the era, the WPA did not permit both a husband and his wife to work. It was assumed that the head of household was a man and that if a woman worked, she would be taking a job away from a man. The women who did work were usually assigned to sewing projects, making clothing and supplies for hospitals and orphanages.

The bulk of WPA jobs were on public works projects, such as government buildings, airports, bridges, national parks, highways, dams, sewers, libraries, and recreational facilities. But it also funded cultural pursuits through its Federal Art Project, Federal Writers' Project, and Federal Theater Project. Many out-of-work actors and playwrights suddenly had an outlet for their talents. Artists were put to work painting murals on public buildings. Writers were employed creating a series of state and regional guidebooks. Among the authors participating in the Federal Writers' Project was Saul Bellow, a later winner of the Nobel Prize.

Blacks especially benefited from the WPA, where employment discrimination was less than what they faced from private employers. In particular, the agency gave blacks their first entry into white-collar occupations.

The WPA attracted criticism from political conservatives, who complained that the program wasted taxpayers' money on unneeded and frivolous work, such as raking leaves in parks. And many of its better educated workers had left-wing or communist sympathies. Critics also alleged that the allocation of projects and funds was often influenced by politics; those Congressional leaders who supported President Roosevelt, they charged, were more likely to have WPA projects assigned to their areas of the country.

The influence of the WPA began to wane by 1940. America's entry into World War II in 1941 boosted factory employment and rendered the agency less necessary. It was terminated in 1943.

- design [v] to intend; to plan
- relief [n] aid; help; assistance
- estimate [v] to calculate roughly; to guess
- reflect [v] to mirror; to express
- assume [v] to suppose; to presume
- assign [v] to allocate; to distribute
- pursuit [n] an activity; an endeavor
- discrimination [n] bias; prejudice
- frivolous [a] trivial; unimportant
- allege [v] to claim; to assert
- boost [v] to foster; to promote
- terminate [v] to end; to finish; to stop

General Comprehension

- The word eligible in the passage is closest in meaning to
 - qualified
 - eager
 - applying
 - asked
- The word they in the passage refers to
 - taxpayers
 - workers
 - critics
 - Congressional leaders

On the TOEFL Test

- According to the passage, the author mentions which of the following as the factors used to set WPA wages?

Click on 2 answers!

 - the worker's geographic location
 - the worker's skill
 - the worker's political party
 - the worker's age
 - the worker's marital status
- According to the passage, the WPA's influence decreased because
 - its workers had communist sympathies
 - President Roosevelt died
 - employment rose when America entered World War II
 - it ran out of money

Works Project Administration

- Established by President Franklin D. Roosevelt during the (1) _____
 - began in 1935
 - provided government jobs for people
- Funding - 3.5 million workers at \$1,200 per year
 - could work (2) _____ a week
- WPA jobs - were on (3) _____
 - airports, bridges, parks, highways, dams, and other buildings
 - employed many different people
 - actors can act, artists can paint, and writers can write
- Criticism - conservatives disliked
 - thought that projects were a (4) _____



D Read the following passage, and answer the questions.

Fresco Painting

Time Limit: 3 min. 40 sec.

Fresco is a technique in which pigments are painted directly onto a wet plaster wall. The word *fresco* comes from the Italian *affresco*, meaning "fresh." Fresco painting can be either *buon fresco*, done on wet plaster, or a *secco*, done on dry plaster. A *secco fresco* usually is used to apply finishing touches or correct mistakes on a dried *buon fresco* painting.

The artist prepares for a fresco painting by drawing an outline of his or her composition onto a rough underlayer of dried plaster called the *arriccio*. This sketch is often made with a red pigment called *sinopia*. Then he applies a second layer of wet plaster called the *intonaco*. He smooths this top layer to prepare it for painting.

The artist then takes a paper on which he has drawn a cartoon, or a full scale drawing of what he intends to paint. He traces the cartoon onto the wet *intonaco* and begins to paint, using the cartoon as a guide. The paint consists of powdered pigments that are ground up into lime water. The wet plaster absorbs the pigment, which dries along with the plaster. No binder is needed, as the chemical composition of the plaster binds the plaster to the pigment. The shine of smooth lime plaster creates a rich texture that highlights the colors.

Buon fresco painting is challenging because of the need to time one's painting to finish before the plaster dries, as a layer of wet plaster dries in about 10 to 12 hours. The artist typically begins painting after one hour and continues until about two hours before the surface is completely dry. Thus he must plan his project in advance, splitting it into sections and choosing which section to work on at a time. The area that he can cover in a day is called the *giornata*, which translates as a "day's work." A wall may have many *giornate*, which blend together as one and hence will not be visible at first. But after hundreds of years, these separate areas may become distinguishable.

Once the *giornata* has dried, no changes are possible unless the dried plaster is removed with a sharp tool and another wet layer is applied. Minor repairs can be made with the *a secco* technique, which requires a binder, such as egg, to hold the pigment to the wall. Sometimes a *secco fresco* is used to cover the borders between *giornate*, as the borders disappear with age.

Frescoes first appeared in Egyptian tomb paintings, which used the *a secco* method, while the Romans used *buon fresco*. Fresco painting achieved its greatest expression during the Italian Renaissance, the premier example of which is the ceiling of the Sistine Chapel that was done by Michelangelo.

- trace (v) to copy; to outline; to sketch • pigment (n) a colored powder • absorb (v) to soak up; to incorporate
• composition (n) a work • rough (a) uneven • texture (n) feel; touch • in advance (phr) beforehand • split (v)
to separate; to divide • blend (v) to intermingle; to merge • border (n) a boundary • premier (a) best; primary

General Comprehension

- The word distinguishable in the passage is closest in meaning to
 - invisible
 - noticeable
 - faded
 - darkened
- The word which in the passage refers to
 - fresco painting
 - its greatest expression
 - the Italian Renaissance
 - the premier example

On the TOEFL Test

- According to paragraph 1, a *secco fresco* is used to
 - cover up mistakes
 - apply wet plaster
 - dry a *buon fresco* painting
 - remove old plaster
- According to the passage, what is the purpose of a cartoon?
 - To amuse the painter
 - To absorb the pigments
 - To provide a guide for the painter
 - To highlight the colors

Fresco Painting

- Put paint directly onto plaster wall - (1) _____ → uses wet plaster
- *A secco* → uses dry plaster
- Steps to making fresco - artist draws outline on dry plaster
 - uses (2) _____ and applies wet plaster
 - traces drawing onto wet plaster and starts painting
 - wet plaster absorbs pigments
- Must plan the fresco properly because of drying plaster
- Can make repairs using (3) _____ method
- Frescoes in different cultures - Egyptian tomb paintings
 - Romans
 - (4) _____ in Italian Renaissance

E Read the following passage, and answer the questions.

The Great Basin

Time Limit: 3 min. 40 sec.

The Great Basin is a 200,000 square mile desert region in the western United States. It forms a high plateau between mountain ranges that covers much of the states of Utah and Nevada in addition to parts of surrounding states. It is called a basin, which is a sloping container for holding water, because it has no outlet to the nearest sea, the Pacific Ocean.

The geologic name for the area encompassing the Great Basin is the Basin and Range Province. That province has a history of underground faults that has created an efficient water drainage system. During the Ice Age, the province was dotted with large lakes that are now dried up, leaving extensive flat lands such as the Bonneville Salt Flats, where automobile races are held. Rain and melting snow quickly evaporate in the dry desert climate. The precipitation that does not evaporate seeps into the ground or gathers into temporary lakes that gradually dry up. Water flow is also blocked by the mountains surrounding the province. So, none of the water that enters the region ever escapes by way of streams or rivers leading to the ocean. It is this internal drainage that maintains the Great Basin in its dry condition.

Geologists say that the Great Basin is in the process of cracking and expanding, causing the topmost layer to become thinner over time. They predict that these forces eventually may split the Great Basin along one of its valleys, opening up a waterway to the ocean.

Wildlife found in the Great Basin include jackrabbits, coyotes, squirrels, packrats, and mountain lions. Non-native animals have been successfully imported, such as wild horses and burros. Because most of the land is open range with vegetation, cattle and sheep raising are common occupations.

Humans first populated the Great Basin about 12,000 years ago. When the Europeans discovered the New World, the region was peopled with Native American Indian tribes such as the Shoshone and Ute. Spanish explorers reached the area in the late 1700s, after which it was settled by fur trappers.

The United States acquired the territory through two treaties. With the 1846 Oregon Treaty, Great Britain gave up its claims to part of the Great Basin. With the 1848 Treaty of Guadalupe Hidalgo, the Mexican War ended, giving the United States land that had been part of Mexico. The Mormons were the first to found a large settlement, establishing Salt Lake City in the late 1840s. When gold was discovered in California in 1848, waves of pioneers traveled across the Great Basin on their way to seek their fortunes, opening up much of the land to development. The area ultimately was divided into the several states that constitute the Great Basin today.

- plateau (n) an elevated land • outlet (n) a channel; an exit • encompass (v) to contain • fault (n) a large crack in the Earth's surface • extensive (a) vast; wide • seep (v) to flow; to leak • precipitation (n) rain, snow, or hail
- temporary (a) short-lived; brief; momentary • internal (a) interior; inner; inside • vegetation (n) plants; flora
- acquire (v) to gain; to obtain • treaty (n) a pact; an agreement • wave (n) an unending group • pioneer (n) a discoverer • ultimately (ad) finally; in the end • constitute (v) to make up; to comprise

General Comprehension

1. The word evaporate in the passage is closest in meaning to
 - (A) fall
 - (B) accumulate
 - (C) erode
 - (D) disappear
2. The word their in the passage refers to
 - (A) the Mormons
 - (B) Salt Lake City
 - (C) pioneers
 - (D) the several states

On the TOEFL Test

3. According to paragraph 2, which of the following is true about water that enters the Great Basin?
 - (A) It flows underground into the Pacific Ocean.
 - (B) It is collected in wells for human consumption.
 - (C) It is never carried away by rivers or streams.
 - (D) It irrigates desert farmland.
4. According to paragraph 6, the Mexican portion of the Great Basin became part of the United States when
 - (A) the Treaty of Guadalupe Hidalgo was signed
 - (B) the Oregon Treaty was signed
 - (C) the Mormons founded Salt Lake City
 - (D) gold was discovered in Mexico

The Great Basin

- Desert region in United States - (1) _____ between mountain ranges
- in Utah, Nevada, and surrounding states
- Geography - once had lakes but have disappeared
- now has flat areas like (2) _____
- sometimes has (3) _____ when rains
- Wildlife - native animals like jackrabbits, coyotes, squirrels, packrats, and mountain lions
- nonnative animals like wild horses and burros
- Humans have been there since (4) _____
- Land has belonged to the United States since 1840s



F Read the following passage, and answer the questions.

Nationalism

Time Limit: 3 min. 40 sec.

Until about 1800, people in most of the world were loyal to the places where they and their families lived. Most did not see themselves as part of a larger state or nation. But the rise of industry and the need to raise armies prompted rulers to try to inspire a sense of national identity and common cause. This drive toward lifting the interests of the nation above those of individuals or groups became known as nationalism. World history over the past 200 years can be explained as one of redrawing the political map with new nation states.

Many historians date modern nationalism from the French Revolution in the late 1700s. The French monarchy was replaced by a republic, in which the citizens no longer were expected to see themselves as subjects of the king. Rather, they found their identity in the abstract concept of France as their mother country. The process was repeated throughout Europe during the next century. With the break up of the Austro-Hungarian and Ottoman Empires at the end of World War II, Europe became a continent of independent nations. Ethnic and language traditions, however, continued to be honored by groups within the nation.

The philosophical basis of nationalism is that the nation is the most important unit of social and economic life to which all other human activities and desires must yield. Helping to secure national pride are flags, foods, sports, traditions, histories, folk tales, music, literature, and culture. There may even be a national religion.

Nationalists point to criteria that distinguish nations from each other, such as a common language, culture, and values. These traits are often represented by a single ethnic group to which almost all citizens of a nation belong. Many nations, however, host different ethnic groups side by side, sometimes with violent or politically disruptive results. Former nations such as Yugoslavia and the Soviet Union have been torn apart by clashes of ethnic groups. Iraq currently is being ravaged by ancient religious conflicts. And the long-simmering Arab-Israeli conflict is fueled by claims that the other side is not a real nation that is entitled to its own territory.

Some ethnic groups refuse to recognize their nation, seeking to secede in order to rule themselves. Separatist movements in Quebec, Canada, and in the Basque region of Spain have been active for many years but have not yet succeeded.

Requiring that all speak the same language has been an important means of enforcing national identity. New nations often attempt to outlaw minority languages. The national language tends to be the one spoken by the upper classes, resulting in the high-status language replacing the low-status ones.

- loyal (a) faithful; devoted • prompt (v) to cause; to inspire • abstract (a) theoretical; ideal • ethnic (a) racial; cultural • secure (v) to obtain; to acquire; to gain • criteria (n) factors; traits • disruptive (a) upsetting; causing disorder • clash (n) a collision; a confrontation • simmer (v) to rage; to be angry • ravage (v) to destroy; to devastate • fuel (v) to stimulate • secede (v) to separate; to become independent • enforce (v) to impose; to insist on • outlaw (v) to ban; to forbid; to prohibit

General Comprehension

1. The word most in the passage refers to
 - (A) people
 - (B) the world
 - (C) places
 - (D) families
2. The word yield in the passage is closest in meaning to
 - (A) suppress
 - (B) overcome
 - (C) surrender
 - (D) tolerate

On the TOEFL Test

3. The author's description of the beginnings of nationalism mentions which of the following?
 - (A) the fall of the Roman Empire
 - (B) the French Revolution
 - (C) World War II
 - (D) American independence
4. According to the passage, the Arab-Israeli conflict is caused in part by
 - (A) one ethnic group's seeking to secede from a nation
 - (B) a single nation's splitting apart
 - (C) two ethnic groups seeking to unite as one nation
 - (D) each side's refusal to admit that the other is a nation

Nationalism

- Is new concept - did not exist before (1) _____
 - people once associated selves with local area
 - with nationalism, now associate selves with state
- (2) _____ in the late 1700s - is beginning of nationalism
 - people do not have allegiance to king
 - have concept of "mother country"
- Distinguishing characteristics - common language, culture, and values
 - single (3) _____
 - common flag, food, sports, tradition, history, and literature
- Can cause problems with different ethnic groups in same country
 - (4) _____ torn apart
 - Iraq has problems
 - Quebec is trying to separate from Canada

● Building Summary Skills

The following summaries are based on the passages you worked on earlier. Complete each of them by filling in the blanks with suitable words or phrases.

1. Dadaism

a more humane other cultural movements	the current fashion the end of World War I	common objects
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Dadaism was a cultural movement that arose at ⁽¹⁾ _____ as a protest against reason and logic. Dadaists felt that ⁽²⁾ _____ world could be created once the traditional system was dismantled. The movement was joined by artists who condemned art that fit ⁽³⁾ _____ or conveyed meaning or beauty. They created art works out of ⁽⁴⁾ _____ that had no serious artistic message. By the 1920s, Dadaism was absorbed into ⁽⁵⁾ _____.

2. Geysers

volcanic rocks the water cools	predictable intervals a hot underground spring	in the form of spray
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A geyser is ⁽¹⁾ _____ that ejects streams of water and steam. It is formed when water is heated by ⁽²⁾ _____ and is subjected to pressure from the cooler water above it. The water boils and escapes through passageways in the ground. It erupts into the air ⁽³⁾ _____. The eruption ends when ⁽⁴⁾ _____. The cycle repeats itself at ⁽⁵⁾ _____.

3. Works Projects Administration

Franklin D. Roosevelt the Great Depression	government-funded jobs bridges, highways, libraries, and dams	cultural projects
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The Works Projects Administration (WPA) helped put Americans back to work during ⁽¹⁾ _____. It was created by President ⁽²⁾ _____ and was the largest agency of the New Deal, his economic recovery program. It provided ⁽³⁾ _____ for those receiving relief payments. Most WPA jobs were on public-works projects, such as ⁽⁴⁾ _____. But it also funded ⁽⁵⁾ _____ giving work to writers, actors, and artists.

4. Fresco Painting

the artist begins painting
a fresh layer of wet plaster

planned and timed
on dry plaster

lime water

In *buon fresco* painting, the artist applies paint directly onto wet plaster. The work is done in four stages: an outline is drawn ⁽¹⁾ _____ (*ariccio*); a layer of wet plaster is applied (*intonaco*); the final version is drawn on paper and traced onto a cartoon (*intonaco*); and ⁽²⁾ _____ with the cartoon as a guide (*painting*). The paint consists of powdered pigments mixed with ⁽³⁾ _____, which is easily absorbed by wet plaster. Frescos must be carefully ⁽⁴⁾ _____ so that the work is finished before the plaster dries. Once it dries, no changes can be made until the dried plaster is removed and ⁽⁵⁾ _____ applied.

5. The Great Basin

Native American Indian tribes
the mountains of Utah and Nevada

escaping to the Pacific Ocean
the mid-19th century

the Ice Age

The Great Basin is a desert plateau mostly in ⁽¹⁾ _____. It was formed during ⁽²⁾ _____. Humans first populated it 12,000 years ago, and Spanish explorers found ⁽³⁾ _____ there in the 1700s. Its underground drainage system and hot, dry climate prevent water from ⁽⁴⁾ _____. The region was populated in ⁽⁵⁾ _____ after the Mormons founded Salt Lake City and gold was discovered in California.

6. Nationalism

political conflict or violence
a tribe or region

the French Revolution
a common language, culture, and values

ethnic or religious

A sense of national pride, or nationalism, arose around the time of ⁽¹⁾ _____. Industrialization and the need to raise armies led to people identifying themselves as being from a country as opposed to from ⁽²⁾ _____. Nations are often united by ⁽³⁾ _____. When a nation includes different ⁽⁴⁾ _____ groups, however, ⁽⁵⁾ _____ can result.



1. The word conspiracy in the passage is closest in meaning to

(A) plot
(B) desire
(C) statement
(D) discussion

2. According to the passage, the first nativist political party was

(A) the Democratic Party
(B) the American Republican Party
(C) the Know Nothing Party
(D) the Native American Party

3. According to paragraph 5, all of the following were favored by the Know Nothings EXCEPT:

(A) limits on the number of immigrants
(B) public schools' hiring only Protestant teachers
(C) banning Catholic children from public schools
(D) a 21-year wait for citizenship for immigrants

4. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

Most of their proposed laws were defeated, however.

Where would the sentence best fit?

5. Which of the following can be inferred about the American Republican Party?

(A) Most of its members had been Whigs.
(B) It welcomed new immigrants.
(C) It was active until 1860.
(D) It did not like Catholics.

The Know Nothing Party

In the 1840s, some native-born Americans decided that the two leading parties, the Democrats and the Whigs, were not doing enough to limit the number of immigrants, especially in the larger cities. These nativists feared that their way of life was being threatened by the new arrivals, many of whom were Irish Catholic. They spread rumors of a conspiracy by Pope Pius IX to seize control of America by appointing priests and bishops who were loyal to him. In turn, the priests would demand obedience from their Catholic followers.

Newly arriving immigrants tended to join the Democratic Party in cities like New York. As they grew in numbers, their political influence expanded, causing the nativists to fear that they would blindly obey the pope's commands instead of acting in Americans' best interest.

The nativist movement organized a political party in New York in 1843, called the American Republican Party. As its influence spread around the country, it changed its name to the Native American Party in 1845.

Dissatisfied with the Democratic Party, which eagerly courted immigrants, the nativists began to form secret societies. On election day, the members would quietly throw their support behind candidates who shared their views. When they were asked about these secret organizations, the members would reply, "I know nothing." Thus they became known as the Know Nothings.

The group favored specific laws designed to lessen the influence of the newly arrived foreigners. They sought to limit the numbers of annual immigrants, especially from Catholic countries. They urged that immigrants be barred from running for public office. **A** They advocated a 21-year wait before immigrants could become citizens. **B** They favored a ban on Sunday liquor sales. **C** And their plan for the public



6. The word they in the passage refers to
- (A) the Know Nothings
 - (B) native-borns
 - (C) mayors
 - (D) some men
7. The word faction in the passage is closest in meaning to
- (A) leadership
 - (B) owners
 - (C) group
 - (D) party
8. Why does the author mention the Whigs in paragraph 6?
- (A) To name another party that disliked immigrants
 - (B) To identify a source of Know Nothing members
 - (C) To note the dominant party in the early 1850s
 - (D) To show that the Whigs got members from the Know Nothings

schools was that only Protestant teachers be hired and that the Protestant version of the Bible be read in schools. **D**

Crucial to the rise of the Know Nothings as a political force was the breakdown of the two-party system, as the Whig party had gradually lost strength. The failure of the Whigs supplied the Know Nothings with a pool of potential converts. And the timing was right for a party that could provide an outlet for nativist feelings.

The Know Nothings finally achieved national political power in the election of 1854. Adopting platforms of fighting crime, closing bars on Sundays, and appointing only native-borns to office, they elected mayors in several cities, won control of some state legislatures, and elected some men to Congress. In 1855, they adopted a new name, the American Party. They seemed ready to join the Democrats as one of the two major parties.

The movement peaked in the 1856 presidential election. Its candidate, former President Millard Fillmore, won 22% of the popular vote, finishing third behind the Democrat and the Republican. But the party soon split over the slavery issue. Those who were pro-slavery joined the Democrats, and the anti-slavery faction switched to the Republicans, who were led by Abraham Lincoln. By the 1860 election, the American Party was no longer a national political force.

The Know Nothing movement teaches two lessons about American politics, which have been repeated throughout history. First, ethnic and religious prejudice often influences politics. Second, political discontent arises when existing political parties fail to give voice to those frustrated by social upheavals.



9. The word extinct in the passage is closest in meaning to
- (A) prosperous (B) rare
(C) threatening (D) vanished
10. According to paragraph 2, why were humans able to walk across the Bering Strait?
- (A) They were hunting animals.
(B) The strait froze solid.
(C) The sea level dropped.
(D) Volcanoes caused the earth to rise.
11. According to paragraph 4, people crossing the Bering Strait migrated to all of the following places EXCEPT:
- (A) Africa (B) New Mexico
(C) the Atlantic coast (D) Chile
12. The author discusses Clovis points in paragraph 4 in order to show that
- (A) Clovis people migrated to South America
(B) Clovis people were hunters
(C) Clovis people made primitive weapons
(D) Clovis people originally came from Asia
13. The word prominent in the passage is closest in meaning to
- (A) inconspicuous (B) noticeable
(C) flattened (D) disfigured
14. Which of the following can be inferred about the fact that migration went from west to east?
- (A) Asia had a worse climate than North America.
(B) Asian people followed animals across the land bridge.
(C) People lived in Asia before they lived in North America.
(D) Many animals had become extinct in Asia.

Human Migration Across the Bering Strait

Humans first lived on Earth 40,000 years ago in Africa. How they arrived in the Americas is a subject of debate among anthropologists. The most accepted explanation today is the Bering Strait land bridge theory. Recent evidence, however, supports the view that migration occurred by other routes as well.

The Bering Strait is a narrow passage between Siberia in Russia and Alaska to the west of Canada. In 1856, Samuel Haven proposed that about 20,000 years ago during the Ice Age, the sea level dropped when the water became locked up in glaciers. The level was about sixty meters lower than it is today. This exposed the land beneath the strait, allowing humans and animals to walk from Siberia to Alaska. Evidence for this land bridge is confirmed by soil cores taken from the waters of the strait, showing that the land during that era was dry plains. Remains of large mammals have also been found, suggesting that Asian tribes were hunters who followed the animals into North America about 12,000 years ago. Mammals native to Africa and Asia, such as lions and cheetahs, later evolved in North America into extinct species. And the North American camelid, which became extinct in North America, evolved into camels in Asia.

The archaeological record shows that the migration went from west to east. The land bridge was about 2,000 kilometers wide. From Alaska, these nomadic hunters moved down into North America by following ice-free routes along the Pacific coastline. Some groups then made their way eastward past the Rocky Mountains and all the way to the Atlantic coast. Other tribes continued south into Central and South America.

The people who crossed the Bering Strait are called the Clovis people after the town of Clovis, New Mexico, where their spear points were



15. Which of the following best expresses the essential information in the highlighted sentence? *Incorrect* answer choices change the meaning in important ways or leave out essential information.

- (A) Some evidence has suggested that humans might have come to the Americas by a route other than the Bering Strait.
- (B) Some scientists believe that the first Americans arrived by boat, not land.
- (C) It has been proved that primitive boats could have crossed the Pacific.
- (D) The Bering Strait was the most likely point of entry by Asians.

16. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the **THREE** answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not in the passage or are minor ideas in the passage.

This passage discusses migration across the Bering Strait.

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Answer Choices

- (A) In 1856, Samuel Haven proposed his theory that the Ice Age occurred about 20,000 years ago.
- (B) During the Ice Age, the sea level in the Bering Strait was low enough to expose a land bridge across the Bering Strait.
- (C) Humans walked across this bridge from Asia into North America.
- (D) The North American camelid disappeared in North America but became the camel in Asia.
- (E) Boats were used in Japan at least 25,000 years ago.
- (F) Humans migrated to all parts of the Americas.

found in 1932. Clovis points have a distinctive shape. Similar points have been found as far east as the east coast of the United States and as far south as Chile. Some scientists theorize that the Clovis people who crossed the Bering Strait continued to all parts of North and South America.

But evidence has also been found that some humans arrived at least 1,000 years before the Clovis people. These findings have caused some to believe that the Americas also may have been populated by a route other than the Bering Strait, perhaps by boats crossing the South Pacific. Archeologists have found indications that boats were used in Australia and Japan as far back as 25,000 to 40,000 years ago. They speculate that some could have sailed to the coast of the Americas and then down the Pacific coast. Unfortunately, many potential coastal sites are now under water, making it difficult to search for signs left by ancient sailors.

Measurements of human skeletons also point to multiple sources of migration. Native Americans have broad faces and prominent cheekbones that match those of Asian people. But other skulls have been found with narrow skulls and flattened faces, consistent with Polynesians and Europeans.

Recent studies in molecular genetics confirm that American Indians share an Asian origin. But a newly discovered DNA line has shown a non-Asian influence as well. DNA research has also revealed that Americans may have diverged genetically from Siberians 20,000 years ago, much earlier than the archaeological evidence indicates.

Vocabulary Review

A Choose the word with the closest meaning to each highlighted word or phrase.

1. The student exhibited her paintings in the museum gallery.
 (A) finished (B) framed (C) advertised (D) displayed
2. During a flood, the water surges into the basement.
 (A) flows (B) drips (C) sprinkles (D) evaporates
3. After fighting a fever for five days, she finally succumbed.
 (A) succeeded (B) recovered (C) died (D) stabilized
4. Reflecting the desires of the people in her state, the senator voted against the bill.
 (A) expressing (B) rejecting (C) examining (D) soliciting
5. He was frustrated because his boss assigned him some frivolous work.
 (A) fruitful (B) boring (C) difficult (D) unimportant
6. The heart surgeon applied the latest research to remove the blockage.
 (A) instruments (B) innovations (C) studies (D) protections
7. Without a passport, you will have trouble crossing the borders of countries.
 (A) customs (B) boundaries (C) passages (D) distances
8. Drops of water quickly evaporate in a heated pan.
 (A) boil (B) flow (C) disappear (D) change
9. It took brave pioneers to go where no men had been before.
 (A) Indians (B) soldiers (C) cowboys (D) discoverers
10. The hurricane ravaged the low-lying areas of the city.
 (A) devastated (B) abandoned (C) touched (D) spared

B Match each word with the correct definition.

- | | | |
|-------------------|---|---|
| 1. plateau | • | a. deep; esoteric |
| 2. manifesto | • | b. an opening; an outlet |
| 3. profound | • | c. an indicator |
| 4. disruptive | • | d. factors; traits |
| 5. vent | • | e. singularity; remarkableness |
| 6. discrimination | • | f. to contain |
| 7. criteria | • | g. an elevated land |
| 8. uniqueness | • | h. upsetting; causing disorder |
| 9. encompass | • | i. bias; prejudice |
| 10. guide | • | j. a public declaration; a policy statement |

Unit 4

Negative Factual Information

4 Negative Factual Information

Overview

■ Introduction

Negative Factual Information questions ask you to find wrong information that is not mentioned in the passage. You should decide which of the answer choices is not discussed in the passage or does not agree with one or more statements in the passage. Like Factual Information questions, scanning is the key skill for this question type. However, you need to scan more of the passage to make sure that your answer is correct.

■ Question Types

1. According to the passage, which of the following is NOT true of _____?
2. All of the following are mentioned in paragraph X as _____ EXCEPT:
3. The author's description of _____ mentions all of the following EXCEPT:
4. Which of the following is NOT mentioned in the passage?

■ Useful Tips

- Make use of the key words in the question and answer choices to spot relevant information in the passage.
- Don't forget that the necessary information may be spread out over an entire paragraph or several paragraphs.
- Make sure that your answer is NOT mentioned in the passage or contradicts the passage.



Sample iBT Question

According to the passage, which of the following is NOT an effect of gravity?

- (A) the creation of black holes
- (B) the spread of cosmic radiation
- (C) the formation of red giants
- (D) the collapse of molecular clouds

Stellar Evolution

Stars are born from giant molecular clouds, which contain diffuse particles of matter. When a cloud collides with another or with other galactic material, gravity causes it to collapse into a star. Young stars remain unstable for billions of years until they become hot enough to generate nuclear reactions that prevent them from collapsing. They enter a mature stage in which the fusion of hydrogen into helium causes nuclear fusion to stop. Gravity then collapses the star inward, raising its temperature so high that it expands rapidly, becoming a red giant for another few million years. When all their nuclear fuel is burned out, smaller stars become white dwarfs, which eventually cool to black dwarfs. Larger stars explode as supernovas, becoming neutron stars. If a star is big enough, it collapses into a black hole, whose matter is so dense that gravity prevents any light from escaping.

Correct Answer

In order to answer this question, you just need to scan for the word gravity in the passage. Gravity involves the collapse of molecular clouds, the formation of red giants, and the creation of black holes. Choice (B) is the correct answer because cosmic radiation is not mentioned in the passage.

The Culture of Cotton in the United States

Before 1800, most Americans wore clothing made of wool or linen. Cotton was expensive and labor intensive because the seeds had to be removed before cotton could be spun into thread. Planters had to limit their cotton crops to the amount they could clean. But in 1793, Eli Whitney invented the cotton gin, a machine with wire teeth that separated the seeds from the cotton fiber. Suddenly, one worker could clean fifty pounds per day, twice the amount possible before the cotton gin. Cotton production soared, as southern farmers turned their land, formerly used for tobacco and rice, into cotton plantations. At the peak of the plantation system in 1850, 75% of all slaves in the southern states, about 1.8 million people, were working in cotton production. The 1850s were known as the decade of King Cotton. But the Civil War in 1860 brought an end to prosperity for southern planters.

1. According to the passage, which of the following was NOT true about cotton?
 - (A) It was expensive and required many workers.
 - (B) The cotton gin made it easier to remove the seeds.
 - (C) Cotton production increased in the south after the Civil War.
 - (D) Many cotton farmers formerly grew tobacco and rice.
2. The author's description of cotton production mentions all of the following EXCEPT:
 - (A) Freeing the slaves decreased cotton production.
 - (B) Cotton production peaked in the 1850s.
 - (C) The Civil War ended cotton planters' prosperous times.
 - (D) The cotton gin had wire teeth that removed the seeds.

Planetary Moons

Our solar system has 240 moons, or natural satellites, that circumnavigate the planets and asteroids. The largest moons are Jupiter's and Saturn's, followed by Earth's moon. Moons were formed at the same time as the larger bodies that they orbit. Some were spun off from their planet during its birth. Others originally were asteroids captured by the planet's gravitational pull, and still others, like Earth's moon, may have been blasted into orbit by a gigantic collision with another celestial object. Most moons, like the Earth's, do not rotate but are tidally locked, meaning that one side always faces its partner. When moons are large enough, they exert their own gravitational force on their planet, just as our moon pulls on the Earth's oceans, causing the tides. Moons, unlike stars, do not generate their own light, appearing to shine at night only because they are reflecting the sun's light.

3. According to the passage, all of the following are true about how moons are formed EXCEPT:
 - (A) They were propelled into orbit by a collision.
 - (B) They spun off when their planet was born.
 - (C) They were asteroids that were captured by a planet's gravity.
 - (D) They were stars that had used up all their fuel.
4. According to the passage, which of the following is NOT true of moons?
 - (A) One side usually faces the body it orbits.
 - (B) Moons shine by burning their own fuel.
 - (C) Large moons pull on other bodies with gravity.
 - (D) Jupiter and Saturn have the largest moons.

Biochemistry

The study of the chemical processes inside living things is called biochemistry. An organism grows and functions through the activity in its cells. Biochemistry focuses on the parts of the cell: proteins, carbohydrates, lipids, and nucleic acids. Proteins are chains of amino acids that bind to other molecules and aid in cell growth and repair. Cells are regulated by special kinds of protein called enzymes. Carbohydrates store energy and provide structure for the cells. Lipids include compounds such as waxes, fat, and steroids. Nucleic acids are best known as DNA—deoxyribonucleic acid—and RNA—ribonucleic acid—the substances that carry genetic data. Recent technology has improved biochemistry, permitting scientists to detect with greater clarity the structure and functions of the cell. These new techniques include electron microscopy, chromatography, and radioisotope labeling. Cancer research depends on the clues provided by biochemistry.

5. According to the passage, which of the following is NOT found inside a cell?
- (A) nerve endings
 - (B) amino acids
 - (C) enzymes
 - (D) nucleic acids
6. The author's description of new technology mentions all of the following EXCEPT:
- (A) radioisotope labeling
 - (B) electron microscopy
 - (C) radiation therapy
 - (D) chromatography

The Culture of the Hopi Indians

Agriculture is a key element of Hopi culture. Farming is not just a subsistence tool; it is a part of Hopi mythology. The Hopi believe that their time on Earth is the "fourth way of life," which they entered when people were offered ears of corn by Maasaw, a Hopi god. Other tribes pushed ahead and took the largest ears, leaving the smallest ears for the Hopi. They see this as a symbol of Hopi life: they have had to overcome the hardships of living in the dry southwest region of the United States. Corn represents humility, cooperation, respect, and reverence for the land. Hopi culture has changed as technology has intruded on their farm-based lifestyle. Electricity, cars, and consumer goods have diverted them from their spiritual ties to the land and toward consumerism. But they continue to hold on to their traditional values through making and selling Kachina dolls and pottery.

7. According to the passage, which of the following is NOT true of the ways technology has affected Hopi culture?
- (A) It has interfered with their agricultural lifestyle.
 - (B) It has made them desire consumer goods.
 - (C) It has caused them to abandon their doll and pottery-making.
 - (D) It has weakened their spiritual ties.
8. In the discussion of the role of corn in Hopi life, the author mentions all of the following EXCEPT:
- (A) an example of hardships
 - (B) Maasaw
 - (C) a symbol of reverence for the land
 - (D) Kachina dolls



A Read the following passage, and answer the questions.

Native American Indian Languages

Time Limit: 3 min. 40 sec.

Before the arrival of the Europeans in North America, Native American Indians spoke over a thousand languages. Most of them were mutually unintelligible. Three Indians from different tribes living within a hundred miles of each other were unlikely to be able to communicate except by sign language. Contrary to the popular stereotype, Indian languages were neither primitive nor simple. Many had complex grammar and phonological structures.

Despite the hundreds of languages in what is now the United States, linguists have grouped them into several large families and many smaller ones. A language family is a collection of languages having a common origin but which have evolved over time into separate languages. For example, just as English, Dutch, and Russian grew out of the Indo-European language family, Apache and Navajo originated in the Athabaskan family of Native American languages. Other large families include the Algonquin, Iroquois, Sioux, Muskogean, and Eskimo-Aleut.

A result of the European conquest was the gradual extinction of most indigenous languages. As the Indian population fell from about twenty million to two million today, languages disappeared as well. Many are spoken only by the oldest members of a tribe. When they die, their languages will die with them. Only eight languages remain with more than a few thousand speakers in the United States and Canada. The largest is Navajo, with about 148,000 speakers. Others are Cree (60,000), Ojibwa (51,000), Cherokee (22,500), Dakota (20,000), Apache (15,000), Blackfoot (10,000), and Choctaw (9,200).

Native American languages are linguistically diverse. But many share common features that distinguish them from Indo-European languages. The glottal stop is common—the sound made by briefly closing the vocal chords, as in the middle of the English sound "uh-oh." Many of the languages use nasal vowels. And, like Chinese, some use changes in tone or pitch to form different words.

One well-known trait of Native American languages is polysynthesis, which is the expressing of complex ideas with a single word consisting of several elements tacked on to a root word. Thus, a verb might have an attached subject or object, usually as a prefix. And the verb tense might be indicated by a word ending. Plurals might be shown by simple repetition of the word instead of an ending like "-s." Thus, the plural of rabbit—*ma*—in one Indian language would be *ma ma*.

As with all languages, Native American languages borrowed from nearby language groups, and English borrowed Indian vocabulary as well. English has many common words of Indian origin, such as moccasin, toboggan, chocolate, and tobacco. Many states and cities derived their names from Indian words and names of tribes. These places include Chicago, Manhattan, Wisconsin, Delaware, Iowa, and Arizona.

- unintelligible (a) incomprehensible • primitive (a) crude; rudimentary • complex (a) complicated; intricate
- phonological (a) relating to speech sounds • origin (n) a root; a source • originate (v) to begin; to arise
- gradual (a) steady; slow • extinction (n) disappearance; extermination • diverse (a) different • distinguish (v) to differentiate • tacked on to (phr) to be added to; to be attached to • derive (v) to borrow; to take

General Comprehension

1. The word many in the passage refers to
 - (A) Europeans
 - (B) Native American Indians
 - (C) tribes
 - (D) Indian languages
2. The word indigenous in the passage is closest in meaning to
 - (A) intelligible
 - (B) native
 - (C) primitive
 - (D) disappearing

On the TOEFL Test

3. According to the passage, polysynthesis includes all of the following EXCEPT:
 - (A) verb tense shown by a word ending
 - (B) plural indicated by repetition
 - (C) meaning changed by tone or pitch
 - (D) subject attached to verb as a prefix
4. According to the passage, which of the following is NOT true of Native American languages?
 - (A) The original languages were complex.
 - (B) The arrival of Europeans caused most of the languages to disappear.
 - (C) The largest remaining language is Navajo.
 - (D) Early Indians communicated only with sign language.

Native American Indian Languages

- Over (1)_____ languages in the Americas – most Indians could not understand others
 - had to communicate with (2)_____
 - used complicated grammar and structures
- Have divided languages into various groups
- Some languages related to one another
- Many Native American languages disappearing today
 - only (3)_____ with thousands of speakers
- Features of languages – use a glottal stop
 - use tone or pitch changes to make new words
 - use (4)_____



B Read the following passage, and answer the questions.

Mars and Earth

Time Limit: 3 min. 40 sec.

Earth and Mars were born at around the same time. About 4.9 billion years ago, they both condensed from a giant cloud of hot gas that shrouded the recently formed sun. They settled next to each other in order from the sun. Earth is about 92 million miles from the sun, and Mars is about 142 million miles. They both have hard crusts and dense cores, and they are made from the same chemical elements, though in different proportions.

But despite their similar origins and composition, the planets display critical differences that make life possible on just one. One key contrast is size. Mars is only a tenth of the mass of Earth, which means that its gravitational pull is much weaker—about 38% of Earth's gravity. As a result, Mars has lost much of its atmosphere and surface water and has cooled more quickly. This rapid cooling explains why Mars has much less volcanic activity than Earth, which is still very hot at its core.

Because of Earth's hotter center, its surface is constantly altered by plate tectonics. As the plates under the crust scrape against each other, new crust rises to the surface and old crust is swallowed up into Earth's interior. While Mars was shaped by plate tectonics in its first 500 million years, those forces stopped when its interior cooled. As a result, 400 million-year-old rocks are common on Mars but rare on Earth, which is continually squeezing new rocks to the surface and burying older ones. Earthly rocks are eroded by winds, whereas the thinner Martian atmosphere generates little wind, preserving the surface in its ancient state.

Half of the surface of Mars is scarred by impact craters. That the craters have been undisturbed for billions of years tells planetary scientists that underground geologic movements ceased before the craters were made. They deduce the same conclusion from the presence of immense volcanoes. Their size and height suggests that they arose billions of years ago and then ceased erupting. Volcanoes on Earth, on the other hand, are still reshaping the planetary landscape today.

Water played a role in molding the Martian surface. But it disappeared about 3.8 billion years ago for reasons unknown. Dried river beds and paths of glaciers can still be seen. Earth, in contrast, is still covered by water over two-thirds of its surface, a fraction that is increasing due to global warming.

Mars lacks the kind of magnetic field that protects the Earth from the electrically charged particles, or solar wind, that bombard it from the sun. Thus the Martian atmosphere is inhospitable to life, consisting of 95% carbon dioxide. Earth's atmosphere is mostly composed of a life-sustaining 78% nitrogen and 21% oxygen.

- condense [v] to compact; to compress • crust [n] the Earth's surface • dense [a] compact; condensed
- proportion [n] a ratio; a measure • composition [n] make-up • critical [a] crucial; very important • constantly [ad] continuously; incessantly
- alter [v] to change • erode [v] to wear away • generate [v] to produce; to create
- scrape [v] to grate; to scratch • scar [v] to mark • immense [a] enormous; huge • deduce [v] to infer • bombard [v] to attack
- inhospitable [a] unwelcoming; hostile

General Comprehension

1. The word shrouded in the passage is closest in meaning to
 - (A) formed
 - (B) emerged from
 - (C) obscured
 - (D) burned up
2. The word they in the passage refers to
 - (A) craters
 - (B) planetary scientists
 - (C) geologic movements
 - (D) volcanoes

On the TOEFL Test

3. According to paragraph 1, all of the following are similarities between Mars and Earth EXCEPT:
 - (A) size
 - (B) chemical elements
 - (C) birth dates
 - (D) hard crusts
4. The author mentions all of the following features of the Martian surface EXCEPT:
 - (A) craters
 - (B) glacier markings
 - (C) ancient rocks
 - (D) rivers

Mars and Earth

- Similarities
 - born (1) _____ years ago
 - next to each other in solar system
 - have hard crusts and dense cores
 - made from same elements
- Differences
 - Mars has smaller mass and less gravity
 - Mars has little atmosphere and (2) _____
 - Earth has very hot core → gives Earth plate (3) _____
 - Mars has many impact craters
 - Earth volcanoes more active and change the planet
 - much of Earth covered by water
 - no (4) _____ on Mars

C Read the following passage, and answer the questions.

The Chemistry of Pottery

Time Limit: 3 min. 40 sec.

The process of firing clay involves two stages: dehydration and vitrification. After the clay is molded into the desired shape, the excess water molecules—called chemical water—seep to the surface. They are propelled by capillary action, the process by which water rises through narrow passages in soil or clay. Once it reaches the surface, the moisture evaporates as the clay is heated.

The chemical dynamics of this process are as follows. Clay's chemical composition is two molecules of water to two molecules of silica (silicon dioxide) and one molecule of alumina (aluminum oxide). During the dehydration stage, the molecules of water evaporate, accounting for about 14% of the clay mixture. The temperature must reach 350 degrees Celsius for evaporation to begin. Dehydration is complete when the temperature reaches about 500 degrees Celsius.

Beyond 500 degrees Celsius, the molecules of silica and alumina begin to bond tightly. They partially fill the spaces left by the escaped water. This bonding gives the clay object its strength and hardness. At this stage, the clay can no longer absorb water and can never return to its soft, malleable state.

Next is the vitrification stage, during which the surface acquires a glass-like smoothness. As the temperature rises above 500 degrees Celsius, the clay's impurities, such as iron oxide, melt away. Those impurities combine to form a glassy substance that flows around the alumina molecules and glues them together, forming a hard bond. A further increase in temperature causes an alumina silicate to grow and interweave with the glassy substance. This interweaving creates a very rigid and crystalline structure in the clay object. That chemical structure is what gives stoneware and porcelain its characteristic ring when struck.

Because of finished clay's chemical bonds, the clay is unable to expand. So if a clay pot is heated over an open fire, the section over the flame will heat faster than other areas, causing uneven expansion. The resulting internal stresses may make the pot shatter. Potters in Africa avoid this problem by firing at lower temperatures to avoid the combining of the silica and alumina. This lower-heat firing allows African pottery to withstand uneven heating over an open flame. It also makes the pottery more porous; heat can gradually escape through the pot, permitting the contents to cool.

Chemical analysis is used by archaeologists to pinpoint the source and age of a pottery artifact. The advantage of chemical analysis over cutting away sections is that results can be obtained from very small samples without damaging the piece. One common technique of chemical testing is to dissolve a sample into acid. This process emits atoms that can be analyzed with a spectrograph, which identifies the elements contained in the pottery.

- dehydration (n) drying up; desiccation • vitrification (n) the process of changing into glass • excess (a) extra; surplus; additional • propel (v) to push; to thrust • evaporate (v) to dry up; to vaporize • dynamic (n) a movement; an operation • account for (phr) to represent; to explain • absorb (v) to soak up • rigid (a) hard; inflexible
- shatter (v) to break into small pieces • withstand (v) to tolerate; to survive • porous (a) permeable; penetrable
- pinpoint (v) to identify; to determine • dissolve (v) to melt • emit (v) to send out; to give off

General Comprehension

1. The word malleable in the passage is closest in meaning to
 - (A) fluid
 - (B) moldable
 - (C) evaporated
 - (D) fragile
2. The word it in the passage refers to
 - (A) lower-heat firing
 - (B) African pottery
 - (C) uneven heating
 - (D) an open flame

On the TOEFL Test

3. The author's description of the dehydration stage mentions all of the following EXCEPT:
 - (A) The surface becomes glassy.
 - (B) Water evaporates.
 - (C) The temperature reaches 500 degrees.
 - (D) 14% of the clay mixture is water.
4. According to the passage, which of the following is NOT true of chemical analysis of pottery?
 - (A) It is used to determine age.
 - (B) A spectrograph identifies the chemical ingredients.
 - (C) It requires that the piece be cut.
 - (D) A sample may be dissolved in acid.

The Chemistry of Pottery

- Two stages to firing clay - dehydration & vitrification
- Dehydration stage
 - (1) _____ evaporate in heat
 - temperature goes from (2) _____ degrees Celsius
 - heating makes elements bond so strengthens and hardens clay
- Vitrification stage
 - gives surface glass-like smoothness
 - (3) _____ in clay come out
 - forms (4) _____ outside the clay
 - changes chemical structure of stoneware

D Read the following passage, and answer the questions.

The Culture of the Alaskan Eskimo

Time Limit: 3 min. 40 sec.

The indigenous peoples of Alaska are divided into four main groups: Eskimo (54,761), Tlingit-Haida (22,365), Athabascan (18,838), and Aleut (16,978).

The largest group, the Eskimo, is a broad term referring to all tribes that live above the timber line in the Arctic area of Alaska. It includes the Inuit and the Yupik. The word Eskimo means "eaters of raw meat." The Eskimo are nomadic, moving with the seasons to follow caribou and sea animals. A taboo among the Eskimo is to mix sea animals with land animals. They are kept separate in the Eskimo kitchen.

The harsh environment compelled the Eskimo to develop advanced tools. They invented the kayak for transportation and the igloo, a house made of blocks of frozen snow. Most Eskimo live in small villages and hunt and fish for their food. Unemployment is high. Oil development since the 1960s has offered careers to some. At the same time, however, it has threatened the traditional Eskimo lifestyle.

The Eskimo resemble East Asians more than they do the Native Americans of the United States. This is because they arrived in Alaska much later than the original migrants who walked across the Bering land bridge. As the land bridge had been submerged before the Eskimo came from Asia, they must have arrived by boat.

Traditional Eskimo were hunters and fishermen. They hunted whales, seals, and walrus from covered seal-skin boats called *qajaits*, named *kayaks* by Europeans. When the waterways froze in winter, the Eskimo would cut holes in the ice and wait for seals and walrus to come to the surface for air. On land the Eskimo traveled with dog sleds led by a team of huskies.

The Eskimo relied on animals to sustain their lifestyle. Not only did the animals provide food, but they were also sources of clothes and tools. Eskimo women would sew clothing and footwear from animal hides using needles made from animal bones and thread from the intestines. The heavy outer garment was the parka. Women made the hood of the parka extra large so as to fit a baby carried in a sling on the mother's back. Boots were fashioned from caribou or seal skins. Work was strictly divided by gender. Men were the hunters and fishermen while women cared for children, made clothing and tools, and cooked the food. Marriages were not always monogamous. Some men practiced polygamy.

One myth in American popular culture is that the Eskimo left their old and infirm relatives out on the ice to die. But the truth is that this method of dying was sometimes voluntarily chosen by those who could no longer work and contribute to the community welfare.

- indigenous (a) native • nomadic (a) wandering; traveling; migrant • taboo (n) a forbidden practice • harsh (a) severe; brutal • compel (v) to force; to coerce • resemble (v) to look like; to be similar to • sustain (v) to support; to maintain • hide (n) skin; a pelt • garment (n) clothes • fashion (v) to make; to design • polygamy (n) the state of having more than one spouse • myth (n) a fallacy; a misunderstanding • voluntarily (ad) willingly; by choice
- infirm (a) sick; feeble

General Comprehension

1. The word it in the passage refers to
 - (A) harsh environment
 - (B) transportation
 - (C) unemployment
 - (D) oil development
2. The word submerged in the passage is closest in meaning to
 - (A) created
 - (B) underwater
 - (C) existing
 - (D) used

On the TOEFL Test

3. According to the passage, all of the following are true of the Eskimo EXCEPT:
 - (A) They live in igloos.
 - (B) They travel on dog sleds.
 - (C) They are the largest indigenous group in Alaska.
 - (D) They were the first Asian tribe to cross the Bering land bridge.
4. The author's description of the Eskimo division of labor mentions all of the following EXCEPT:
 - (A) Men built the igloos.
 - (B) Women cared for the children.
 - (C) Men did the hunting and fishing.
 - (D) Women made clothing from animal skins.

The Culture of the Alaskan Eskimo

- People who live in the Arctic area of Alaska
 - are (1) _____
 - hunt caribou and seals
- Development of tools
 - invented (2) _____ for transportation
 - made igloo for home
- Traditional lifestyle
 - were hunters and fishermen → caught (3) _____
 - used animals for (4) _____
 - men hunted and fished
 - woman took care of children and made clothes and tools

E Read the following passage, and answer the questions.

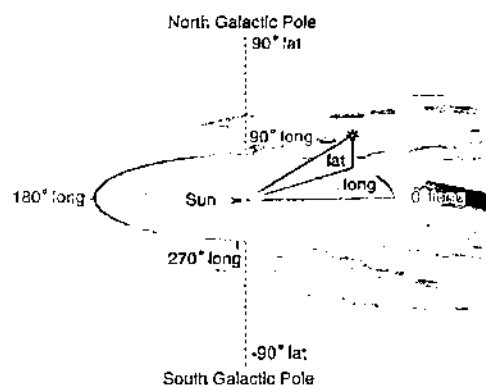
Galactic Coordinates

Time Limit: 3 min. 40 sec.

Places on Earth can be fixed by their coordinates of latitude and longitude. In the same way, our Milky Way galaxy can be plotted by a galactic coordinate system. It was created in 1958 by the International Astronomical Union. It is an altitude/azimuth coordinate system that is similar to the better known coordinate system on Earth. Simple equations can convert from one system to the other.

The galactic equator traces the zero degree latitude line. That line is parallel to the general orientation of the plane of the Milky Way. Thus bodies with a galactic latitude near zero degrees will be located in the Milky Way's arms. Objects with a positive galactic latitude will lie above the arms in the northern galactic hemisphere. And those with a negative latitude will fall below the arms in the southern galactic hemisphere.

Galactic longitude is arbitrarily defined as being in the direction pointing to the center of the galaxy. Longitude moves from zero to 360 degrees. Lines of longitude move counterclockwise as viewed from the top of the galactic sphere. Our sun is at the center of the sphere at the point where zero degree latitude bisects 90 degrees longitude. The North Galactic Pole is at 90 degrees latitude. The South Galactic Pole is at minus 90 degrees latitude.



With these coordinates superimposed on the imaginary sphere that defines the boundaries of our galaxy, astronomers can find celestial objects on the grid of their latitude and longitude. For example, the brightest star in Earth's sky is Sirius, which is at 227 degrees longitude and minus 8.4 degrees latitude. That mapping aids them in conducting star surveys and in tracking the movement of objects through the galactic field. It can also help answer questions about how the density of stars varies with distance from the galactic equator or how much the disk of the Milky Way is flattened at its edges.

Galactic coordinates are useful for marking the location of objects far outside our solar system. The Earth's distance from stars beyond our sun is so great that Earth's orbiting of the sun has little effect on our perception of distant objects' positions. But that same orbital movement would make measurements of bodies inside our solar system inaccurate under the galactic coordinate system.

Objects beyond the Milky Way do not rotate along with it. Thus they will be perceived by us as changing positions to a substantial degree. But they will do so in a predictable way relative to the galactic coordinates. As measured with respect to the rotating Milky Way, other galaxies revolve around us every 220 million years.

- plot [v] to locate; to map • coordinate [n] a point marking a location • convert [v] to change • hemisphere [n] one half of the globe • trace [v] to track • arbitrarily [ad] decided without reason • bisect [v] to divide into two parts
- superimpose [v] to place over something else • conduct [v] to do; to carry out • vary [v] to differ • perception [n] observation • substantial [a] significant; considerable

General Comprehension

1. The word celestial in the passage is closest in meaning to
 - (A) nearby
 - (B) speeding
 - (C) heavenly
 - (D) mapped
2. The word them in the passage refers to
 - (A) coordinates
 - (B) boundaries
 - (C) astronomers
 - (D) objects

On the TOEFL Test

3. According to paragraph 1, which of the following is NOT true of the galactic coordinate system?
 - (A) Locations can be plotted in our galaxy.
 - (B) It was created in 1958.
 - (C) It is based on altitude and azimuth.
 - (D) It can locate places on Earth.
4. The author mentions all of the following uses of galactic coordinates EXCEPT:
 - (A) measuring the flattening of the Milky Way at its edges
 - (B) estimating the distance between Earth and the sun
 - (C) locating objects outside our solar system
 - (D) conducting star surveys

Galactic Coordinates

- Can plot (1) _____ on galactic coordinate system
 - created in (2) _____ by International Astronomical Union
 - is (3) _____ coordinate system
- Works like latitude and longitude
- Can find celestial objects with it
- Can mark objects far outside (4) _____

F Read the following passage, and answer the questions.**Electrolytic Detector**

Time Limit: 3 min. 40 sec.

In the late 1800s, the only means of long-distance communication besides the mail service was the telegraph and telephone. But both required wires to carry their signals. The possibility of wireless transmissions seemed like a fantasy of science fiction. But by the early 1900s, radio broadcasts had become a reality.

The principles making radio possible were developed throughout the nineteenth century. The first breakthrough was by the British physicist Michael Faraday in 1831. He discovered that when an electric current passes through one wire, it produces a current in another wire even though the wires do not touch each other. In 1864, James Maxwell showed that this current—composed of electromagnetic waves—travels at the speed of light. Heinrich Hertz proved that the waves pass through solid objects. With these discoveries in place, the race was on to develop a system of wireless radio.

Among the contenders was Reginald Fessenden, a Canadian inventor. Fessenden began experimenting with radio detectors in order to explore the possibility of voice transmission. In 1900, he was the first person to transmit his voice, but the sound was unrecognizable because the waves were not continuous. He invented a barreter detector, taking its name from the French word *exchanger*, to receive AM (amplitude modulated) signals, but it was not sensitive enough. One day in 1901, he accidentally left a filament of wire in acid for too long until only a tip of the wire was in contact with the acid. Fessenden noticed that, with the wire in the acid, the barreter was very sensitive to nearby continuous radio waves.

Fessenden called his invention a liquid barreter, but it became known as an electrolytic detector. The detector consisted of several connected parts forming an electric circuit. A silver-coated platinum wire was dipped into a small platinum cup filled with nitric or sulfuric acid and connected to the ground. A battery was connected between the wire and the acid, prompting a current to flow in the detector. Someone wearing headphones that were hooked up to the detector could hear a hissing noise, which could be adjusted by turning a dial until the hissing noise stopped. At that point, the detector was highly sensitive to incoming radio waves.

This wet form of the device was known as a bare-point electrolytic detector, after the bare wire that was immersed in the acid. A better design was the sealed-point electrolytic detector, which was more stable because it was sealed in glass. Thus the acid could not spill or evaporate. Fessenden patented his detector in 1903. The device was used in early radio receivers. It set the standard for sensitivity in radio receivers until it was supplanted by the vacuum tube in 1915.

- breakthrough (n) a discovery
- contender (n) a competitor; a contestant
- explore (v) to examine; to research
- sensitive (a) responsive; easily affected
- filament (n) a threadlike object
- dip (v) to dunk; to immerse
- prompt (v) to cause
- hook up (phr) to connect
- adjust (v) to attune; to adapt
- immerse (v) to dip; to sink; to submerge
- supplant (v) to replace

General Comprehension

1. The word transmission in the passage is closest in meaning to
 - (A) detection
 - (B) transcription
 - (C) conveyance
 - (D) interpretation
2. The word it in the passage refers to
 - (A) his voice
 - (B) the sound
 - (C) barreter detector
 - (D) AM signals

On the TOEFL Test

3. The author's description of the discovery of electromagnetic waves mentions all of the following people EXCEPT:
 - (A) Heinrich Hertz
 - (B) James Maxwell
 - (C) Reginald Fessenden
 - (D) Michael Faraday
4. According to the passage, which of the following is NOT true of the electrolytic detector?
 - (A) It worked without a battery.
 - (B) A wire touched acid.
 - (C) It formed an electric circuit.
 - (D) It made a hissing noise.

Electrolytic Detector

- Many advances in radio technology
 - Michael Faraday → makes discovery of currents through wires
 - James Maxwell → shows currents travel at (1) _____
 - Heinrich Hertz → proves waves go through (2) _____
- Race to create wireless radio - Reginald Fessenden → Canadian inventor
 - works on (3) _____
 - invents barreter to receive AM signals
- Liquid barreter - later called (4) _____
 - forms an electric circuit
 - can hear noise through it
 - used in early radio receivers

● Building Summary Skills

The following summaries are based on the passages you worked on earlier. Complete each of them by filling in the blanks with suitable words or phrases.

1. Native American Indian Languages

endings or prefixes
tobacco and chocolate

eight languages
Native Indian languages

polysynthesis

Native American Indians spoke over a thousand languages. But the European conquest of America began the slow extinction of most ⁽¹⁾ _____. Today just ⁽²⁾ _____ remain with more than a thousand speakers. The largest are Navajo, Cree, Ojibwa, and Cherokee. The languages are characterized by ⁽³⁾ _____, in which a single word can express many ideas with ⁽⁴⁾ _____ added to a root word. Many common English words were borrowed from Indian languages, such as ⁽⁵⁾ _____.

2. Mars and Earth

a weaker force of gravity
a lack of water

origins and compositions
the same chemical elements

tectonic movements

Earth and Mars share similar ⁽¹⁾ _____. They both condensed from a cloud of gas around the sun and are made of ⁽²⁾ _____. But Mars is much smaller, resulting in ⁽³⁾ _____, a thinner atmosphere, and ⁽⁴⁾ _____. While volcanic activity continues to shape Earth today, the Martian surface is no longer changed by ⁽⁵⁾ _____. Without the kind of magnetic field that protects Earth, Mars is bombarded by electrically charged particles from the sun.

3. The Chemistry of Pottery

the age and source
expansion

500 degrees Celsius
its glassy surface

high temperatures

Pottery is made by exposing clay to ⁽¹⁾ _____. The process involves two stages. In the dehydration stage, the clay is heated to between 350 and 500 degrees Celsius. As the clay heats, it dehydrates and hardens. In the vitrification stage, the clay is heated above ⁽²⁾ _____, which removes the impurities and gives the clay ⁽³⁾ _____. Pottery may shatter during heating, as its chemical bonds hinder ⁽⁴⁾ _____. Heating at a lower temperature can avoid this problem. Chemical analysis can detect ⁽⁵⁾ _____ of a pottery shard.

4. The Culture of the Alaskan Eskimo

dog sleds
inventing kayaks

parkas
caribou and sea animals

Alaskan Indians

The Eskimo are the largest group of ⁽¹⁾ _____. They are nomadic, moving with the seasons to follow their food supply of ⁽²⁾ _____. They have adapted to the harsh environment by ⁽³⁾ _____ for water travel, ⁽⁴⁾ _____ for land travel, and igloos for shelter. Men do the hunting and fishing while women do the domestic chores and childcare. Animals provide not only food but also clothing and tools. Women sew outer garments called ⁽⁵⁾ _____, which are made from animal hides. Some men marry more than one wife.

5. Galactic Coordinates

the galactic coordinate system
the galaxy

the galactic coordinates
the Milky Way

astronomers

Celestial objects in our Milky Way galaxy can be mapped with ⁽¹⁾ _____, which was invented in 1958 by the International Astronomical Union. Lines of latitude and longitude are imposed on an imaginary grid over ⁽²⁾ _____. Using these lines, ⁽³⁾ _____ can assign locations to stars and track their movements through ⁽⁴⁾ _____. The system also permits the mapping of objects outside the Milky Way, as they move in predictable ways relative to ⁽⁵⁾ _____.

6. Electrolytic Detector

incoming radio waves
an electric circuit

Reginald Fessenden
the electrolytic detector

1915

Radio transmission was made possible by ⁽¹⁾ _____, which was invented by ⁽²⁾ _____ in 1901. The detector formed ⁽³⁾ _____ when a platinum wire was dipped in acid. The circuit could detect ⁽⁴⁾ _____. A person wearing headphones connected to the detector could hear the hissing sound of the radio waves. The device was used in early radio receivers until ⁽⁵⁾ _____.



1. The word they in the passage refers to
 - (A) ice caps
 - (B) water and seasons
 - (C) improved telescopes
 - (D) speculations
2. According to paragraph 2, the first map of Mars showed which of the following surface features?
 - (A) mountains
 - (B) craters
 - (C) deserts
 - (D) canals
3. What does the author imply about water on Mars?
 - (A) It never existed because Mars has no oxygen.
 - (B) It disappeared because of Mars's thin atmosphere and cosmic radiation.
 - (C) It was carried by manmade canals.
 - (D) It was used to irrigate the deserts.
4. The word conveyed in the passage is closest in meaning to
 - (A) evaporated
 - (B) collected
 - (C) transported
 - (D) condensed
5. Why does the author mention H.G. Wells's novel War of the Worlds?
 - (A) To show that another astronomer agreed with Lowell
 - (B) To give an example of how Lowell's view was adopted by popular culture
 - (C) To identify a famous novel of the early 1900s
 - (D) To prove that there were canals on Mars

Theories of Life on Mars

In the mid-1700s, astronomers observed polar ice caps on Mars. William Herschel saw that the ice caps changed in size with the seasons. The presence of water and seasons, features present on Earth, prompted speculation that life might exist on Mars.

Improved telescopes in the nineteenth century further fueled these speculations. They allowed Mars's surface features to be identified. In 1877 an Italian astronomer, Giovanni Schiaparelli, used a 22-centimeter telescope to draw the first map of Mars. His map depicted long lines that he called *canali*, the Italian word for channels. But his term was mistakenly translated into English as canals. Because channels are usually natural and canals are manmade, the mistake gave birth to imaginative theories of life on Mars over the next 100 years.

The leading proponent of the view that the canals were built by intelligent beings was an American astronomer, Percival Lowell. At the Lowell Observatory in the high altitude and clear air of Flagstaff, Arizona, Lowell studied Mars extensively and made detailed drawings of its surface features. He published books about his Mars studies, including *Mars and Its Canals* in 1906 and *Mars As the Abode of Life* in 1908. Lowell proposed that the canals had been constructed by a long-extinct civilization as an elaborate irrigation system. The canals conveyed water from the polar regions to the dry population centers of the planet. Lowell's ideas were embraced by popular culture. The British novelist H.G. Wells wrote the most famous novel describing life on Mars, War of the Worlds. He imagined that Martians invaded Earth in order to flee the death of their own planet.

Bigger and better telescope lenses in the twentieth century failed to confirm that the features Lowell observed really were canals. In



6. According to the passage, which of the following is NOT true about Mars?
- (A) It has methane.
 - (B) It had water at one time.
 - (C) It has a thick atmosphere.
 - (D) Its surface has no organic matter.
7. Which of the following can be inferred from paragraph 5 about Earth?
- (A) Its atmosphere is made mostly of carbon dioxide and water.
 - (B) Its atmosphere is thinner than Mars's.
 - (C) Its oceans were once frozen carbon dioxide.
 - (D) Its magnetic field protects life forms from cosmic radiation.
8. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not in the passage or are minor ideas in the passage.

This passage discusses the history of theories of life on Mars.

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•
•

Answer Choices

- (A) H.G. Wells wrote *War of the Worlds*.
- (B) The Italian word for channels is *canali*.
- (C) Observations of polar ice caps and canals suggested that life existed.
- (D) Recent space probes have proved that life is lacking.
- (E) Improved telescopes showed that there are no canals.
- (F) The Viking project conducted soil surveys on Mars.

fact, they ultimately were shown to be optical illusions.

Life on Mars was dealt a further blow beginning in 1965. The United States launched the Mariner spacecrafts to fly close to the surface to take photographs and test the atmosphere. Those probes showed that Mars has a thin atmosphere made mostly of carbon dioxide and that the polar ice caps are frozen carbon dioxide, not water. The photos revealed that Mars had no rivers, oceans, or any other visible signs of life. Scientists concluded that Mars's thin atmosphere and lack of a magnetic field made it vulnerable to harmful cosmic radiation. Biological and soil experiments were conducted by the Viking project in 1976. To the scientists' surprise, the tests showed that Mars's surface has no organic matter at all. Thus the present view is that Mars is a dead planet, though there may have been life early in its history that later became extinct.

Beginning in 1996, the United States launched a highly successful series of landings on Mars. While they have not found life, they have expanded our knowledge of Martian geology and chemistry. A robotic exploration vehicle in 2001 sent back to Earth spectacular images of Mars's terrain. Other missions have detected hydrogen and methane. In 2004, Martian vehicles provided conclusive evidence that water existed in the distant past. Additional American missions have been planned through 2009. The European Space Agency wants to land humans on Mars by 2035. And in 2004, the American president declared a national goal of sending astronauts to land on and explore Mars.

9. The word elaborate in the passage is closest in meaning to

- (A) unique (B) formal
(C) intricate (D) traditional

10. According to the passage, the term landscape architecture was first used by

- (A) Gilbert Laing Meason
(B) the Romans
(C) Frederick Law Olmstead
(D) the American Society of Landscape Architects

11. The word it in the passage refers to

- (A) a public park
(B) a large rectangular space
(C) the city
(D) Olmstead and Vaux's design

12. According to paragraph 4, Olmstead's goal in designing Central Park was to

- (A) establish landscape architecture as a profession
(B) create a restful place for all people
(C) provide a recreational area for the wealthy
(D) plant trees to conceal traffic

13. According to paragraph 4, which of the following is NOT part of the current Central Park?

- (A) Tavern on the Green
(B) running tracks
(C) a wildlife sanctuary
(D) horse-drawn carriages

14. The word adept in the passage is closest in meaning to

- (A) enthusiastic (B) reluctant
(C) skilled (D) professional

Landscape Architecture in America

Landscape architecture is the design and development of land for human use and enjoyment. Before the middle of the nineteenth century, landscape architecture was practiced as an art but not as a profession. Since ancient times, the art had been employed only by the wealthy. Romans had their courtyards, Persians their gardens, Italians their city plazas, and the French their palace grounds. The upper classes in the American colonies adopted the landscape style of the British, especially their elaborate gardens. As most landscape projects included gardens, the designers were called landscape gardeners.

The inventor of the term landscape architecture was a British scholar, Gilbert Laing Meason, who wrote it in a book in 1828. He was the first to draw attention to the connection between the natural landscape and principles of building design. In the United States, the label was adopted by Frederick Law Olmstead, the first person to claim that title as his profession.

Olmstead revolutionized the field when he and architect Calvert Vaux entered a competition for the design of New York's proposed Central Park. With New York's rise in population in the early 1800s, the city's leaders realized the need to set aside open spaces for a public park. The New York legislature approved money for a large rectangular space in the middle of the city. In 1858, Olmstead and Vaux's design was selected, and it was built over the next 15 years.

Olmstead's concept was to make the park a symbol of democracy and egalitarian ideals. He saw it as a place that welcomed all classes of people and encouraged them to contemplate and recreate away from the pressures of everyday life. His novel design idea was to create what he called "separate circulation systems" for the different classes of users—pedestrians, horseback riders, and horse-drawn



15. Why does the author mention landscape scientists?

- (A) To give an example of a specialized field of landscape architecture
- (B) To list one of the professions requiring an advanced degree
- (C) To name the professionals who solve hydrology problems
- (D) To show that landscape architects must understand social problems

16. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not in the passage or are minor ideas in the passage.

This passage discusses the development of landscape architecture in America.

•
•
•

Answer Choices

- (A) Landscape architecture became a separate profession in the middle of the nineteenth century.
- (B) Landscape managers are concerned with the long-term care of a landscape.
- (C) Landscape architecture now requires an advanced degree and knowledge of many disciplines.
- (D) Olmstead added the Summer House to the Capitol as a drinking fountain for horses.
- (E) Central Park was built over 15 years.
- (F) Frederick Law Olmstead, the designer of New York's Central Park, was the first great American landscape architect.

carriages. Traffic moving through the park was concealed in sunken roadways hidden by shrubs to preserve the appearance of an unspoiled landscape. Today the park includes running tracks, ice skating rinks, a wildlife sanctuary, baseball fields, playgrounds, and a world-famous restaurant, Tavern on the Green.

Olmstead also designed the grounds of the United States Capitol building in Washington, D.C. He installed the marble terraces that project from the sides of the building. Some visitors to the Capitol complained that they had no place to water their horses. In response, Olmstead designed an open-air brick building, the Summer House, which had a fountain from which horses could drink.

Landscape architects founded their own organization in 1899, the American Society of Landscape Architects. It is now a profession equal to that of doctors and lawyers, requiring an advanced degree plus a license to practice. The field is multi-disciplinary. A landscape architect must be familiar with mathematics, science, engineering, art, and technology. He must also understand the social context of the work and must be adept at dealing with politicians, public interest groups, and government agencies.

The profession has become increasingly specialized. Landscape designers and technicians or engineers plan and build the project. Landscape managers are concerned with the long-term care of the landscape. They might work in forestry, nature conservation, or estate management. Landscape scientists work with the architects on technical problems in areas such as soils, hydrology, or botany. Public policy and planning strategies are developed with the aid of landscape planners. Garden designers work on private gardens as well as historic-garden preservation.

Vocabulary Review

A Choose the word with the closest meaning to each highlighted word or phrase.

- The international fair served diverse foods.
 (A) different (B) multiple (C) plentiful (D) popular
- The freezing process quickly condensed the fluid into solid ice.
 (A) consolidated (B) created (C) compressed (D) dissolved
- The rebels bombarded the palace with gunfire.
 (A) entered (B) surrounded (C) captured (D) attacked
- The doctor applied a rigid cast to immobilize her broken wrist.
 (A) flexible (B) plaster (C) hard (D) removable
- The witness was unable to pinpoint the exact date of his injury.
 (A) identify (B) write (C) approximate (D) summarize
- The harsh climate doomed the expedition.
 (A) wet (B) hostile (C) changeable (D) unexpected
- As she is elderly and infirm, my grandmother cannot travel.
 (A) miserable (B) lonely (C) sickly (D) unpleasant
- The cloudy night impaired his perception of the passing comet.
 (A) observation (B) understanding (C) recording (D) prediction
- Two construction companies were contenders for the government contract to build the bridge.
 (A) builders (B) participants (C) writers (D) competitors
- Million of dollars were missing, prompting an investigation.
 (A) causing (B) suggesting (C) terminating (D) rejecting

B Match each word with the correct definition.

- | | | |
|----------------|---|---|
| 1. tacked on | • | • a. to place over something else |
| 2. filament | • | • b. decided without reason |
| 3. proportion | • | • c. a forbidden practice |
| 4. porous | • | • d. added; attached |
| 5. stereotype | • | • e. a ratio; a measure |
| 6. superimpose | • | • f. the state of having more than one spouse |
| 7. polygamy | • | • g. to push; to thrust |
| 8. arbitrarily | • | • h. a threadlike object |
| 9. propel | • | • i. permeable; penetrable |
| 10. taboo | • | • j. commonly accepted wisdom about the nature of a person or thing |

Unit

5

Sentence Simplification

5 Sentence Simplification

Overview

■ Introduction

Sentence Simplification questions ask you to choose a sentence that best paraphrases the original sentence in the passage. The correct answer uses different vocabulary and different grammar to restate the essential meaning of the original sentence in a simpler way. This type of question does not appear in every reading passage. Also, there is never more than one Sentence Simplification question in a passage.

■ Question Type

Which of the following best expresses the essential information in the highlighted sentence? *Incorrect* answer choices change the meaning in important ways or leave out essential information.

■ Useful Tips

- Figure out what essential information is in the original sentence.
- Do not focus on minor information such as details and examples.
- Keep in mind that incorrect answers contradict something in the original sentence or leave out important information from the original sentence.
- Make sure that your answer agrees with the main argument of the paragraph or the passage as a whole.



Sample iBT Question

Which of the following best expresses the essential information in the highlighted sentence? *Incorrect* answer choices change the meaning in important ways or leave out essential information.

- (A) Anytime a plate pushes upwards, it forms a volcano on the Earth's surface.
- (B) Volcanoes are formed when the rise of tectonic plates makes a gap in the Earth's surface.
- (C) Volcanoes are always formed when gaps in the Earth's crust appear.
- (D) A mountain can be changed into a volcano when a plate pushing upwards opens a gap in the Earth's crust.

Volcanoes

When people think of volcanoes, they typically imagine large, cone-shaped mountains that explode with hot lava. In fact, there are many different kinds of volcanoes, and they are commonly found on flat ground or under the ocean. They are created when two or more tectonic plates either come together or pull apart. Tectonic plates are large pieces of the Earth's crust that are constantly, yet very slowly, moving. When tectonic plates come together, they create mountain ridges. Some of the mountains are volcanoes, which are formed when the plates that push upwards create gaps in the Earth's crust. Likewise, when tectonic plates pull apart, they often leave similar gaps in the Earth's crust, which create volcanoes. Most of the time, however, volcanoes that are formed by tectonic plates pulling apart are flat volcanoes. In the ocean, there are both flat and mountainous volcanoes.

Correct Answer

The essential information in the original sentence is that the rise of plate tectonics creates a volcano by making a gap in the Earth's crust. So the correct answer is (B).

Sea Level and Land

Sea level refers to the average height of the ocean as compared to land. Measuring the height of the ocean is difficult, as it can be as much as two meters higher in one part of the world than in another. Also, sea level can rise because of tides, which are caused by the position of the moon. High tide refers to the time when the sea level is high compared to land, the result of which is there is little beach near the ocean. Low tide is the time when the sea is low compared to land, so the size of the beach expands. Melting icebergs are another cause of rising sea levels. Icebergs are enormous chunks of ice which float in the world's coldest oceans. They are melting on account of global warming and thus causing the world's average sea level to rise. As a result of icebergs melting, some islands are being swallowed by the sea.

1. Which of the following best expresses the essential information in the highlighted sentence?
Incorrect answer choices change the meaning in important ways or leave out essential information.
 - (A) The moon's location affects tides, causing sea levels to rise.
 - (B) Sea levels always rise because they are affected by the moon.
 - (C) High tide is a result of the position of the moon.
 - (D) The moon's position is caused by the tides making sea levels rise.

Migratory Birds

Every fall and winter, birds set out on their annual migrations to southern lands. They take these long journeys for many different reasons: they may need to go where there is more food, where they can live comfortably, or where they can breed in peace. Migratory birds often remain in northern places during the summer and migrate south when the temperature starts to dip. Birds spend their winters in warm, southern regions and then return north when it starts to become too hot. The advantages of migration are that birds have more hours to feed their young during the long, northern summers and there is lots of food like insects for them to eat. When it starts to become cold, they can return to warmer regions, where there is not much difference in the lengths of the days and the food supply. The disadvantage is that migration can be a dangerous trek and requires vast stores of energy.

2. Which of the following best expresses the essential information in the highlighted sentence?
Incorrect answer choices change the meaning in important ways or leave out essential information.
 - (A) Birds live in the north in summer but fly south for the winter.
 - (B) Migratory birds leave their northern habitat to move to the south when it becomes colder.
 - (C) When temperatures become colder, migratory birds fly north to avoid the cold.
 - (D) Migrating south for winter is one way birds avoid dipping temperatures in the north in winter.

Weather Changes in the Desert

The weather can change drastically in the desert over the course of a mere day. For example, the temperature can be 40°C at 2 p.m., yet, on that same day, it may potentially drop to -15°C by 3 a.m. The sand reflects the sunlight during the day, making both the sand and air temperature extremely hot. The principle behind this is the same as when one walks along a beach on a hot day and feels the burning hot sand under one's feet. It is the same principle in the desert. At nighttime, because the sand does not absorb any of the sun's heat during the day, the temperature becomes very cold. In forests and grasslands, the sun's heat is absorbed by trees and grass during the day, so the temperature is not as cold as during the night. But in deserts, there are almost no trees and little grass. Thus heat is not absorbed, and the results are extremely hot days followed by frigid nights.

3. Which of the following best expresses the essential information in the highlighted sentence? *Incorrect answer choices change the meaning in important ways or leave out essential information.*

(A) The sand in deserts becomes cold at night since it does not absorb the sun's energy.
 (B) Temperatures in sandy places can be cold since sand cannot absorb any of the sun's heat.
 (C) Deserts become cold at night because the sand fails to retain the daytime solar heat.
 (D) Sand only absorbs small amounts of energy from the sun, resulting in cold desert nights.

Plant Defenses Against Plant-Eating Animals

There are many ways that plants can defend themselves against the animals that eat them. Their various defenses allow them to survive in areas where there are many herbivores. Plant defenses include protections on the surface of plants, like thorns on roses; materials in the plants that make them difficult to digest by animals, and poisons that kill or make herbivores very sick. Plants also have other amazing ways of protecting themselves by attracting animals that hunt and eat herbivores, called carnivores. For example, they create smells that the predators of herbivores like, or they provide them food or shelter. Defenses can always exist in plants, or they can develop after the plant has been damaged by herbivores. Any plant species often has many ways to defend itself from herbivores. That is why many plant species are millions of years old.

4. Which of the following best expresses the essential information in the highlighted sentence? *Incorrect answer choices change the meaning in important ways or leave out essential information.*

(A) Plants are always protected by various defenses like poisons or thorns because herbivores always eat them.
 (B) Plants protect themselves from herbivores by developing various defense mechanisms.
 (C) Some herbivores become sick or die when eating plants, which helps protect these plants from animals.
 (D) Thorns, poison, or hard-to-digest leaves are ideal protection for many plants.



A Read the following passage, and answer the questions.

Eye Variation Among Different Species

Time Limit: 3 min. 30 sec.

The human criterion for perfect vision is 20/20 for reading the standard lines on a Snellen eye chart without a hitch. The score is determined by how well you read lines of letters of different sizes from around six meters away. But being able to read the bottom line on the eye chart does not approximate perfection as far as other species are concerned. Most birds would consider us very visually handicapped. The hawk, for instance, has such sharp eyes that it can spot a dime on the sidewalk while perched on top of the Empire State Building. It can make fine visual distinctions because it is blessed with one million cones per square millimeter in its retina. And in water, humans are farsighted while the kingfisher, swooping down to spear fish, can see well in both the air and water because it is endowed with two foveae—areas of its eye, which consist mostly of cones that provide visual distinctions. One fovea permits the bird, while in the air, to scan the water below with one eye at a time. This is called monocular vision. Once it hits the water, the other fovea joins in, allowing the kingfisher to focus both eyes, like binoculars, on its prey at the same time. A frog's vision is distinguished by its ability to perceive things as a constant motion picture. Known as bug detectors, a highly developed set of cells in a frog's eyes responds mainly to moving objects. So it is said that a frog sitting in a field of dead bugs would not see them as food and would starve.

The bee has a compound eye, which is used for navigation. It has 15,000 facets that divide what it sees into a pattern of dots, or mosaic. With this kind of vision, the bee sees the sun only as a single dot, a constant point of reference. Thus, the eye is a superb navigational instrument that constantly measures the angle of its line of flight in relation to the sun. A bee's eye also gauges flight speed. And if that is not enough to leave our 20/20 perfect vision paling in comparison, the bee is capable of seeing something we cannot—ultraviolet light. Thus, what humans consider to be perfect vision is in fact rather limited when we look at other species. However, there is still much to be said for the human eye. Of all the mammals, only humans and some primates can enjoy the pleasures of color vision.

- criterion [n] a standard; a basis • hitch [n] a problem • approximate [v] to come close to; to approach
- handicapped [a] limited; restricted • perch [v] to alight; to sit down • retina [n] the area at the back of an eye
- swoop [v] to fly down suddenly • be endowed with [phr] to be blessed with • monocular [a] involving a single eye
- prey [n] a victim • perceive [v] to see; to notice • constant [a] continuous; incessant; perpetual
- respond to [phr] to react to • starve [v] to die of hunger • navigation [n] direction finding • facet [n] an aspect; an angle; a phase; a slide
- gauge [v] to measure; to check • pale [v] to diminish; to recede; to fade • superb [a] excellent; exceptional

General Comprehension

- According to paragraph 1, what kind of vision does a kingfisher have?
 - It has the ability to see a coin from very high up.
 - It can use just one eye to look at something.
 - It can detect things according to how they move.
 - It has a compound eye that it uses for navigation.
- According to the passage, how does human eyesight compare with most animals?
 - Most animals have worse eyesight than humans.
 - All animals can see in ultraviolet light, unlike humans.
 - Humans typically have poorer eyesight than animals.
 - Humans and animals have comparable eyesight.

On the TOEFL Test

- Which of the following best expresses the essential information in the first highlighted sentence? *Incorrect answer choices change the meaning in important ways or leave out essential information.*
 - Other species might not consider perfect human eyesight to be ideal for them.
 - Some other animals can also read the eye chart, which means that they have perfect eyesight.
 - Other species are not particularly concerned about being able to read the bottom of an eye chart.
 - Different species have different methods of determining perfect eyesight.
- Which of the following best expresses the essential information in the second highlighted sentence? *Incorrect answer choices change the meaning in important ways or leave out essential information.*
 - One type of vision the bee has is to see the sun as a mere dot.
 - The bee constantly refers to the sun's position even though it only appears as a small dot.
 - A small dot is all that bees need to determine their reference point.
 - The bee uses the sun as a reference point, which appears as a dot in its vision.

Eye Variation Among Different Species

- Hawks
 - very sharp eyes → can make fine distinctions from (1) _____
- Kingfishers
 - can see in water and air
 - have (2) _____ → give it monocular vision
- Frogs
 - perceive objects (3) _____
- Bees
 - have (4) _____
 - see patterns of dots
 - use sun as point of reference

B Read the following passage, and answer the questions.

The White Ant

Time Limit: 3 min. 30 sec.

White ants are more commonly known as termites. They are given the name white ants because they look a little like ants; however, their diets and lifestyles are completely different. Termites mostly feed on dead plants and trees, and they can be quite a pest in parts of the world where people use wood to build houses. They can also cause a lot of damage to farmers' crops. On the other hand, they are very useful animals in that they recycle a lot of dead trees and plants back into the ecosystem. Because they eat dead trees and plants, they often nourish the living parts of forests with their mineral-rich feces.

Termites are similar in size and social habits to regular ants, but that is where the similarities end. They are softer, whiter, shorter-legged, fatter, and much slower than ants. Surprisingly, they belong to the same species as praying mantises and cockroaches. Termites use parts of their mouths to bite into dead wood, so their teeth are quite strong. They usually live inside dark nests and tunnels, and they only leave their homes to make new tunnels or nests to live in or to find food.

White ants are highly social in that they live in colonies of several hundred to several million individuals. They cooperate with one another to find and gather the food not only that they need but that the colony as a whole requires. They are also highly organized according to what job or task they must perform for the colony. Most termites are workers, though there are also soldiers, male ants that are used just for reproduction, and queens that lay eggs.

In some parts of the world, white ants create enormous nests that eventually become mounds that can tower into the sky. In many African countries, the landscape is scattered with these gigantic piles, sometimes as high as six meters! Termites tend to build straight upwards rather than horizontally. Some scientists believe that they do this to create better air circulation inside the big nests. With improved air circulation, the temperature inside stays almost the same all day long, regardless of the outside temperature. This is important because if the temperature changed a lot, then many of the termite eggs could die before they hatched. There are also complex tunnels inside the mounds that allow the termites to do their work more easily and in a more organized way. Most tunnels are used for a specific job, and the termites always seem to know which tunnel to use and which way to go when they have a specific job to do. In some ways, white ants seem smarter than people!

• mostly [ad] mainly; chiefly • pest [n] a harmful insect; a nuisance • nourish [v] to enrich • feces [n] waste; manure • social [a] enjoying the company of others • colony [n] a group • cooperate [v] to work together
• as a whole [phr] in general • task [n] a job; a duty • reproduction [n] procreation; generation • enormous [a] huge; gigantic • circulation [n] a flow; a movement • regardless of [phr] irrespective of; nonetheless • hatch [v] to come out; to break open • mound [n] a large pile

General Comprehension

1. According to the passage, which of the following are true about termites when compared to ants?

Click on 2 answers.

- ☐ A They can move faster.
- ☐ B Their bodies are softer.
- ☐ C They show more sociability.
- ☐ D They have shorter legs.
- ☐ E Their queens lay more eggs.

2. According to the passage, why do termites build nests straight up?

- ☐ A They are unable to build them horizontally.
- ☐ B They can build larger nests this way.
- ☐ C It helps them improve the air quality in their nests.
- ☐ D Scientists are not sure why they do it.

On the TOEFL Test

3. Which of the following best expresses the essential information in the first highlighted sentence?
Incorrect answer choices change the meaning in important ways or leave out essential information.

- ☐ A Termites have strong teeth for biting into dead wood.
- ☐ B Termites' teeth have evolved to be strong over the years.
- ☐ C Termites' teeth become stronger when they bite into dead wood.
- ☐ D Termites that bite dead wood have stronger teeth than those which do not.

4. Which of the following best expresses the essential information in the second highlighted sentence?
Incorrect answer choices change the meaning in important ways or leave out essential information.

- ☐ A Six-meter-high termite nests are found in every country in Africa.
- ☐ B Gigantic piles of termites that are six meters high may be seen in Africa.
- ☐ C It is possible to see high termite nests in many African countries.
- ☐ D African termites build very high nests in all the countries there.

The White Ant

- Commonly called (1) _____, – look like ants but are very different
- Characteristics – eat dead plants and trees
 - damage homes and farmer's crops
 - help (2) _____
- Different from ants – softer, whiter, (3) _____, fatter, and slower
 - belong to the praying mantis and cockroach family
 - have very strong teeth
- Types of white ants – workers, soldiers, males for (4) _____, and queens

C Read the following passage, and answer the questions.

The Archaeopteryx Fossil

Time Limit: 3 min. 30 sec.

The Archaeopteryx fossil was a very important discovery by archaeologists. It was discovered in Southern Germany, where there are many well-preserved fossils. The Archaeopteryx fossil is the remains of an ancient bird, which is about 150 million years old. Many scientists believe that Archaeopteryx might have been the first kind of bird ever. It is not very similar to the kinds of birds we see today. Scientists believe it was part bird and part dinosaur because it had feathers and wings, but it was also reptilian, like the ancient dinosaurs. Unlike birds in today's world, Archaeopteryx had a full set of teeth, a flat chest, a long, bony tail, and three claws on its wings, which might have been used to attack prey or to hold on to trees. In fact, from looking at the fossils of Archaeopteryx, the ancient creature looks a lot more like a dinosaur than a bird.

A big debate amongst scientists is what Archaeopteryx used its feathers for. Some scientists suggest they were used to control their body temperature while others believe that they were used for flight. This is a very important question for scientists because they want to know how animals first started to fly. There are two theories about the origin of flight and about what Archaeopteryx used its feathers for. The first argument is called trees-down; this is the theory that ancient birds used their feathers to glide down to the ground from trees much like how flying squirrels do today. The other argument is called ground-up; this is the theory that ancient birds lived on the ground and used their feathers to help them make long leaps into trees whenever they needed to. For example, if they needed to get away from predators, then they could jump into the trees from a great distance and hold on to them with their claws.

Scientists are curious as to why ancient birds stroked their wings like modern birds. They believe it might be related to the way that some kinds of dinosaurs used their strong forearms to grab downwards and hold on to their prey. If Archaeopteryx did this, then it might have learned that it could also use its strong forearms to flap its wings and stay in the air for longer periods of time. Over millions of years, animals that were related to Archaeopteryx might have been able to stay in the air for longer and longer until finally they could fly like modern birds do.

- fossil (n) the preserved remains of an animal
- archaeologist (n) a scholar who studies the societies and peoples of the past
- ancient (a) very old
- reptilian (a) relating to reptiles, such as snakes and lizards
- debate (n) a discussion; controversy
- origin (n) the beginning
- argument (n) reason; argumentation
- glide (v) to fly or move in a smooth way
- get away (phr) to run away
- curious (a) inquisitive
- leap (n) a long jump
- flap (v) to flutter; to beat wings

General Comprehension

- According to paragraph 1, Archaeopteryx used the claws on its wings for
 - flying
 - grabbing things
 - defensive purposes
 - fishing
- According to the passage, why do scientists want to know why ancient birds stroked their wings?
 - They will be able to find out the birds' mating habits.
 - They might understand more about evolution.
 - They will be able to learn when animals first learned how to fly.
 - They will learn the secret to how Archaeopteryx could fly for so long.

On the TOEFL Test

- Which of the following best expresses the essential information in the first highlighted sentence?
Incorrect answer choices change the meaning in important ways or leave out essential information.
 - Scientists think that Archaeopteryx was created when a bird and dinosaur mated with one another, giving it characteristics of both.
 - Since Archaeopteryx had feathers but was reptilian, scientists think it was a cross between a bird and a dinosaur.
 - Archaeopteryx had feathers like a bird and was also reptilian, so this makes scientists believe that it was an ancient dinosaur.
 - Many scientists believe that the ancient dinosaurs were both part bird and part dinosaur.
- Which of the following best expresses the essential information in the second highlighted sentence?
Incorrect answer choices change the meaning in important ways or leave out essential information.
 - Archaeopteryx's first flight and the purpose of its feathers can be explained in two ways.
 - Two theories perfectly describe the uses of Archaeopteryx's feathers and flight origins.
 - Scientists are not sure how Archaeopteryx learned to fly or how it used its feathers.
 - The great mysteries of Archaeopteryx are the use of its feathers and how it learned to fly.

Archaeopteryx Fossil

- Remains of ancient bird found in (1) _____
- Characteristics - about (2) _____ years old
 - maybe first bird ever
 - was part bird and part dinosaur
- Don't know the use of feathers - some think to control (3) _____
 - others think to fly
- Theories on flight origins - trees-down → used feathers to (4) _____ from trees
 - ground-up → used feathers to leap into trees

D Read the following passage, and answer the questions.

Ecosystems

Time Limit: 3 min. 40 sec.

The word ecosystem is a mix of the words ecological and system. Ecosystem refers to all the natural things and processes that control the behavior of plants, animals, and minerals in a certain part of nature. One example is the desert ecosystem. It is usually hot and dry in the desert though it can be very cold at night. Therefore, all of the plants, animals, and other things have adapted to this environment. In other words, there is a harmony in the desert ecosystem between all things that live or exist there and the environment. There is no limit as to how big or how small an ecosystem may be. As long as the harmony is real, then there is an ecosystem.

Ecosystems have become an important issue in modern politics and amongst environmental groups because many of the world's ecosystems are being destroyed. In recent years, the representatives of 175 countries—almost every country in the world—signed an international agreement called the Convention on Biological Diversity. This convention says that nations and individuals should protect ecosystems and natural living areas and try to maintain the populations of plants and animals that exist in all ecosystems. This convention states that all parts of an ecosystem work together in harmony and as a whole, so the ecosystem is like a unit or one body. If a part of a body is cut off or killed, then there is a good chance that the whole body will die or will stop working properly. When any part of an ecosystem is destroyed, it is likely that the ecosystem will be destroyed or will stop working properly.

It is important to learn about how the harmony or balance is maintained in an ecosystem. The balance is maintained through many different interactions between the various parts of an ecosystem. For example, when there are too many mosquitoes in a forest, then frogs eat a lot of them. Because frogs eat a lot, they tend to be healthier, and thus they have more babies. But then there are too many frogs, so other animals start to eat more frogs. And the cycle repeats itself over and over until there is harmony in the ecosystem. There are some plants and animals that help one another to survive more easily. Insects like termites break down dead trees and return nutrients to the soil. This makes the soil richer, and plants can grow more easily in the soil. There are millions of things that happen to maintain the balance or harmony in an ecosystem. But when one part of the ecosystem dies because of what humans do to the environment, then there are terrible consequences for the ecosystem.

- adapt to (phr) to get used to; to get accustomed to
- limit (n) a boundary; a constraint
- representative (n) a delegate
- convention (n) an agreement; a pact
- diversity (n) variety
- maintain (v) to keep constant or steady
- state (v) to declare; to write; to say
- destroy (v) to kill; to eliminate
- properly (ad) correctly; appropriately
- interaction (n) a communication
- various (a) different; diverse
- break down (phr) to decompose; to disintegrate
- nutrient (n) a substance that helps life to grow
- soil (n) the top layers of earth
- consequence (n) a result; an aftereffect

General Comprehension

- According to paragraph 1, which of the following is true about the desert?
 - It is always hot in the desert.
 - Not every plant has adapted to life in the desert.
 - Plants and animals live in harmony with the desert.
 - Ecosystems are often limited by their size.
- According to the passage, how is the balance in the ecosystem maintained?
 - Animals must work within their species to maintain the balance.
 - Humans must lend a helping hand to affect the ecosystem positively.
 - The birth and death cycle must repeat itself several times before harmony is achieved.
 - Various animals and plants must interact with one another.

On the TOEFL Test

- Which of the following best expresses the essential information in the first highlighted sentence?
Incorrect answer choices change the meaning in important ways or leave out essential information.
 - Politicians are combining with environmental groups to help save the world's ecosystems.
 - Since the world's ecosystems are being destroyed, environmental groups are gaining more importance in modern politics.
 - Both politicians and environmental groups are concerned with ecosystems since many of them are being ruined.
 - The issue of the destruction of ecosystems is often debated by environmental groups in the political arena.
- Which of the following best expresses the essential information in the second highlighted sentence?
Incorrect answer choices change the meaning in important ways or leave out essential information.
 - Without plants and animals, ecosystems could not survive.
 - Some animals and plants work together to ensure each other's survival.
 - The presence of plants and animals makes survival easier.
 - Plants and animals always try to help the other survive more easily.

Ecosystems

- All things and processes that control behavior of (1) _____ in one area
 - everything adapts to ecosystem
 - must live (2) _____ with others
- Are important to environment
 - many ecosystems being (3) _____
 - countries and environmental groups trying to protect them
- Must learn how to maintain harmony
 - plants and animals help each other survive
 - many things happen to (4) _____



E Read the following passage, and answer the questions.

The Intelligence of Dolphins

Time Limit: 3 min. 40 sec.

Many scientists believe that dolphins are very intelligent creatures because dolphins have large brains, show intelligent behavior, and are creative. All of these factors make dolphins very compelling animals for scientists to study. Some scientists believe that by studying dolphins, they can learn how humans became such intelligent animals.

Dolphins' brains are quite large compared to other animals. In fact, their brains are bigger than humans' if you consider their weight. However, if you look at the weight of the brain compared to overall body size, then humans have slightly larger brains. Compared to chimpanzees, which are also considered intelligent animals and which many people believe are related to humans, a bottle-nosed dolphin's brain is four times larger. One part of an animal's brain, the cerebral cortex, is 40% larger in dolphins than in humans. This is an area of the brain that many scientists believe that much complex thinking occurs.

The complex behavior of dolphins shows that they are very intelligent. For example, they usually swim in small groups of six to twelve individuals. Researchers believe that the dolphins can recognize one another in their groups. Some scientists in Scotland have shown that two or three dolphins often make strong bonds with one another, similar to human's making close friendships. In addition, dolphins work together as a unit to help one another survive and live well. When a shark approaches, the dolphins move together at the exact same time to avoid the threat. Some scientists even believe that they make clicking sounds to warn one another. They seem to work well together and are always aware of their surroundings, which people often are not.

Dolphins are also exceptional because of their creativity. An American scientist named Karen Pryor performed an experiment on captive dolphins to learn how creative they are. The dolphins had been taught tricks, but Pryor wanted to see if she could make them act creatively. For instance, if they performed their tricks in an original way, they were rewarded with extra fish. When the dolphins performed the same trick they had done before, they were not rewarded. The dolphins learned after awhile that they would be rewarded for doing original tricks, so they started doing more and more original and creative ones. Pryor measured the amount of time it took the dolphins to learn what was wanted of them. Afterwards, she tried an experiment where people were taught simple tricks and then were rewarded for doing the tricks originally. Interestingly, it took the humans about the same amount of time as it took the dolphins to learn what was wanted of them!

- overall (a) total; complete
- complex (a) complicated; intricate
- creative (a) original; imaginative; inventive
- cerebral cortex (n) a part of the brain
- recognize (v) to know; to identify
- bond (n) a connection; a tie
- threat (n) a danger; a risk
- be aware of (phr) to notice; to know about
- exceptional (a) extraordinary; special; unusual
- captive (a) confined; caged
- reward (v) to recompense
- extra (a) additional; more
- measure (v) to assess; to quantify
- surroundings (n) the environment; a location

General Comprehension

- According to the passage, what do dolphins do when a shark approaches?
 - They attack the shark in conjunction.
 - They flee in separate directions.
 - They move simultaneously to avoid it.
 - They act differently on each occasion.
- According to the passage, what did Karen Pryor do?
 - She conducted experiments on dolphin creativity.
 - She wrote a book about how humans and dolphins learn creativity.
 - She studied dolphins in the wild.
 - She created a number of new tricks for dolphins to perform.

On the TOEFL Test

- Which of the following best expresses the essential information in the first highlighted sentence?
Incorrect answer choices change the meaning in important ways or leave out essential information.
 - A dolphin's cerebral cortex comprises 40% of its brain.
 - Humans have larger cerebral cortexes but smaller brains than dolphins.
 - 40% of dolphins have larger cerebral cortexes than humans.
 - A dolphin's cerebral cortex is almost one and a half as large as a human's.
- Which of the following best expresses the essential information in the second highlighted sentence?
Incorrect answer choices change the meaning in important ways or leave out essential information.
 - Humans learned in about the same amount of time what the dolphins wanted them to do.
 - It is interesting that both humans and dolphins spent a similar amount of time learning certain tasks.
 - Dolphins were, interestingly enough, somewhat quicker than humans at learning what they were supposed to do.
 - Humans took the same amount of time to accomplish the tasks as dolphins did.

The Intelligence of Dolphins

- Very intelligent creatures - have (1) _____
- can learn about humans by studying dolphins
- Brains - weigh more than humans'
- (2) _____ is 40% larger than in humans
- Exhibit complex behavior - (3) _____ for protection
- develop friendships with other dolphins
- make clicking sounds as warnings
- engage in (4) _____
→ can create new tricks on their own
→ takes same amount of time as humans



F Read the following passage, and answer the questions.

Silicon

Time Limit: 3 min. 30 sec.

Silicon is a very important element that is similar to carbon and is found almost everywhere on the planet. The Earth's crust is more than one-quarter silicon, which makes it the second most abundant element in the world. Silicon does not exist alone. It is contained inside minerals like clay, sand, and rocks. When silicon is taken from rocks, sand, and other minerals, it has a dark gray color, and it looks metallic. It is similar to glass in that it can be broken or chipped easily. Significantly, it can conduct electricity and other forms of energy very easily, which is why it is used in the production of semiconductors.

Silicon is important because it is used to make computers and a lot of computer parts like semiconductors. It is not merely used to make semiconductors, however. It is used in many ways. In fact, a lot more silicon is used to make aluminum than computer products. In fact, the silicon made for the aluminum in car parts represents about 55% of the world's use of the element. The second largest use is to make silicones, which is a durable substance that is similar to plastic or rubber. The third largest use is in making semiconductors. In addition, there are hundreds of other products that silicon is used in. It is one of the most used substances on the planet.

Silicon is taken from the minerals by placing rocks, sand, clay, or other minerals into very hot furnaces. The furnaces are heated to more than 1,900°C, which causes the mineral that contains the silicon to burn away, leaving only liquefied silicon with small traces of carbon in it. The element collects at the bottom of the furnace, and it is then drained and cooled. When it is cool, the silicon turns solid. This form of silicon is 98% pure, with the remaining part carbon. This kind of silicon is fine for making car parts. But for making high-quality semiconductors, technicians must use nearly 100% pure silicon. Therefore, the silicon used in computer parts must be purified.

The purification of silicon is a complex process. Scientists and technicians nowadays use a chemical process to purify silicon for use in computer parts. In one method, called the Siemens process, impure silicon is exposed to special gases, again using high temperatures. In this process, the silicon molecules become much larger, making the carbon molecules tiny in comparison. Thus the silicon becomes almost completely pure.

• element (n) a substance • abundant (a) plentiful; ample • contain (v) to include; to have • chip (v) to break off; to fragment • significantly (ad) importantly • conduct (v) to carry; to transmit; to convey • represent (v) to account for; to equal • durable (a) strong; sturdy • furnace (n) an oven that can achieve very high temperatures • liquefy (v) to make or become liquid • trace (n) a small amount • drain (v) to flow out • purify (v) to make pure; to refine • expose (v) to uncover; to display • tiny (a) extremely small

General Comprehension

- According to the passage, how much of the Earth's crust is silicon?
 - Around 10%
 - Around 25%
 - Around 50%
 - Around 75%
- According to the passage, what is the primary commercial use for silicon?
 - Making silicones
 - Making semiconductors
 - Building computers
 - Making aluminum in car parts

On the TOEFL Test

- Which of the following best expresses the essential information in the first highlighted sentence?
Incorrect answer choices change the meaning in important ways or leave out essential information.
 - Silicon can conduct electricity well, so it is sometimes found in semiconductors.
 - People use silicon to make semiconductors because it is good at conducting energy, including electricity.
 - Because silicon produces semiconductors, it is able to conduct electricity and other forms of energy.
 - It is significant that the conduction of electricity enables silicon to produce semiconductors.
- Which of the following best expresses the essential information in the second highlighted sentence?
Incorrect answer choices change the meaning in important ways or leave out essential information.
 - It takes almost pure silicon to make semiconductors of high quality.
 - Technicians make high-quality semiconductors entirely from pure silicon.
 - Without pure silicon, technicians cannot make high-quality semiconductors.
 - The manufacture of silicon results in high-quality semiconductors.

Silicon

- Very important element - similar to (1) _____
 - second most abundant element
 - is contained in many minerals
 - can (2) _____ easily
- Has many uses - used for computers and computer parts like semiconductors
 - makes (3) _____ for car parts
 - makes silicones
- Processing method - must be heated to (4) _____ Celsius
 - becomes liquid and collects in pools
 - when turns solid, can use

● Building Summary Skills

The following summaries are based on the passages you worked on earlier. Complete each of them by filling in the blanks with suitable words or phrases.

1. Eye Variation Among Different Species

when they move
monocular vision

20/20 eyesight
hawks

compound eyes

While humans consider ⁽¹⁾_____ to be perfect, this is not true for members of the animal kingdom, which see in different ways. ⁽²⁾_____ can see extremely small objects from distances high in the sky. The kingfisher uses ⁽³⁾_____, where it uses just one eye to see above and under the water. Frogs see things only ⁽⁴⁾_____. And bees have ⁽⁵⁾_____ that see everything as a mosaic of dots.

2. The White Ant

six meters high
termites

eat wood
the mantis and cockroach family

social insects

⁽¹⁾_____ are sometimes called white ants, but they are very different from them. They are considered pests because they ⁽²⁾_____, which can bother humans. They do not resemble ants at all, but are members of ⁽³⁾_____. They are ⁽⁴⁾_____ that live in communities of up to several million insects. They have enormous nests that can be up to ⁽⁵⁾_____.

3. The Archaeopteryx Fossil

its feathers
three claws

a full set of teeth
150 million years ago

Germany

The Archaeopteryx fossil was first found in ⁽¹⁾_____. It was a bird that lived over ⁽²⁾_____. It did not resemble modern birds, having ⁽³⁾_____, a flat chest, a long, bony tail, and ⁽⁴⁾_____ on its wings. There are a couple of theories that attempt to explain how Archaeopteryx used ⁽⁵⁾_____. Scientists want to know about this so that they can learn how birds first learned to fly.

4. Ecosystems

environmentalists	caring about ecosystems	achieve a harmony
plants, animals, and minerals	the Convention of Biological Diversity	

The ecosystem refers to all natural things and processes that control the behavior of ⁽¹⁾ _____ in a certain part of nature. All living things must ⁽²⁾ _____ to survive in their own ecosystem. ⁽³⁾ _____ and countries are becoming more involved in ⁽⁴⁾ _____. Many countries signed ⁽⁵⁾ _____ recently. It is important to know about the ecosystem in order to keep it functioning properly.

5. The Intelligence of Dolphins

humans and chimpanzees	Karen Pryor	their large brains
at about the same rate as humans	predators attack	

Scientists believe dolphins are intelligent because of ⁽¹⁾ _____ and ability to be creative. In fact, dolphins have larger brains than ⁽²⁾ _____. They form bonds like friendship, and this helps when ⁽³⁾ _____. ⁽⁴⁾ _____, a scientist, experimented with them and discovered that they have the ability to engage in creative behavior. Dolphins can also learn tricks ⁽⁵⁾ _____.

6. Silicon

extreme temperatures	like semiconductors	to conduct electricity
aluminum parts	highly abundant and extremely common	

Silicon is a ⁽¹⁾ _____ element that can be found almost everywhere on Earth. It has many qualities, particularly its ability ⁽²⁾ _____, which makes it ideal for manufacturing. It has many different uses, including computers, computer parts ⁽³⁾ _____, and ⁽⁴⁾ _____ in cars. It must be purified by heating it to ⁽⁵⁾ _____. After it hardens, it can be used to manufacture various items.



1. The word defeat in the passage is closest in meaning to
 - (A) encourage
 - (B) prevent
 - (C) kill
 - (D) weaken

2. According to paragraph 1, what is biological pest control?
 - (A) A method of killing insects based on organic gardening
 - (B) Using biological weapons to kill pests
 - (C) Destroying the pest population in its larval stages
 - (D) A way that swiftly eliminates all pests from a garden

3. The word if in the passage refers to
 - (A) biological pest control
 - (B) a system of checks and balances
 - (C) agriculturalist's ecosystem
 - (D) a self-sustaining manner

4. Why does the author mention equilibrium in the passage?
 - (A) To explain why most gardens have pests
 - (B) To detail the methods needed to attain this state
 - (C) To argue in favor of using biological pest control methods
 - (D) To describe the ideal state of a garden

5. According to paragraph 5, the ladybug eliminates all of the following pests EXCEPT:
 - (A) caterpillars
 - (B) larvae
 - (C) aphids
 - (D) mites

Biological Pest Control

Many agriculturists have moved from chemical pesticides to biological pest control to control pests and diseases in their gardens and farms. Biological pest control is a method in which predatory animals and insects are introduced into an area so that they will hunt, kill, and eat parasitic pests that damage crops. Another form of biological pest control is to include various plants in a garden or field that are known naturally to defeat parasitic pests that are known to bring disease and destruction.

This style of pest and disease control takes into consideration the principles of organic gardening. Organic gardeners seek to minimize or eliminate the use of chemicals in their agricultural practices. Conventional practices which use chemicals are known to kill both harmful and useful garden life forms indiscriminately. But by using this holistic approach, the gardener is able to take advantage of the webs of interaction between different plants and animals in the garden.

It is believed that these practices increase the level of biodiversity in the garden, which furthers health altogether. This belief comes from the principle that increased biodiversity creates a sustainable ecosystem in which pests and diseases are not eliminated but rather reduced to manageable levels. The goal of biological pest control in this respect is to create a system of checks and balances by which the agriculturalist's ecosystem will operate in a self-sustaining manner, allowing it to thrive. This self-sustaining state can be described as equilibrium.

A good example of the damage that is caused to an ecosystem by chemical pesticides is when an area is sprayed to kill mosquitoes. When this is done, the pesticides also kill dragonflies. These insects are important biocontrol agents that capture and eat mosquitoes and their larvae. This kind of spraying often increases mosquito populations on a long-term basis since



6. The word mask in the passage is closest in meaning to
- (A) separate
 - (B) distinguish
 - (C) disguise
 - (D) prevent
7. According to paragraph 6, all of the following are the ways pest control plants protect crop plants from harmful insects EXCEPT:
- (A) They mislead pests about the location of crop plants.
 - (B) They emit certain smells to confuse pests.
 - (C) They help useful insects to increase in number.
 - (D) They paralyze pests' olfactory glands.
8. Which of the following best expresses the essential information in the highlighted sentence? *Incorrect answer choices change the meaning in important ways or leave out essential information.*
- (A) The most valuable plant for driving away pests is the marigold.
 - (B) Marigolds are useful in getting rid of various pests.
 - (C) If marigolds are planted somewhere, Mexican beetles and other pests will not live there.
 - (D) Mexican beetles, slugs, and other pests will be killed when marigolds are planted.

the dragonflies are not around to consume the incubating mosquito larvae.

An excellent biological control insect is the ladybug and its larvae. These insects hunt, kill, and consume many crop-destroying insect pests such as aphids, greenflies, mites, and caterpillars. Many agriculturists introduce these helpful insects to their gardens to protect their plants. They even plant rows of bushes called beetle banks where the ladybugs can live and breed to create larger populations. These useful insects can be purchased at most gardening shops.

Some plants can also be used to protect gardens and crops. These special biological pest control plants can be helpful in several different ways. Regulatory plants can mask crop plants from pests by being planted nearby or mixed with the crop plant. This confuses pests and draws them away from the important crop plants. They can also produce olfactory inhibitors, which change the smells that draw pests, sending them signals through their olfactory glands that send them away from important plant crops. These plants might also serve as breeding areas for helpful insects.

Some such biocontrol plants are basil, which drives away flies and mosquitoes, catnip, which repels flea beetles, and garlic, which deters the Japanese beetle. One of the most useful of these plants is marigold, which drives away Mexican beetles, slugs, and other harmful pests. When these plants are used, they work together in conjunction with helpful predatory insects to create a state of stasis in which the levels of harmful pest damage is minimized without the use of any chemicals.

Biological pest control has proven itself to be very successful economically. As tests have been done over the years, a benefit-to-cost ratio of 32:1 has been attributed to biological pest control while the average chemical pesticide program returned a benefit-to-cost ratio of 13:1.

9. Based on the information in paragraph 1, which of the following best explains the term tundra?

- (A) The area immediately under the earth
- (B) Frozen areas directly under the soil
- (C) Places with extremely cold winters and summers
- (D) An area where no vegetation grows

10. The word it in the passage refers to

- (A) permafrost
- (B) subsoil
- (C) surface
- (D) water

11. The word frigid in the passage is closest in meaning to

- (A) moderate
- (B) chilly
- (C) freezing
- (D) temperate

12. Which of the following best expresses the essential information in the highlighted sentence? *Incorrect* answer choices change the meaning in important ways or leave out essential information.

- (A) During summer, the entire permafrost thaws to make swampy areas, thereby attracting thousands of insects.
- (B) Countless insects go to the tundra in summer to live on the permafrost.
- (C) Various insects live in the tundra in summer after marshlands are created by the melting permafrost.
- (D) The permafrost thaws to create marshlands in months other than summer, which attracts insects.

Tundra Vegetation

Tundra is classified as an area where the layers of soil beneath the surface are permanently frozen. While the surface thaws in the short summer season, the subsoil remains in a state of permafrost. These soil and temperature conditions determine the type of vegetation that is able to grow on the tundra.

Strong winds sweep over the tundra, and rainfall is rare. Most of the water occurs in the form of snow. Tundra regions experience comparable levels of precipitation to desert climates. During the summer, the permafrost thaws enough so that plants are able to grow and reproduce. But this subsoil under the surface stays frozen, and water cannot sink below it. The trapped water creates lakes and marshes in the summer months.

During the summer months in tundra regions, the temperature becomes high enough to melt the snow on the surface but not underground. Due to low temperature and short growing seasons, trees rarely grow here. The separation between tundra and forest regions is defined by the natural barrier of trees called the timberline. The most common types of vegetation in tundra regions are grasses, mosses, and lichens. These forms of plant life are capable of surviving the long winter months of frigid temperatures and growing quickly during the short summer growing season.

One definitive characteristic of tundra is a very low level of biodiversity. No more than 1,700 species of flora and 48 kinds of land mammals can be found in these regions. Only in the summer months, when the upper layers of permafrost thaw just enough to create marshlands, do thousands of insect species populate the tundra.

Tundra exists in various areas around the world. Most of it is found in the extreme northern and southern polar regions, as well as in areas



13. According to the passage, all of the following are tundra regions EXCEPT:

(A) polar
(B) Antarctic
(C) Arctic
(D) alpine

14. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

There is almost nothing for animals to eat here.

Where would the sentence best fit?

15. The word sustaining in the passage is closest in meaning to

(A) engendering
(B) creating
(C) supporting
(D) developing

16. According to paragraph 7, why is the Antarctic Peninsula unique?

(A) It is one of the few places in Antarctica where life exists.
(B) Many rare mosses live in that part of Antarctica.
(C) Seals and penguins make their summer homes in the region.
(D) It is the only tundra in the world that supports a large amount of plant life.

at a high elevation. These regions can be divided into Arctic, Antarctic, and alpine types, each with their own distinct characteristics.

The Arctic tundra is a large area of stark landscape north of the taiga belt in the far northern hemisphere. It stays completely frozen for most of the year. It includes northern Lapland, as well as vast portions of northern Russia and Canada. It is impossible for trees to grow here. **A** The land is often bare and rocky. Lichen and moss grow on these rocks while small tufts of grass spring up sporadically in between the boulders and stones. **B** Only a few hearty mammal species are able to maintain heavy populations. **C** Some of these are caribou, arctic foxes, polar bears, lemmings, and musk oxen. **D**

The Antarctic tundra occurs on the opposite side of the Earth as the Arctic tundra. It can be found on this icy continent as well as on several Antarctic and sub-Antarctic islands. The rocky soil of the Antarctic Peninsula is one of the only regions on the continent that is capable of sustaining life. Several hundred species of lichens, mosses, and liverworts can be found there. Many terrestrial and aquatic algae species are also able to thrive. There are only two species of flowering plants to be found, the Antarctic hair grass and Antarctic pearlwort. This inhospitable tundra region also supports mammals such as seals as well as penguins.

Alpine tundra can be found at high elevations on mountains around the world. This type of tundra cannot support tree growth. Some of the lower regions of Alpine tundra do not retain permafrost, as it is able to drain away down the mountain slope. Animals like the Kea parrot, marmot, mountain goats, chinchilla, and pika can be found in Alpine tundra areas. But different species of animals and vegetation are found in the many Alpine tundra regions around the planet.

Vocabulary Review

A Choose the word with the closest meaning to each highlighted word or phrase.

- The furnace in the factory was turned up as high as possible.
 (A) temperature (B) oven (C) assembly line (D) kiln
- A various number of animals live in Africa.
 (A) unique (B) exceptional (C) small (D) diverse
- The cat prepared to leap up onto the table.
 (A) run (B) crawl (C) jump (D) climb
- There was a hitch in the program, which caused a two-hour delay.
 (A) bug (B) problem (C) issue (D) setback
- Mr. Baker had a huge mound of files sitting on his desk for him to read through.
 (A) folder (B) hill (C) assortment (D) pile
- Today many countries are trying to develop sustainable energy sources.
 (A) renewable (B) winnable (C) terrible (D) damaging
- Some animals can actually help nourish the soil with various nutrients.
 (A) enrich (B) enroll (C) enliven (D) encroach
- The soldier suddenly perceived the enemy troops approaching from the rear.
 (A) contacted (B) shot (C) noticed (D) destroyed
- The paleontologists discovered the ancient fossils while they were out digging.
 (A) individual (B) old (C) strange (D) worn-out
- The company managed to retain its best workers and kept its rival from stealing them.
 (A) hire (B) promote (C) refrain (D) keep

B Match each word with the correct definition.

- | | | |
|--------------------|---|--|
| 1. cerebral cortex | • | a. the ossified remains of an animal |
| 2. criterion | • | b. to die from not eating food |
| 3. fossil | • | c. an area; a location |
| 4. reptilian | • | d. waste; manure |
| 5. starve | • | e. to turn into a flowing substance like water |
| 6. handicapped | • | f. a part of the brain |
| 7. surroundings | • | g. having the characteristics of animals like snakes and lizards |
| 8. liquefy | • | h. extraordinary; special; unusual |
| 9. feces | • | i. unable to do something as well as most people or things can |
| 10. exceptional | • | j. a standard or basis for something |

PART

2

Making Inferences

In this part, the reading comprehension questions include: rhetorical purpose, inference, and insert text. The learning objectives of these comprehension questions are to understand the rhetorical function of a statement or paragraph, the logic of the passage, and strongly implied ideas in the text.

- **Unit 6 Rhetorical Purpose**

Zoology / Sociology / Literature / Language

- **Unit 7 Inference**

Psychology / History / Geography

- **Unit 8 Insert Text**

Art / Economics / Science

Unit



Rhetorical Purpose

6 Rhetorical Purpose

Overview

■ Introduction

Rhetorical Purpose questions ask you to understand why and how the author uses a particular piece of information in the passage. This information can be used to argue, define, explain, or compare ideas. Because this type of question usually focuses on the logical development of the passage, you need to figure out how one sentence or paragraph relates to another.

■ Question Types

1. The author discusses X in paragraph _____ in order to ~
2. Why does the author mention X?
3. The author uses X as an example of ~
4. Why does the author quote X in the passage?
5. In paragraph _____, why does the author give details about X?
6. In paragraph _____, the author explains X by ~
7. How does the author explain the idea of X in paragraph _____?

■ Useful Tips

- Read the question first, and then recognize the author's purpose immediately by scanning the specific phrases or paragraphs.
- Focus on the logical links between sentences and paragraphs, not on the overall organization of the passage.
- Familiarize yourself with the words or phrases for rhetorical functions like *to illustrate*, *to criticize*, *to explain*, *to contrast*, *to compare*, *to note*, etc.



Sample iBT Question

Why does the author mention that nowadays they can only be found in the western coastal mountains of the United States?

- (A) To emphasize that there are very few California Condors
- (B) To tell what kind of environment California Condors like
- (C) To explain that California Condors are one of the largest birds in America
- (D) To show the distribution of California Condors in America

The California Condor

The California Condor is a large American bird that is related to vultures. It is the largest bird in North America that flies over land. There are very few of these condors left in the world. In fact, nowadays they can only be found in the western coastal mountains of the United States. Like vultures, condors are scavengers, which means that they eat animals that are already dead and not animals that they kill themselves. California Condors have a wingspan of as much as 9.2 feet and can weigh up to 31 pounds, making them one of the largest birds in North America. Adult California Condors are black all over except under the wings. An unusual aspect of these birds is that they have an elongated toe, which helps them to walk. Most vultures do not have such a toe to help them walk.

Correct Answer

The author mentions first that there is only a limited number of California Condors left in the world, and then gives a detail of the only location where they can be found today. So the correct answer is (A).

Social Grooming in Monkey Packs

Monkeys are highly social animals. A good example of this is the fact that they groom one another. Social grooming is a way in which animals that live close to each other can make bonds with other individuals. This is similar to the way that people make friendships. Social grooming can also be used as a way of apologizing to other monkeys or a way to avoid fighting. On top of that, it is a method that these animals use to maintain good hygiene. Because monkeys have thick fur, they often get a lot of insects, leaves, dirt, and twigs stuck on them. When other individuals groom them, they take out the dirt, insects, and other objects while making an important bond with that individual that they have just groomed. These bonds are important in social life, just like friendships are important for people.

1. The author discusses social grooming of monkeys in order to
 - (A) Illustrate that they like to be clean
 - (B) demonstrate that they do not like to fight
 - (C) show that they are social animals
 - (D) emphasize a disadvantage of thick fur
2. Why does the author mention on top of that in the passage?
 - (A) To offer another advantage of social grooming
 - (B) To explain why dirt and insects must be removed from the monkey's hair
 - (C) To show that friendship is important to monkeys
 - (D) To contrast the ways social grooming functions in monkey packs

The Definition and Types of Social Groups

In sociology, a group is a collection of people or animals that are similar in some ways, that interact, that accept certain social responsibilities, and that have a common identity. By this definition, human civilization could be considered a social group. In sociology, there are three kinds of social groups: primary, secondary and reference. Primary groups are small groups with very close relationships. Close friends or family are members of a primary group. Secondary groups are large groups whose relationships are formal or based upon certain social circumstances, such as those between schoolmates or work colleagues. Sometimes, primary groups can be formed from secondary groups, like when schoolmates become friends. Reference groups are groups that have no real members but which individuals themselves think they belong to. For example, some people wear dark clothing and makeup and consider themselves to be "Goths" even though no such social group formally exists.

3. The author discusses the sociological definition of a group in order to
 - (A) deduce that human civilization is one kind of social group
 - (B) describe how people rely on a common identity
 - (C) show that there are three kinds of social groups
 - (D) prove that people groups do not need to be formally recognized
4. The author uses "Goths" as an example of
 - (A) a primary group
 - (B) a secondary group
 - (C) a reference group
 - (D) a formal social group

Literary Criticism

Literary criticism is the study, discussion, and interpretation of literature. Nowadays, most literary critics use some form of literary theory to appraise novels, poems, and plays. Literary theory is based on certain philosophical ideas that critics use when they discuss certain books or poems. These philosophical ideas might include Marxism, feminism, or realism. Most professional literary critics are university professors or reporters who write for literary magazines. An example of a Marxist literary critic might be a university professor who examines The Little Prince based upon social theories created by the economist and philosopher Karl Marx. Therefore, he would argue that all of the characters that the Little Prince meets in his travels act greedily because humans are basically all greedy. This is a simplified concept of Karl Marx.

5. Why does the author mention Marxism, feminism, or realism?
 - (A) To argue that philosophical perspectives must be considered in literary criticism
 - (B) To name a few perspectives on which literary theory can be based
 - (C) To show what philosophical ideas professional critics study
 - (D) To prove that literary critics cannot discuss literature without philosophy
6. The author discusses The Little Prince in order to
 - (A) show how it can be interpreted from a Marxist perspective
 - (B) argue that it was written based on Marxist social theories
 - (C) describe how it was criticized by a Marxist professor
 - (D) explain Marxist philosophy in a simple way

Seanachai—Irish Storytellers

In ancient Ireland, before there were any books, there was a group of people called *seanachai*. Seanachai means “storyteller” in Irish Gaelic. These people earned money by traveling from village to village while telling stories. They often spoke about ancient Irish legends. Sometimes, they just told stories that they had heard in the last village. Later, when the British occupied Ireland and made the Irish people speak English instead of Irish Gaelic, the seanachai continued to travel from town to town telling their stories in their native language. After a while, just speaking their language became more important than the stories themselves because it was a way of keeping the Irish language alive. Today, there are not many native Irish Gaelic speakers, but there are some in certain areas of the country. Gaelic is also taught in schools. The seanachai played a large part in the survival of the language.

7. The author mentions before there were any books in the passage in order to
 - (A) imply that written records were not important to early Gaelic speakers
 - (B) show that storytellers have a long history in Ireland
 - (C) declare that the seanachai no longer exist
 - (D) define the seanachai as ancient people who liked to travel
8. Why does the author mention that just speaking their language became more important than the stories themselves?
 - (A) To show that the seanachai changed from storytellers to language teachers
 - (B) To explain that language is an important means for telling stories
 - (C) To indicate that the Irish tradition of storytelling came to a crisis
 - (D) To describe how the seanachai contributed to the survival of Irish Gaelic



A Read the following passage, and answer the questions.

Prairie Dogs

Time Limit: 3 min. 30 sec.

Prairie dogs are small rodents that live in the prairies of North America. They are highly social animals that live in families, usually consisting of one male and two to four females. The prairies are large, flat lands with lots of wild grass that grows everywhere. There, the prairie dogs dig holes and tunnels in which they live. Small holes and tunnels are perfect for these rodents to live in because they are long, skinny animals that grow, on average, 12 to 16 inches long and are only about 4 inches tall. The tunnels that they build connect with one another, and the prairie dogs often use the same tunnel system for twenty or thirty years.

Their tunnel systems are expansive. Within the shared tunnel complex, there are separate rooms for sleeping, eating, and babysitting. They can span a large distance and can go as deep as 33 feet into the ground.

The tunnels also help to protect the prairie dogs from predators. Around the holes of their tunnels, prairie dogs often pull out the grass and weeds so that they can see if any predators are coming. If they see one approaching, they make a high-pitched call to warn the other members of their family. In fact, some scientists believe that they use specific calls for each kind of predator that they encounter. After the call, all members of the family that are above ground immediately dive into their tunnels, where they are safe from danger.

Farmers regard prairie dogs as pests and try to kill as many of them as they can to prevent farm-related problems. This is particularly true with farm machinery and cattle. Prairie dog tunnels weaken the ground, so the heavy tractors used to plough it are often damaged, and cattle, which are prone to step into the prairie dogs' holes, are likely to suffer broken legs.

Nevertheless, experts believe that prairie dogs are vital to the prairie ecosystem. It is an important prey species for the many eagles, hawks, and foxes that hunt prairie dogs as their main source of food. Wild animals like bison and deer prefer to graze on the prairies where prairie dogs live because the wild grasses tend to be both healthier and lusher, and the prairie dogs' tunnel systems soften the ground as it becomes compact as a result of cows' grazing. Furthermore, the tunnel systems allow rainwater to channel deep into the ground. This channeling is important because it helps to prevent floods and erosion of the prairie soil.

- rodents (n) small mammals which have sharp front teeth, such as rats, mice, and squirrels • social (a) living in groups • skinny (a) very thin; lean • expansive (a) spreading over a large area • separate (a) divided; unconnected • span (v) to spread out • predator (n) an animal that preys on others • weed (n) a wild plant; an unwanted plant • warn (v) to alert; to caution • specific (a) particular; special • encounter (v) to come across; to meet • regard (v) to consider • plough (v) to turn up the earth • be prone to-V (phr) be apt to-V; be liable to-V • nevertheless (ad) however; nonetheless; in spite of that • expert (n) a specialist; a professional; an authority • vital (a) essential; necessary • graze (v) to browse; to eat grass • lush (a) green; verdant • compact (a) dense; compressed • erosion (n) the process of wearing away

General Comprehension

1. According to the passage, which of the following is NOT true about the tunnel systems of the prairie dog?
 - (A) They are up to 10 meters deep into the ground.
 - (B) They provide protection from enemies.
 - (C) They are used for more than twenty years.
 - (D) They consist of separate tunnels.
2. According to paragraph 4, farmers try to get rid of prairie dogs because
 - (A) they destroy crops
 - (B) they spread disease
 - (C) they undermine the ground
 - (D) they cause soil erosion

On the TOEFL Test

3. Why does the author mention separate rooms for sleeping, eating, and babysitting?
 - (A) To show the complex nature of the systems
 - (B) To define the social nature of prairie dogs
 - (C) To emphasize that prairie dogs are assigned tasks
 - (D) To illustrate prairie dogs' family life
4. The author uses bison and deer as an example of
 - (A) animals that destroy prairie dogs' tunnel systems
 - (B) animals that benefit from prairie dogs
 - (C) animals that compete with prairie dogs for food
 - (D) animals that prey on prairie dogs

Prairie Dogs

- Characteristics - (1) _____ living in North America
 - live in families of one male and two to four females
 - live on (2) _____
 - homes are series of tunnels
- Prairie dog tunnels - very large system
 - protect prairie dogs from predators
 - can help warn others about coming predators
- Can damage (3) _____ and injure cattle
- Importance to ecosystem - are food for many predators
 - tunnels (4) _____ so grass grows better
 - tunnels let water into ground easier



B Read the following passage, and answer the questions.

Urbanization in LA

Time Limit: 3 min. 20 sec.

Urbanization is the increase in population over time or the increase in area of towns and cities. Critics argue that urbanization has created many problems and has dramatically decreased people's quality of life in the cities. In America, urbanization has had a largely negative impact on the economies, societies, and ecosystems surrounding towns and cities. In particular, the city of Los Angeles in California has had a lot of problems with urbanization. It has led to a degradation of the city and an increase in ghettos.

The city of Los Angeles is the largest city in America in terms of the area that it occupies. There, the negative effects of urbanization include urban sprawl. Urban sprawl is the unplanned, uncontrolled spreading of development in and around a large city. Critics of Los Angeles point out that urban sprawl is responsible for many ugly and unsafe buildings and neighborhoods that have resulted in heavy amounts of pollution and violent crime. Los Angeles city planners were in such a hurry to increase the size of the city that they quickly and cheaply constructed its buildings and neighborhoods, thus creating a series of unattractive neighborhoods and environments. As a consequence, the attitudes of the residents have become largely negative as a reflection of their unattractive environments. Negative attitudes lead to negative behavior, such as the forming of violent gangs and the increased use of drugs and alcohol. Furthermore, as the number of people living within each neighborhood increases, so do the pollution and the unsanitary living conditions that characterize those city neighborhoods.

Economically, the process of urbanization was intended to create economic opportunities for all people who move to the cities. In America, urban planners felt that citizens would have access to better jobs, education, and markets. To a large extent, many American citizens have enjoyed these opportunities. But in cities like Los Angeles, the city space and houses became limited, which made certain communities very expensive to live in. Thus, the poor people could not afford to live in the nice communities, and they all moved to areas known as ghettos. Usually, the people who live in ghettos do not have access to better education because they cannot afford it, and thus they cannot get better jobs later in life. For people who live in ghettos, it is very hard to make better lives for themselves and leave the area. This is perhaps the most negative aspect of urbanization.

- critic (n) an opponent; a dissenter; an objector • negative (a) undesirable; harmful; damaging • impact (n) an effect • degradation (n) deterioration; decline • in terms of (phr) with respect to • occupy (v) to take up
- sprawl (n) an extension • construct (v) to build; to put up • as a consequence (phr) as a result • resident (n) an inhabitant; a dweller • reflection (n) an echo; a mirror image • furthermore (adv) moreover; in addition
- unsanitary (a) unhygienic; unhealthy • have access to (phr) to approach • cannot afford (phr) to not manage to pay for • to a large extent (phr) to a large degree • aspect (n) a side; a facet

General Comprehension

- The word dramatically in the passage is closest in meaning to
 - excitingly
 - vividly
 - greatly
 - theatrically
- According to paragraph 3, which of the following is NOT true about urbanization?
 - It improved the living conditions of many Americans.
 - It caused ghettos to form in the city of Los Angeles.
 - It was supposed to create more opportunities to make money.
 - It helped people in Los Angeles get better jobs and education.

On the TOEFL Test

- The author discusses the city of Los Angeles in paragraph 2 in order to
 - identify the city as a major source of pollution
 - illustrate an example of random urbanization
 - describe what urbanization is like
 - show the reason why people are attracted to big cities
- Why does the author mention Los Angeles city planners were in such a hurry?
 - To describe the negative attitudes of the city planners
 - To show a cause for the ugly and unsafe neighborhoods
 - To explain how quickly Los Angeles became the largest city in America
 - To state the increased number of people that live in unattractive neighborhoods

Urbanization in LA

- Characteristics - increase in population of city
 - has (1) _____ on economy, society, and ecosystem of area
- Los Angeles - many negative effects from (2) _____
 - ugly and unsafe buildings
 - pollution and violent crime
 - increase of gangs and use of drugs and alcohol
 - (3) _____
- Economic effects - some have enjoyed better jobs and educations
 - many cities have created ghettos
 - people cannot get (4) _____
 - people cannot get good jobs
 - people cannot improve their lives



C Read the following passage, and answer the questions.

Neoclassical Theater

Time Limit: 3 min. 20 sec.

Neoclassical theater was the most important form of theater from the sixteenth to the eighteenth century in Western Europe, especially in France. Elaborate scenery and costumes were very important in neoclassical theater, as were overacting and maintaining common themes and methods of acting. In neoclassical theater, the plots were similar and repetitive just like modern-day soap operas. They also tended to use a lot of farce and tragedy.

Neoclassical theater developed in France during the sixteenth century, and it changed the way the playwrights wrote their plays. It also changed methods of production and the way sets were designed. French neoclassical theater was based largely on unities; these were unity of time, unity of action, unity of place, and several others. In other words, the French neoclassical dramatists wanted the time, place, and action of the play to be unified and to be more like real life. Therefore, according to the neoclassicists, there could not be a change of day in the play without a sunset and then a sunrise, just like in real life. Also, when the action of the play changed from one place to another, the background scenery had to be changed as well. Another important aspect of neoclassical theater was the use of farce, which is a way of making important situations or people seem ridiculous. The opposite of farce, tragedy, was also commonly used in neoclassical theater. Tragedy is a dramatic method where people make sad situations seem even sadder.

The three most popular neoclassical playwrights were Pierre Corneille, Jean Racine, and Molière. They all had different styles of writing, and they lived and worked in Paris at the same time. Parisian audiences loved watching the different styles of the playwrights and comparing the three. Corneille was the first to begin writing, and the content of his plays created a lot of controversy. His most famous play, *Le Cid*, written in 1637, was popular and controversial simply because it did not follow the established unities of neoclassical theater. To this day, critics argue about whether it should be classified as a neoclassical play or not. Unlike Corneille, Jean Racine tried to stick to the rules of neoclassical theater as much as possible. His most famous tragedy, *Andromache*, written in 1664, is perhaps the best example of neoclassical theater. Meanwhile, Molière was the king of farce and the most influential neoclassical playwright. His characters were used to depict real people, and he was interested in showing the reality of human weakness as much as possible.

- elaborate (a) complicated; complex; detailed • maintain (v) to continue; to keep up • costume (n) an outfit; clothes
- theme (n) a subject; a category • plot (n) a plan; an action • repetitive (a) recurrent • soap opera (phr) a popular television drama series; a serial
- tend to-V (phr) be apt to-V • farce (n) a humorous play • tragedy (n) a serious and sad drama
- unity (n) sameness; oneness; integrity • unify (v) to unite; to combine • ridiculous (a) absurd
- opposite (n) reverse; contrary • controversial (a) disputed; debatable • established (a) conventional; traditional
- classify (v) to categorize; to sort • stick to (v) to stay with; to follow • influential (a) powerful; important; significant

General Comprehension

1. According to paragraph 2, all of the following is true about neoclassical theater EXCEPT:
 - (A) It unified the time, place, and action of the play.
 - (B) It made use of both farce and tragedy as part of its repertoire.
 - (C) It caused playwrights to change their way of writing.
 - (D) It insisted that a play be performed within a day.
2. The word depict in the passage is closest in meaning to
 - (A) ridicule
 - (B) amuse
 - (C) describe
 - (D) imitate

On the TOEFL Test

3. Why does the author mention modern-day soap operas in paragraph 1?
 - (A) To help readers understand the plots of neoclassical theater
 - (B) To show that farce and tragedy were essential components of neoclassical theater
 - (C) To indicate that soap operas have similar themes to neoclassical theater
 - (D) To contrast neoclassical theater with present-day dramas
4. The author discusses Pierre Corneille, Jean Racine, and Molière in order to
 - (A) show that neoclassical theater embraced various styles of writing
 - (B) argue that good plays should cause much controversy
 - (C) give good examples of neoclassical theater
 - (D) explain why they succeeded in attracting audiences

Neoclassical Theater

- Western European theater in (1) _____ - used elaborate scenery and costumes
 - overacting
 - (2) _____ plots
- Development - began in sixteenth century France
 - was based on unities → unities of (3) _____, and others
 - utilized farce → making important situations seem ridiculous
 - utilized tragedy → made sad situations sadder
- Popular playwrights - Pierre Corneille, Jean Racine, and Molière
 - had different styles but lived in Paris at same time
 - (4) _____ was most famous and most influential

D Read the following passage, and answer the questions.

Gerontology

Time Limit: 3 min. 20 sec.

Gerontology is the study of old people and the process of aging. Gerontological investigations include social, biological, and psychological studies. These studies include examinations of physical, mental, and social changes in people as they get older and the effects of an aging population on society. Gerontologists apply what they learn to government policies and programs that support the elderly.

Many gerontologists come from a variety of educational backgrounds. Furthermore, they work in hospitals, universities, and government institutions. For example, gerontologists might have university degrees in sociology, medicine, psychology, or even business management. On an administrative level, gerontologists develop programs and coordinate services that will benefit older people.

All of these experts conduct their research in an effort to understand and improve the lives of elderly people. They work and communicate directly with the elderly, who are seen as individuals, with their families, or in groups with other elderly people who are approximately the same age. The information gained from research and conversations with old people is considered when old age homes and recreational activities are designed to improve the lives of the elderly. In addition, gerontologists write articles for magazines and publish books that allow other experts to understand more about the special concerns of the elderly and their families.

Within the field of gerontology, there is also a subfield called biogerontology or biomedical gerontology. It is concerned with the possibilities of slowing down or controlling the aging process with medical treatment. Here, the gerontological experts have specific medical backgrounds and goals. They are known as biogerontologists and biomedical gerontologists. Biogerontologists study the biological process of aging that results in senility. Senility is when elderly people cannot think accurately anymore and sometimes act as if they were children once again. It seems to be some kind of degenerative process of the mind. On the other hand, biomedical gerontologists are scientists who work to control, prevent, or reverse the aging process in people and animals. Both types of experts work in the anti-aging field, which has become a very popular occupation in modern days.

Today, there is a high demand for people who might be able to control or reverse the aging process, and breakthroughs in the field can result in large earnings for such medical specialists. Perhaps there will never be a cure for aging, but biogerontologists and biomedical gerontologists are certain that they can slow down the aging process, which will allow people to live longer and more fulfilling lives until a great age.

- biological (a) related to the study of living organisms
- psychological (a) concerned with a person's mind and thoughts
- a variety of (phr) various; many kinds of
- administrative (a) managerial; supervisory
- coordinate (v) to organize; to harmonize
- benefit (v) to help; to aid
- expert (n) a specialist; a professional; an authority
- conduct (v) to do; to perform
- accurately (ad) precisely; correctly
- degenerative (a) getting worse as time progresses
- reverse (v) to change; to rearrange
- breakthrough (n) an innovation; an advance; a discovery
- cure (n) a remedy

General Comprehension

- The word their in the passage refers to
 - experts
 - the elderly
 - individuals
 - groups
- According to paragraph 4, which of the following is true about senility?
 - It damages old people's thinking abilities.
 - It is an unavoidable biological phase of aging.
 - It tends to improve over the course of time.
 - It can be healed by controlling the aging process.

On the TOEFL Test

- Why does the author mention sociology, medicine, psychology, or even business management?
 - To show that gerontologists come from many different backgrounds
 - To demonstrate that gerontologists must have many degrees
 - To state how gerontologists work together
 - To illustrate what fields gerontologists work in
- Why does the author mention on the other hand?
 - To change the topic from biogerontologists to biomedical gerontologists
 - To show how biomedical gerontologists attempt to cure senility
 - To contrast biogerontologists and biomedical gerontologists
 - To indicate that biomedical gerontologists work in the anti-aging field

Gerontology

- Study of (1) _____ and aging
 - can be social, biological, and psychological studies
 - examine physical, mental, and social changes
- Try to understand and improve lives of elderly
 - do research
 - have (2) _____ with elderly
 - write articles and publish books
- (3) _____
 - tries to (4) _____ aging process
 - examines issues like senility



E Read the following passage, and answer the questions.

Rattlesnakes in Arizona

Time Limit: 4 min.

Rattlesnakes are venomous snakes found all over North and South America. Unlike many other reptiles, they bear their babies live rather than in eggs. These young rattlesnakes emerge fully loaded with deadly venom. After shedding their skin several times, these snakes develop rattles. The rattle is a formation of dead skin at the end of the snake's tail. Rattlesnakes shake their rattles when they perceive a threat. They also use them to communicate with other rattlesnakes in a process called caudaling.

Rattlesnakes have sophisticated skin membranes between their eyes and nostrils called pits. These organs can detect motion, vibrations, or changes in temperature at a great distance. Rattlesnakes do not have ears, but they use their pits to register sound, and they can use their tongues to detect predators by picking up air molecules.

The fangs of the rattlesnake work like the hypodermic needles used in a doctor's office. They are a defensive measure that can inject venom into the body of a would-be attacker. This venom acts to paralyze and sometimes kill a victim, and its potency varies according to the type of rattlesnake that produces it. People who have survived a venomous rattlesnake bite often suffer a loss of motor skills and tissue damage even after they have recovered from the initial bite.

Seventeen types of rattlesnakes can be found in Arizona. The most common variety is the Western Diamondback. These snakes have camouflage patterns on them and can be very difficult to see since they blend in with their surroundings. This makes Western Diamondbacks especially dangerous to hikers and other people who walk around in areas that they inhabit. Many people are bitten after unwittingly stepping on these snakes.

The Mohave, also known as the Three-stepper or Greenback snake, is the most poisonous rattlesnake in North America. Its venom has twenty times the toxicity level of other common rattlesnakes such as the Western Diamondback, and most human deaths by rattlesnake bite in North America are caused by bites of the Mohave snakes. The nickname "Three-stepper" refers to how many steps a person usually takes before he collapses and dies after getting bitten.

Only one kind of rattlesnake has blue eyes. It is the Arizona speckled rattlesnake. Its eyes have been known to take on coloring from white to gray to blue, and they can even change to red when the snake is surrounded by red rocks. Although this snake is not as deadly as the Mohave, it is twice as venomous as the Western Diamondback and is known to eat bats for sustenance.

Generally, however, snakes are not known to initiate attacks on humans and will almost always flee if given the opportunity. As a matter of fact, some specialists believe that rattlesnakes can sense the intentions of a person in their proximity and react accordingly. For example, one controlled study demonstrated that rattlesnakes in an enclosed space will react more defensively to ranchers who are prone to kill them but will react more passively to herpetologists who like and do not threaten them.

- venomous [a] poisonous • bear [v] to give birth to • emerge [v] to appear • loaded [a] filled • deadly [a] lethal; fatal • shed [v] to get rid of; to remove • perceive [v] to notice; to sense • sophisticated [a] delicate; complex
- inject [v] to give a shot • paralyze [v] to harden; to become inflexible • hypodermic [a] beneath the skin
- camouflage [n] a disguise • inhabit [v] to live in; to populate • unwittingly [ad] without knowing • collapse [v] to fall down • sustenance [n] food • proximity [n] nearness; closeness • enclosed [a] surrounded; encircled
- herpetologist [n] a scientist who studies reptiles and amphibians

General Comprehension

1. According to paragraph 2, rattlesnakes use their pits to detect which of the following?

Click on 2 answers.

- ☐ A predators
☐ B sound
☐ C distance
☐ D temperature changes
☐ E taste

2. According to the passage, which of the following is true about the Mohave?

- ☐ A It can change the color of its eyes according to its surroundings.
☐ B It is called Three-stepper because it bites humans before they take three steps.
☐ C It is the most venomous of all the rattlesnakes in Arizona.
☐ D It is considered dangerous to hikers in particular.

On the TOEFL Test

3. In paragraph 1, the author mentions that rattlesnakes bear their babies live to emphasize that

- ☐ A snakes should hatch from eggs
☐ B rattlesnakes are venomous from birth
☐ C people have misjudged rattlesnakes
☐ D rattlesnakes are different from other reptiles

4. Why does the author mention people who have survived a venomous rattlesnake bite in paragraph 3?

- ☐ A To show that venom sometimes has long-lasting effects
☐ B To demonstrate an advantage of camouflage
☐ C To illustrate a new medical treatment
☐ D To explain the aggressive nature of snakes

Rattlesnakes in Arizona

- Characteristics - are venomous snakes in North and South America
 - babies are (1) _____, not in eggs
 - shed skin and develop rattles
 - have pits to detect motion, vibrations, (2) _____, and sound
- Venom - used for (3) _____ purposes
 - paralyzes and kills victims
- Arizona rattlesnakes - are seventeen types
 - (4) _____ is most common
 - Mohave is most poisonous → called Three-stepper

F Read the following passage, and answer the questions.

Jean Berko Gleason's Wug Test

Time Limit: 3 min. 20 sec.

In 1958 Jean Berko Gleason, an American psycholinguist, created an experiment called the Wug Test. It investigated how children learn to make plural forms of nouns in English like *cats*, *dogs*, and *horses*. The children were shown imaginary words in the singular and asked to change the word into their plural forms. There are three ways of pronouncing the "s" that comes after plural nouns in English; it can be pronounced like /z/, /s/, or /iz/. The most common sound is the /z/ sound like in *dogs*, then the /s/ sound like in *cats*, then the /iz/ sound like in *horses*.

In the experiment, the child was presented with a picture of some kind of pretend creature. He or she was told that the creature was a "wug." The experimenter said, "This is a wug." Another card was pulled out with another wug, and the experimenter said, "Now there are two of them. These are two ...?" Children who understood the proper use of the plural form for nouns ending with a "g" would say, "They are two wugs," with a /z/ sound. Very young children were often confused by this and said "Two wug." Generally, children who were 4 years or older got the question right. The researchers also carried out several other experiments to generate plural forms ending with the /s/ sound and with the /iz/ sound and found that children usually learned these rules later in their lives because they are not as common as the /z/-sound plurals.

The Wug Test also included questions that explored a child's understanding of the proper use of verbs and the using of the possessive, such as "This is Rob's bike." Possessives are parts of grammar that show ownership. Also, the children were prompted to use the -er suffix of a noun to demonstrate a person's job, such as someone who drives is a "driver." Again, the children were given a nonsense word, this time "zib." The researcher asked the child, "A man who 'zibs' is a ...?" Some young children replied "zibber," but many young children replied "zibman."

The Wug Test demonstrated that even very young children have established grammatical systems that allow them to make plurals, possessives, and other forms of words that they have never heard before. This test was the first of its kind to prove that children learn their language skills naturally without needing to be taught grammar rules.

- psycholinguist (n) a person who studies the mental faculties involved in the development, use, and interpretation of language
- experiment (n) a scientific test; research
- investigate (v) to examine; to look into
- plural (a) more than one
- imaginary (a) not real; make-believe
- singular (a) single; sole; one
- pronounce (v) to say; to articulate
- present (v) to show
- proper (a) correct; precise
- carry out (phr) to do; to perform
- generate (v) to produce
- include (v) to contain; to cover
- explore (v) to research; to investigate; to examine
- ownership (n) possession
- prompt (v) to cause
- suffix (n) a word ending
- demonstrate (v) to show; to prove
- reply (v) to answer
- establish (v) to set up; to create

General Comprehension

- The word pretend in the passage is closest in meaning to
 - artificial
 - deceptive
 - domestic
 - incorrect
- According to the passage, which of the following is true about the Wug Test?
 - It was an experiment to show that children must be taught the rules of language.
 - It investigated whether children could use English verbs to show ownership.
 - It examined how children learn to produce plural forms of English nouns.
 - It proved that children acquire /z/-sound possessives before /s/-sound ones.

On the TOEFL Test

- The author introduces Jean Berko Gleason as a psycholinguist in order to
 - show that he was interested in how the mind learns language
 - explain why he used imaginary words for the experiment
 - suggest that he studied the language of the mentally ill
 - state that he illustrated the pictures used in the experiment
- Why does the author mention generally in paragraph 2?
 - To note that results varied in later experiments
 - To illustrate that the ages of the children ranged from three to five
 - To explain that the children were not exactly four years of age
 - To indicate that there were exceptions in the results of the study

Jean Berko Gleason's Wug Test

- Tests how children make (1) _____ of nouns
- Method
 - show children (2) _____
 - ask children to make words plural
- Objective of test
 - see if children can create plurals properly
 - check children's understanding of use of (3) _____
 - show children have established (4) _____ for unknown words

● Building Summary Skills

The following summaries are based on the passages you worked on earlier. Complete each of them by filling in the blanks with suitable words or phrases.

1. Prairie Dogs

grazer-lamped ground soft
social animals

machinery and cattle
erosion to the soil

the ecosystem

Prairie dogs are small, slender ⁽¹⁾_____ that burrow complex tunnels in the large flatlands of North America. Many farmers consider prairie dogs to be pests because their tunnels can cause damage to ⁽²⁾_____. But scientists recognize that prairie dogs are important to ⁽³⁾_____. For example, prairie dogs are the food source for some predator species, and their intricate tunnels create the conditions needed to grow preferred grasses for cattle and keep ⁽⁴⁾_____. Furthermore, the tunnels help to channel rainwater that could cause ⁽⁵⁾_____.

2. Urbanization in LA

cheaply and quickly
unsanitary conditions

better education and jobs
the uncontrolled and unplanned development

the spread of cities

Urbanization is ⁽¹⁾_____ accompanied by the increase in population in those areas. The city of Los Angeles in America is a good example of urban sprawl. Urban sprawl is ⁽²⁾_____ that takes place in city areas. In Los Angeles, many neighborhoods were constructed ⁽³⁾_____. As a result, unattractive, unsafe, and crowded neighborhoods, called ghettos, gave rise to ⁽⁴⁾_____ and violent crime among the poor. There, opportunities for ⁽⁵⁾_____ are seldom seen.

3. Neoclassical Theater

methods of farce
time, place, and action

French neoclassical dramatists
the 16th to the 18th century

Molière

Neoclassical theater was the most important form of theater from ⁽¹⁾_____ in Western Europe, especially in France. ⁽²⁾_____ wanted the ⁽³⁾_____ of the play to be unified and to be more like real life. Playwrights used costumes and scenery to evoke a sense of real time and place in their productions, and they employed ⁽⁴⁾_____ to make important situations seem ridiculous or methods of tragedy to make sad situations even sadder. The most influential neoclassical playwright was ⁽⁵⁾_____, who used farce to highlight human weaknesses.

4. Gerontology

related health information	issues of the elderly	the aging process
control, prevent, or even reverse	old age homes and recreational activities	

Gerontologists are scientists who are concerned with ⁽¹⁾ _____. They come from various backgrounds. Many gerontologists research, study, and plan the day-to-day conditions and needs of the elderly, which include the development of ⁽²⁾ _____ as well as administrative services and the publication of ⁽³⁾ _____. Two particular types of gerontologists are biogerontologists and biomedical gerontologists. Biogerontologists study ⁽⁴⁾ _____ while biomedical gerontologists try to find ways to ⁽⁵⁾ _____ the process of aging.

5. Rattlesnakes in Arizona

a defense mechanism	naturally aggressive	seventeen types
an ability to bear live young	North and South America	

Rattlesnakes can be found all over ⁽¹⁾ _____. Their unique physical characteristics such as pits and ⁽²⁾ _____ set them apart from other snakes and help them to adapt to their environments. ⁽³⁾ _____ of rattlesnakes have been identified in Arizona alone. Among them are the Western Diamondback, the Mohave, and the Arizona speckled rattlesnake. Although rattlesnake venom is often fatal to humans, studies have shown that rattlesnakes are not ⁽⁴⁾ _____. In fact, rattlesnakes only seem to attack humans as ⁽⁵⁾ _____.

6. Jean Berko Gleason's Wug Test

appropriate use of plurals	change verb forms	learn language naturally
an American psycholinguist	how children learn language	

In 1958, Jean Berko Gleason, ⁽¹⁾ _____, conducted experiments to find out ⁽²⁾ _____. One experiment was the Wug Test. In order to examine children's ⁽³⁾ _____, each child was shown a toy creature called a "wug" and then prompted to finish the sentence, "These are two ...?" In a separate experiment, each child was asked to ⁽⁴⁾ _____ of words to noun forms as related to occupations. For example, a person who drives is a driver. The results of the experiment proved that children ⁽⁵⁾ _____ without being taught grammar rules.



1. The phrase by the same token in the passage is closest in meaning to
 - (A) for the same reason
 - (B) for the same price
 - (C) for a small cost
 - (D) at the same time

2. According to paragraph 1, which of the following is true about "the Protestant Ethic"?
 - (A) It implies that differences in cultures result in different religious ethics.
 - (B) It shows how Weber generalized the characteristics of western people.
 - (C) It reflects Weber's belief that capitalism could not be successful without religion.
 - (D) It indicates that Weber was ignorant of non-Protestant religions.

3. The author mentions modern political science and economics in order to show
 - (A) Weber earned respect in several academic fields.
 - (B) Weber considered sociology the more important discipline.
 - (C) Weber was a politico-economist rather than a sociologist.
 - (D) Weber studied sociology based on political science and economics.

4. According to paragraph 2, Weber formulated his ideas from which of the following?
 - (A) religious studies
 - (B) essays
 - (C) observations
 - (D) his colleagues

Max Weber

Max Weber is considered one of the founders of modern sociology although he also made major contributions to modern political science and economics. Weber began his career researching the sociology of religion. He argued that religion was one of the major reasons for the difference in cultures between western and eastern countries. Furthermore, he believed that religion and culture are the main things that create political systems in countries. He also stressed the importance of qualities that are common to people that belong to certain religions. For example, Weber felt that many Western Europeans had a strong work ethic. Interestingly, Weber defined whole races through generalizations and specifically dubbed the work ethic of Western Europeans "the Protestant Ethic." The essential thesis of Weber's work was his belief that capitalism was formed in the west as a result of western people's religion and, by the same token, that capitalism could never be successful in the east because of people's religion.

Weber's work on the sociology of religion started with what was to be his most famous essay, *The Protestant Ethic and the Spirit of Capitalism*. After this publication, he also wrote other essays about all of the major world religions. In all of them, his three main themes were the effect of religious ideas on economic activities, the relation between social status and religious ideas, and the characteristics of western civilization that made it different than eastern civilization. The purpose of his work was to find the reasons why the cultures of the east and the west developed differently. It is important to note, however, that he did not consider one civilization to be better than the other, like many of his colleagues did. His ideas were simply based on observation. In his work, Weber argued that Protestant religious ideas



5. The word phenomena in the passage is closest in meaning to
- (A) reasons
 - (B) developments
 - (C) components
 - (D) occurrences
6. According to paragraph 2, the economic systems of Western Europe and the United States were influenced by all of the following EXCEPT:
- (A) the founding of small businesses
 - (B) scientific and mathematical discoveries
 - (C) religious monopolies
 - (D) the organization of governments
7. The word viable in the passage is closest in meaning to
- (A) extensive
 - (B) successful
 - (C) advanced
 - (D) standardized
8. Which of the following best expresses the essential information in the highlighted sentence? *Incorrect* answer choices change the meaning in important ways or leave out essential information.
- (A) China could not develop capitalism because eastern and western religions were incompatible.
 - (B) Eastern religions should have followed western ones to develop capitalism in China.
 - (C) Religions and capitalism in the east developed very differently from those of the west.
 - (D) Unlike in the west, religions prevented capitalism from developing in China.

shaped the development of the economic system of Western Europe and the United States. Other phenomena that shaped the western economic system included scientific and mathematical discoveries, the creation of a legal system, the organization of governments, and the founding of small businesses. Weber believed that through social organization, religion, and the development of a modern economic system, western people were outgrowing their primitive, superstitious beliefs.

In contrast, Weber found that eastern religions were fundamentally different than western ones, and this is the reason why capitalism did not develop in China. Weber believed that while western religions overcame primitive superstitions, eastern religions like Confucianism, Taoism, and Hinduism systematized these beliefs, and they became an important part of their religions. Moreover, in Confucianism and Taoism, "superior" men should not try to become rich, but they should only serve society as best as they can. For Weber, this meant that capitalism could not develop in many eastern countries. Also, he felt that the social world was divided into the educated and the uneducated in eastern countries. The educated continuously tried to behave like prophets while the uneducated were preoccupied simply with living and believed in magic. Therefore, he believed that a viable economy could not be created in eastern countries like China and Japan.

9. The word subsequent in the passage is closest in meaning to
- (A) previous (B) later
(C) foreign (D) resultant
10. According to paragraph 2, all of the following are true about the nativist theory of language acquisition EXCEPT:
- (A) Children are capable of organizing language rules without training.
(B) Language input from others is needed to activate children's ability to learn language.
(C) Children are born with innate grammar knowledge.
(D) Children are not genetically predisposed to learn language naturally from birth.
11. The author mentions Social Interactionism in paragraph 3 as an example of
- (A) the theory that children have an inborn ability to learn their first languages
(B) the theory that adults contribute to children's language acquisition
(C) the fact that children need formal language lessons to learn language
(D) the theory that children below a certain age tend to learn language more easily
12. According to paragraph 4, what can be inferred about the Critical Period Hypothesis?
- (A) It totally rejects the nativist position.
(B) It strongly supports the non-nativist position.
(C) It basically agrees with the nativist position.
(D) It provides a neutral stance on children's language acquisition.
13. The word innate in the passage is closest in meaning to
- (A) inherent (B) essential
(C) extraordinary (D) creative

Children's Language Acquisition

Language acquisition refers to the way in which people learn languages whether it is their first language or a subsequent language. Nowadays, a hotly debated issue amongst linguists is whether children are born with a natural ability to learn languages or whether they learn how to understand languages from their environment. This debate is known as "the nativist vs. the non-nativist" debate.

Linguists that support the nativist theory believe that children learn through their natural ability to organize the laws of language, but they cannot use this ability if there are no other people to talk to. According to the nativist theory, children do not need any kind of training in language learning because their brains are ready to learn languages from the time they are born. A newborn child, the nativists argue, is able to understand languages because he has a basic understanding of grammar which is natural or native to him. As the child grows, he uses an innate grammar knowledge to make sense of the world and to express and decode ideas in complex ways. If this theory is true, then people must have some basic knowledge in their genes that helps them simply to understand language from the time they are babies.

On the other hand, there are many different non-nativist theories, including the most popular, called Social Interactionism. Social-interactionists believe that adults play an important part in children's language acquisition. These linguists believe that parents, especially mothers, talk to their children in a manner that is similar to formal language lessons, and, although children seem to learn language easily, their progress is the result of getting language lessons almost all of the time. Social-interactionists also believe that children have an ability to learn much more quickly than teenagers or adults. However, this theory is



14. According to paragraph 5, which of the following best describes Genie's language progress?

(A) She never learned language skills.
 (B) She learned many language skills.
 (C) She learned some skills.
 (D) She proved the nativist theory.

15. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

As a matter of fact, Genie was confined to a room with very little light and tied to a potty chair most of the time.

Where would the sentence best fit?

16. Directions: Complete the table below by indicating which of the answer choices describe characteristics of Social Interactionism and which describe characteristics of the Critical Period Hypothesis. TWO of the answer choices will NOT be used.

Social Interactionism	Critical Period Hypothesis
•	•
•	•
•	

Answer Choices

- (A) Young children receive informal language lessons from their mothers.
 (B) Children lose their ability to learn languages around the time of puberty.
 (C) Young children do not have the ability to learn languages more easily than teenagers and adults.
 (D) Adults play an important role in children's language acquisition.
 (E) The discovery of Genie allowed scientists to test this theory.
 (F) A newborn baby never understands languages.
 (G) This is challenged because some mothers do not speak to their children as much as others, yet the children's language is not affected.

being challenged because there are many societies in the world where mothers do not speak to their children very much, yet the children are nonetheless able to become fluent quickly.

Another important theory of children's language acquisition is the Critical Period Hypothesis. Linguists who support this theory argue that a child's innate ability to learn a language deeply and with a proficiency that is normally associated with first language acquisition will typically end at around the age of twelve. After that, these scholars believe that it is impossible for anyone to learn any language profoundly. People who support this theory use the example of a girl known as Genie, also called "the Wild Child."

Genie was raised in isolation. **A** Her father was a disturbed man who decided to keep her away from all contact with other people, and he never talked to her or allowed her to learn anything. **B** She was thirteen when she was discovered and taken away from her father. **C** Although her circumstances were very tragic, linguists were excited at the opportunity to teach this girl some language skills because through her example they could test the Critical Period Hypothesis and the nativist or non-nativist theories. **D** Genie was able to learn some language, though never to the level that a normal teenager would. Linguists believe that Genie's case proves the Critical Period Hypothesis although they still debate whether or not it supports the nativist or non-nativist arguments.

Vocabulary Review

[A] Choose the word with the closest meaning to each highlighted word or phrase.

- The airplane will be landing in approximately ten minutes.
 (A) closely (B) nearly (C) falsely (D) appropriately
- The extent of the damage forced them to abandon the project.
 (A) loss (B) aftermath (C) degree (D) cause
- People perceive that some movies are like fairy tales.
 (A) know (B) change (C) open (D) relate
- The queen knew that she unwittingly offended the princess.
 (A) accidentally (B) magnificently (C) individually (D) extremely
- Always try to stick with the plan.
 (A) customize (B) follow (C) remember (D) forget
- This student will apply knowledge from many of her life experiences in her work.
 (A) refer (B) send (C) use (D) discount
- To prevent the spread of germs, it is recommended that you often wash your hands.
 (A) nourish (B) view (C) help (D) stop
- The loaded truck was too heavy for the bridge.
 (A) dangerous (B) rusty (C) filled (D) long
- The elderly man collapsed on the floor.
 (A) fell down (B) danced (C) slipped (D) slept
- The children replied in unison to the teacher's questions.
 (A) answered (B) shouted (C) stood (D) opened

[B] Match each word with the correct definition.

- | | | |
|------------------|---|--|
| 1. coordinate | • | a. perspective |
| 2. plough | • | b. not real; make-believe |
| 3. attitude | • | c. debate |
| 4. elaborate | • | d. words that make no sense; an absurd situation |
| 5. camouflage | • | e. to turn up the earth |
| 6. social | • | f. complicated; complex; detailed |
| 7. imaginary | • | g. research; study |
| 8. controversy | • | h. to balance; to organize |
| 9. investigation | • | i. living in communities; needing companionship |
| 10. nonsense | • | j. a disguise to hide or blend into the surroundings |

Unit **7**

Inference

7 Inference

Overview

■ Introduction

Inference questions ask you to understand an argument or an idea that is strongly suggested but not clearly mentioned in the passage. So you should use logical thinking in order to make an inference based on some information in the passage. You need to figure out the logical implications of the author's words as well as the surface meaning of those words.

■ Question Types

1. Which of the following can be inferred about X?
2. Which of the following can be inferred from paragraph _____ about X?
3. According to the passage, it can be inferred that X ~
4. The author of the passage implies that X ~
5. It can be inferred from the passage that the author most likely believes which of the following about X?
6. Which of the following statements most accurately reflects the author's opinion about X?

■ Useful Tips

- Think logically to draw a reasonable conclusion from what is implied in the passage.
- Remember that the correct answer does not contradict the main idea of the passage.
- Do not choose an answer just because it is mentioned in the passage.



Sample iBT Question

It can be inferred from the passage that operant conditioning

- (A) is more likely to be used on animals than on humans
- (B) makes use of negative reinforcement more often than positive
- (C) is widely used for behavior modification in the classroom
- (D) uses rewards and punishments as stimuli to elicit wanted behavior

Behaviorism

Common methods of behavioral modification are based on behaviorism. Behaviorism is the belief that observable experiences can be measured, and it emphasizes the relationship between actions and consequences. Two well-known methods of behavioral modification are classical conditioning and operant conditioning. In classical conditioning, a neutral object or event is used to get a response from a different object or event. For example, in his famous dog experiment, Ivan Pavlov introduced the neutral ringing bell stimuli along with the meaningful food stimuli until the sound of the bell alone made the dog salivate by association.

Unlike classical conditioning, operant conditioning is based on a system of rewards and punishments and is a principal method of classroom management. A reward or punishment follows an action. If an action is desirable, a reward will be given to positively reinforce it. On the other hand, if a teacher stops withholding a privilege when unwanted behavior stops, negative reinforcement has been issued. Negative reinforcement is defined as the removal of a punishment or negative consequence when an undesirable action stops.

Correct Answer

According to the passage, behaviorism is commonly used to change someone's behavior, and operant conditioning is a principal method of classroom management. Therefore, choice (C) is the correct answer.

Siberia

Environmentalists have turned their attention to Siberia's harsh landscape because they are concerned with the causes and effects of global warming. Known for its frigid temperatures, ice, and snow, Siberia makes up more than one half of Russia and encompasses all but the upper northeastern tip of Asia. Siberia, together with Canada, Scandinavia, and small patches of Alaska, forms the Arctic tundra. There, even in the absence of trees, vegetation and animal life have supported traditional livelihoods for thousands of years. These livelihoods include reindeer herding, hunting, and fishing. But today, that environment is changing. The Arctic landscape has become home to large-scale industrial sites and their surrounding towns that add to the rising pollutants from Earth's middle latitudes. While this increase gravely impacts the delicate ecosystem of the Arctic tundra, it also poses a major global threat.

1. The author of the passage implies that Siberia's harsh landscape
 - (A) prevented people from living there until industrial sites were created
 - (B) is too dangerous for environmentalists to study
 - (C) accelerates global warming
 - (D) is suffering damage due to pollution
2. Which of the following can be inferred about the Arctic tundra?
 - (A) It occupies the northeastern part of Asia.
 - (B) It is located in Siberia.
 - (C) It has a variety of plant and animal life.
 - (D) It is a good place to build new towns.

Jacob Levy Moreno

Jacob Levy Moreno is the father of sociometrics, psychodrama, and group psychotherapy. Born in Romania in 1889 but raised in Vienna, he moved to the United States in 1925. Moreno studied and expanded on the tenets of Carl Jung but discounted the theories of Sigmund Freud, who believed in confining therapy to the private fancies of individual patients.

Unlike Freud, Moreno focused on public or social therapy. He viewed learning and living as socially constructed experiences and reasoned that if patients could learn to work out distantly represented problems within non-judgmental and safe group settings, they would be better equipped to work out the real problems that occur in day-to-day situations. If real problems could be easily worked out, then the lives of the patients would be happier.

3. According to paragraph 1, what can be inferred about Jacob Levy Moreno?
 - (A) He advanced the beliefs of Carl Jung and Sigmund Freud.
 - (B) He was satisfied with the work of traditional psychology.
 - (C) He would be more apt to agree with Carl Jung than Sigmund Freud.
 - (D) He paid attention to the subconscious of individual patients.
4. It can be inferred from paragraph 2 that Jacob Levy Moreno
 - (A) wanted his patients to learn problem-solving strategies
 - (B) did not understand the value of cooperative groups
 - (C) put more weight on individuality than on collectivity
 - (D) solved the real problems of his patients

The Rosetta Stone

The Rosetta Stone was discovered near the Egyptian port city of Rosetta in 1799. It was a valuable find for anthropologists because it provided the critical key needed to decipher ancient texts. Dated to 196 B.C., the pinkish-gray stone was scribed by priests as a celebratory tribute to the Egyptian Pharaoh Ptolemy V.

To ensure that it could be read by all, the priests transcribed their homage in Egyptian and Greek using the three prevailing scripts of the day: hieroglyphs, Greek, and demotic Greek. Hieroglyphs catered to religious rites and represented important concepts with stylized pictures, Greek was the language of the ruling class, and demotic Greek was the form used by the masses for everyday speech and writing. Although Greek and demotic Greek flourished, hieroglyphs became a forgotten form, and the meanings behind Egyptian artifacts became a mystery.

In 1822, however, Jean-François Champollion, a young history lecturer who could speak several languages, including Greek, endeavored to compare the scripted equivalents, and he broke the elusive hieroglyphic code.

5. Which of the following can be inferred about the languages of ancient Egypt?
☐ (A) Hieroglyphs could only be read by the elite of the society.
☐ (B) The languages were a reflection of the classes that used them.
☐ (C) The Greek language derived from the ancient Egyptian language.
☐ (D) Common Egyptians spoke demotic Greek and wrote hieroglyphs.
6. Which of the following can be inferred about the importance of the Rosetta Stone?
☐ (A) It provided new information about Ptolemy V.
☐ (B) It provided the means to translate ancient hieroglyphs.
☐ (C) It represented ancient Egyptian art.
☐ (D) It highlighted religious rites in ancient Egypt.

The Appalachian Mountains

The Appalachian Mountains form the oldest mountain chain on the North American continent. They cross from Canada in the north to the United States in the south and are about 19,884 miles long. The whole mountain system can be divided into three main sections. The northern section includes the mountains that stretch from Newfoundland in Canada to the Hudson Valley. The central section includes those from the Hudson Valley to the New River Valley in Virginia and West Virginia, and the southern section includes the mountains that pick up from the New River Valley and continue to the end of the mountain chain in central Alabama. Because the Appalachian Mountains run parallel to the Atlantic Coast, they form a natural dividing line between the eastern seaboard of the United States and the Midwest area of the country.

7. The author of the passage implies that the Appalachian Mountains
☐ (A) range from Canada to part of the United States
☐ (B) are the longest mountain chain in North America
☐ (C) end where Canada meets the United States
☐ (D) extend to the West Coast
8. According to the passage, what can be inferred about the Midwest area of the United States?
☐ (A) It is protected from cold sea winds by the Appalachian Mountains.
☐ (B) It is divided into three parts by the Appalachian Mountains.
☐ (C) It is linked to the east coast of the United States by the Appalachian Mountains.
☐ (D) It is separated from the Atlantic Ocean by the Appalachian Mountains.

A Read the following passage, and answer the questions.

Jean Piaget's Stages of Cognitive Development

Time Limit: 3 min. 50 sec.

Swiss psychologist Jean Piaget classified four stages of cognitive development: sensorimotor, pre-operational, concrete operational, and formal operational. The stages unfold chronologically and are roughly age-related. Although the characteristics of several stages may overlap within the same time frame, the ages for each reflect an approximate understanding of reality during that period.

The sensorimotor stage occurs during infancy when the construction of knowledge is restricted to sensory input and motor action experiences. It is marked by two chief accomplishments. The first is differentiation between self and other, and the second is object permanence—the realization that objects and events exist irrespective of being seen, touched, or heard.

Between two and seven years of age, the pre-operational stage takes place. It weights symbolic representations of reality with language development and is comprised of two successive substages—the symbolic thought substage and the intuitive thought substage. The symbolic thought substage occurs between two and four years of age. It is characterized by naming and pretend play that are limited by egocentrism and animism. Egocentrism inhibits perception from another's viewpoint, and animism is the belief that human-like feelings and actions are attributes of inanimate objects.

Between four and seven years of age, intuitive thought initiates a form of metacognition. It allows a child to know, but it does not provide an understanding of how that knowledge was derived. This phenomenon results from concentration on one facet or idea to the exclusion of all others and is marked by the child's inability mentally to conserve an object's inherent properties when that object's appearance is changed.

The concrete operational stage takes place from seven to eleven years of age. At that time, concrete operational thinkers begin to interpret information logically. They can categorize objects according to shared or connected properties, and they can reverse the processes of seriation and transitivity. Seriation is the process of ordering stimuli along a quantitative continuum. Transitivity is the problem-solving strategy exercised in concretely represented if-then scenarios.

The formal operation stage might be reached by eleven to fifteen years of age or older. It is characterized by abstract and ideological reasoning as well as adolescent egocentrism, a heightened self-consciousness that prompts self-assessment and judgment of others. With a propensity for speculation and hypothesis testing, individuals in this stage can devise and execute a broad range of systematic algorithms to reach logical conclusions. This ability allows adolescents to explore greater possibilities than concrete operational thinkers who hold more rigidly to preconceived notions.

Since its introduction in the 1950s, Piaget's theory about the stages of cognitive development has been criticized for its narrow estimates of children's competencies at different developmental levels and for its failure to factor social discourse, culture, and education into the rate and degree of progression from one stage to another. Furthermore, recent studies show that several stages are apt to co-occur according to the domain of knowledge elicited. Nevertheless, Piaget's stages continue to profoundly influence pedagogical trends.

- classify (v) to categorize; to divide • cognitive (a) relating to thought processes • chronologically (ad) sequentially; consecutively • be restricted to (phr) to be limited to • permanence (n) continuity; constancy • inhibit (v) to prohibit; to ban • attribute (n) a quality; a characteristic; a property • inanimate (a) lifeless • intuitive (a) instinctive; spontaneous • exclusion (n) keeping out; elimination • inherent (a) innate; inborn • propensity (n) a tendency • preconceived (a) presumed; presupposed • competency (n) ability • apt (a) likely • elicit (v) to draw out; to stimulate • pedagogical (a) related to teaching

General Comprehension

1. According to paragraph 5, which of the following is true about transitivity?
 - (A) It demands great physical changes.
 - (B) It moves a child from one stage to another.
 - (C) It operates on the cause-and-effect basis.
 - (D) It helps interpret information intuitively.
2. According to the passage, which of the following is true about individuals between 11 and 15 years of age?
 - (A) Logical thinking based on abstraction becomes prominent.
 - (B) Objects start to be categorized according to their characteristics.
 - (C) Egocentrism hinders assessing and judging others' viewpoints.
 - (D) Metacognition begins to allow an understanding of knowledge source.

On the TOEFL Test

3. It can be inferred from paragraph 3 that the pre-operational stage
 - (A) is divided into two co-occurring substages
 - (B) is marked by the use of words to represent reality
 - (C) allows children to see things from another's point of view
 - (D) differentiates between living and non-living things
4. What can be inferred about Piaget's stages of cognitive development?
 - (A) They occur in sequential order.
 - (B) They provide a conclusive analysis of children's abilities.
 - (C) They are often associated with age.
 - (D) They are apt to co-occur.

Jean Piaget's Stages of Cognitive Development

- (1) _____ stage - occurs during infancy
 - builds knowledge through senses and motor action experiences
- Pre-operational stage - occurs during ages two to seven
 - relies on (2) _____ and intuitive thought
- Concrete operational stage - occurs during ages (3) _____
 - can interpret information logically
- Formal operational stage - occurs during ages eleven to fifteen or older
 - uses (4) _____ reasoning



B Read the following passage, and answer the questions.

Numeric Symbols

Time Limit: 5 min.

A number is a concept. It is abstract. It cannot be seen, heard, felt, tasted, or smelled. A numeral is a symbol that is created to represent a number, and a number can be represented in many ways. Among the classifications of numbers are ordinal and cardinal numbers. An ordinal number acts as a determiner and answers the question "which one?" It also indicates order. A cardinal number tells how many.

Numerals are symbols that represent numbers. A numeration system is a method of putting symbols to numbers. There are three kinds of numeration systems: simple, multiplicative, and positional. Simple systems apply the same power of a base and add each value in the numeral. For example, a series of lines would be added together to tally a sum. Multiplicative systems use multipliers to avoid grouping symbols more than once after a base and its symbols have been defined. Generally, numerals appear in pairs with one multiplier followed by a grouping symbol. Each time the base is reached, a new symbol is used. If the base is four, dashes or lines would represent 1, 2, 3, and 4, but 5 would be represented with a new symbol, and so forth. Any arrangement of the symbols is added together for tallying. The positional systems refine the multiplicative systems because it incorporates value positions. With value positions, symbols can be reused but represent different numbers based on the position or order that they take in a symbol grouping.

Each of the numeric systems has been used throughout history where different cultures have marked numbers with their own symbols and base numbers. For example, the early Egyptian civilization used a simple grouping numeration system based on ten. In order to decode Egyptian numerals, long stretches of symbol groupings had to be sorted out and added together.

On the other hand, the Chinese-Japanese system used a multiplicative system. Like the Egyptian system, it was based on ten. However, instead of using one symbol as a multiplier, the system used nine different symbols that were written vertically, not left to right like the Egyptian system.

The Babylonians had a modified positional numeration system based on 60. They had two symbols for multipliers, a ten symbol and a one symbol, and only wrote them in value positions. They did not have a symbol to represent zero. The Babylonian system was weak because each grouping was open to many interpretations.

The Mayan's modified positional numeration system was based on twenty. It contained a zero and was written vertically. The bottom numerals represented the one's place, and the ascending order gave way to greater values. However, the third place shifted from a 20×20 representation to 20×18 and altered the course of the successive place values.

The Hindu-Arabic is the most highly developed numeration system. It is a positional numeration system based on ten. It uses ten multipliers. Each multiplier is called a digit. The ten digits are 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. Each digit can be expressed by a single symbol, and each is different from the others. When a digit holds a particular position, it indicates how many of that place value are represented. So, the Hindu-Arabic system is not only more sophisticated but is also much simpler to use. Furthermore, any positional numeral in a given base can be translated into the Hindu-Arabic system. For instance, the Hindu-Arabic system has supplied the format for the binary system that is used to program today's computers.

- concept (n) an idea • abstract (a) existing as a quality rather than something real • represent (v) to symbolize; to stand for
- indicate (v) to show • tally (v) to count • refine (v) to improve; to polish • incorporate (v) to include; to combine
- decode (v) to interpret; to make out • vertically (ad) straight up • modify (v) to change; to alter • ascending (a) rising
- give way (phr) to yield; to give in • alter (v) to change • sophisticated (a) advanced; having a refined knowledge
- binary (a) based on two

General Comprehension

1. According to the passage, which of the following is the most efficient numeration system?
 - (A) a positional system based on ten
 - (B) a multiplicative system based on twenty
 - (C) a modified positional system based on sixty
 - (D) a simple grouping system based on ten
2. According to paragraph 4, which of the following is true about the Chinese-Japanese numeration system?
 - (A) It is a positional system.
 - (B) It is a simple grouping system.
 - (C) It is a multiplicative system.
 - (D) It is a system that altered the course of successive place values.

On the TOEFL Test

3. It can be inferred from paragraph 3 that numeration systems
 - (A) are important to every culture
 - (B) were most highly developed in Egypt
 - (C) were introduced by ancient Egyptians
 - (D) are all decoded in a fast and simple way
4. It can be inferred from the passage that the author most likely believes which of the following?
 - (A) The value of the numerals is always clear.
 - (B) The symbols that represent numbers are more important than their positional values.
 - (C) Simple grouping is the fastest method of counting.
 - (D) The Hindu-Arabic system can adapt to other bases.

Numeric Symbols

- Numbers - are just (1) _____
- Numerals - are (2) _____ that represent numbers
- Numeration system - method of putting symbols to numbers
- Historical numerical systems - Egyptian system based on ten
 - Chinese-Japanese system was (3) _____
 - Babylonians had system based on 60
 - Mayans has system based on 20
 - (4) _____ was most developed system
 - positional system based on ten
 - was much simpler than other systems

C Read the following passage and answer the questions.

Lake Superior

Time Limit: 3 min. 30 sec.

Lake Superior is the world's largest freshwater lake which is located in North America. It forms a natural boundary between the United States and Canada. Together with Lake Huron, Lake Ontario, Lake Michigan, and Lake Erie, it forms the Great Lakes. It is bordered by Ontario, Canada, to the north and east, by Michigan and Wisconsin to the south, and by Minnesota to the west. Of the Great Lakes, Lake Superior sits the highest north and furthest west. It is very remote, densely forested, and sparsely populated.

Lake Superior is so large that it could fill all of the other Great Lakes—Huron, Ontario, Michigan, and Erie—plus three more lakes the size of Lake Erie. It contains about 2,900 cubic miles of water—or 12.11 quadrillion liters. Lake Superior is 350 miles long and 160 miles wide, and it reaches a maximum depth of nearly 1,333 feet. Its surface elevation is 600 feet. Fed by more than 300 streams and rivers, it empties into Lake Huron.

Because of its vast size and depth, Lake Superior is also the coldest of the Great Lakes and remains at a constant 40 degrees Fahrenheit. The temperature of the lake regulates the climate of the surrounding area and keeps it cooler in the summer and warmer in the winter. It also causes the greatest lake effect snows on Earth. They sometimes reach 20 to 30 miles inland and produce snowfalls with depths of 16.5 feet in some places.

Lake Superior is the largest freshwater lake by area and the third largest by volume. Its surface area is roughly 32,000 square miles. While 20% of the Earth's freshwater supply comes from the Great Lakes, a full 10% comes from Lake Superior. This is significant since only 3% of the Earth's water is freshwater, and two-thirds of that is frozen in glaciers and frozen ice caps. Freshwater is important because other grades of water contain salts that are harmful to people, and many species including humans need freshwater to survive.

The water from Lake Superior is the drinking water of the more than 40 million people who reside in its adjacent states, and, more recently, it is being bottled and shipped abroad. To maintain its level of purity, a pact was made between the United States and Canada in 1972 to eliminate unwanted pollutants and to improve the water supply. Currently, water levels are monitored and controlled by the International Lake Superior Board of Control.

- remote (a) isolated • densely (ad) thickly; compactly • sparsely (ad) rarely • populate (v) to furnish with inhabitants or members • empty into (phr) to flow into • vast (a) huge; boundless; immense • constant (a) steady; unchanging • regulate (v) to control • volume (n) amount; quantity • roughly (ad) approximately
- significant (a) important • glacier (n) an extremely large mass of ice; an ice foe • reside (v) to live; to dwell
- adjacent (a) neighboring; bordering; adjoining • eliminate (v) to remove; to get rid of • pollutant (n) a contaminant
- pact (n) a formal agreement

General Comprehension

1. According to the passage, which of the following is true about Lake Superior?
 - (A) It is surrounded by many towns and villages.
 - (B) It divides the United States and Canada.
 - (C) It feeds more than 300 streams and rivers.
 - (D) Its main feature is a frozen glacial cap.

2. According to paragraph 4, which of the following is true about the Earth's freshwater?
 - (A) Ten percent of it is not suitable for human drinking due to its salinity.
 - (B) Twenty percent of its supply comes from Lake Superior.
 - (C) Around sixty percent of it exists in frozen form.
 - (D) Three percent of it is used as drinking water for animal species.

On the TOEFL Test

3. It can be inferred from paragraph 3 that Lake Superior
 - (A) is easily affected by the weather changes of the surrounding area
 - (B) remains at a low temperature all year round
 - (C) causes heavy snow to fall far inland every winter
 - (D) is large enough to change the weather systems throughout North America

4. The author of the passage implies that Lake Superior is an important resource because
 - (A) it has become a top commodity for U.S. exporters
 - (B) it contains natural mineral salt
 - (C) it can be controlled by humans
 - (D) it provides people with freshwater to drink

Lake Superior

- Geography
 - located in North America between the United States and Canada
 - world's largest (1) _____
 - remote, heavily forested, and has few people
- Extremely large lake
 - could fill all other (2) _____ easily
- Is very cold and has constant (3) _____ - 40 degrees Fahrenheit
- Supplies (4) _____ of world's freshwater supply
- Provides drinking water for 40 million people

D Read the following passage, and answer the questions.

Memory Theories

Time Limit: 3 min. 50 sec.

Theories about memory are important because they offer explanations about how individuals learn. Since learning is the relatively permanent influence on behavior, knowledge, and thinking skills that results when information is derived through experience, and experience is the physical contact with or observation of facts or events, then memory is the retained information from experience.

Memory formation involves three main processes. They are encoding, storage, and retrieval. Encoding is the process of taking information in as it is experienced; storage is the mental process of storing or representing that information in the mind; and retrieval is the process of recalling that information as it is needed for specific and related tasks.

Encoding relies on learning and attention. While learning involves how the senses interpret an experience, attention is concentrating and focusing mental resources on a specific task. Attention includes being able to shift from one activity to another and to use different skills to accomplish a relevant goal. For example, in order to attend to writing a sentence, an individual must focus on the purpose of the letter as well as how to write the letters and how to spell the words correctly on paper. Proper capitalization, grammar, and punctuation must be implemented for the task to be successfully completed. Attending to something relevant takes effort.

Storage is the potentially progressive manner in which experiences are categorized as memories for later retrieval. The three types of memory storage are sensory memory, short-term memory, and long-term memory. Sensory memory lasts only an instant and is the actual introduction to information in its original form. For example, touching a hot pot or hearing a crack of thunder will imprint a sensory memory. Because the experience is instantaneous, attention to relevant information is vital to its retention.

Short-term memory normally lasts for up to 30 seconds. It is limited by the amount of information that individuals can hold at any one time. In order to retain information longer, it must be repeated and learned by rote or sparked by orchestrated cues.

Long-term memory is relatively permanent information that has been worked and attached to various schemas. Schemas are concepts or frameworks of knowledge that exist in an individual's mind and organize and interpret information. When a set of information is inducted into long-term memory, it forms attachments to vast and intricate networks of ideas that exercise it and strengthen its placement there.

Retrieval is the process of searching for relevant information. Like encoding, it can be automatic or require the effort and attention of the individual. The storage of the information impacts the ease or likelihood of retrieval since not all experiences are retained.

According to theorists, memories can be actively constructed by individuals. Understanding how the memory processes function is important to educators and students because it aids in the formulation of new teaching and learning strategies that support the acquisition and retrieval of base knowledge that is needed to understand new concepts.

- theory (n) a hypothesis; an assumption
- permanent (a) long-lasting; enduring
- derive (v) to obtain
- observation (n) watching; inspection
- retain (v) to keep
- involve (v) to include; to entail
- recall (v) to bring to mind; to remember; to recollect
- relevant (a) related; pertinent
- implement (v) to carry out; to plan
- progressive (a) ongoing; advancing
- imprint (v) to impress; to mark
- instantaneous (a) immediate; instant
- vital (a) essential; indispensable
- by rote (phr) by habitual repetition
- orchestrated (a) organized; arranged
- induct (v) to admit; to let in
- intricate (a) complicated; complex
- acquisition (n) a possession; a gain
- formulation (n) preparation; design

General Comprehension

1. According to paragraph 4, which of the following is true about sensory memory?
 - (A) It interferes with the working ability of the senses.
 - (B) It disappears in a very short time without attention.
 - (C) It processes information into a more concrete memory.
 - (D) It changes one experience to another.
2. According to the passage, all of the following are true about memory processes EXCEPT:
 - (A) Memory storage may happen from sensory through short-term to long-term memory.
 - (B) Long-term memory keeps new information by associating it with existing information.
 - (C) Retrieval process sometimes requires the effort and attention of the individual.
 - (D) Short-term memory can be strengthened by repetition or the use of schemas.

On the TOEFL Test

3. Which of the following statements most accurately reflects the author's opinion about memory?
 - (A) Any memory can be retrieved.
 - (B) People have some control over their memory.
 - (C) Long-term memory is the most difficult to retrieve.
 - (D) Every experience is stored.
4. What can be inferred about encoding?
 - (A) It is necessary for the retention of a long-term memory.
 - (B) It requires deliberate attention.
 - (C) It is not central to learning.
 - (D) It takes place after information is stored.

Memory Theories

- Provide explanations for how people learn
- Involve three processes – encoding, storage, and (1) _____
- Encoding
 - relies on learning and (2) _____
 - sees how senses interpret experience and focus mental resources on task
- Storage
 - way in which memories are categorized for later use
 - has (3) _____, short-term memory, and long-term memory
- Retrieval
 - act of searching for relevant information
 - can be (4) _____ or require effort



E Read the following passage, and answer the questions.

Clipper Ships

Time Limit: 3 min. 30 sec.

Clipper ships saw their heyday in the early to mid-1800s. Spurred on by the dissolution of the East India Trading Company and the advent of the California Gold Rush, clipper ships answered the call for fast and efficient transportation of perishable cargo.

Merchants from the East wanted to rush their goods west to California and take advantage of prices that had inflated to unbelievable heights. There, a barrel of flour that cost four dollars in New York sold for forty dollars in San Francisco, and a four-month-old newspaper from Philadelphia cost a dollar. One of the most pressing of the commodities was tea from China. Tea was a popular item that tasted better when it was fresh. The slow trips that started at the port of China stopped at the port of New York, circled around Cape Horn, and ended on the western side of the United States, resulting in spoiled tea that was not fit for human consumption. Because Americans loved their tea and were willing to pay for it, ship owners were confident that any money invested in new ship designs would be recouped in their profits and be well worth the trouble.

Nat Palmer, Edward Collins, Donald McKay, and John Willis Griffiths are credited by many historians as the innovators of the new breed of ships. Nat Palmer, an experienced seaman and captain, was the first to envision a sailing vessel with a flat bottom instead of the v-shaped form that prevailed at that time. Edward Collins, a financier of the project, owned a shipping company and was willing to take a risk on the novel structure. Donald McKay, a talented craftsman and shipyard owner, was hired to build the ships hands-on, and John Willis Griffiths, a noted genius, laid the plans based on principles of science and higher math on paper.

Aptly named for its ability to clip time, the clipper had a knifelike bow to slice easily through the water, a narrow hull so that the ship would move smoothly, and taller masts to collect every bit of wind that might hurry the ship along. Griffiths even removed everything from the deck to lessen wind resistance that normally slowed ships down.

The final result was the spectacular and streamlined *Rainbow*. The *Rainbow* was the first true clipper ship. It provided the template for a new generation of ships that amazed the world with their swiftness and inspired poets to romanticize the movements of their graceful lines.

- heyday (n) a period of greatest success; prime
- spur (v) to stimulate; to prompt
- dissolution (n) break up; termination
- advent (n) arrival; beginning
- perishable (a) decomposable; quickly decaying
- inflate (v) to increase rapidly
- pressing (a) urgent; necessary
- commodities (n) goods; products
- fit (a) suitable; appropriate
- consumption (n) drinking; eating
- recoup (v) to regain; to recover
- credit (v) to acknowledge; to recognize
- envision (v) to conceive; to see
- prevail (v) to be widespread
- novel (a) new
- financier (n) an investor; a sponsor
- hands-on (a) practical; direct
- aptly (adv) suitably; properly; appropriately
- clip (v) to shorten; to curtail
- bow (n) the front part of a ship
- hull (n) the main body of a ship
- mast (n) a tall upright pole that supports a sail
- deck (n) the floor of a ship
- lessen (v) to decrease; to diminish; to lower
- resistance (n) a hindrance; an obstruction
- spectacular (a) impressive; amazing
- template (n) a model; a prototype
- swiftness (n) rapidity; fastness; speed
- graceful (a) elegant; beautiful; charming

General Comprehension

1. According to the passage, which of the following is true about clipper ships?
 - (A) They were needed to transport goods more efficiently.
 - (B) They were sold for high profits.
 - (C) They were popular in the 18th century.
 - (D) They were quickly replaced by faster ships.
2. According to paragraph 4, which of the following was NOT a characteristic of the clipper ship?
 - (A) It had a streamlined front part with a sharp edge.
 - (B) It had a strong main body made of steel.
 - (C) It had taller poles to support the sails.
 - (D) It had a lightweight deck.

On the TOEFL Test

3. It can be inferred from paragraph 2 that clipper ships
 - (A) soon replaced traditional ships completely once they were invented
 - (B) were used to deliver newspapers from Philadelphia to New York
 - (C) were expensive to make but returned small profits to ship owners
 - (D) provided an efficient means to transport tea to California
4. According to the passage, what can be inferred about the *Rainbow*?
 - (A) It inspired poets to write romantic poems about the sea.
 - (B) It had a unique design that other clipper ships could not imitate.
 - (C) It was renowned for its appearance and speed.
 - (D) It was the first commercial clipper ship to be used in America.

Clipper Ships

- Provided fast and efficient transportation in (1) _____
- Reason for existence
 - needed fast ships to transport from American East Coast to California
 - goods could not survive long boat trips
- Clipper ship inventors
 - Nat Palmer, Edward Collins, (2) _____, and John Willis Griffiths
 - created fast ship that sailed smoothly
 - had tall masts
 - had nothing on deck to reduce (3) _____
 - (4) _____ (first true clipper ship)



F Read the following passage, and answer the questions.

The Characteristics of the Northwest Coast of the U.S.

Time Limit: 3 min. 30 sec.

The northwest coast of the United States is uniquely characterized by the formidable Cascade Mountain Range. This chain of tall, active volcanoes, also known as the High Cascades, runs from British Columbia in Canada through the regional states of Washington and Oregon. It crosses the international boundary between Canada and the United States and makes up the northernmost third of the subdivided Pacific Mountain System. As the mountain system enters the United States from Canada, where it is known as the Coast Mountains, it follows the bent of the Pacific Coast about 150 to 200 miles inland. Traveling southward into California, it joins with the Sierra Nevada Mountains. The Sierra Nevadas link with the Basin Range to complete the mountain chain.

The Cascade Mountain Range is best known for its enormous and volatile snow-capped volcanoes. They include Mount Baker, Mount Rainier, Mount Adams, Mount St. Helens, and Mount Hood. Mounts Baker, Rainier, Adams, and St. Helens are located in the state of Washington. Mount Hood is located in Oregon. These huge natural formations generally rise in isolation and are separated by great intervening plateaus. Deep cuts mark them in a jagged line and are indicative of the glaciers that sculpted them.

Besides the volcanic giants, there are many non-volcanic mountains. Most notable among them are the 150-mile stretch of highlands that are located just south of Canada in the North Cascades of Washington. Although these rocky pinnacles are judged to be smaller than their volcanic counterparts, they are comprised of hundreds of summits with height differentials that often exceed those of the higher peaks of the Sierra Nevadas.

The remarkable geography of the Northwest coast is further distinguished by the ongoing climatic battle that takes place around the coastal mountain range. While the Cascade Mountains are beset with extensive glaciers and heavy snowfalls, they are also notoriously prone to low clouds and heavy warm weather rains. Such conditions are conducive to temperate rainforests.

Thick rainforests cover the deep narrow valleys surrounding the mountains, particularly from the west, and run from Alaska through Canada and into Northern California. Furthermore, they are included among the Pacific temperate rainforests of North America which make up the largest temperate rain forest zone on the planet. Inherent to west-facing coastal mountains, these rainforests typically foster the tallest species of trees in the world and are part of the Nearctic ecozone that encompasses the greater portion of North America.

- uniquely (ad) incomparably • characterize (v) to typify; to distinguish • formidable (a) very impressive; awesome
- regional (a) local; provincial • boundary (n) a border; a frontier • bent (n) grassland • enormous (a) huge; colossal; gigantic • volatile (a) unstable; changeable; unsettled • in isolation (phr) alone • intervening (a) in-between • jagged (a) uneven; rough • notable (a) unusual; remarkable • pinnacle (n) a peak; a summit; a zenith
- counterpart (n) an equivalent • be comprised of (phr) to be made up of; to consist of • exceed (v) to go above; to surpass • remarkable (a) extraordinary; notable; significant • be prone to (phr) be liable to; be subject to • beset (v) to trouble; to plague • extensive (a) widespread; wide-ranging; far-reaching • conducive (a) helpful; enabling
- inherent (a) intrinsic • foster (v) to promote; to nourish • encompass (v) to include; to cover

General Comprehension

1. According to paragraph 1, which of the following is true about the Cascade Mountains?

Ⓐ They extend from North to South America.
 Ⓑ They include the Pacific Mountain System.
 Ⓒ They are known as the Coast Mountains in Canada.
 Ⓓ They are coastal mountains near the Pacific Ocean.

2. According to paragraph 4, the Cascade Mountains are easily affected by

Click on 2 answers!

Ⓐ temperate rainforests
 Ⓑ sudden climatic changes
 Ⓒ plenty of warm weather rains
 Ⓓ heavy snowstorms
 Ⓔ low-altitude clouds

On the TOEFL Test

3. It can be inferred from paragraph 3 that the Cascade Mountain Range

Ⓐ consists of high volcanic mountains and lower non-volcanic mountains
 Ⓑ is famous for rock-capped volcanoes
 Ⓒ ends in the state of Washington
 Ⓓ has higher peaks than the Sierra Nevadas

4. According to paragraph 5, what can be inferred about the rainforests of the Cascade Mountains?

Ⓐ They are similar to tropical rainforests in size.
 Ⓑ They are the largest temperate rainforests in the world.
 Ⓒ They are a very good place for tall trees to grow.
 Ⓓ They take up most of the Nearctic region.

The Characteristics of the Northwest Coast of the U.S.

- Cascade Mountain Range is there

- has many (1) _____
 → many famous ones, including (2) _____
- goes from Canada down to California
- has many non-volcanic mountains

- Geography

- has many (3) _____ and heavy snowfalls
- also has (4) _____
- tallest trees in the world grow there

● Building Summary Skills

The following summaries are based on the passages you worked on earlier. Complete each of them by filling in the blanks with suitable words or phrases.

1. Jean Piaget's Stages of Cognitive Development

chronological order four stages of cognitive development the formal operational
children's competencies social and cultural influences

Swiss psychologist Jean Piaget introduced a theory about the ⁽¹⁾ _____. They are the sensorimotor stage, the pre-operational stage, the concrete operational stage, and ⁽²⁾ _____ stage. Each of the stages is roughly age related and occurs in ⁽³⁾ _____. Although Piaget's theory gained wide acceptance in the 1950s, today it is criticized for its narrow view of ⁽⁴⁾ _____ and its failure to address ⁽⁵⁾ _____ on learning as well as the possibility that stages are apt to co-occur.

2. Numeric Symbols

abstract concepts the positional Hindu-Arabic system numerals
distinct symbols and systems simple, multiplicative, and positional

Because numbers are ⁽¹⁾ _____, different cultures have used ⁽²⁾ _____ to represent them. The symbols that are used to represent the numbers are called ⁽³⁾ _____, and they are typically arranged in one of three kinds of numeration systems: ⁽⁴⁾ _____. Of these, ⁽⁵⁾ _____ is the most advanced. It is the simplest to use and can be adapted to any base.

3. Lake Superior

the remnants of glaciers the Earth's freshwater supply to protect the lake
the largest freshwater lake the United States and Canada

North America's Lake Superior, a natural boundary between ⁽¹⁾ _____, is ⁽²⁾ _____ in the world. It was formed from ⁽³⁾ _____ and provides a significant portion of ⁽⁴⁾ _____. Freshwater that is free of salts and other unhealthy pollutants is needed by humans and many other species for survival. For that reason, the United States and Canada work together ⁽⁵⁾ _____ from pollutants and to monitor and improve its water supply.

4. Memory Theories

controlled by the learner	sensory memory	past experiences
encoded, stored, and retrieved	teaching and learning strategies	

Memory theories focus on how experiences are ⁽¹⁾ _____. There are three types of memory storage: ⁽²⁾ _____, short-term memory, and long-term memory. Since the encoding and retrieval processes that surround memory storage can be ⁽³⁾ _____, understanding memory processes is influential in the development of ⁽⁴⁾ _____. Such strategies seek to engage learners so that new learning finds stable connections to ⁽⁵⁾ _____.

5. Clipper Ships

perishable items like tea	merchant vessels	transport commodities
the California Gold Rush	scientific and mathematical principles	

As a result of the breaking up of the East India Trading Company and ⁽¹⁾ _____, merchants sought a quick and efficient means to ⁽²⁾ _____ to the west coast of the United States. This was particularly true for merchants who wanted to ensure that ⁽³⁾ _____ reached the coast in a timely fashion. In answer to this unprecedented need, American innovators applied ⁽⁴⁾ _____ to create the first true clipper ship, the *Rainbow*. The *Rainbow* became a prototype for the new swift and streamlined ⁽⁵⁾ _____.

6. The Characteristics of the Northwest Coast of the U.S.

glaciers and heavy snowfalls	temperate rainforests	the Northwest coast
the Pacific Mountain System	heavy warm weather rains	

The Cascade Mountain Range runs along ⁽¹⁾ _____ of the United States and into Canada. It makes up the northernmost third of ⁽²⁾ _____ and is comprised of volcanic and non-volcanic mountains. Although the Cascade Mountain Range is best known for its ⁽³⁾ _____, it also houses ⁽⁴⁾ _____ that grow under the low clouds and ⁽⁵⁾ _____ that are inherent to the mountain region.



1. The word uncanny in the passage is closest in meaning to
 - (A) unusual
 - (B) reliable
 - (C) competitive
 - (D) hidden

2. According to paragraph 2, which of the following is true of Abraham Maslow?
 - (A) He emphasized meeting physiological needs more than anything else.
 - (B) He was severely criticized by Freudians and behaviorists.
 - (C) He claimed that gestalt psychology could contribute to enhancing cognition.
 - (D) He integrated different schools of psychology to develop his own theory.

3. The word gratified in the passage is closest in meaning to
 - (A) frustrated
 - (B) identified
 - (C) fulfilled
 - (D) reduced

4. It can be inferred from paragraph 3 that Maslow
 - (A) was critical of Freudians and neo-Freudians
 - (B) believed that success in life depended on obvious inborn capacities
 - (C) was not interested in mentally unhealthy minds
 - (D) tended to focus on how to satisfy basic needs

5. The word they in the passage refers to
 - (A) people
 - (B) individuals
 - (C) distinct capacities
 - (D) political birthrights

Abraham Maslow's Hierarchy of Needs

Abraham Maslow was born in Brooklyn in 1908. The firstborn son of Jewish immigrants, he possessed an uncanny intelligence that put him in company with the greatest social thinkers of the day. The Freudians touted the impact of the personal subconsciousness on behavior, the behaviorists emphasized external punishments and rewards as factors that influenced action, and the gestalt theorists tried to see how the whole was comprised of many factors. Moved by a steady discourse of eagerly anticipated discussions, Maslow resolved to combine these disparate and often warring schools of thought and to refine a new conception of human motivation.

Maslow's perspective was humanistic. He stressed that individuals have an innate capacity for personal growth, the freedom to choose and act toward their own destiny, and other positive attributes that affect their quality of life. In 1948, Maslow published two papers that addressed the inner needs of people and of how they are satisfied. They were entitled "Cognition of the Particular and of the Generic" and "Some Political Consequences of Basic-Need Gratification." In them, Maslow argued that there are greater needs than the physiological ones posited by the predominant Freudian thinkers and behaviorists, and he pulled the seemingly oppositional schools of thought together, along with the gestalt perspective, to clarify the unacknowledged attributes of fulfilled individuals. He observed that individuals whose basic needs had been gratified performed differently than the other people.

At the core of Maslow's tenets is his hierarchy of needs. It is based on observations meant to discern the values by which people guide their lives. Maslow sought to prove that individuals are not born with distinct capacities to achieve through political birthrights, but rather that they



6. According to paragraph 4, which of the following is NOT included in an individual's set of basic needs?

(A) love (B) protection from harm
(C) self-respect (D) self-fulfillment

7. According to paragraph 5, self-actualization is NOT likely to occur because

(A) people stop maturing once they develop a high sense of self-esteem
(B) needs are arranged in a particular order or hierarchy
(C) self-actualization and self-esteem are the same
(D) motivation is not necessary for the satisfaction of basic needs

8. Directions: Complete the table below by matching FIVE of the seven answer choices with the psychological theory that they exemplify. TWO of the answer choices will NOT be used.

Psychological Theory Associated Claims

Behaviorism	▶
Freudianism	▶
Humanistic Psychology	▶

Answer Choices

- (A) Human behavior is governed by the subconscious.
(B) Individuals are born with potential capacities for personal growth.
(C) Once the basic needs are met, self-actualization results.
(D) Man tends to perceive things as a whole.
(E) Human needs are arranged in a particular order.
(F) Punishments and rewards are required to change action.
(G) It is essential to focus on what people are like when their basic needs are not met.

are given or not given the tools that are needed to achieve greatness—or at least success. Unlike the Freudians and neo-Freudians, who had developed a portrait of what people are like when they are thwarted or frustrated in their lower needs, Maslow was determined to look at the end results when people have their needs met and to see how they got there. He insisted that the study of mental health should include the healthy, not just the diseased.

Maslow argued that each individual has a set of basic needs that include the physical well-being associated with hunger, thirst, and sleep, safety from harm, belongingness or love within a social realm, and a positive and empowering self-esteem. He also maintained that these needs are arranged in a particular sequence or hierarchy. First, the need for food and sleep must be met, followed by the need for safety, love, and so on. The final stage of the hierarchy is self-actualization.

Self-actualization encompasses the motivation to develop one's full potential as a human being, and it is only possible after all of the lower needs have been satisfied. According to Maslow, most people never reach the point of self-actualization because they stop maturing once they develop a high sense of self-esteem. In fact, Maslow proposed that once the lower needs are fulfilled, motivation to assert oneself to move up the hierarchy is abated. He reasoned that the lower needs were stronger and more fiercely animal-related while the needs higher up were weaker and more distinctly human.



9. The word cumbersome in the passage is closest in meaning to

☐ (A) inconvenient
☐ (B) bulky
☐ (C) delicate
☐ (D) unskilled

10. According to paragraph 1, which of the following tools are used to build a ship?

Click on 2 answers.

☐ (A) a plane
☐ (B) a handsaw
☐ (C) a pit
☐ (D) an axe
☐ (E) a hammer

11. According to paragraph 2, which of the following is true about the shipbuilders of the 1600s?

☐ (A) They only used undried lumber to build ships quickly.
☐ (B) They all came from Britain to teach people how to build ships.
☐ (C) They usually worked in teams of three.
☐ (D) They became rich through shipbuilding in colonial America.

12. It can be inferred from paragraph 3 that colonial ships

☐ (A) would be sold along with the cargo they carried
☐ (B) only set sail once every three years
☐ (C) were paired with older ships on journeys
☐ (D) had to compete with traditional styles

13. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

The manufacturing of ships was slow, but it continued at a steady and profitable pace.

Where would the sentence best fit?

Shipping and Shipbuilding in the British Colonies in North America

Early shipbuilding practices in the British colonies of North America were crude and tedious. All planking was sawn by hand, and the bulkier components were shaped and fitted by use of an adze, broadaxe, and plane. As a part of the cumbersome process, a pit was dug, and a platform, or staging, was set up across it. A log was placed upon the platform where a pair of men would work together to operate a two-man saw in a push-pull fashion. With one man in the pit and the other on the platform, they would haul the saw blade across the log until the log ripped into a plank. So much skill was required to master this feat that the work of the sawyer became a recognized trade.

In the early settlements of the 1600s, English shipwrights were imported to train apprentices. The second man was the shipwright's helper, and together they were a gang. A third man had the job of turning the log away from the staging when the saw cut loomed too near it or when it was time to start a new cut. Although shipbuilding led to other industries such as the making of sails, rope, nails, anchors, and chains, the cost of converting timber to usable planks was so great that little of it was kept on hand by shipbuilders, and they used a good deal of green lumber in their ship construction.

A By the mid-1650s, most of the colonies did not lay down a ship more than once every three years. **B** Builders would send out and sell a vessel as well as its fully loaded cargo to English or foreign owners after it reached its destination. **C** These slow-moving ships closely followed the 400-year-old traditional lines of the popular English and Danish styles. **D** They bore three masts and square-rigging on a broad base, but they were usually much smaller. Nevertheless, by the late 1600s, colonial shipbuilders were strong competitors in the



14. The word propel in the passage is closest in meaning to

(A) stay afloat
(B) change direction
(C) decrease weight
(D) send forth

15. In stating that colonial Boston became the jewel in the crown of Britain's commercial exploits, the author means that Boston became

(A) the greatest exporter of jewelry to Britain
(B) the most loyal colony to the British government
(C) the most important colony to British trade
(D) Britain's biggest market in commerce

16. According to the passage, which of the following is true about colonial Boston?

(A) It relied exclusively on timber and fish for economic stability.
(B) It provided more valuable resources than the coastal areas did.
(C) It became the richest city in the British Atlantic realm by the early 1700s.
(D) It offered many new trades that competed with shipbuilding.

shipbuilding and shipping trades and helped to propel heavy trans-Atlantic commerce.

Colonial Boston became the jewel in the crown of Britain's commercial exploits. Under puritanical management, its harbor and plentiful resources ensured a robust trade economy that would be a matter of course for the young American colonies. The coastal and continental resources that provided for fur trapping, iron making, and the production of textiles paled in comparison to the rich supplies of timber and fish that seemed to be inexhaustible exports for the young colony. Although none of the trades, not even the fisheries, gave constant employment, these resources laid the underpinnings for a secure economic boon that anchored the shipping and shipbuilding industries.

By the early 1700s, Boston Harbor was the number one seaport in America and the third largest port in the British Atlantic realm. A lucrative salt-cod trade resulted in strong collaborative ties among shipbuilders, fishermen, and merchants and led to new shipping innovations that bolstered the path for the infamous Triangle Trade Route and made Boston America's largest, wealthiest, and most influential city through the 1760s.

Vocabulary Review

A Choose the word with the closest meaning to each highlighted word or phrase.

- The young boy would wear a cape and pretend that he could fly.
 (A) insist (B) find out (C) make believe (D) hope
- Spoiled children are apt to have tantrums when they do not get their way.
 (A) likely (B) sure (C) forbidden (D) quick
- The constant drip from the tap left her no choice but to call a plumber.
 (A) steady (B) loud (C) broken (D) wasteful
- The lovers made a pact to meet in one year under the tree.
 (A) bet (B) agreement (C) race (D) plan
- The student body will induct the new members at their next meeting.
 (A) introduce (B) applaud (C) admit (D) listen to
- Her greatest acquisition was a signed autograph from the band.
 (A) possession (B) achievement (C) desire (D) fear
- The cashier sorts out the receipts from the pile.
 (A) receives (B) combine (C) creates (D) selects
- Her formidable talent won her a part in the show.
 (A) impressive (B) natural (C) raw (D) single
- The steady breeze was conducive for kite flying.
 (A) harmful (B) helpful (C) difficult (D) needed
- Water supply to the city and several adjacent areas remains affected by the earthquake.
 (A) remote (B) surrounding (C) suburban (D) neighboring

B Match each word with the correct definition.

- | | | |
|--------------------|---|---|
| 1. advent | • | a. to live; to dwell |
| 2. reside | • | b. related to teaching |
| 3. algorithm | • | c. a creator |
| 4. volatile | • | d. by habitual repetition |
| 5. inflate | • | e. a trait; an attribute |
| 6. innovator | • | f. rising |
| 7. by rote | • | g. likely to change abruptly; dangerously unpredictable |
| 8. pedagogical | • | h. a beginning |
| 9. ascending | • | i. to increase rapidly |
| 10. characteristic | • | j. a determined procedure for solving a problem |

Unit 8

Insert Text

8 Insert Text

Overview

■ Introduction

Insert Text questions ask you to determine where the best place for a given sentence would be in the passage. In this type of question, you will see four black squares appearing in one paragraph or spreading across the end of one paragraph and the beginning of the next. In either case, you need to understand the logical stream of the passage and focus on any grammatical connections between sentences such as conjunctions, pronouns, demonstratives, and repeated words or phrases.

■ Question Type

Look at the four squares [■] that indicate where the following sentence could be added to the passage.

[a sentence to be inserted into the passage]

Where would the sentence best fit?

Click on a square [■] to add the sentence to the passage.

■ Useful Tips

- Put the sentence in each place next to the squares.
- Try to pay attention to the logical connection between sentences.
- Be familiar with the connecting words, such as *on the other hand*, *for example*, *on the contrary*, *similarly*, *in contrast*, *furthermore*, *therefore*, *in other words*, *as a result*, *finally*, etc.



Sample iBT Question

Look at the four squares [■] that indicate where the following sentence could be added to the passage.

In fact, they were disregarded.

Where would the sentence best fit?

Click on a square [■] to add the sentence to the passage.

Impressionism

The term Impressionism comes from a painting by Claude Monet entitled *Impression Sunrise*. **A** Ironically, it was attributed to the 19th-century art movement, of which Monet was a member, by the art critic Louis Leroy. **B** This movement had its beginnings in Paris and included a loosely associated group of Parisian artists who broke the conventions of academic painting at that time. **C** Many of the original Impressionists, such as Monet, Pierre August Renoir, Paul Cezanne, and Edouard Manet, were rejected from an important juried art show at the Salon of Paris. **D** In reaction to this, they organized their own show in which the public would be allowed to judge, calling it "Salon of the Refused." The characteristics of their radical paintings were visible brushstrokes, the use of light colors, open composition, an emphasis on light and its changing qualities, ordinary subject matter, unusual visual angles, and the accentuation of the effects of the passage of time.

Correct Answer

The new sentence is best inserted at square **C**. The pronoun *they* in the given sentence refers to 'Parisian artists' in the third sentence of the passage, and the verb *disregarded* is semantically related to 'rejected' in the fourth sentence of the passage.

The Bauhaus Movement

The Bauhaus movement refers to a German art school named Staatliches Bauhaus that was responsible for one of the strongest influences in Modernist architecture and interior design. **A** Ironically, this school only operated for a relatively short period of time between the First and Second World Wars, from the years 1919 to 1933, and very briefly in the United States from 1937 to 1938. **B** Constant leadership changes and power struggles at the school resulted in a constant shift of the school's focus, technique, instructors, and politics. **C** The catalyst for the utilitarian style of this movement was a text published by the critic Adolf Loos in 1908 entitled *Ornament and Crime*, which claimed that surface decoration was primitive. **D** The school's original founder, the architect Walter Gropius, proclaimed in his opening manifesto that the school's goal was, "to create a new guild of craftsmen, without the class distinctions which raise an arrogant barrier between craftsmen and artist."

1. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

Its philosophy centered on the belief that things must be useful to be valuable.

Where would the sentence best fit?

Market Regulation

Market regulation takes place when a government seeks to control some or all aspects of a particular market through the application of laws. **A** The government does this to achieve various purposes, such as the creation of a centrally planned market or in hopes of remedying market failure. **B** Market regulation is also enacted by a corrupt government for the purpose of benefiting well-connected companies or politicians. **C** One type of market that is commonly regulated is that of public services. **D** This takes place in order to balance the opposing interests of maximizing profits and serving the best interests of the people who use the public services. Some good examples of this are government regulations placed on alcohol and prescription drug markets. Most countries seek to control these markets to ensure that these products are safe and only sold to the appropriate customers.

2. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

However, such action is not always in the best interests of all private sectors.

Where would the sentence best fit?

Cognitive Science

Cognition is defined as the process by which the mind or intelligence functions or "thinks." **A** Cognitive science is an interdisciplinary field of research that employs psychology, neuroscience, linguistics, philosophy, computer science, anthropology, and biology to understand this process. **B** Cognitive science may be distinguished between the studies of human and animal brains. **C** There are three major approaches to the study of cognitive science: symbolic, connectionist, and dynamic systems. **D** The symbolic approach is one that attempts to explain cognition through the use of operations performed on symbols. These operations run parallel to the workings of a digital computer and are expressed by means of explicit computational theories and modes of mental processes. These mental processes are not considered on the physical brain level. The connectionist approach looks at cognition through models of artificial neural networks that exist on the level of physical brain properties. The third approach is that of dynamical systems. It contends that cognition is best explained in the form of a continuous dynamical system in which all the elements are interrelated.

3. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

It includes aspects of awareness, perception, reasoning, and judgments.

Where would the sentence best fit?

Hypatia of Alexandria

Hypatia of Alexandria was a philosopher, mathematician, and astronomer in Egypt and is thought to have been born in the year 370 A.D. **A** Since none of Hypatia's writings have survived, historians know of her only by letters written to her by a pupil as well as from several descriptions in personal histories recorded by other authors. **B** From these, the historians have learned that Hypatia was a highly respected scholar and member of the intellectual community in Alexandria. **C** Hypatia was a follower of the Platonic school of philosophy and is reputed to have invented the astrolabe, which was used for mapping the position of stars, and the hydrometer, which is still used for determining the specific gravity of liquids. **D** By 415, Hypatia, who was a pagan, had run afoul of the rising Christian movement and was murdered by a vicious mob of them.

4. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

Her interests resulted in many new inventions.

Where would the sentence best fit?

A Read the following passage, and answer the questions.

The 1973 Oil Crisis

Time Limit: 3 min. 50 sec.

The 1973 oil crisis began because of the Yom Kippur War being fought between Israel and Syria and Egypt at that time. Syria and Egypt, which were members of OPEC (Organization of Petroleum Exporting Countries), convinced the Arab members of this organization to cut the supply of petroleum to nations that supported Israel. This embargo immediately affected the United States, Canada, and many of their allies in Western Europe.

While cutting back the much needed supply of petroleum to the Western world, the Arab oil powers also increased the price of oil all over the world. This sharp increase had dramatic inflationary effects on economies around the world. The United States and the Netherlands, both staunch supporters of Israel, were especially targeted by this embargo and experienced immediate economic effects.

The most immediate effect of the embargo was that the price of oil by the barrel quadrupled. The Arab politicians and other elites that controlled the oil suddenly became very wealthy. Many of these suddenly rich oil countries invested their newfound wealth in weapons that increased tensions in the Middle East even more.

This oil shock resulted in chaos in western societies. **1A** As the retail price of gasoline by the gallon skyrocketed, shares on the New York Stock Exchange lost \$97 billion in value in the course of six weeks. **1B** The supply of Arab oil into the U.S. dropped from 1.2 million barrels a day to just 19,000 barrels a day. **1C** The United States suffered its worst fuel shortage since the Second World War. **1D**

In order to control the long lines for gasoline at gas stations and the price gouging that resulted, the U.S. government initiated a number of measures. One measure was to limit the price of "old oil," which was already discovered, while leaving the pricing of "new oil" open, in order to encourage exploration.

Another measure was that drivers of vehicles with odd numbered license plates were only allowed to purchase gas for their cars on the odd numbered days of the month. In turn, drivers of cars with even numbered license plates were only allowed to purchase their gas on the even numbered days of the month.

The U.S. government also began to encourage its citizens to reduce their use of gasoline and generally to conserve energy whenever possible. In order to implement this, the national speed limit was dropped to 55 miles per hour. Daylight savings time was also imposed to decrease the need for lighting. **2A** One popular conservation campaign used the slogan, "Don't Be Fuelish" to encourage people to cut down on their use of energy.

2B By March of 1974, the Yom Kippur War was over, and all of the Arab OPEC countries, with the exception of Libya, ended their embargo against the United States. **2C** The supply of oil rose, and prices leveled off, but a series of recessions had already been triggered and plagued many western countries throughout the 1980s. **2D**

- convince [v] to persuade • embargo [n] a prohibition • ally [n] a supporter; a collaborator • staunch [a] committed
- tension [n] strain • skyrocket [v] to increase very rapidly • price gouge [phr] overcharging; a rip-off • initiate [v] to begin
- conserve [v] to preserve • implement [v] to carry out; to execute • impose [v] to force • level off [phr] to stabilize
- recession [n] a temporary economic decline • trigger [v] to cause; to prompt • plague [v] to bother

General Comprehension

1. According to the passage, the oil crisis in the United States was caused by
 - (A) the adoption of daylight savings time
 - (B) a decrease in the supply of oil
 - (C) price gouging by gas stations
 - (D) Israel's embargo of the Arab nations
2. According to the passage, which of the following actions was taken in the United States to conserve energy during the oil crisis?
 - (A) The speed limit was reduced.
 - (B) Oil prices were raised.
 - (C) A curfew was imposed in some cities.
 - (D) Daylight savings time was ended.

On the TOEFL Test

3. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

The U.S. government took several measures to soften the impact of the crisis on both the public and private sector.

Where would the sentence best fit?

4. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

Nevertheless, the impact of the oil crisis set in motion far-reaching effects.

Where would the sentence best fit?

The 1973 Oil Crisis

- Began because of (1) _____
 - fought between Israel, Syria, and Egypt
 - Arab OPEC members stop supplying oil to Israel's supporters
 - U.S., Canada, and Western European countries
- Effects of oil embargo - reduced supply of oil to West
 - increased (2) _____ worldwide
 - caused inflation
- Effects in the United States - (3) _____ loses value
 - long lines for gas
 - make a national (4) _____
 - introduce daylight savings time
- Embargo ends in 1974



B Read the following passage, and answer the questions.

Bird Migration

Time Limit: 3 min. 50 sec.

Many birds are known to migrate long distances. It is common for a number of species to spend the summer months in the mild climates of the northern hemisphere, breeding and fattening themselves on abundant food sources. When the winter months approach, these migratory birds fly south to spend the winter months in the warm tropical and southern hemisphere regions.

This migratory behavior is most commonly found in land-dwelling birds. These various species are known to migrate the greatest distances. They migrate in search of food as the fall and winter months in the northern hemisphere bring with them great scarcity. These birds are genetically predisposed to take on the risks that migration carries in order to satisfy a sense of migratory restlessness that is expressed by the German word *Zugunruhe*.

1A *Zugunruhe* has been found to exist even in caged birds that are closed off from the environmental cues that could spark the urge to migrate. **1B** This instinctual urge is exhibited in the direction that these captive birds prefer to fly, which is the same direction in which wild members of their species migrate. **1C** They even exhibit this preferred flight direction at the same time of year that the same species of birds in the wild perform their annual migration, and this direction changes at times when the wild birds change their flight course.

1D Based on these observations, scientists, who do not fully understand bird migration, believe that the birds' ability repeatedly to follow the same migratory route every year is based on a combination of circannual endogenic programming within the birds' genes as well as cognitive ability in the birds' minds to form crude mental maps based on memories of landmarks and habitats.

Although these migratory paths are programmed into the genetic structures of these birds, they have been known to alter their routes for various reasons. Some of these reasons are to increase aerodynamic efficiency, to respond to changes in weather conditions, or to avoid the risk of predation. One bird, the Eleonora's Falcon, is known to have adapted its migration pattern by having a very late breeding season so that it can hunt migrating passerines as they fly by on their way south for the winter.

2A One type of bird that does not migrate long distances is broad-winged birds such as vultures, eagles, buzzards, and storks. **2B** These large birds are only able to soar by way of thermal columns of rising hot air. **2C** This necessity inhibits them from flying over vast oceans since thermal columns only occur over land. **2D** This inability to cross the larger bodies of water results in these large birds crossing the narrowest of landmasses during their migratory cycle. One example is the massive numbers of raptors and storks which can be seen crossing the Mediterranean Sea at its narrowest points, such as Gibraltar and the Bosphorus, on their way south from Europe to Africa for the winter months.

• hemisphere (n) one half of the Earth • abundant (a) plentiful; ample; copious • scarcity (n) a shortage; a lack; a deficiency • be predisposed to-V (phr) to be inclined to-V • urge (n) a strong desire • circannual (a) occurring every year • endogenic (a) caused by factors inside the organism • cognitive (a) relating to the mental process of knowing • crude (a) unrefined • alter (v) to change • predation (n) the act of one organism eating another • soar (v) to fly high • thermal (a) related to heat • inhibit (v) to restrain; to hold back

General Comprehension

- According to the passage, many birds spend the summer months in
 - the southern hemisphere
 - resting for their migration
 - the northern hemisphere
 - searching for scarce food
- According to the passage, why did the Eleonora's Falcon change its migration pattern?
 - To improve its flying efficiency
 - To hunt other migrating birds
 - To avoid being attacked by larger birds
 - To choose the warmest climate

On the TOEFL Test

- Look at the four squares [■] that indicate where the following sentence could be added to the passage.

Observable data is collected through band recoveries, netting records, and personal observations that help to determine migration routes.

Where would the sentence best fit?

- Look at the four squares [■] that indicate where the following sentence could be added to the passage.

Of course, scientists have also investigated the migratory habits of species that travel shorter distances.

Where would the sentence best fit?

Bird Migration

- *Characteristics*
 - birds fly long distances
 - fly south in winter and north in summer
 - are (1) _____ to migrate
- *Zugunruhe*
 - describes (2) _____ that induces migration
 - has been found even in (3) _____
- *Understanding bird migration*
 - scientists do not fully understand it
 - think it is a combination of (4) _____ to follow same path
 - can sometimes alter their routes for various reasons



C Read the following passage, and answer the questions.

Georgia O'Keeffe

Time Limit: 5 min.

Georgia O'Keeffe is one of the most influential American artists of the 20th century. She is famous for paintings that use images of natural objects such as flowers, rocks, shells, landscapes, and animal bones in order to create abstraction and representation. In 1928, a set of six calla lily paintings by O'Keeffe sold for \$25,000, which at the time was the largest amount of money ever paid for a group of paintings by an American artist who was still alive.

O'Keeffe was born in Wisconsin in 1887, the second of seven children. **1A** Her parents, who were dairy farmers, recognized her artistic abilities when she was young and made sure she received art instruction very early on. **1B** Her first instructor was a local watercolorist named Sarah Mann. **1C**

After graduating from high school, O'Keeffe attended the Art Institute of Chicago and later the Art Students League in New York City. **1D** It was in New York that she attended an exhibition of Rodin's watercolors at a gallery named 291, which was owned by Alfred Stieglitz, who was to become her husband some years later.

For the next few years, O'Keeffe struggled with illness and financial troubles. In 1908, believing that she could not support herself through painting, she stopped it altogether. **2A** Then, in 1912, her creative spark was rekindled when she attended an art class at the University of Virginia Summer School. **2B** There, her instructor Alon Bement introduced her to new ideas about design through the harmonious interactions of lines, color, and shapes. **2C** These ideas greatly influenced and altered O'Keeffe's ideas about the creative artistic process. **2D**

Eventually, Alfred Stieglitz found his way back into O'Keeffe's life by helping along her career as a painter. He arranged for an apartment for her to live in New York City. There they fell deeply in love, and Stieglitz divorced his wife so that they could marry. Shortly after they married, Stieglitz began taking photographs of O'Keeffe, including some nudes. These were exhibited in a retrospective exhibition of his work and swiftly created a public fervor.

In the following years, O'Keeffe became part of the early American modernist art circles. Around this time, O'Keeffe shifted away from her past work in watercolors and began using oils to paint. She soon developed a new style of painting on a very large scale, depicting natural forms in a very close-up manner, as if they were under a magnifying lens. Her husband, Stieglitz, began exhibiting her work at his gallery. O'Keeffe's artistic career blossomed, leading to her great commercial success, such as the sale of her calla lily paintings in 1928.

Then, in the summer of 1929, O'Keeffe visited New Mexico with a friend and discovered the area's unique architectural and landscape forms. From 1929 to 1949, O'Keeffe spent a portion of every year working in New Mexico, drawing inspiration from the animal bones she collected and painted on her second summer there. The images of cow skulls, expansive blue skies, and jagged red rock hills were to become some of the most memorable images to find their way into her work. Eventually, she discovered a piece of property north of Abiquiá, which she named Ghost Ranch. The colorful surrounding desert landscape and sweeping cliffs and hills of this area were to offer her inspiration for the rest of her career.

• influential (a) important; powerful • abstraction (n) the use of shapes and patterns in art • representation (n) a depiction; a portrayal • financial (a) economic; monetary • rekindle (v) to reawaken • alter (v) to change • exhibit (v) to display; to show • retrospective (a) looking back • fervor (n) passion; enthusiasm; eagerness • depict (v) to picture; to portray • magnify (v) to enlarge • expansive (a) spread-out; vast; wide

General Comprehension

1. According to the passage, which of the following is true about Georgia O'Keeffe's parents?
 - (A) They never realized how talented she was.
 - (B) They taught her how to paint.
 - (C) They recognized and encouraged her talent.
 - (D) They were well-known painters.
2. According to the passage, Georgia O'Keeffe's paintings focused on which of the following?
 - (A) portraits
 - (B) nature
 - (C) photographs
 - (D) nudes

On the TOEFL Test

3. Look at the four squares [■] that indicate where the following sentence could be added to the passage.
 As a matter of fact, by the age of 8, O'Keeffe was determined to be an artist.
 Where would the sentence best fit?
4. Look at the four squares [■] that indicate where the following sentence could be added to the passage.
 Instead, she accepted a teaching position in Amarillo, Texas.
 Where would the sentence best fit?

Georgia O'Keeffe

- Was an influential American artist - painted (1) _____
 - sold paintings for very high prices
- Early life - was born in (2) _____
 - parents recognized her talent and helped her nurture it
 - attended various art institutes
- Marries (3) _____ - helps her resume painting
 - takes nude photographs of her
- Changes style - had used watercolors
 - now uses oils
 - paints on a large scale
 - moves to (4) _____ to paint images there

D Read the following passage, and answer the questions.

Gold Rushes of the 19th Century

Time Limit: 5 min.

In America in the 1800s, many vast fortunes were made by gold and silver prospectors. The 19th century was a time when several mineral deposits or lodes rich with gold and silver were discovered. As soon as one of these discoveries was made public knowledge, a fevered migration called a rush would ensue.

A rush was a situation in which thousands of prospectors would travel to areas near the site of the discovery and attempt to make their own discovery and fortune. This process accelerated the settlement of whites in frontier areas such as California, Nevada, Alaska, and the Yukon Territories in Northern Canada and helped to displace native peoples and their cultures at an even faster pace than was already happening.

These prospectors ranged from the most uneducated, lower class laborers to well-heeled entrepreneurs. At the heart of every quest was a deep desire to become rich. Many prospectors were able to amass great fortunes, but many more did not, and a great many died in their search. All prospectors, both the rich and poor and young and old, were required to endure great hardships during their search. Food and water were scarce, desert temperatures were hot enough to make horses and mules drop dead, and the winters were always even worse as prospectors suffered endless cases of frostbite in which their limbs had to be amputated.

The first major gold rush in American history was the California Gold Rush, which began when gold was found at Sutter's Mill, California, in 1848. Those early prospectors who arrived in 1848 were called "forty-eighters," and many of them came from nearby areas such as Oregon or other regions in California. These lucky prospectors found it very easy to remove thousands of dollars of easily accessible gold from streams every day. **1A** But for those who arrived in 1849, called "forty-niners," it was more difficult, as so much of the more reachable gold had already been taken.

1B By 1855, some 300,000 prospectors had come to California from all over the United States and abroad. **1C** The prospectors traveled to California by wagon train and ship, and many of them used very simple means to retrieve gold flakes from beneath running water in stream beds. **1D** This simple method was called "panning."

Another major North American Gold Rush occurred in 1896 when a Native American named Skookum Jim Maon and his group discovered rich placer gold deposits in the Klondike River in the northern Yukon Territories of Canada. At this time, the Yukon Territories were scarcely populated with whites due to the harsh winters that kept this region covered in frigid snow for most of the year. **2A** Once again, as soon as the news of this discovery got out, there was a stampede of white prospectors racing greedily into this area while looking to make their fortunes by panning for gold.

2B By 1898, the population along the Klondike had swollen from a few thousand to 40,000 people, an upsurge that brought with it the threat of famine and typhoid fever from polluted water supplies. **2C** Once again, as is captured in the Klondike Gold Rush literature of Jack London such as *White Fang*, *Call of the Wild*, and his most famous short story, *To Build a Fire*, many fortunes were made, but because of the terribly harsh conditions, for every fortune that was made, a hundred other people suffered misfortune. **2D**

- lode (n) a deposit of ore • ensue (v) to follow • accelerate (v) to speed up • displace (v) to remove; to take the place of
- well-heeled (a) wealthy • entrepreneur (n) a risk-taking businessperson • amass (v) to collect; to accumulate
- scarce (a) rare; insufficient • amputate (v) to sever; to cut off • accessible (a) available; reachable • retrieve (v) to get; to gain; to obtain
- harsh (a) severe; inhospitable • frigid (a) very cold; freezing • swell (v) to increase • upsurge (n) a sudden, large increase

General Comprehension

1. According to paragraph 2, the Yukon Territories are found in
 - (A) northern Canada
 - (B) Alaska
 - (C) the northern United States
 - (D) California and Nevada
2. According to the last paragraph, Jack London is well known as
 - (A) a miner
 - (B) an explorer
 - (C) a doctor
 - (D) a writer

On the TOEFL Test

3. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

This placer gold was released naturally from primary veins as a result of weathering.

Where would the sentence best fit?

4. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

This time, however, the Northwest Mounted Police monitored the activities of the prospectors to ensure safety and order.

Where would the sentence best fit?

Gold Rushes of the 19th Century

• Many gold and silver lodes discovered in nineteenth century in America

- sparked (1) _____
- many people became rich

• Gold rush - occurs when many people go to area to find gold

- happened in California, Nevada, Alaska, and (2) _____

• Prospectors - were both rich and poor people

- endured great hardships
- some even died

• (3) _____ - began in 1848 when gold discovered at Sutter's Mill
 - thousands go to California

• North American Gold Rush - up in Canada and Alaska

- (4) _____ writes about it in his literature



E Read the following passage, and answer the questions.

Nuclear Reactors

Time Limit: 3 min. 40 sec.

The first nuclear reactors were not made by mankind, but rather they occurred naturally. Fifteen natural fission reactors have been discovered within uranium ore deposits at the Oklo mine in Gabon, West Africa. Scientists theorize that these reactors gave off heat, light, and other forms of radiation for approximately 150 million years. These uranium deposits, known as the Oklo Fossil Reactors, were discovered in 1972 by French physicist Francis Perrin. It is estimated that they would have averaged 100 kilowatts of power output when they were active.

1A Modern nuclear reactors are devices in which nuclear chain reactions are harnessed for their useful power output. **1B** This is done by initiating, controlling, and sustaining nuclear fission at a steady rate. **1C** The main use for nuclear reactors is to generate electrical power, but they are also used to do research and beamline experiments to produce weapons-grade plutonium and radioisotopes and even to propel nuclear-powered submarines and ships. **1D**

Nuclear fission is the only reaction process that is currently used commercially since it is considered to be a safe and pollution-free power source. **2A** Conversely, nuclear fusion reaction is currently an experimental technology and is looked down upon by many scientists because of the potential health and safety risks it creates. **2B** Other methods for creating controlled nuclear reactions are radioisotope thermoelectric generators and atomic batteries. **2C** Both of these generate heat and power through passive radioactive decay. **2D**

There are several different nuclear reactor technologies used to create commercial fission-powered electricity. They can be divided into two classes, fast and slow reactors, which are based on the energy of the neutrons used to sustain the fission chain reaction.

Slow reactors are also known as thermal reactors. They utilize slow neutrons. These neutrons are moderated by materials that slow them until they approach the average kinetic energy of the surrounding particles; this process is called thermalization. This is the most common type of reactor for generating power. The first commercial plutonium reactors were of this variety and used graphite as the moderator.

Fast reactors utilize fast neutrons to create and sustain the necessary fission chain reaction and lack the moderating material required by slow reactors. This type of reactor requires highly enriched fuel, such as weapons-grade plutonium, in order to ensure that the amount of U-238 is reduced to as little as possible in order to avoid radioactive contamination. Some of the early Russian ship and submarine propulsion units as well as some early power stations used fast reactors. However, the fast reactor has not achieved the success that slow reactors have in any application even though the construction of this kind of reactor continues.

- fission [n] the splitting of an atom, which produces a release of energy
- ore [n] rock or earth from which metal can be obtained
- give off [v] to emit; to send out
- harness [v] to control; to use
- sustain [v] to continue; to maintain
- generate [v] to produce
- propel [v] to push forward
- conversely [ad] in contrast
- fusion [n] the melting together of more than two things
- potential [a] possible; likely
- thermal [a] relating to heat
- utilize [v] to use; to take advantage of
- moderate [v] to check; to curb; to restrain
- kinetic [a] related to motion
- contamination [n] pollution

General Comprehension

- According to paragraph 1, which of the following is true about the Oklo Fossil Reactors?
 - They were discovered in France in 1972.
 - They send out radiation by the process of nuclear fission.
 - They have been active since 1972.
 - They had uranium deposits that have been used up.
- According to the passage, the most widely used reactor for generating electricity is
 - the slow reactor
 - the fission reactor
 - the fast reactor
 - the plutonium reactor

On the TOEFL Test

- Look at the four squares [■] that indicate where the following sentence could be added to the passage.
As a power source, nuclear fission promises many potential applications.
Where would the sentence best fit?
- Look at the four squares [■] that indicate where the following sentence could be added to the passage.
For this reason, scientists opt for more stable means of generating power.
Where would the sentence best fit?

Nuclear Reactors

- First ones occurred naturally - in uranium ore deposits in (1) _____ in Gabon, Africa
- gave off heat, light, and radiation for 150 million years
- Modern reactors - harness nuclear chain reactions to make energy
- initiate, control, and sustain (2) _____
- Nuclear fission - safe and pollution-free
- Nuclear fusion - experimental and possibly (3) _____
- Different kinds of reactors - slow reactors → called thermal reactors
→ use slow neutrons
→ create energy through (4) _____
- fast reactors → use fast neutrons
→ need highly enriched uranium

F Read the following passage, and answer the questions.

The Great Portrait Painters of Colonial America

Time Limit: 3 min. 50 sec.

Two of the most renowned portrait painters of the American Colonial Period were John Singleton Copley and Gilbert Stuart. During this time, before the advent of cameras and photography, realistic portrait painters were important since they served to create the only visual historical record of important people and places.

John Singleton Copley was a Boston-born artist who was known for his innovative style. Most of his portraits were of important figures in colonial New England as well as the men and women of the middle class. These popular portraits commonly portrayed their subjects in poses with objects that indicated the details of their lives, such as a carpenter with a saw or a teacher with a book.

Some of Copley's most famous paintings are of Revolutionary War heroes Samuel Adams and Paul Revere. But at the start of the revolution, around the year 1774, Copley himself moved to Europe to avoid the fighting and continue perfecting his painting skills.

Another important painter of this time was Gilbert Stuart. His painting career did not develop as smoothly as that of Copley, who was a major influence on Stuart. But ultimately, Stuart's paintings are held in even higher esteem than those of Copley's. After training under the Scottish painter Cosmo Alexander, Stuart followed Copley's example and moved to Europe to avoid the Revolutionary War and continue painting. But Stuart's early efforts to establish himself were unsuccessful.

After suffering several early failures, Stuart became the protégé of Benjamin West in London. By 1777, Stuart was able to exhibit his work at the Royal Academy and finally began to meet with success and acclaim. The price of Stuart's paintings soon rose dramatically, but despite this success, he habitually mismanaged his money. Due to his neglectfulness towards his finances, Stuart was forced to flee to Ireland in 1787 to escape going to debtors' prison.

Upon returning to the United States in 1793, Stuart opened a studio in Philadelphia. Here he established his lasting fame painting portraits of important Americans. **1A** Perhaps the most famous of his works is a series of iconic portraits of George Washington. **1B** This new fame kept Stuart busy and well-paid for years. **1C** The most well-known of his George Washington likenesses is known as the *Athenaeum Head* and is currently featured on the U.S. one-dollar bill. **1D**

Stuart's most celebrated portrait of Washington is a large painting that hangs in the East Room of the White House. This portrait was saved from destruction by the First Lady of the time, Dolley Madison during the War of 1812 when British soldiers burned down the presidential mansion.

2A By the end of his career, Stuart had painted more than one thousand American political figures. **2B** His style was praised for its vitality and naturalness. **2C** The great American founding father and president John Adams was heard to remark that sitting for a portrait painter was usually a terribly uncomfortable experience but that sitting for Stuart was a pleasure because of his loose manner and amusing conversation. **2D** Stuart was also known not to work from sketches but just to begin painting directly on the canvas.

- renowned (a) famous • advent (n) appearance • portray (v) to depict • ultimately (ad) finally; in the end
- esteem (n) respect; admiration; regard • protégé (n) a pupil; a student; an apprentice • acclaim (n) public praise
- neglectfulness (n) carelessness; indifference • flee (v) to run away; to take flight; to escape • iconic (a) symbolic; important; impressive
- vitality (n) vigor; liveliness; energy

General Comprehension

1. According to the passage, which of the following is true about Copley and Stuart?
 - (A) They came from the same hometown.
 - (B) They painted in an Impressionistic style.
 - (C) They painted portraits of celebrities.
 - (D) They fought in the Revolutionary War.
2. According to paragraph 5, Stuart fled to Ireland in order to
 - (A) paint prominent politicians
 - (B) avoid being imprisoned
 - (C) sell his paintings
 - (D) open a studio

On the TOEFL Test

3. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

However, he painted many subjects from the Old World as well.

Where would the sentence best fit?

4. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

Indeed, Stuart's easy demeanor won him a devoted following.

Where would the sentence best fit?

The Great Portrait Painters of Colonial America

- Were two major painters – John Singleton Copley and Gilbert Stuart
- John Singleton Copley – had an innovative style
 - painted important people and members of (1) _____
 - created visual record of various events
 - painted (2) _____ and Paul Revere
- Gilbert Stuart – was influenced greatly by Copley
 - became protégé of (3) _____
 - moved to America to open studio in Philadelphia
 - made famous paintings of (4) _____
 - painted over 1,000 American political figures

● Building Summary Skills

The following summaries are based on the passages you worked on earlier. Complete each of them by filling in the blanks with suitable words or phrases.

1. The 1973 Oil Crisis

a series of recessions	withhold petroleum	Syria and Egypt
the purchase of weapons	the U.S. government	

In 1973, during the Yom Kippur War, ⁽¹⁾_____ tried to stifle support for Israel. They convinced the Arab members of the OPEC to ⁽²⁾_____ from the United States, Canada, and many of their allies in Western Europe. ⁽³⁾_____ took many steps to ease the effects of the shortage while elite Arabs grow rich from their increased profits and invested much of their newfound wealth in ⁽⁴⁾_____. Meanwhile, although the Yom Kippur War ended in 1974, the ramifications of the oil crisis included ⁽⁵⁾_____ in many western countries throughout the 1980s.

2. Bird Migration

<i>Zugunruhe</i>	food and other basic needs	genetic programming
migratory patterns	thermal columns of air	

Many land-dwelling bird species have ⁽¹⁾_____. According to scientists, these patterns are the result of ⁽²⁾_____ as well as environmental factors. Both short and long-distance migration patterns have been studied. Although both types are generally associated with birds that take flight to warmer climates for ⁽³⁾_____ during cold weather months, short-distance migrators, like buzzards and vultures, which are typically broad-winged, must rely on ⁽⁴⁾_____ to travel. Migration is instinctual; the urge to migrate—known by the German word ⁽⁵⁾_____—has been found even in birds raised in cages.

3. Georgia O'Keeffe

the photographer	New Mexico	painting natural scenes close up
a set of six calla lily paintings	natural objects and landscapes	

Georgia O'Keeffe is one of the most well-known painters of the 20th century. Her works include ⁽¹⁾_____. She adopted a unique style of ⁽²⁾_____ as if they were magnified. Her career was aided by her husband, ⁽³⁾_____ Alfred Stieglitz, for whom she posed nude. Recognized as a great talent during her own lifetime, O'Keeffe reportedly garnered the highest compensation of that time for ⁽⁴⁾_____ that earned her \$25,000. Later, inspired by the colorful images of ⁽⁵⁾_____, she moved to reside there and reflected those images in her work.

4. The Gold Rush of the 19th Century

Jack London	frostbite, famine, and plague	discoveries of gold ore
great rushes of whites	the insurmountable odds	

During the mid-19th century, ⁽¹⁾_____ sparked the imaginations of thousands of prospectors. These greedy, courageous, and starry-eyed adventurers rapidly migrated to California and the Yukon Territories of North Canada. Suffering great hardships to overcome ⁽²⁾_____ of striking it rich, ⁽³⁾_____ infiltrated sparsely populated areas and brought with them the threat of ⁽⁴⁾_____. Author ⁽⁵⁾_____ captured this period in his famous works that include *White Fang*, *Call of the Wild*, and *To Build a Fire*.

5. Nuclear Reactors

thermal reactors	the energy of neutrons	nuclear reactors
uranium deposits	a safe and pollution-free source of power	

Nuclear reactors can be natural or manmade. Natural reactors have been found in ⁽¹⁾_____ in West Africa. In order to generate electrical power, scientists have designed ⁽²⁾_____ that initiate, control, and sustain nuclear fission at a steady rate. Unlike nuclear fusion, nuclear fission is considered to be ⁽³⁾_____, and it is used commercially. Nuclear reactors are classified as fast or slow. This classification is based on ⁽⁴⁾_____ employed in the reaction process. Although slow ⁽⁵⁾_____ are the most common and successful, the construction of fast reactors still continues.

6. The Great Portrait Painters of Colonial America

Samuel Adams and Paul Revere	the American Revolution	fine work
the American Colonial Period	George Washington and John Adams	

John Singleton Copley and Gilbert Stuart are recognized as the most outstanding portrait painters of ⁽¹⁾_____. Although both men fled to Europe to avoid the trials of ⁽²⁾_____, each became renowned for his masterful portraits of the politically elite. Copley's subjects included ⁽³⁾_____. Stuart's included ⁽⁴⁾_____. Although they were contemporaries and Copley was a major influence on Stuart, the painters never met. Ironically, Stuart's reputation for ⁽⁵⁾_____ eventually surpassed Copley's.



1. The word sustenance in the passage is closest in meaning to
 - (A) inspiration
 - (B) nourishment
 - (C) support
 - (D) instruction

2. According to the passage, evidence of the oldest pottery was found in which of the following areas?
 - (A) Mesopotamia
 - (B) China
 - (C) North Africa
 - (D) Japan

3. Which of the following best expresses the information in the highlighted sentence? *Incorrect answer choices change the meaning in important ways or leave out essential information.*
 - (A) Pottery shards provide information about the cultures of prehistoric people.
 - (B) Early people recorded their history on pottery shards.
 - (C) Archaeologists study ancient cultures.
 - (D) Pre-literate people tried to hide their pottery in underground strata.

4. The author discusses handwork in paragraph 4 in order to
 - (A) show the regular patterns of early pottery
 - (B) distinguish it from later advances in pottery making
 - (C) explain that it was the best method for pottery making
 - (D) discuss the types of decoration used in early pottery

The Development of Pottery

The advent of pottery in primitive human cultures around the world signified a milestone in human history. Sometimes referred to as the container revolution, pottery enabled primitive people to boil and steam food, which in turn allowed them to gain sustenance from new and more varied sources. Durable and watertight pottery containers also allowed them to capture and store freshwater from rainfall or clean rivers and lakes.

The earliest pottery has been traced back to a few civilizations that appear to have developed this advancement independent of each other. The oldest pottery known to historians comes from the Jomon people of Japan from around the year 10,500 B.C. Evidence of the independent development of pottery has also come from North Africa around 10,000 B.C. and from South America around 7,000 B.C.

Collecting pottery shards has proven to be one of the best ways for archaeologists to identify the developmental levels of ancient cultures, especially the ones that were pre-literate and therefore unable to leave behind a recorded history. By digging up different shards from different stratum layers, archaeologists can easily date the stages of a culture's development. They are able to do this by looking at the style and decoration of the pottery fragments. Furthermore, trace element analysis enables these researchers accurately to identify the source of the clay used to make the pottery.

The early pottery was formed with a technique called handwork. Handworked pieces are constructed from clay that is rolled into long strands by hand and then coiled to form the body of the vessel. Each of these early pieces of pottery would have been one-of-a-kind due to the irregularity that is a characteristic of handwork. After these primitive pieces of pottery were shaped by hand, they would be fired in



5. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

The introduction of glazes contributed to the quality of the vessels.

Where would the sentence best fit?

6. The word imitate in the passage is closest in meaning to

- (A) use (B) make
(C) copy (D) shape

7. According to paragraph 5, the significance of the invention of the pottery wheel was that

- (A) it allowed each piece to be unique
(B) it encouraged artists to paint scenes on pottery
(C) it enabled potters to mass produce their works
(D) it inspired many more people to become potters

8. Directions: Complete the table below by matching FIVE of the seven answer choices that describe early advances in pottery manufacturing. TWO of the answer choices will NOT be used.

Pottery Wheel	Wood-fired Kiln
•	•
•	•
	•

Answer Choices

- (A) It led to the mass production of pottery.
(B) It was invented by the Chinese.
(C) It originated in the Roman Empire.
(D) It hardened the pottery.
(E) It did not use coal.
(F) It used tin oxide to finish the pottery.
(G) It helped shape the pottery evenly.

a primitive kiln, which would have resembled more of a wood fire.

The next major development in pottery came about with the invention of the pottery wheel in Mesopotamia sometime between 6,000 and 2,400 B.C. This device revolutionized the production of pottery since it enabled potters to mass produce their work to meet the growing needs of the first cities in the world. The pottery wheel is a spinning turntable powered by a foot pedal that spins clay very quickly, allowing the potter to shape pottery with rotational symmetry. This results in a much more regular piece of pottery than handwork.

A By 800 A.D., Muslim potters in Samarra and Baghdad began employing lead-based glazes further to finish their pottery. **B** This process of glazing came from the Romans, who had spread it around the Mediterranean and North Africa. **C** These potters also discovered new forms of glazing as they attempted to imitate the Chinese white ceramics that were popular at that time. **D** Although they were able closely to imitate the work of the Chinese, their experimentation also resulted in new methods of glazing that used tin oxide instead of lead.

In order to harden pottery, it must be fired in a kiln which holds heat at very high temperatures. The Chinese developed an efficient wood-fired kiln very early in the history of pottery, called the *anagama*. This useful device was capable of sustaining the necessary temperatures without the use of coal and was soon adopted by the Koreans and Japanese as well.

The modern era of pottery factories capable of truly large-scale mass production came about in 1785 with the English city of Stoke-on-Trent. This was one of the first industrial cities to make pottery manufacturing its primary industry. The city was known to have more than 200 pottery manufacturers that employed upwards of 20,000 workers. This city is so famous for pottery that its nickname is "The Potteries."

9. The word spearheaded in the passage is closest in meaning to

(A) led (B) controlled
(C) stopped (D) advertised

10. According to paragraph 2, which of the following is true of Frederick Winslow Taylor?

(A) He failed the Harvard admissions test.
(B) He earned a degree in electrical engineering.
(C) He worked in a factory as an assistant.
(D) He learned about scientific management from a MIT correspondence course.

11. Why does the author mention that during this time, he learned firsthand about the kinds of conditions that exist in a factory?

(A) To show how Taylor learned about factory conditions
(B) To note that poor eyesight is no barrier to working in a factory
(C) To explain why he was unable to graduate from college
(D) To show how his life improved after being rejected by Harvard

12. In paragraph 3, the word this refers to

(A) one best way
(B) scientific analysis
(C) principle
(D) experiment

13. Look at the four squares [■] that indicate where a sentence could be added to the passage.

Nevertheless, at the time, it did not win him any fame.

Where would the sentence best fit?

Frederick Winslow Taylor

Frederick Winslow Taylor thought there was always "one best way" to fix a problem. He was a man who developed the theory of scientific management. His thoughts and studies on efficiency changed the managing practices and the workplace environments for managers and workers all over the world. He was an American engineer who spearheaded the Efficiency Movement at the beginning of the 20th century. This movement led to the rise of industrialism in the strongest nations around the world.

Taylor's path towards efficiency in engineering began when he was unable to attend Harvard because of his poor eyesight. As an alternative career, he became an apprentice machinist in 1874. During this time, he learned firsthand about the kinds of conditions that exist in a factory. Despite his life as a factory worker, he was able to get a degree in mechanical engineering. He studied through a correspondence course from the Stevens Institute of Technology and graduated in 1883.

At the core of Taylor's beliefs about efficiency was the idea that the "one best way" to do any kind of work could be discovered through careful scientific analysis. Based on this principle, he created his most well-known experiment, called the time and motion study. This consisted of breaking a job down to its basic component parts and measuring each operation to the second.

A The most famous of such studies done by Taylor was with shovels. **B** It started when he saw that workers were using the same shovels for many different materials. **C** After closely analyzing their movements, he figured out that the most effective load was around ten kilograms. **D** Then he designed shovels for each material that could lift exactly that amount. Ironically, however, Taylor was usually not successful when he tried to apply his concepts to actual factories. His recognition came in later



14. Which of the following best expresses the essential information in the highlighted sentence? *Incorrect* answer choices change the meaning in important ways or leave out essential information.

- (A) Taylor was fired from the steel firm for writing books about his management beliefs.
- (B) Taylor's books described his experiences at the steel firm.
- (C) The steel firm prevented Taylor from applying his principles.
- (D) Taylor wrote his own management books after losing his job because of his failed principles.

15. According to paragraph 6, all of the following were Taylor's principles of management EXCEPT:

- (A) Work should be divided equally between workers and managers.
- (B) Scientifically created work methods should be adopted.
- (C) Management should be taught as a separate discipline.
- (D) Management must cooperate with workers in implementing scientific methods.

16. According to the last paragraph, what can be inferred about Taylor's Principles?

- (A) They came into existence with the help of Henry Ford.
- (B) They were not welcomed by every manager.
- (C) They were put into practice first in Western Europe.
- (D) They were only recognized as an academic theory.

years when his ideas were implemented by followers of his teachings.

Due to his failures at applying his principles, Taylor was fired from the large steel firm where he worked and began to write books on his management beliefs. He felt strongly that the common management styles of the time were amateurish. Also, he strongly believed that management should be studied as a discipline and that if management was done properly, workers would cooperate with their managers, thus eliminating the need for trade unions.

By 1900, Taylor became a professor at the Tuck School of Business at Dartmouth College. There he published his major work, *The Principles of Scientific Management*. In this book he developed four major principles of scientific management. His management principles were: (1) to replace the rule-of-thumb work methods with methods that were created by the scientific study of tasks; (2) to hire, train, and develop each worker scientifically rather than allowing them to train themselves; (3) to cooperate with workers to make sure that scientifically developed methods are being followed; (4) to divide work equally between managers and workers so that managers can use scientific management principles in their planning strategies while workers use the same principles in the tasks they perform.

By 1908, Harvard began teaching business management at the graduate degree level with a curriculum based on Taylor's ideas as well as his four principles of scientific management. Along with the concepts of mass production introduced by Henry Ford, Taylor's ideas became highly influential around the world, including countries such as Switzerland, France, and especially the Soviet Union. Managers around the world who implemented Taylor's thoughts referred to them as Taylor's Principles and sometimes disparagingly as Taylorism.

● Vocabulary Review

A Choose the word with the closest meaning to each highlighted word or phrase.

- The staunch members of the ladies' group would not give up their fight.
 (A) elder (B) new (C) committed (D) angry
- Many people are thankful for their abundant blessings.
 (A) plentiful (B) moderate (C) adequate (D) timely
- The scarcity of food during that long winter left many families in despair.
 (A) availability (B) shortage (C) variety (D) packaging
- The United States imposed a shipping embargo on Cuba.
 (A) prohibition (B) requirement (C) suspension (D) surveillance
- Contestants ranged from babies in strollers to old men shaking their canes.
 (A) sprang (B) fled (C) extended (D) grew
- A dictator imposes his will on his people.
 (A) forces (B) fosters (C) announces (D) legislates
- Cave dwellers depicted their lives by drawing on cave walls.
 (A) honored (B) shortened (C) pictured (D) remembered
- After days of rising, the stock price leveled off.
 (A) plunged (B) receded (C) spiked (D) stabilized
- The great chef is renowned for his blueberry pancakes.
 (A) sought after (B) watched (C) remembered (D) famous
- His big brother always took the largest portion of dessert.
 (A) fraction (B) share (C) ingredient (D) container

B Match each word with the correct definition.

- | | | |
|------------------|---|---------------------------------|
| 1. recession | • | a. a show; a display |
| 2. crude | • | b. public praise |
| 3. amass | • | c. to carry out; to execute |
| 4. implement | • | d. related to motion |
| 5. esteem | • | e. to collect; to accumulate |
| 6. exhibition | • | f. to get; to obtain |
| 7. retrieve | • | g. looking back |
| 8. retrospective | • | h. a temporary economic decline |
| 9. kinetic | • | i. respect; admiration; regard |
| 10. acclaim | • | j. unrefined |

PART

3

Reading to Learn

In this part, the reading comprehension questions include: prose summary and fill in a table. The learning objectives of these comprehension questions are to recognize the major ideas and the relative importance of information in a passage and to organize the main ideas and other important information in the appropriate categories.

- **Unit 9 Prose Summary**

Geology / Astronomy / Chemistry

- **Unit 10 Fill in a Table**

Culture / Anthropology / Ecology / Biology

Unit 9

Prose Summary

9 Prose Summary

Overview

■ Introduction

Prose Summary questions are a new type of question on the TOEFL® iBT. In this type of question, you will be asked to complete a summary chart by choosing three most important ideas from six choices. In order to solve Prose Summary questions, you should understand the overall theme of the passage and distinguish important ideas from minor ones in the passage.

■ Question Type

Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the **THREE** answer choices that express important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. *This question is worth 2 points.*

[An introductory sentence]

-
-
-

Answer Choices

- | | |
|---------------------------------|---------------------------------|
| 1. XXXXXXXXXXXXXXXXXXXXXXXXXXXX | 4. XXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| 2. XXXXXXXXXXXXXXXXXXXXXXXXXXXX | 5. XXXXXXXXXXXXXXXXXXXXXXXXXXXX |
| 3. XXXXXXXXXXXXXXXXXXXXXXXXXXXX | 6. XXXXXXXXXXXXXXXXXXXXXXXXXXXX |

■ Useful Tips

- Try to understand the overall structure of the passage.
- Write down the main idea of each paragraph on your scratch paper.
- Distinguish major points from minor details in the passage.
- Incorrect answer choices usually deal with the minor points of the passage or are not mentioned in the passage.



Sample iBT Question

Dmitri Mendeleev and the Periodic Table

Dmitri Mendeleev was a Russian chemist born in 1834. As a young man, Mendeleev was spellbound by glass, and this interest would later cause him to study liquids and the properties of light. Mendeleev was also interested in all of the chemical elements. A chemical element is a substance that cannot be broken down further. The smallest part of each element is called an atom, which contains electrons, protons, and neutrons. Several chemists before Mendeleev worked on creating a table of elements, usually based upon atomic weight, but it was Dmitri whose table was most successful, as he mapped the elements based upon their atomic mass. His periodic table of elements is also arranged to show that elements with similar chemical properties also have atomic weights which increase in regular increments. Mendeleev's Periodic Table of Elements is still used today.

Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the **THREE** answer choices that express important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. *This question is worth 2 points.*

The Periodic Table is credited to Dmitri Mendeleev.

-
-
-

Answer Choices

- | | |
|--|---|
| 1. Before Mendeleev, chemists unsuccessfully attempted to arrange the elements according to their atomic weight. | 4. Mendeleev's interest in glass caused him to investigate the properties of liquids and light. |
| 2. An atom is composed of protons, neutrons, and electrons. | 5. Chemical elements are the smallest units of a substance. |
| 3. The Periodic Table organizes chemical elements according to their atomic masses. | 6. The table also groups together those elements with similar properties |

Correct Answer

Choices 1, 3, and 6 are correct answers because they directly deal with Mendeleev's Periodic Table of Elements. Choices 2, 4, and 5 are only minor ideas in the passage.

Types of Seismic Waves

Seismic waves are waves that travel through Earth as a consequence of an earthquake. There are two types of seismic waves. One is the body wave, which travels internally through the Earth, and the other is the surface wave, which travels just under Earth's exterior.

The initial tremors experienced during an earthquake can be attributed to body waves, which are comprised of both P waves and S waves. The paths these two waves journey are dependent on both the composition and density of Earth. P waves elicit alternate compressions and dilations of the ground. Meanwhile, S waves are busy displacing the Earth in a transverse fashion.

Surface waves move with a low frequency, long duration, and large amplitude. They are culpable for an earthquake's corresponding destructiveness. There are two types of surface waves; the Rayleigh wave causes the ground to roll like ripples of water, and the Love wave causes the horizontal sheering of the ground.

1. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage.

Earthquakes result in seismic waves.

- _____
- _____
- _____

Answer Choices

- (A) Surface waves are comprised of Rayleigh waves and Love waves that cause surface displacement.
- (B) Seismic waves can be either body waves or surface waves.
- (C) P waves and S waves compress and dilate the ground repeatedly to cause tremors.
- (D) An earthquake's first tremors are caused by two types of body waves: P waves and S waves.
- (E) There are four major types of seismic waves.
- (F) Fault lines mark areas that are predisposed to earthquake activity.

Asteroid 1989 FC

An asteroid is an astronomical object that drifts in the solar system and orbits the sun. One type of asteroids is known as NEAs, or Near-Earth asteroids, because their orbits are very close to Earth's orbit around the sun. Some NEAs have an intersecting orbit with Earth, posing a risk of collision.

One such NEA did pose a significant risk to Earth on March 23, 1994. The Apollo asteroid 4581 Asclepius, later to be known as 1989 FC, just missed colliding with Earth by 400,163 miles. While that may not seem like a near-miss situation, to put it in perspective, Asteroid 1989 FC moved into the same position in space that Earth had occupied only six hours prior. Had the asteroid struck Earth, it would have created the largest explosion known to man. The impact would have been equivalent to one large atomic bomb detonating every second for fifty days in a row.

2. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage.

Asteroids create a risk of colliding with Earth.

- _____
- _____
- _____

Answer Choices

- (A) Meteorologists are investigating ways to track asteroids.
- (B) NEAs can possibly enter Earth's orbit and pose the threat of hitting Earth.
- (C) There is an ongoing debate over whether the public should be informed about asteroids that threaten Earth.
- (D) If Asteroid 1989 FC had hit Earth, the force would have been the largest ever recorded.
- (E) In 1994, Asteroid 1989 FC almost collided with Earth.
- (F) NEA is the abbreviation for Near Earth Asteroids.

Foods and Carbohydrates

In order to survive, a person must eat a variety of foods. Every type of food we eat can be broken down into three main types of nutrients: protein, fat, and carbohydrate. Each plays an important role in maintaining the body, but it is carbohydrates that are our main sources of energy.

A carbohydrate is a biological molecule that helps with the storage and transport of energy within the body. A carbohydrate is also known as a sugar, or saccharide. The basic unit of a carbohydrate is a monosaccharide. Monosaccharides can be linked together in limitless ways to form other carbohydrates, such as disaccharides and glucose.

When talking about food, nutritionists divide carbohydrates into two categories: foods that contain complex carbohydrates and foods that contain simple carbohydrates. A complex carbohydrate is one that takes longer to break down in the body than a simple carbohydrate. Examples of foods that are high in carbohydrates are rice, potatoes, breads, and cereals.

3. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage.

Carbohydrates are essential to a healthy diet.

- _____
- _____
- _____

Answer Choices

- (A) Although fats, proteins, and carbohydrates are all necessary components of a healthy diet, carbohydrates provide the bulk of energy.
- (B) Rice, potatoes, breads, and cereals are a rich source of carbohydrates.
- (C) Nutritionists may suggest a low carbohydrate diet as a way to lose weight.
- (D) There are two types of carbohydrates, complex and simple, according to the length of time it takes the body to break them down.
- (E) Disaccharides and glucose are formed from carbohydrate molecules that are known as monosaccharides.
- (F) The biological molecules of carbohydrates are saccharides that can be linked together in a variety of forms.

Metamorphic Rock

Metamorphic rock is created when a different form of rock, for example, igneous rock or sedimentary rock, changes in makeup due to extreme heat or pressure. This process is known as metamorphism, and the pre-existing rock, before the heat and pressures is applied, is known as the protolith. For instance, perhaps there is an island that is made up of mostly sedimentary rock, and it suddenly undergoes a volcanic eruption. During the eruption, the heat and pressure applied to the sedimentary rock (the protolith) cause it to change. Now the sedimentary rock is known as metamorphic rock.

Scientists can learn a lot about the makeup of Earth's crust by studying metamorphic rock as it reveals valuable information about Earth's inner temperatures and pressures and how Earth has changed over geologic time. A few examples of metamorphic rock are slate and marble.

4. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage.

Metamorphic rock is the result of changes inside Earth.

- _____
- _____
- _____

Answer Choices

- (A) Metamorphic rock is formed when other rocks are exposed to extreme heat and pressure in a process called metamorphism.
- (B) Metamorphic rocks reveal information about Earth's temperatures, pressures, and geological changes.
- (C) Slate and marble are examples of metamorphic rock.
- (D) The rock that changes into metamorphic rock is the protolith.
- (E) Islands are made mostly of igneous rock.
- (F) When sedimentary rock is subjected to a volcanic eruption, it changes into metamorphic rock.

A Read the following passage, and answer the questions.

How to Measure Geologic Time

Time Limit: 3 min. 40 sec.

The geologic time scale is the time scale used by scientists to describe the time and relationship between events that happened during the history of Earth. Because Earth is over 4,570 million years old, the time scale that humans use to mark their own time—days, years, and centuries—is in too small of increments to be of use when measuring Earth time.

The geologic time scale is broken down into units according to particular events that occurred in various periods. Generally, the periods of time on the geologic time scale are delineated by major geological events, such as the extinction of the dinosaurs or the rise of man.

The time scale is also divided into three main time components: eons, eras, and periods. An eon is the largest unit of time. Eons are then divided in eras, which in turn are divided into different periods. The periods are generally classified as upper, middle, and lower. The terms late and early may also be substituted for the terms upper or lower. For instance, suppose an archaeologist and a geologist found a dinosaur fossil that was embedded in a particular kind of rock. The archaeologist would research the make-up of the dinosaur bone in the lab and then use the geologic time scale to try to classify the eon, era, and period from which the bone evolved. He might say to the geologist, "This dinosaur bone is a fossil from the Early Jurassic Period of the Mesozoic Era, which falls under the Phanerozoic Eon." The geologist might find that the rock was "Upper Jurassic Sandstone" of the same period, era, and eon as the bone.

The geologic time scale was first conceived in the late 17th century by Danish geologist Nicholas Steno. Steno concluded that rock layers found on Earth were laid down over certain periods of time, and by studying the formation and composition of rock, a time scale could be created of Earth. Steno also pointed out that any given layer of rock is probably older than the one above it and younger than the one below it.

Many scientists after Steno provided valuable research and input into the creation of the geologic time scale. British geologists dominated the process, and their influence can be evidenced in the naming of some of the periods. Cambrian and Siluria were British tribes, while the term Devonian originates in the English county Devonshire.

In conclusion, scientists from all over the world created the geologic time scale based upon the relationship between the different rock layers and fossils. This time scale has allowed scientists to make precise hypotheses about the history of our Earth.

- measure (v) to gauge; to assess; to calculate • various (a) different • delineate (v) to describe; to outline
- extinction (n) a disappearance • component (n) a constituent; an element; a factor • classify (v) to organize
- substitute (v) to take the place of; to replace • suppose (v) to imagine; to pretend • embed (v) to ingrain
- evolve (v) to change; to develop; to advance • composition (n) makeup • conceive (v) to envision • valuable (a) helpful; useful
- dominate (v) to control; to lead • precise (a) exact • originate (v) to begin • hypothesis (n) an assumption; a theory

General Comprehension

- The word increments in the passage is closest in meaning to
 - increases
 - tools
 - fragments
 - intervals
- According to the passage, which of the following is true about Nicholas Steno?
 - He conceived the geologic time scale.
 - He lived during the Cambrian Period.
 - He was a British geologist.
 - He found a dinosaur bone embedded in rock.

On the TOEFL Test

- Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage.

The geologic time scale allows scientists to place historic events within relevant time frames.

•
•
•

Answer Choices

- | | |
|--|---|
| (A) Dinosaur bones are from the Jurassic Period. | (D) British geologists named the time periods after English tribes and provinces. |
| (B) Nicholas Steno invented the geologic time scale. | (E) Periods are classified into three parts: upper, middle, and lower. |
| (C) Steno's key insight was that layers of rock form over long periods and that each layer is younger than the one below it. | (F) Periods on the time scale are defined by major geologic events. |

How to Measure Geologic Time

- Geologic time scale
 - scientists measure time and relationship between events on Earth
 - need (1) _____
 - can be broken down into various units
- Three main time components
 - (2) _____
 - can further divide into upper, middle, and lower
- First thought of in late 17th century by geologist (3) _____
 - looked at (4) _____ and discovered they came from different time periods
 - has enabled scientists to make good hypotheses about Earth



B Read the following passage, and answer the questions.

The Pleiades

Time Limit: 3 min. 30 sec.

The Pleiades is a type of open star cluster, a group of a few thousand stars that were formed out of the same interstellar cloud and still loosely bound to each other due to gravity. The Pleiades in particular refers to the open cluster that makes up the constellation Taurus. The Pleiades is also known as M45 or the Seven Sisters.

The stars that comprise the Pleiades are relatively young in astronomical terms, having formed within the last one hundred million years. These stars in particular are of a type called blue-white stars, which means that they are some of the hottest and strongest stars in the galaxy. Because they are so powerful, it is speculated that the Pleiades will only live for a short time as they will burn themselves out very quickly. It is thought that the group of stars will survive for another two hundred and fifty million years before it disperses due to other gravitational forces within the galaxy. In terms of distance, the Pleiades is known to lie 440 light years away from Earth and 12 light years in total diameter.

Not just made up of stars, the Pleiades also contain what are called reflection nebulae, clouds of dust that reflect the light from nearby stars. The reflection nebula also contributes to the overall brightness of the Pleiades. While it was once thought that the dust particles surrounding the Pleiades were part of the original interstellar cloud that bore the Pleiades, it is now thought that the Pleiades is simply passing through a particularly dusty part of the galaxy.

The Pleiades has been important to many cultures over the course of history. The ancient Greeks considered the Pleiades to be a constellation, and it was even mentioned in Homer's classics *The Iliad* and *The Odyssey*. The Pleiades is noted three different times in the Bible, and it received the name Seven Sisters thanks to Greek mythology and the title Seven Mothers thanks to Hindu mythology. The ancient Aztecs based their calendar upon the Pleiades, and the Native Americans measured the sharpness of each other's vision based upon how many stars one could see in the Pleiades. The indigenous Australians believed that the star cluster was a woman who was being raped by the "man in the moon." The vast amount of mythology surrounding the Pleiades shows just how much prominence and brilliance this group of stars holds in the night sky.

- cluster (n) a group
- interstellar (a) between stars
- gravity (n) a pull
- constellation (n) a grouping of stars
- comprise (v) to make up; to consist of
- galaxy (n) a system of stars, gas, and dust held together by gravitational forces
- speculate (v) to guess
- disperse (v) to scatter; to spread out
- in terms of (phr) in relation to; concerning
- diameter (n) the measurement across the center of a circle
- reflect (v) to return; to throw back
- contribute to (phr) to help; to lead to; to be instrumental in
- particle (n) a very small piece of matter
- mythology (n) a set of widely held fictitious stories or beliefs
- indigenous (a) native
- vast (a) huge; great
- prominence (n) importance

General Comprehension

- According to paragraph 3, the dust particles surrounding the Pleiades come from
 - the original interstellar cloud
 - reflected light
 - a dusty region of the galaxy
 - nearby stars
- According to the passage, blue-white stars are generally
 - prone to burn themselves out rapidly
 - among the oldest stars
 - burnt slower than most stars
 - found only in our galaxy

On the TOEFL Test

- Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage.

The Pleiades is a well-known star cluster.

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Answer Choices

- | | |
|--|---|
| (A) The Pleiades has been celebrated in the history and mythology of many cultures. | (D) Australian natives believed that the Pleiades was a woman being raped by the "man in the moon." |
| (B) The Pleiades is mentioned in ancient Greek, Aztec, Hindu, and Native American texts. | (E) The Pleiades is also known as the M45, or the Seven Sisters. |
| (C) The brightness of the Pleiades is enhanced by reflection nebulae. | (F) The Pleiades consists of a relatively young group of blue-white stars that will burn out quickly. |

The Pleiades

- Is an (1) _____ cluster
 - formed of several thousand stars
 - still bound to each other
 - called the "Seven Sisters"
- Characteristics of Pleiades
 - are "blue-white" stars
 - are very hot and strong
 - will burn out quickly
 - (2) _____ from Earth
- (3) _____
 - are contained in Pleiades, making them brighter
- Historical importance
 - mentioned by ancient Greeks and in Hindu mythology
 - Bible mentions three times
 - had importance to (4) _____, Native Americans, and indigenous Australians



C Read the following passage, and answer the questions.

The Daguerreotype

Time Limit: 3 min. 50 sec.

The daguerreotype is an early type of photograph that involved a very complex and exhausting process to create. The photograph is formed when an image is directly exposed onto a polished surface of silver. The main drawback to this photographic process is that there is no negative, which means that an exact image cannot be reproduced.

The daguerreotype was named after one of its inventors, a French chemist named Louis Daguerre. He was also an artist who was interested in the different properties of light. In 1839, after years of working with another French inventor Joseph Nicéphore Niépce, Daguerre discovered that a mixture of silver and chalk would darken when exposed to light.

The daguerreotype process begins when silver halide particles are sprinkled onto a polished piece of silver, and then an image is focused through a lens onto the silver plate. The image is captured when the silver plate is placed over a heated cup of mercury. The heat produces mercury vapors that condense onto those places on the plate where the exposure to light was the strongest. The picture is developed when the mercury attaches itself to the silver. The last step in the daguerreotype process is to fix the image to the plate by dipping it into a solution called soda. Treating the plate with gold chloride also helps to strengthen the image. Still, the image is delicate, and since the photograph cannot be recreated, Daguerre and those after him made certain to cover the image with a piece of glass.

The daguerreotype process of photography quickly spread around the world. One of the reasons that it became so popular was that, compared to earlier methods in photography, the daguerreotype was a much faster process. By the mid-nineteenth century, traveling photographers using the daguerreotype moved from town to town, taking portraits for people. It was the first time in history that a person could own an exact image of his likeness that was not first being filtered through the eyes of an artist.

Unfortunately, however, the passing of time meant that newer forms of photography were invented, and the daguerreotype fell out of use because the process proved too exhausting for the photographer and too expensive for the average person. Also, because the daguerreotype image could not be copied, new forms of photography that provided a negative became much more desirable. One of the later types of photography that did provide a negative worked by fixing an image to a piece of glass using silver salt.

- involve [v] to include; to require
- complex [a] intricate; complicated
- expose [v] to display
- drawback [n] a disadvantage; a flaw
- property [n] a characteristic; a trait
- sprinkle [v] to scatter
- polished [a] shining
- capture [v] to represent
- vapor [n] a gaseous substance
- condense [v] to concentrate
- dip [v] to dunk
- solution [n] a liquid; a mix
- delicate [a] fragile; weak
- portraiture [n] portrait making
- filter [v] to screen

General Comprehension

- According to paragraph 3, which of the following is used in the daguerreotype process of photography?
 - (A) iron fillings
 - (B) silver halide particles
 - (C) long, wooden handles
 - (D) safety glasses
- The word it in the passage refers to
 - (A) mercury
 - (B) silver
 - (C) image
 - (D) plate

On the TOEFL Test

- Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage.

The daguerreotype process of photography took the place of artists in fashioning realistic images of people.

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Answer Choices

- (A) One later type of photography fixed images to glass with silver salt.
- (B) A lens focused an image onto a surface of silver sprinkled with silver halide particles.
- (C) French artist and chemist Louis Daguerre discovered how properties of a silver and chalk mixture would react to light.
- (D) The drawback to the process was that it did not provide a negative.
- (E) The daguerreotype became popular because it was much faster than earlier methods of photography.
- (F) The photographs created by the daguerreotype were protected between sheets of glass.

The Daguerreotype

- Early type of photograph - complex and exhausting to complete
 - had no (1)_____ so cannot reproduce image
- (2)_____ - invented daguerreotype
 - interested in properties of light
 - used mixture of silver and chalk
- Daguerreotype process - uses (3)_____ particles
 - captures image
 - heat produces (4)_____
 - mercury attaches to silver and produces image
- Development - spread quickly around world
 - was a faster process
 - eventually fell out of use

D Read the following passage, and answer the questions.

Sand Dunes

Time Limit: 3 min. 40 sec.

A sand dune is a geological feature that is simply a mound of sand that has formed due to wind erosion called the Eolian processes. The shape and size of a sand dune is entirely dependant on the wind and can differ in look from the other adjoining sand dunes. Although they can differ, there are some standard descriptive terms that apply to all types of sand dunes: the slack is the valley between two adjoining sand dunes while a dune field refers to a landscape filled with dunes. If a dune field is particularly large, it is referred to as an erg. The side of a dune is known as a slipface.

The two most common places that sand dunes are found are along coastal regions or inland in large, dry regions such as deserts. Along the coasts, sand dunes protect the land against stormy seas and subsequent erosion. Although the conditions sound harsh, many kinds of seaweed and seabirds find coastal dunes to be an ideal habitat while many forms of cacti, snakes, and spiders find the conditions of desert dunes to be ideal.

There are a variety of dune shapes, each caused in part by the vigor and direction of the wind and the landscape that surrounds it. The most common dune shape is the crescent dune. This type of dune is generally wider than long and is formed when the wind blows continuously from one direction. Star-shaped dunes are very symmetrical, with three or more sides that radiate down from a high peak. This kind of dune is common in deserts, such as the Grand Erg Oriental in the Sahara, due to winds shifting in various directions. This dune grows upwards as opposed to laterally. Reversing dunes are the ones that come in varying shapes and sizes due to a periodic reversal of wind direction.

No matter what the dune shape, each type can occur in three forms: simple, compound, or complex. A simple dune is the one that has the minimum number of sides, or slipfaces, that form a geometric shape. A compound dune is a larger dune that contains many smaller dune of the same shape as itself, and a complex dune is a combination of two or more dune types.

Sand dunes are an essential part of certain habitats, especially in coastal regions, where they aid against the erosion of coastal land and also foster an environment for certain kinds of wildlife. On the other hand, sand dunes can also contribute to a problem known as desertification. Desertification happens when there is a degradation of land due to climatic changes. The same winds that create sand dunes often help them encroach on human habitats in the form of sand storms or sand avalanches, which can cause major damage to buildings or crops. Every year, in places like Africa and the Middle East, sand fences are put up to try to stop sand from migrating into inhabited areas.

- mound (n) a hill • erosion (n) the process of being worn away • descriptive (a) explanatory • subsequent (a) following; ensuing • vigor (n) strength; energy; power • crescent (n) the shape of the waxing or waning moon
- symmetrical (a) balanced; in proportion • radiate (v) to emit; to give off • laterally (ad) side to side
- degradation (n) worsening; deterioration; a decline • encroach (v) to intrude

General Comprehension

- The word adjoining in the passage is closest in meaning to
 (A) eroded (B) neighboring (C) distant (D) increasing
- According to paragraph 3, which of the following is true about the shapes of dunes?
 (A) They are caused by the wind.
 (B) They are symmetrical.
 (C) They are altered by human activity.
 (D) The most common shape is the star-shaped dune.

On the TOEFL Test

- Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage.

Sand dunes are unique features of the environment.

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Answer Choices

- | | |
|--|--|
| (A) All sand dunes, no matter what their size and shape, are formed by wind erosion. | (D) Every year sand fences are put up to stop sand from encroaching on human habitats and crops. |
| (B) The slack is the valley between two adjoining sand dunes. | (E) Sand dunes protect against erosion and provide a habitat for wildlife. |
| (C) A large dune field is known as an erg. | (F) Sand dunes can occur in three forms: simple, compound, and complex. |

Sand Dunes

- Geological feature - is a large mound of sand
 - shape depends upon (1) _____
 - there are different kinds of dunes
- Are usually in coastal regions and in deserts
- Have many different shapes - (2) _____ is most common
 - can be star-shaped
- Different types - simple → has minimum number of sides
 - compound → larger dune with (3) _____ in same shape
 - complex → combination of two or more dune types
- Effects - help prevent erosion
 - create environment for animals to live in
 - contribute to (4) _____



E Read the following passage, and answer the questions.

The Development of Advanced Radio Telescopes

Time Limit: 3 min. 30 sec.

A radio telescope is a radio receiver that "sees" radio waves. Unlike a normal telescope, which sees light, a radio telescope is used primarily in the area of astronomy because it can detect radio waves that are emitted by celestial objects. Such objects in space, also called radio objects, can be things such as hot gas, electrons, and wavelengths given off by different atoms and molecules.

The first radio telescope was invented by Grote Reber in 1937. He was an American who graduated with a degree in engineering. He went on to work as an amateur radio operator and later decided to try to build his own radio telescope in his backyard. Reber's first two radio receivers failed to pick up any signals from outer space, but in 1938, his third radio telescope successfully picked up radio waves from space.

A radio telescope consists of a large parabolic-shaped dish antenna or a combination of two or more. The significance of the parabolic shape allows for the incoming radio waves to be concentrated on one focal point, allowing the signals to be picked up as strongly as possible. A larger dish means that more signals can be received and focalized.

In the late 1950s and early 1960s, the largest radio telescope of the time was invented with a seventy-six-meter telescope although larger telescopes have been made since then. The largest current radio telescope in the world is the RATAN-600 in Russia, whose diameter is 576 meters. It has provided valuable feedback of the sun's radio wavelengths and atmosphere. The largest radio telescope in Europe is a 100-meter diameter telescope in Germany, and the largest radio telescope in the United States is the Big Ear in the state of Ohio. The largest array of telescopes is the Giant Metrowave Radio Telescope in India.

Radio telescopes have provided scientists with valuable information about our universe. One of the most important functions of radio telescopes is their ability to allow scientists to track different space probes, the unmanned space missions in outer space. Radio telescopes allow for the travel of space probes into places like the surface of Mars that are too dangerous for men to explore. Without radio wave technology, scientists would not know much of what inhabits the universe nor would they be able to see it. Radio waves are our eyes and ears in outer space.

• primarily [əd] mainly; chiefly • astronomy [n] the scientific study of the universe • detect [v] to pick up • emit [v] to give off • celestial [a] heavenly • significance [n] importance • parabolic [a] bent like an arc • concentrate on [phr] to focus on; to converge on • focalize [v] to limit; to concentrate • atmosphere [n] the air • current [a] present; contemporary • array [n] a range; a display • track [v] to trace • inhabit [v] to live in; to dwell in

General Comprehension

1. According to paragraph 2, Grote Reber was all of the following EXCEPT:
 - (A) an amateur radio operator
 - (B) an astronomer
 - (C) an engineer
 - (D) an inventor
2. According to paragraph 4, the largest radio telescope in the world is
 - (A) the Big Ear
 - (B) the Giant Metrewave
 - (C) the RATAN-600
 - (D) a 100-meter diameter telescope

On the TOEFL Test

3. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage.

A radio telescope allows for advances in astronomy.

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Answer Choices

- | | |
|---|--|
| (A) A radio telescope detects celestial objects. | (D) Astronauts are trained to read radio telescopes. |
| (B) The largest radio telescope in the United States is the Big Ear in the state of Ohio. | (E) Space probes are unmanned missions in outer space. |
| (C) The radio telescope is made up of one or more parabolic dishes that concentrate radio waves into one focal point. | (F) Radio telescopes enable space probes to travel into areas that are too dangerous for men to explore. |

The Development of Advanced Radio Telescopes

- Is a radio receiver that sees radio waves - can detect (1) _____ emitted by celestial objects
- can be hot gas, electrons, and wavelengths
- (2) _____ - invented first radio telescope in 1937
- Shape - has large parabolic-shaped dish antenna
→ enables incoming radio waves to be focused on one point
- Development - large 76-meter one built
 - Russians have one 576 meters in diameter
 - 100-meter telescope in Germany
 - (3) _____ is largest in America
- Uses - provide information about universe
 - can track different space probes → all for (4) _____ space travel



F Read the following passage, and answer the questions.

The Ionization of an Atom

Time Limit: 3 min. 30 sec.

The process of ionization involves converting an atom into a charged ion by changing the difference between the number of protons and the number of electrons attached to an atom. An atom can become either positive or negative in charge, depending on whether one or more electrons is removed or added. If an electron is removed, then an extra proton exists and thus the atom is now a positive ion. If a free-floating electron is added, then the atom is now a negative ion. Depending on which one the atom becomes, either a positive ion or negative ion, the ionization process is slightly different for each.

In 1913, a Danish physicist, Neils Bohr, postulated that during the process of ionization, the energy required by an atom either to join with another atom or to remove itself never exceeds the potential energy required to break that barrier. As an example, according to Bohr's theory, if a person wants to jump over a bar that is two feet tall, he or she must at least jump two feet in the air. According to this theory, when an electron attaches itself to or removes itself from an atom, the energy required by the atom is never lower than the energy potential of the barrier.

Water is a good example that shows the process of ionization: water is made up of two hydrogen ions that each have a positive charge (H^+) and one oxygen ion that has a charge of negative two ($-2O$). When two hydrogen atoms and one oxygen atom come in close contact with each other, the positive charge of the hydrogen (due to two missing electrons) attaches to the two extra electrons of the oxygen atom because an atom strives to be in its most balanced state. Thus, H_2O stays tightly bound and is only itself ionized if it comes into contact with another molecule whose energy potential has a stronger pull.

Practically speaking, the process of atom ionization is what allows scientists to create and manipulate molecules for such things as making new products like plastics or chemical agents. Ionization has also become very popular, environmentally speaking, with companies manufacturing air purifiers, which are nothing more than ionizers. The purifier works by attracting free radical ions out of the air and rebalancing their charge with electrons.

The ionization process outlined above and based upon Neils Bohr's model is known as Classical Ionization. There are also more complex ionization processes such as Tunnel Ionization and Non-sequential Ionization; however, these processes are less common and are often carried out in laboratories.

- convert [v] to change • charged [a] electric • attached to [phr] added to; linked with • remove [v] to get rid of
- extra [a] additional; superfluous • exceed [v] to surpass • potential [a] possible; likely • barrier [n] a blockade
- come in contact with [phr] to get in touch with • strive [v] to try with great effort • molecule [n] a group of atoms
- manipulate [v] to operate; to process; to handle • agent [n] a means; an instrument • complex [a] intricate; complicated
- sequential [a] successive; consecutive; serial • carry out [phr] to do; to perform

General Comprehension

- The word postulated in the passage is closest in meaning to
 (A) confirmed (B) published (C) suggested (D) explained
- Which of the following can be inferred about ionization?
 (A) Ionization must always take place in a laboratory.
 (B) A water molecule is a negative ion.
 (C) There are several methods of ionization.
 (D) Atoms require negative charges.

On the TOEFL Test

- Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage.

Ionization is the process of changing an atom into a charged ion.

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•
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Answer Choices

- | | |
|---|---|
| (A) Tunnel Ionization and Non-sequential ionization are complex ionization processes. | (D) Ionization has become popular with companies that produce air purifiers. |
| (B) The process of ionization makes it possible to create and manipulate molecules. | (E) Neils Bohr's theory works with breaking barriers and water charges. |
| (C) Neils Bohr developed the classical model of ionization, the most common ionization process. | (F) Bohr's key insight was that the energy used by an electron in leaving or joining an atom must be at least as high as the energy potential of the force keeping the electron in place. |

The Ionization of an Atom

- Converts an atom into a charged ion - changes number of (1) _____ in atom
 - can make it positive or negative in charge
- (2) _____ - postulated on ionization of atoms
 - made postulation based on energy needed
- Water can show ionization process
- Uses - lets scientists create and manipulate (3) _____ for new products
 - used for plastics and chemical agents
 - popular for air purifiers
- Types of Ionization - Classical Ionization, (4) _____, and Non-sequential Ionization

● Building Summary Skills

The following summaries are based on the passages you worked on earlier. Complete each of them by filling in the blanks with suitable words or phrases.

1. How to Measure Geologic Time

the time scale	major geological events	the Geologic Time Scale
eons, eras, and periods	historic artifacts and fossils	

Nicholas Steno devised ⁽¹⁾ _____ in the late 17th century. The time scale calibrates the history of Earth according to ⁽²⁾ _____. The scale is divided into ⁽³⁾ _____. These smaller increments allow scientists to categorize and reference ⁽⁴⁾ _____ within certain time frames and to piece together a map of Earth's history. Since its inception, many scientists have contributed to ⁽⁵⁾ _____.

2. The Pleiades

advancements of many cultures	about 440 light years	gravitational forces
the constellation Taurus	reflection nebulae	

The Pleiades makes up ⁽¹⁾ _____. It is formed of the hottest and brightest stars in the galaxy as well as ⁽²⁾ _____ that further enhance its overall shine. Estimated to be ⁽³⁾ _____ away from Earth and spanning 12 light years in diameter, scientists predict that it will burn itself out before ⁽⁴⁾ _____ can pull it apart. Meanwhile, its intense power and brilliance have won it a prominent role in the mythologies and ⁽⁵⁾ _____.

3. The Daguerreotype

Louis Daguerre	exact images of people	less cumbersome
take portraits	the introduction of the negative	

The daguerreotype was invented by French chemist ⁽¹⁾ _____ in 1839 when he discovered that a mixture of silver and chalk would darken an image exposed to light. This discovery made it possible to create ⁽²⁾ _____. Furthermore, although early methods of photography had been attempted, the daguerreotype process was ⁽³⁾ _____ than its predecessors and meant that early photographers could travel from town to town to ⁽⁴⁾ _____ of their subjects. Unfortunately, the daguerreotype lacked the means to produce copies, and with ⁽⁵⁾ _____, the daguerreotype soon lost favor.

4. Sand Dunes

ideal habitats	wind erosion	the type of sand dune
buildings and crops	coastal areas or in desert regions	

A sand dune is a mound of sand formed from ⁽¹⁾ _____. Generally, dunes are created along ⁽²⁾ _____. The ferocity and direction of the wind determines ⁽³⁾ _____ that is formed. Although sand dunes provide ⁽⁴⁾ _____ for various plants and animals as well as prevent subsequent erosion, they also encroach on human habitats through a process called desertification. In desertification, sand storms and sand avalanches cause major damage to ⁽⁵⁾ _____.

5. The Development of Advanced Radio Telescopes

Grote Reber	576 meters	concentration
a parabolic shape	information from space	

Radio telescopes are important to scientists because they are able to see and track ⁽¹⁾ _____. First developed by American ⁽²⁾ _____ in 1937, radio telescopes are designed with ⁽³⁾ _____ that concentrates signals into a strong focal point that can more easily be detected. A larger dish size determines a greater degree of ⁽⁴⁾ _____. Since then, the early 1960s saw the invention of a radio telescope with a 76-meter diameter, but today the largest radio telescopes exceed 100 meters in diameter with the largest having a diameter of ⁽⁵⁾ _____. Furthermore, radio telescopes can be found around the world.

6. The Ionization of an Atom

Classical Ionization	attract free radical ions	Neils Bohr
changing the charge of an atom	environmentally friendly	

Ionization is the process of ⁽¹⁾ _____. It allows scientists to manipulate atoms into new products. Possibly because it is ⁽²⁾ _____, the process of ionization has become particularly profitable for companies that market air purifiers. Ionization enables the purifiers to ⁽³⁾ _____ and rebalance their charges with electrons. This type of ionization is called ⁽⁴⁾ _____ and was first theorized by ⁽⁵⁾ _____ in 1931. Although other types of ionization processes have been developed, they are less commonly used.



1. According to paragraph 1, Venus is named the Morning Star and Evening Star because

(A) it is very bright
(B) it is close to the sun
(C) it can be seen from evening till morning
(D) it is used to find the direction by sailors

2. The word that in the passage refers to

(A) size (B) bulk
(C) atmosphere (D) density

3. Which of the following best expresses the essential information in the highlighted sentence? *Incorrect* answer choices change the meaning in important ways or leave out essential information.

(A) Earth experiences greater surface pressure than Venus.
(B) If a man could survive Venus's surface temperature, he could also survive its surface pressure.
(C) The surface pressure and heat of Venus are much greater than those on Earth.
(D) Venus's surface temperature and pressure make it uninhabitable by humans.

4. According to paragraph 3, the greenhouse effect on Venus is owed to

(A) the small amounts of nitrogen
(B) the rapidly increasing amounts of carbon dioxide
(C) growing plants
(D) the high atmospheric temperatures

5. In paragraph 4, the author of the passage implies that Earth

(A) might suffer the same greenhouse effect as Venus
(B) once had an atmosphere similar to Venus's
(C) has bodies of water similar to those on Venus today
(D) is experiencing a reduction of carbon dioxide emissions

The Atmosphere of Venus

Venus, also called the Morning Star and Evening Star, is the second-closest planet to the sun and the brightest object in the night sky. The planet orbits the sun every two hundred and twenty four Earth-days and is sometimes referred to as Earth's sister planet because the two share both a similar size and bulk. What is not similar, however, is Venus's atmosphere in comparison to Earth's atmosphere.

The atmosphere on Venus is much heavier and has a higher density than that of Earth. Venus's atmosphere also expands significantly higher than Earth's atmosphere although a thick cloud cover makes the surface of Venus nearly impossible to see unless observed through radar mapping.

While the pressure and temperature of Venus's upper atmosphere are comparable to those of Earth, the heat and pressure of the lower atmosphere are not unlike a furnace. Venus's atmosphere is very thick due to a composition consisting mainly of carbon dioxide, and a small amount of nitrogen. If man could survive the extreme heat of Venus's surface (400 degrees Celsius), then he would have to contend with a surface pressure that is more than 90 times that of Earth. Venus's extremely high temperature is thanks to the greenhouse effect caused by such a large amount of carbon dioxide. The greenhouse effect is a process by which the sun's infrared radiation is more readily absorbed by the atmosphere. Just like in a real greenhouse used to grow plants year round, the proliferation of carbon dioxide traps radiation and warms Venus's atmosphere. Due to this phenomenon, Venus boasts a higher atmospheric temperature than Mercury, even though Venus is twice the distance from the sun.



6. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

Although the causes are different, the ramifications are the same.

Where would the sentence best fit?

7. The word propagation in the passage is closest in meaning to

- (A) generation (B) elimination
(C) evaporation (D) desecration

8. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the **THREE** answer choices that express important ideas in the passage.

Scientists look at Venus to predict Earth's future.

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-
-

Answer Choices

- (A) Venus once had large bodies of water that evaporated and caused a rapid increase in carbon dioxide.
- (B) Earth's wind has a greater velocity than Venus's because the air movement on Venus is denser and can even move large obstructions.
- (C) Spaceship landings on Venus, though often crushed by Venus's atmosphere, have revealed much about its carbon dioxide filled atmosphere.
- (D) If man could survive the hot temperature of Venus, then he would have to contend with the great surface pressure.
- (E) The first space probe of Venus was made in 1966.
- (F) Scientists are concerned that conditions on Earth that propagate significant quantities of carbon dioxide will produce a greenhouse effect similar to Venus's.

However, scientists postulate that Venus's atmosphere was not always so hot. **A** Studies show that large bodies of water were once on Venus's surface but that eventual evaporation of all the water caused the runaway greenhouse effect which regulates the planet today. **B** Thus Venus has become a critical study for today's scientists, as human beings are only beginning to struggle with the early stages of the greenhouse effect. **C** Our problems do not stem from evaporated water supplies but from a propagation of carbon dioxide and other greenhouse gases due to industrial and automobile emissions. **D**

Another interesting characteristic to note regarding Venus's atmosphere is that its daytime temperatures and nighttime temperatures are not that far removed from each other. This is due to thermal inertia, the ability of a substance to store heat despite changing temperatures and the transfer of heat by Venus's strong winds. Although winds on the surface of Venus move slowly in comparison with Earth's winds, Venus's air is so dense that a slow-moving wind there can move large obstructions and even skip stones along the planet's surface.

In 1966, humankind made its first attempt at sending a recording instrument into Venus's atmosphere. The Venera 3 probe did collide with Venus's surface; however, the abrupt impact caused its communication system to fail, and it was unable to send and feedback. In 1967, Venera 4 successfully entered Venus's atmosphere and was able to take many readings, one of which recorded that Venus's atmosphere was between ninety and ninety-five percent carbon dioxide. Subsequent Venera probes were sent into Venus's atmosphere, but most of them succumbed to the crushing air pressure.

9. The word un-fused in the passage is closest in meaning to

- (A) fixed (B) scattered
(C) unattached (D) unrelated

10. The author mentions an aquifuge in paragraph 1 as an example of

- (A) a completely unpenetrable aquifer
(B) an aquitard
(C) an unconfined aquifer
(D) a non-porous rock

11. According to paragraph 2, aquifers can be found in which of the following places?

- (A) unsaturated regions of Earth's crust
(B) saturated regions of Earth's crust
(C) above the water table
(D) spaces not filled with groundwater

12. Which of the following best expresses the essential information in the highlighted sentence? *Incorrect* answer choices change the meaning in important ways or leave out essential information.

- (A) Aquifers have no large rocks, which are too heavy to be carried away from the water source.
(B) A rapidly flowing river deposits fine particles in shallow areas and large rocks in deeper areas.
(C) Large rocks sink to the bottom of aquifers while small materials float to the surface.
(D) Aquifers form close to a river's source and thus are filled with large rocks.

13. According to paragraph 3, all of the following are true about alluvium EXCEPT:

- (A) It is sediment made of silt, clay, sand, or gravel.
(B) It requires more energy to move it than to move large rocks.
(C) It is the main component of aquifers in non-mountainous areas.
(D) It is deposited by running water.

Aquifers

An aquifer is an underground layer of rock and other un-fused materials that allows water to pass through it and from which groundwater can be removed using a water well. Aquifers can be either unconfined or confined. An unconfined aquifer is one that does not have a restrictive layer between it and the surface. A confined aquifer is one that has an aquitard as its upper boundary and oftentimes another unconfined aquifer above that. An aquitard is a region of Earth that restricts the flow of groundwater from one aquifer to another. If an aquifer is completely impenetrable, it is called either aquifuge or aquifuge. Aquitard layers are made up of materials with low hydraulic conductivity, such as clay or other non-porous rock.

Nearly everywhere under Earth's shallow surface, groundwater can be found. Earth's crust is itself divided into two regions: saturated and unsaturated. In the saturated areas, all possible spaces are filled with water. This is where the aquifers can be found. In the unsaturated area, air still fills some spaces that groundwater has not yet reached. In the saturated areas, the pressure in the aquifers is greater than the atmospheric pressure. At the water table, the pressure on the water is equal to that of the atmosphere. On the other hand, in the unsaturated areas, the water is under negative pressure, which causes the water to suction upward and adhere to the upper boundary of whatever is above it.

In areas without mountains, the aquifers are typically made up of alluvium, a sediment that has been deposited by a river or other running water. Alluvium is typically made up of small particles such as silt or clay and also some larger particles like sand and gravel. Rivers are continuously picking up and dropping fine particles. When a river is moving quickly, it is picking up and dropping more particles than



14. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

How much water is needed must be considered when planning to dig an aquifer.

Where would the sentence best fit?

15. The word depleted in the passage is closest in meaning to

- (A) reinforced (B) polluted
(C) emptied (D) conserved

16. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express important ideas in the passage.

Aquifers are underground repositories of groundwater.

-
-
-

Answer Choices

- (A) An aquitard is a region of Earth that limits the flow of groundwater from one aquifer to another.
- (B) Aquifers should not be overused, as their water supplies are limited.
- (C) Alluvium is made up of small particles deposited by running water such as rivers.
- (D) Aquifers are found in the saturated areas of Earth's crust.
- (E) Some aquifers are impenetrable because their upper boundary is made up of non-porous rock.
- (F) The water from aquifers can be accessed by manmade wells.

when it is moving slowly. As one would guess, because larger particles in a river require more energy to move them, bigger rocks and pieces of gravel are often found closer to the water sources, whereas aquifers located a long way from the water source are usually found to be made up of finer materials.

Aquifers are essential to human life because they allow people to withdraw water from Earth despite where they might live. **A** Obviously, the closer one is to a large, open body of water, the less one is required to dig in depth to locate a viable aquifer. **B** Those who live in drier areas or regions of higher elevation would need to dig further to find an aquifer. **C** Some aquifers are also bigger than others. **D** If the water well being dug is purely for the purpose of enabling one residence to have drinking water, then the aquifer could be small. If, however, the aquifer is going to be used for farming irrigation or mining, then a larger aquifer would be required. It is important that human beings do not exploit the use of aquifers as, like most natural resources, supplies are limited. Freshwater aquifers in particular should not be over-used since the replenishing of readily drinkable water is limited. Some aquifers, however, have little threat of being depleted anytime soon. For example, the Great Artesian Basin in Australia is one of the biggest groundwater aquifers in the world. It is responsible for providing water to even the most remote portions of Australia and lies underneath 23% of the continent.

Vocabulary Review

A Choose the word with the closest meaning to each highlighted word or phrase.

- The worker manipulated the machine with dexterity.
 (A) started (B) replaced (C) repaired (D) operated
- Archaeologists have often speculated about the whereabouts of Atlantis.
 (A) guessed (B) talked (C) dreamt (D) wrote
- Many indigenous plants had medicinal value for early civilizations.
 (A) evergreen (B) leafy (C) native (D) rare
- Astronomers classify stars according to their size and age.
 (A) count (B) track (C) categorize (D) study
- The baker sprinkled colored sugar over the holiday cookies.
 (A) scattered (B) spread (C) mixed (D) heated
- Many publishers condense novels to make them easier and faster for people to read.
 (A) lengthen (B) rewrite (C) discontinue (D) concentrate
- After 25 years of marriage, she could not conceive of being married to anyone else.
 (A) stand (B) imagine (C) admit (D) avoid
- The focal point of the gossip became the new girlfriend of the man who lived across the street.
 (A) sharp (B) undeniable (C) main (D) dull
- Many alchemists tried their hand at converting common ores into gold.
 (A) changing (B) turning (C) stirring (D) breaking
- A passionate artist strives to create great works of art.
 (A) practices (B) attempts (C) learns (D) hopes

B Match each word with the correct definition.

- | | | |
|--------------|---|---|
| 1. molecule | • | • a. related to the sky or heaven |
| 2. celestial | • | • b. a set firmly and deeply in a surrounding mass |
| 3. crescent | • | • c. a blockade |
| 4. barrier | • | • d. a gaseous substance |
| 5. galaxy | • | • e. an increase on a fixed scale |
| 6. erosion | • | • f. the physical universe beyond Earth's atmosphere |
| 7. vapor | • | • g. a group of atoms |
| 8. increment | • | • h. the process of being worn away |
| 9. embed | • | • i. the shape of the waxing or waning moon |
| 10. space | • | • j. a system of stars, gas, and dust held together by gravitational forces |

Unit **10**

Fill in a Table

10 Fill in a Table

Overview

■ Introduction

Fill in a Table questions ask you to identify and organize major ideas and important supporting information from across the passage. Then, you should classify them into the appropriate categories. Passages used for this type of question usually have particular types of organization such as compare/contrast, cause/effect, or problem/solution. A five-answer table is worth 3 points, and a seven-answer table is worth 4 points.

■ Question Type

Directions: Complete the table below to summarize information about X discussed in the passage. Match the appropriate statements to the categories with which they are associated. TWO of the answer choices will NOT be used. *This question is worth 3 points.*

Answer Choices

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

Category 1

-
-
-

Category 2

-
-

■ Useful Tips

- Look at the categories of information in the table first.
- Using your scratch paper, make an outline of the passage according to these categories.
- Distinguish between major and minor information in the passage.
- Wrong answers usually include information that is not mentioned in the passage or that is not directly relevant to the categories in the table.



Sample iBT Question

Emergence

The concept of emergence describes the way in which a complex pattern arises. This is a constantly changing process. It may occur over a long period of time. The evolution of the human body is a good example. Its form emerged over thousands of generations. The human body is very complex. But it is formed by millions of tiny cells, which are not.

Emergence occurs on disparate-size scales. An example is between neurons and the human brain. Interactions between many neurons produce a human brain which is capable of thought. But none of the neurons that made it are capable of thought. The brain is much bigger than any of the single neuron parts that created it.

A common way of looking at emergence in nature is through structures. They can come from organic or inorganic sources. A good example of a living structure is a flock of birds. The flock takes a shape and has behavioral characteristics. But these properties are not exhibited by individual birds. Another example of an organic emergent structure is an ant colony. The ant colony is emergent because no single ant, including the queen, could organize such an effective colony of workers. Yet collectively, the colony structure arises. An example of an inorganic emergent structure is a hurricane. This storm system forms as a result of various factors such as pressure, temperature, and humidity. They combine to form a violent storm. But any single factor would not form the same storm.

Emergence also occurs in human culture. One place this kind of emergence has occurred on a large scale is in the stock market. As a system, it regulates the prices of companies around the world. But there is no single leader that controls the entire market. Agents only know of a limited number of companies and must follow strict rules of the market. Through these interactions, the complexity of the market as a whole emerges. Another type of this emergence is with the World Wide Web. In this case, there is no central website, yet links between major and minor websites create the complex whole that is known as the World Wide Web.

Directions: Complete the table below to summarize information about structural and cultural emergence discussed in the passage. Match the appropriate statements to the categories with which they are associated. TWO of the answer choices will NOT be used. *This question is worth 3 points.*

Structural Emergence	Cultural Emergence
• • •	•

Answer Choices

- The queen bee is fed by workers many times a day.
- A flock of birds exhibits a shape and certain behavior.
- The stock market forms a complex pattern
- The human brain is composed of numerous thinking neurons.
- A hurricane is the result of various climatic factors.
- Small and large websites are linked to create the World Wide Web.
- Ants build an effective colony collectively.

Correct Answer

Choices 2, 5, and 7 are associated with structural emergence, and choices 3 and 6 with cultural emergence. Choice 1 is not relevant to the passage, and choice 4 includes incorrect information about neurons.

The Fruit Tree Leaf Roller

The Fruit Tree Leaf Roller (*Archips argyrospilus*) is a caterpillar that damages trees throughout California. This pest defoliates ornamental trees such as deciduous and live oaks. It also damages the fruits of cherry, apple, apricot, and plum trees, among others. These caterpillars can even drop to the ground and defoliate the grass or plants beneath the trees. This insect goes through four stages of development, beginning as an egg that is one of many deposited on a tree twig or branch. After emerging from the cement mass, the newly hatched larvae begin to eat away at their host tree as they mature and grow into a full-grown caterpillar. After it feeds long enough, the larva rolls itself in a leaf wrapped and lined in silk webbing called a pupa. Eight to eleven days later, an adult moth emerges from the pupa. The adult then migrates to a new location to mate and lay eggs for the next life cycle.

- Directions: Complete the table below to match information about the life stages and habitat of the Fruit Tree Leaf Roller discussed in the passage. Match the appropriate statements to the categories with which they are associated. TWO of the answer choices will NOT be used.

Life Stages of the Fruit Tree Leaf Roller

- _____
- _____
- _____

Habitat of the Fruit Tree Leaf Roller

- _____
- _____

Answer Choices

- (A) The larva rolls itself into a pupa.
- (B) A silk lined leaf is called a pupa.
- (C) The egg is deposited on a twig or branch.
- (D) Deciduous trees are safe nesting places.
- (E) An adult moth emerges.
- (F) The caterpillars are found in California.
- (G) The caterpillar is harmful to fruit trees and low-lying plants.

Neolithic Culture

The Neolithic Age took place between the Paleolithic, or Old Stone Age, and the Bronze Age. The Neolithic Age is not defined by the time at which it occurred but by the behavioral and cultural characteristics that accompanied the time. One such characteristic is the cultivation of wild and domestic crops. This culture of farming signaled an end to the nomadic lifestyle for early humans, as they created agricultural bases where they lived and worked for their entire lifetimes. Another characteristic is the domestication of animals. The advent of animal husbandry led to advancements in every aspect of human development from science to psychology. One of the first cultures in which the Neolithic Age has been identified through fossil evidence is in Southwest Asia and the Middle East. There in southeastern Anatolia and northern Mesopotamia, development occurred soon after the 10,000 B.C. and spread east and westward.

2. Directions: Complete the table below by indicating which of the answer choices describe Neolithic humans and which describe Pre-Neolithic humans. TWO of the answer choices will NOT be used.

Neolithic Humans

- _____
- _____
- _____

Pre-Neolithic Humans

- _____
- _____

Answer Choices

- (A) They moved from place to place.
- (B) Agriculture formed the basis of their livelihoods.
- (C) The Paleolithic Age preceded the Bronze Age.
- (D) They made advancements in animal husbandry.
- (E) Farming allowed them to settle in one place.
- (F) They did not use agriculture.
- (G) Fossil evidence has been found for both ages of people.

Mangrove Stands

Mangrove stands are saltwater areas where trees and bushes are able to grow. There are about 110 species of bushes and trees that grow in saltwater mangrove stands around the world. These swamplands occupy rivers and coastal environments with lots of fine sediment that is easy for mangrove roots to grow through. Mangroves also thrive in areas with high organic content for nourishment. These areas must also be somewhat protected from the action of strong waves. The plants in these stands have successfully adapted to several problems, such as anoxia, salinity, and frequent flooding by tides. The underwater roots of mangroves are havens for saltwater creatures like oysters, sponges, and even crabs. Aside from being a haven for these creatures, mangroves serve an important purpose as barriers against storms and other natural forces that would otherwise batter the coast. These stands also impede erosion and provide a natural barrier against unusually large waves.

3. Directions: Complete the table below to summarize information about the characteristics and benefits of mangroves discussed in the passage. Match the appropriate statements to the categories with which they are associated. TWO of the answer choices will NOT be used.

Characteristics

- _____
- _____

Benefits

- _____
- _____
- _____

Answer Choices

- (A) Mangroves have adapted to the salty water.
- (B) Crabs and oysters live in saltwater.
- (C) Mangroves give protection from storms.
- (D) Mangroves grow best where there is protection from strong waves.
- (E) Many saltwater creatures can find homes in mangroves' root systems.
- (F) Anoxia and salinity hamper the growth of many plants.
- (G) Erosion of coastlines is prevented by mangrove stands.

The Effects of Television on Families in the U.S.

The effects of television on members of families in America have been closely studied. Some scholars feel that daily exposure to television programming heavily affects the communication patterns within the family. Others believe that children's thinking capacity is improved. One study concerned with the effects of television on the family used parent-child groups called dyads to fill out comparative surveys. It showed that parents that let their children watch television are able to control their children more effectively but their communication is less effective. Exposure to different types of television shows can make it more difficult for parents and children to communicate because of differing perspectives. The violence on television has proven to lead to a less advanced perspective, which in turn leads to less advanced moral reasoning in the mind of a child, especially when the parents do not explain the lack of realism in such violent shows.

4. Directions: Complete the table below about the positive and negative effects of television viewing on families discussed in the passage. Match the appropriate statements to the types of effects with which they are associated. TWO of the answer choices will NOT be used.

Positive Effects

- _____
- _____

Negative Effects

- _____
- _____
- _____

Answer Choices

- (A) Children are unable to understand the viewpoints of their parents.
- (B) Television may improve children's cognitive abilities.
- (C) The moral reasoning of children may be impaired by violence.
- (D) Parents have less effective communication with their children.
- (E) Parent-child groups are called dyads.
- (F) Parents do not like to watch violence on television.
- (G) Parents are able to control their children more effectively.

A Read the following passage, and answer the questions.

Possible Solutions to Overfishing

Time Limit: 4 min.

Overfishing is a problem that occurs when commercial fishing activities lower fish stocks to a point at which the fish cannot naturally reproduce in great enough numbers or fast enough to bring the level back up. The life cycle equilibrium that fills oceans with fish for humans to eat is locked in an unsustainable cycle because of fishermen's desire to profit.

When a stock collapses, it is defined as declining to a point that less than 10% of a previously observed maximum abundance level exists. A major international scientific study printed in the journal *Science* concluded that a third of all worldwide fishing stocks have collapsed, and if this current trend is allowed to continue, all worldwide fishing stocks will have collapsed within the next fifty years.

An example of overfishing was seen in the 1970s, when the stocks of anchovy fisheries on the coast of Peru crashed. At the same time, scientists claimed that the stocks of natural anchovies in Peruvian waters had been driven away by the El Niño effect. Between the years 1971 and 1972, Peruvian fishermen were able to harvest 60% fewer anchovies than they had in previous years. This collapse represented a major loss to Peru's economy.

Scientists concerned with this problem have come up with a set of overfishing principles of precautionary approach to tackle this emerging problem. They have introduced harvest control rule management principles to fisheries around the world.

A system called the Traffic Light Color Convention has been designed to introduce rules to combat overfishing, depletion, and the collapse of fishing stocks. This is a simple convention that attempts to classify fishing waters as green light for open fishing, yellow light for highly regulated fishing that is cautious of stock levels, and red light which means an area should not be fished in until the fish stocks have returned to a safe and sustainable level.

In addition to the Traffic Light Color Convention, the United Nations Convention on the Law of the Sea Treaty has several articles concerned with the problem of overfishing. The first article to address this problem is 61, which states that all coastal states should maintain the living resources in their fishing zones, making sure that they are not endangered by overexploitation. This article also calls for the maintenance and restoration of populations that are seriously threatened. The next article about this matter is 62, in which all coastal states are bound to promote the best possible use of commercial living resources in their economic zones. Finally, article 65 provides general rights for coastal states to control the exploitation of marine mammals for commercial gain.

Another possible solution to the problem of overfishing is gene splicing which can accelerate the reproduction of fish many times. This method was invented by Aqua Bounty Farms, a company in Newfoundland. It is hoped that once further developed, this program will allow fish farmers to use enclosed tank systems to meet worldwide fish demands while natural stocks are left alone and allowed to repopulate.

- equilibrium (n) a balance • unsustainable (a) insupportable • collapse (v) to break down • crash (v) to fall
- precautionary (a) preventive • tackle (v) to deal with; to address • depletion (n) exhaustion • exploitation (n) abuse
- marine (a) maritime; nautical • accelerate (v) to speed up; to quicken

General Comprehension

- According to paragraph 2, which of the following will occur if the current trends in overfishing continue?
 - The numbers of fish will decline to under 10% of current levels.
 - Large fisheries will be forced to close.
 - Advancements in science will be needed to increase the supply.
 - One-third of all fish will disappear.
- According to the last paragraph, which of the following solutions to overfishing was developed by Aqua Bounty Farms?
 - enclosing tank systems
 - regulating the exploitation of fisheries
 - color-coding fishing zones
 - gene splicing

On the TOEFL Test

- Directions: Complete the table below. Select the appropriate phrases from the answer choices and match them to the type of remedy for overfishing practices to which they relate. TWO of the answer choices will NOT be used.

The Law of the Sea Treaty

- _____
- _____
- _____

The Traffic Light Color Convention

- _____
- _____

Answer Choices

- Calls for the restoration of endangered fish populations
- Divides fishing areas into open, closed, and monitored fishing areas
- Introduces rules to fight against the decline and collapse of fishing stocks
- Requires licenses to fish in regulated areas
- Uses traffic lights to regulate fishing zones
- Provides general rights for coastal states to control exploitation
- Calls for the maintenance of fish populations in coastal waters

Possible Solutions to Overfishing

- Occurs when fish stocks drop to levels that cannot be replaced
 - drops to less than (1) _____ of previously observed maximum abundance level
 - happens because of fishing
 - most fishing stocks will collapse in next (2) _____
- Scientists have ways to prevent collapse
 - (3) _____ → classifies fishing waters by color
 - United Nations Convention on the Law of the Sea Treaty
 - coastal states should maintain fishing stocks
 - must restore populations
- (4) _____ of fish - done by Aqua Bounty Farms
 - try to accelerate fish reproduction



B Read the following passage, and answer the questions.

The Communication and Learning of Honeybees

Time Limit: 4 min.

Honeybees are a highly advanced variety of bees that are capable of learning and communication, which they use to locate food sources. They also use these skills to deploy worker bees to harvest these food resources.

The process of learning is important for honeybees since they create an efficient and successful foraging system for their individual hive. As forager bees leave the hives in the morning, they search for plants and flowers that offer rewards of pollen and nectar. If the plants or flowers do not offer much reward, the forager bees quickly learn not to make repeat visits. If they do offer much reward, then the bees learn to visit repeatedly. This type of conditioning is called associative learning and is usually only found in vertebrates.

Scientists have studied the honeybees' ability to learn in an experiment that used a simple Y-shaped maze. The forager bees were trained to enter a maze, which was marked with a certain color. These bees were then presented with a choice of directions, one marked with the same color that was at the entrance and the other marked with a different color. The bees quickly learned that the reward was located in the direction that was marked with the same color.

The scientists administering this test also reversed the color and extended the length of the path to see if the bees could re-learn new conditions, which they did. By lengthening the distance the bees had to travel before identifying the correct color marker, scientists were able to prove that the bees could retain the information of the color markers for up to five seconds. This proves that honeybees have a short-term memory that is comparable to that of many birds.

After locating the most rewarding plants and flowers, the forager bees return to the hive and communicate their findings to worker bees. They do this to recruit the worker bees to forage for pollen and nectar in the same area. There are two competing theories about how the forager bees recruit workers. These two theories are the dance language theory and the odor plume theory.

Since the time of Aristotle, it has been known that honeybees perform dances after successfully foraging for pollen and nectar and returning to the hive. The two dances they do are the round dance and the waggle dance. The round dance consists of the bee flying in small circles while the waggle dance takes on a zigzag pattern. These dances are meant to communicate the presence and location of rewarding plants and flowers so as to gather a group of recruits to go out and forage more nectar and pollen. According to the dance language theory, this behavior serves to communicate the location of the good nectar sources to the honeybee recruits.

The odor plume theory claims that honeybee dance language is used only to attract attention while honeybees are recruited to forage for nectar and pollen by the existence of an odor plume given off by the nectar. To prove this, scientists have done studies in which odorless sugar sources have shown that worker bees were unable to recruit other honeybees to fly to those sources.

• deploy (v) to send out • harvest (v) to gather; to reap • forage (v) to search • pollen (n) a fine powder produced by flowers • nectar (n) a sweet liquid produced by flowers • associative (a) linking separate ideas and thoughts to one another • vertebrate (n) an animal that has a backbone • retain (v) to keep; to maintain • recruit (v) to choose a new member; (n) a new member • odor plume (n) the diffusion of smell

General Comprehension

- According to the passage, which of the following is true about bees' learning?
 - They identify each other with color markings.
 - They have lifelong dance partners.
 - They communicate the locations of good nectar recruiters.
 - They use short-term memory.
- According to paragraph 2, all of the following are true about associative learning EXCEPT:
 - Only vertebrates are capable of it.
 - Bees leave their hives only at night.
 - Bees search for food.
 - Bees do not return if no food is found.

On the TOEFL Test

- Directions: Complete the table below. Select the appropriate phrases from the answer choices and match them to the type of theory to which they relate. TWO of the answer choices will NOT be used.

Dance Language Theory	Answer Choices
• _____	(A) Scientists proved it by using odorless sugar sources.
• _____	(B) Bees fly in circles.
• _____	(C) Bees' sense of smell is stimulated.
	(D) Other bees are informed of the presence of nectar and pollen.
Odor Plume Theory	(E) It explains why bees search for pollen.
• _____	(F) Bees communicate in a zigzag motion
• _____	(G) It was discovered with the use of time-lapsed photography.

The Communication and Learning of Honeybees

- Use learning and communication to locate (1) _____
 - creates efficient and successful foraging system
 - can learn where good food sources are so will return
- Scientists conduct tests on honeybees - can learn where food sources are (2) _____
 - show have short-term memory like birds
- Honeybee communication
 - Dance language theory → perform dances when find food and return to hive
 - round dance and (3) _____
 - communicate presence and location of food
 - (4) _____ → dancing just attracts attention to get foragers



C Read the following passage, and answer the questions.

Cultural Diffusion

Time Limit: 3 min. 40 sec.

Cultural diffusion is the term used to describe the spread of ideas, behaviors, and material objects between different cultures. This term is used especially when this movement occurs without being linked to a population movement or mass exodus of people.

Theories that involve the concept of cultural diffusion often stir up controversy in anthropological circles. This is because they often contradict theories on mass migration. This opposition between cultural diffusion and mass migration can be found in theories regarding similar human burial sites involving the skulls of cave bears around the Arctic Circle on the continents of North America, Europe, and Asia. Nevertheless, many anthropologists prefer to consider theories based on cultural diffusion, or the borrowing of traits between cultures, as they commonly describe it.

Throughout human and pre-human history, cultures have never been or remained completely isolated from each other. Even in the isolationist culture of feudal Japan, the religious philosophy of Buddhism was able to spread from India and China, where it originated by traveling monks. This is an example of how cultural diffusion can take place on a grand scale. This type of cultural diffusion happens today. When considering cultural diffusion, there are three major forms: direct, forced, and indirect diffusion.

Direct diffusion takes place when two cultures are located geographically close to each other. This results in intermarriage between citizens, economic trade, and physical combat. An example of direct diffusion would be a marriage between two people from bordering countries, such as a Mexican and American, or members of two bordering countries, such as America and Canada, engaging in the same sport, such as hockey or baseball, together.

Forced diffusion happens when a stronger culture conquers or enslaves a weaker one and forces its own customs on the subjugated people. An example of this would be when African slaves were brought to the United States and forced to become Christian. Another good example would be the way England once colonized India, forcing many Indians to learn to speak English.

Indirect diffusion is the most common form that occurs these days. This type of diffusion occurs when cultural traits are passed between cultures through an intermediary or middleman without the sending and receiving cultures ever being in direct contact. This happens when a European visits the U.S. and discovers that the Japanese dish called sushi. Another example would be when an African receives a Mickey Mouse T-shirt from a visitor and wears it even though he has never been to Disneyland.

These forms of cultural diffusion have risen and fallen in trends of frequency throughout history. In ancient times, direct diffusion was very common since groups of humans lived in adjoining settlements. But today, because of mass media and the invention of the Internet, indirect diffusion is the most common form.

- diffusion (n) spread • exodus (n) a departure; a migration • controversy (n) a debate, an argument • contradict (v) to deny; to rebut; to challenge • regarding (prep) about; concerning • originate (v) to start; to begin
- subjugate (v) to defeat; to overpower; to conquer • middleman (n) a go-between • frequency (n) the number of times that something happens during a period of time • adjoining (a) neighboring; adjacent

General Comprehension

- According to paragraph 2, why is it difficult to define theories about cultural diffusion?
 - Cultural diffusion theories conflict with migration theories.
 - Cultural diffusion is still taking place throughout the world.
 - Cultural diffusion only occurs indirectly.
 - Trends in cultural diffusion theories are always changing.
- The word *it* in the passage refers to
 - isolationist culture
 - Buddhism
 - India
 - China

On the TOEFL Test

- Directions: Complete the table below by matching FIVE of the seven answer choices comparing the three forms of cultural diffusion. TWO of the answer choices will NOT be used.

Direct	Forced	Indirect
• •	• •	•

Answer Choices

- | | |
|--|---|
| (A) A native African may spend holidays in Disneyland. | (E) This occurred when Americans enslaved Africans. |
| (B) Indians were compelled to adopt the English language. | (F) Culture is passed through an intermediary. |
| (C) Skulls of cave bears were found near the Arctic Circle. | (G) Two cultures are interested in the same sport. |
| (D) This occurs when cultures are situated close enough to interact. | |

Cultural Diffusion

- Spread of (1) _____ between cultures
- Are many different anthropological theories
- Three major forms of diffusion
 - direct diffusion → two cultures (2) _____, geographically
 - caused by cultural, economic, and physical interaction
 - (3) _____ → stronger culture conquers weaker one
 - African slaves brought to America and become Christian
 - indirect diffusion → most common form today
 - caused by (4) _____
- Different forms occur at different times in history

D Read the following passage, and answer the questions.

The Nesting Habits of Rodents

Time Limit: 3 min. 50 sec.

Rodents are an order of mammals that include between 2,000 and 3,000 species. They make up over 40% of all mammals. The success of their order is due to their small size, short breeding cycle, and overall ability to survive by eating a wide variety of foods.

While most rodents are rather small, they vary greatly in weight and physical characteristics. A clear example of this variation can be seen in the differences between the African pygmy mouse, a rodent that usually weighs about 7 grams, compared to the largest rodent still alive today, the capybara, which can weigh up to 45 kilograms.

These common differences between rodent species are very evident when looking at the patterns of nests built by different rodents. For example, the North American beaver is a rodent that builds its nest by gnawing on and felling trees. The beaver uses these trees as well as various branches to construct a dam across a river that will eventually create an artificial pond. Within this pond, the beaver builds a semi-aquatic home called a lodge.

A rodent nest that is much different from that of the beaver is the one built by a squirrel. The squirrel is known to build its nest, called a drey, amongst the branches of a tree. Squirrels are also known to build storage areas in or around their nests where they hoard acorns and other kinds of nuts to provide themselves with nourishment during the winter season. Scientists have discovered that squirrels possess extremely short memories, so they must store their nuts in places where the landmarks will remind them of the place. For example, squirrels may store their nuts on the north sides of trees in order to help themselves remember the location of their food stores.

Another rodent whose nest building patterns are vastly different is the prairie dog. Prairie dogs are famous for creating highly organized colonies or towns in which large groups of prairie dog families live. A family usually consists of one male and two to four females. These towns are actually expansive tunnel systems that the prairie dogs have burrowed through the ground. These tunnel systems are constructed to maximize fresh air ventilation and to control the flow of rainwater. They even have different rooms for sleeping, eating, and babysitting. These burrows also contain several routes for escape in the event they are infiltrated by predators.

Yet another species of rodent, the mouse, is known to build its nest above ground. Most mice will construct nests of grass, fibers, and shredded materials in a small area. This is the place where they will sleep, mate, and raise their young. While most mice ensconce their nests in cozy, small, protected above ground areas, some mice have been observed to dig shallow burrows. Other types of mice have been seen making their nests in the walls of old homes, in tree stumps, and even in the exhaust pipes of abandoned cars.

• rodent (n) a general class of animals that includes rats, mice, and squirrels • order (n) a division of plants or animals classified by similarity • vary (v) to differ • evident (a) obvious; clear • gnaw (v) to chew; to bite • felt (v) to cut down • artificial (a) not natural; synthetic • hoard (v) to store; to amass • ventilation (n) freely circulating or moving air • infiltrate (v) to sneak in; to penetrate • ensconce (v) to establish in a safe, comfortable place • observe (v) to watch; to monitor

General Comprehension

- According to the passage, which of the following is NOT true about rodents?
 - They are omnivorous animals.
 - They produce a large number of offspring.
 - They show great differences in weight and shape.
 - They represent over half of all mammal species.
- According to paragraph 4, squirrels must rely on which of the following to find their cache of food?
 - their instincts
 - their sense of smell
 - landmarks
 - the location of beaver nests

On the TOEFL Test

- Directions: Complete the table below by matching FIVE of the seven answer choices with the appropriate rodent. TWO of the answer choices will NOT be used.

Squirrel	Mouse	Prairie Dog
.	.	.
.	.	.

Answer Choices

- | | |
|---|---|
| (A) Its nest is called a drey. | (E) It stores food for the winter. |
| (B) It constructs its nests in small, cozy areas. | (F) It lives in highly organized towns or colonies. |
| (C) Its home is semi-aquatic. | (G) It uses fallen trees for its home. |
| (D) It sometimes digs a shallow burrow. | |

The Nesting Habits of Rodents

- Rodents are 40% of all mammals - about (1) _____ species
 - are small and have short breeding cycle
 - can eat many different foods
 - can vary in physical characteristics
- Rodent nests are all different
 - beaver → cuts down trees and uses to dam river
 - has (2) _____ home
 - squirrel → builds nest in tree branches
 - hoards acorns and other food near nest
 - prairie dog → has highly organized colony
 - lives in groups of one male and (3) _____ females
 - lives underground in tunnels
 - mouse → builds nest (4) _____
 - makes nest of many different materials
 - will live in almost any place



E Read the following passage, and answer the questions.

The Intelligence of Capuchin Monkeys

Time Limit: 3 min. 40 sec.

Capuchin monkeys are considered to be the most intelligent of the New World monkey species. They can be found in Central and South America. They live in forests and spend most of their days searching for food. At night, they sleep together in trees, having tucked themselves in between the branches. They remain here at night to avoid their natural predators, such as large falcons, snakes, and cats.

Capuchins are omnivorous creatures that consume fruits, nuts, seeds, and buds as well as insects, spiders, bird eggs, and small rodents. They have also been observed using stones to crack open the shells of crabs, which they then eat.

The tufted capuchin is noted as being especially intelligent and has been observed to use tools on a long-term basis. This is one of the few examples of primate tool use other than with apes. These capuchins have been seen to imitate the fruit-cracking behavior of macaws when eating palm nuts.

The capuchins select the ripest of the fruits, bite off the tip, and drink the juice. They then toss the fruit aside, appearing to have discarded it. But once these discarded fruits harden, the capuchins gather them and place them on a large, flat boulder, where they use previously gathered river stones to crack open the fruits and get the nuts inside. The river stones used by the capuchins are considered long-term tools since they use the same stones that they have gathered and used from previous fruit cracking sessions. The young capuchins observe the older ones complete this task and eventually learn from them.

Another example of capuchin intelligence and tool use is during the mosquito season. Around this time, older capuchins gather millipedes and crush them. They then rub the crushed millipede paste on each other's backs. This paste that they have made acts as a natural insect repellent.

One study on capuchin monkeys used a mirror test to examine the self-awareness of these animals. When the capuchin was confronted with a mirror reflection, it was observed to react in a way that indicated a state of self-awareness that was between seeing the mirror as another individual and recognizing the image as itself. This experiment showed the capuchin monkeys to be much more self-aware than many other species of primates.

For hundreds of years, these monkeys have used their intelligence to serve humans. They are easily recognized as the organ grinder monkeys that traveled with musicians of the past. They have also served as entertainers with traveling circuses and carnivals. These days, the capuchin monkeys serve paraplegics and people with spinal cord injuries as service animals. Around the houses of these injured people, the monkeys help by completing simple tasks such as microwaving food, washing their human's face, and opening drink bottles.

- tuck (v) to fold • omnivorous (a) eating all kinds of food • consume (v) to eat; to use up • crack (v) to break
- note (v) to mention; to remark • discard (v) to throw away; to abandon • eventually (v) in the end; finally
- confront (v) to face; to encounter • paraplegic (n) someone who cannot move the lower half of his body

General Comprehension

1. According to the passage, capuchin monkeys feed on which of the following?

Click on 2 answers:

- ☐ A spiders
- ☐ B snakes
- ☐ C small birds
- ☐ D palm nuts
- ☐ E leaves

2. According to the passage, all of the following are true about capuchin monkeys EXCEPT:

- ☐ A They populate tropical forests in South America.
- ☐ B They are trained to do domestic tasks for humans.
- ☐ C They hunt small animals at night.
- ☐ D They are cleverer than any other American monkey species.

On the TOEFL Test

3. Directions: Complete the table below to summarize information about the abilities of capuchin monkeys discussed in the passage. Match the appropriate statement to the ability with which they are associated. TWO of the answer choices will NOT be used.

Food Acquisition Skills	Answer Choices
• _____	<input type="radio"/> A They can learn sign language.
• _____	<input type="radio"/> B They use stones to open crabs.
	<input type="radio"/> C They find their homes with their sense of smell.
Service Skills	<input type="radio"/> D They open bottles for their human companion.
• _____	<input type="radio"/> E They drink the juice of fruits and eat the insides later.
• _____	<input type="radio"/> F They can cook food for humans.
• _____	<input type="radio"/> G They can wash the face of a human.

The Intelligence of Capuchin Monkeys

- Most intelligent New World monkey species
- Characteristics
 - found in Central and South America
 - sleep together in trees to avoid predators
 - are (1) _____
 - can use tools on long-term basis
- Tool use
 - use stones to crack open nuts from fruit
 - crush millipedes to rub on bodies as (2) _____
- Intelligence
 - when look in mirror, are (3) _____
 - are organ grinder monkeys people use
 - can serve (4) _____ people
 - can learn to do simple tasks



F Read the following passage, and answer the questions.

The Puebloan Culture

Time Limit: 3 min. 50 sec.

People of the Anasazi culture populated the southwestern region of the United States from around the year 1200 B.C. until 1300 A.D., when they mysteriously disappeared. The largest concentration of architectural ruins left behind by this extinct culture can be found in the Four Corners area, which includes parts of Utah, Arizona, New Mexico, and Colorado.

The modern-day descendants of the Anasazi people would prefer to be called Puebloans, as they are members of the the Pueblo culture. This is because the word *Anasazi* came from another tribe called the Navajo, who spoke a different language. In their language, the term *Anasazi* means "enemy ancestors." Early on, this word was used to describe the extinct culture whose remains had existed in this region, so it is still used today. But many people would like for it to be removed from usage.

The ancient Pueblo culture is best known for the dwellings they built into the sides of cliffs that were made from types of stone and clay, such as jacal, adobe, and sandstone. Many of these ancient cliff dwelling ruins can be viewed in national historical parks such as Chaco Culture National Historical Park, Mesa Verde National Park, and Bandelier National Monument. Some of these dwellings are only accessible by rope or rock climbing.

The earliest Puebloan homes were not in the sides of cliffs, however. They were based on pit house designs that were common to many ancient cultures in a period called Basketmaker. These early homes were organized in small villages. They featured simple construction and were organized in L-shapes, semicircles, or rectangles. As time passed, they became more elaborate and sturdy. By the great Pueblo period of 1150 A.D., construction methods had evolved to the point that these dwellings were built into the sides of cliffs. These ancient Puebloans were also known for their extraordinarily unique style of pottery as well as the many artistic drawings they made in the form of petroglyphs and pictographs.

Archaeologists and anthropologists are not certain why the ancient Puebloans left their established cliff dwellings in the 12th and 13th centuries. Many possible factors have been suggested. Some are prolonged periods of drought, top soil erosion, environmental damage, religious or cultural change, and even hostility from newly arrived groups of people.

The current scientific opinion about the ancient Puebloans' mysterious disappearance contends that it was caused by a combination of a climate change that was disastrous to their agriculture and also the arrival of new tribes who drove them out.

This opinion is disputed by many modern Puebloan people, who think that their ancient ancestors did not disappear. Rather, they believe they simply migrated to areas in the Southwest that offered more dependable rainfall and better streams. They also claim that the ancient Puebloans merged with various other peoples, such as native Mexicans and various other Southwestern tribes.

• **concentration (n)** a close gathering • **extinct (a)** vanished; gone • **dwelling (n)** a house • **accessible (a)** approachable; reachable; available • **elaborate (a)** detailed • **sturdy (a)** robust; durable; well-built • **prolonged (a)** lengthy • **erosion (n)** a gradual destruction • **hostility (n)** hatred; enmity; animosity • **contend (v)** to argue; to assert; to maintain • **merge (v)** to mix; to combine; to mingle

General Comprehension

- According to paragraph 2, today's Anasazi descendants prefer to be called Puebloans because
 - they live in villages called pueblos
 - the term *Anasazi* did not originate from their language
 - the name is too outdated to be used today
 - the name confuses their culture with that of the Navajo
- According to paragraph 4, which of the following is true about the earliest dwellings of the Puebloans?
 - They were built before the Basketmaker period.
 - They were grouped together in small villages.
 - They were adorned with exquisite artistry.
 - They were complex structures set in several geometric designs.

On the TOEFL Test

- Directions: Complete the table below by matching FIVE of the seven answer choices with the appropriate theory about the disappearance of the Puebloans. TWO of the answer choices will NOT be used.

Academic Theories	Answer Choices
• _____	(A) The Puebloans were driven out by other tribes.
• _____	(B) They migrated to areas with better water sources.
• _____	(C) They followed the animals that they hunted.
	(D) Cultural changes led to their disappearance.
Current Puebloan People's Theories	(E) They were seeking to relieve their excessive population.
• _____	(F) The Puebloans merged with other tribes.
• _____	(G) The villages suffered long periods of drought.

The Puebloan Culture

- Members of the Anasazi culture - lived in (1) _____ from 1200 B.C. to 1300 A.D.
 - suddenly disappeared
- Modern-day descendants - prefer to be called (2) _____
 - "Anasazi" is word from another culture
- Dwellings - lived in sides of cliffs
 - ruins still exist in some national parks
 - earliest homes were (3) _____
 - were simple at first
 - became more elaborate and sturdy
- Puebloans departure - archaeologists do not know why they left
 - are many theories
 - drought or other environmental damage
 - religious or cultural change
 - (4) _____ from other groups
 - modern-day Puebloans think migrated to other areas

● Building Summary Skills

The following summaries are based on the passages you worked on earlier. Complete each of them by filling in the blanks with suitable words or phrases.

1. Possible Solutions to Overfishing

issues of exploitation accelerating fish reproduction regulate fishing
safe and sustainable levels the decline and collapse of fish stocks

The problem of overfishing has led to ⁽¹⁾ _____. Several steps are needed to combat the problem. Fishing rules have been implemented to ⁽²⁾ _____ in depleted areas until their fish stocks return to ⁽³⁾ _____. The United Nations Convention on the Law of the Sea Treaty issued several articles that address related ⁽⁴⁾ _____, and methods of ⁽⁵⁾ _____ have been introduced.

2. The Communication and Learning of Honeybees

the odor plume theory a short-term memory the memory capacity
the round dance and the waggle dance the whereabouts of the desired plants

Scientists are interested in how bees learn and communicate. They have investigated ⁽¹⁾ _____ of honeybees and determined that honeybees have ⁽²⁾ _____ similar to that of birds. Scientists have also studied the ways and purposes that bees communicate through dances, particularly ⁽³⁾ _____. The study has led to debate on ⁽⁴⁾ _____ because, while some scientists argue that dance is merely used to attract the attention of worker bees, which are cued to the existence of rewarding plants through their aromas, other scientists argue that the dance itself communicates ⁽⁵⁾ _____.

3. Cultural Diffusion

geographically close indirect diffusion forced diffusion
direct, indirect, and forced exposure brought through a middleman

Although anthropologists do not agree on all aspects of cultural diffusion, they have identified three main forms: ⁽¹⁾ _____. Direct diffusion occurs when populations are ⁽²⁾ _____ enough to allow for interaction through activities that include trade or marriage. Indirect diffusion can occur from ⁽³⁾ _____ such as a traveling merchant who carries wares and stories from one culture to another. ⁽⁴⁾ _____ is the imposition of one culture's values and customs on another through subjugation. Today, with the widespread use of mass media and the Internet, ⁽⁵⁾ _____ is the most prevalent form.

4. The Nesting Habits of Rodents

40% of all mammal species away from predators	short breeding cycles the 2,000 to 3,000 rodent species	the type of nest
--	--	------------------

Rodents are a varied and hardy kind of mammal that make up more than ⁽¹⁾ _____. Included among ⁽²⁾ _____ are beavers, squirrels, prairie dogs, and mice. Although each is distinguished by ⁽³⁾ _____ that it builds, rodents are usually characterized as relatively small animals that have ⁽⁴⁾ _____ and the ability to eat many kinds of food for survival. Their high survival rate is owed to nests that are built in safety ⁽⁵⁾ _____. Beavers build nests by felling trees, squirrels build them between tree branches, mice construct nests above ground, and prairie dogs dig tunnels.

5. The Intelligence of Capuchin Monkeys

river stones sociable	household and personal tasks make a salve from millipedes	a high level of intelligence
--------------------------	--	------------------------------

Scientists have taken an interest in the capuchin monkeys because they are ⁽¹⁾ _____ and demonstrate ⁽²⁾ _____. For example, they sleep together at night, and during the day, they look for and process food with ⁽³⁾ _____. They have even learned to ⁽⁴⁾ _____ to protect themselves from insect bites. In the past, capuchin monkeys were well-known for their adeptness at entertaining, but today scientists are more interested in training the monkeys to perform ⁽⁵⁾ _____ for paraplegics and victims of spinal cord injuries.

6. The Puebloan Culture

Puebloans about 1300 A.D.	the Anasazi cliff dwelling people the emergence of a hostile tribe	environmental changes
------------------------------	---	-----------------------

Known for their strong homes and exquisite artistry, ⁽¹⁾ _____ of southwestern North America mysteriously disappeared ⁽²⁾ _____. Anthropologists and archaeologists, as well as the descendants of that culture, who prefer to be called ⁽³⁾ _____, speculate about the disappearance. Some of their explanations involve ⁽⁴⁾ _____ that would have devastated an agricultural lifestyle while others suggest that the Anasazi people merged with other cultures. Still another explanation is that ⁽⁵⁾ _____ drove them from their territory.



1. The word *vulnerable* in the passage is closest in meaning to

(A) susceptible
(B) critical
(C) accessible
(D) favorable

2. According to the passage, all of the following are ways to prevent desertification EXCEPT:

(A) stacking stones around trees
(B) introducing livestock
(C) erecting sand fences
(D) spraying petroleum over semi-arid land

3. According to paragraph 4, soil gets more affected by erosion because of

(A) dominant bunchgrasses
(B) free-roaming animals
(C) the stomping of the hooves of livestock
(D) the planting of leguminous plants

4. Which of the following can be inferred from paragraph 5 about desertification in the Midwest in the 1930s?

(A) Those who had abandoned their homes moved back when the land improved.
(B) Better farming practices could have prevented the Dust Bowl.
(C) The land was polluted by toxic minerals.
(D) The Dust Bowl gave rise to economic prosperity.

5. The word *counter* in the passage is closest in meaning to

(A) neutralize
(B) accelerate
(C) eliminate
(D) offset

Desertification

Desertification is the process by which once fertile lands in sub-humid, arid, and semi-arid areas become infertile desert. These changes can be caused by climatic variations and by human activities. Much modern desertification is the result of heavy demands by increasing populations for land on which crops can be raised and cattle can graze.

The biggest problems of desertification are the loss of biodiversity and productive capacity. These effects can be seen in the U.S. Southwest, where many once-dominant bunchgrasses have been wiped out and replaced by creosotebush shrublands since the early 1900s.

Another place these changes are evident is on the central highland plateau of Madagascar, where ten percent of the entire country has undergone the desertification process. This terrible loss of vegetation and farmland is due to the slash and burn agricultural practices used by the indigenous people.

One of the major modern causes of the desertification process is the grazing of livestock beyond the sustainable limit for a piece of land. These cows and sheep pound the soil with their hooves, which causes the substrate to become compacted and decreases its ability to absorb moisture. The weight and constant stomping of the livestock also grinds the soil into finer particles. All of these activities make the soil more vulnerable to erosion by wind and water. The grazing activity of the livestock as well as the collection of wood for fires also reduce and eliminate the plants that bind the soil.

Another cause of desertification is the over-farming of land. As fertile soil is used to plant crops, the crops are harvested, and the land is reused. Eventually it is stripped of its minerals and moisture. As farmers break up the land to plant new crops, the soil is left exposed to the forces of erosion. These poor farming practices contributed to the desertification of the midwestern United States in the 1930s. This economic disaster that drove a large portion of



6. The word which in the passage refers to

- (A) method
- (B) land
- (C) grooves
- (D) ground

7. Why does the author mention the restriction of areas where vehicles can be driven?

- (A) To show how land developers comply with scientists
- (B) To show that simple measures can lessen environmental damage
- (C) To highlight the dangers of technology
- (D) To encourage hiking

8. Directions: Complete the table below by indicating which of the answer choices describe the causes of desertification and which describe the methods to decrease desertification. TWO of the answer choices will NOT be used.

Causes	Methods
•	•
•	•
•	

Answer Choices

- (A) Rural populations have declined in China.
- (B) Sheep and cows compact the soil.
- (C) Farmers break up mineral depleted soil.
- (D) Creosotebush shrubs became common in the early 1900s.
- (E) Sand fences and windbreaks are set up.
- (F) Livestock grind soil into fine particles.
- (G) Large stones are placed around trees.

the population away from their homes as they attempted to abandon unproductive lands was termed the Dust Bowl.

Desertification is occurring rapidly over large portions of the People's Republic of China. Because the populations of rural areas have increased since the middle of the 20th century and species of livestock which require higher food intakes have been introduced, desertification is on the rise.

As desertification has been recognized as a major threat to biodiversity, some countries have developed biodiversity action plans to reverse the ill effects. These plans have been designed to limit the damaging factors and to protect the endangered flora and fauna as well.

One method to counter desertification that is being used is the planting of leguminous plants. These plants are known to extract nitrogen from the air and pump it into the soil. This process has proven to restore fertility in lands that have begun the process of desertification. Another method is to stack stones around the bases of trees in order to create a larger surface area for morning dew to collect on and retain soil moisture.

Another method to repair land is the digging of artificial grooves into the ground, which retain rainfall and trap wind-blown seeds. These grooves protect the land against desertification. This method shows that land can be protected through simple efforts.

Environmental scientists in Iran have begun a new process of spraying petroleum over semi-arid land where crops are planted. This process coats seedlings to prevent the loss of moisture and stops the wind from blowing them away.

Some very simple, yet successful methods to limit desertification are the erection of sand fences to prevent sand from moving into areas, as well as windbreaks to keep the wind from eroding the soil. Another important restriction that combats desertification is the restriction of areas where land damaging off-road vehicles can be driven.

9. The word associated in the passage is closest in meaning to

- (A) compared
- (B) separated
- (C) linked
- (D) handled

10. According to paragraph 2, tropisms are named for

- (A) the variety of affected plants
- (B) the stimulus that affects plants
- (C) the static movement of plants
- (D) the rate and direction of plant growth

11. According to paragraph 3, which of the following is true about a taxis?

- (A) It is a kind of tropism.
- (B) It is a directed response to stimulus.
- (C) It is more responsive than a kinesis.
- (D) It impairs motility.

12. Which of the following can be inferred from paragraph 4 about chemotropism?

- (A) Adding pollen to a flower creates a chemical stimulus.
- (B) The action of water is always visible in plants.
- (C) Lipids are a part of a plant.
- (D) Pollen is a natural inhibitor of plant growth.

13. According to paragraph 5, which of the following is a sign of geotropism?

- (A) vines climbing a tree trunk
- (B) fungi growing on another plant
- (C) the downward lichen growth of a rock
- (D) roots appearing above ground

Varieties of Tropism

A tropism is considered by scientists to be a phenomenon of the biological variety in which a living organism turns or grows in response to stimulus from its environment. The direction the organism grows or turns in is dependent on the direction of the stimulus. The opposite of tropism is nastic movement, in which the response to stimulus is considered non-directional.

Tropisms are named for the stimulus which generates them. The word *tropism* comes from the Greek word *trope*, which means "to turn" or "to change." Some of the varieties of tropism are chemotropism, geotropism, hydrotropism, heliotropism, phototropism, and thigmotropism.

Tropisms are usually associated with plants or other fixed organisms. If an organism is capable of physically moving by its own will or motility, its activity or movement in response to stimulus is not considered to be a tropism, but rather a taxis, which is a directional response, or a kinesis, which is a non-directional response.

Chemotropism occurs as a result of chemical stimulus, usually in plants or bacteria. A good example of this type of movement is evident during the growth of a pollen tube. It can be witnessed when lipids are present at the surface of the stigma, stimulating accelerated growth in the pollen tubes. These tubes can also be stimulated to grow even faster by the presence of more than one grain of pollen in the stigma of the flower.

Charles Darwin was the first to document the presence of geotropism, or gravitropism, which is the turning or growth movement of a plant or fungi in response to the Earth's gravity. This is visible in the downward growth of the roots of plants and also in jungle vines which grow downwards from the tops of trees. It can also be seen by taking a close look at the growth directions of lichens and mosses on rocks.

Hydrotropism is the directional growth in



14. The word it in the passage refers to

- (A) hydrotropism
- (B) stimulus of water
- (C) direction of movement
- (D) action of water

15. According to the last paragraph, which of the following is NOT typical of climbing vines?

- (A) They exhibit thigmotropic reactions.
- (B) They contain auxin.
- (C) They are affected by touch.
- (D) They harbor mold and mildew.

16. Directions: Complete the table below to summarize information about three of the types of tropism discussed in the passage. Match the appropriate statements to the types of tropism with which they are associated. TWO of the answer choices will NOT be used.

Phototropism	Heliotropism	Hydrotropism
.	.	.
.	.	.

Answer Choices

- (A) It describes the motion of plants in response to the sun.
- (B) It is present in plants that pump potassium ions into their tissue.
- (C) Its negative category affects the downward growth of roots.
- (D) It causes moss to grow on rocks exposed to sunlight.
- (E) It explains why some plants grow around surfaces like walls and poles.
- (F) It involves a directional response to water.
- (G) It stimulates growth in the pollen tubes with lipids.

response to the stimulus of water and its direction of movement. It is very difficult to observe in the roots of plants even though it is present since the action of water is not visible as it constantly courses through the soil and would require the disturbance of the subject in order to observe. But this process is easy to imagine, as the water thirsty roots of plants reach out, growing in the direction that will give them the best access to moisture.

Heliotropism is also referred to as the diurnal motion of plants. This term describes the plants' movements in direct response to the movement of the sun across the sky. Flowers may assume a random orientation at night, but when the sun rises in the east, the flowers turn towards it and follow it across the sky as it sets in the west. This motion is accomplished by motor cells within the flexible segments of the stem, just below the flower. They do this by pumping potassium ions into their tissue, which changes the pressure, resulting in motion.

Phototropism is different than heliotropism in that it describes the motion of plants in response to light stimulus, but not just that of the sun. The growth of plants towards a light source is termed positive phototropism while growth away from a light source is termed negative phototropism. Most plants experience positive phototropism while their roots exhibit negative phototropic tendencies as they grow deeper into the soil. Many mosses and lichens are phototropic and can be found to grow on the parts of rocks that are exposed to the sun while mold and mildew grows in the areas that receive no sunlight.

Some climbing plants such as vines exhibit thigmotropic reactions to the stimulus of touch or contact. Plants that react in this way contain cells that produce auxin, which causes them to move as they grow around surfaces such as walls, pots, or poles.

Vocabulary Review

A Choose the word with the closest meaning to each highlighted word or phrase.

1. Illness can result when bodily systems are not in equilibrium.
 (A) balance (B) operation (C) entropy (D) disharmony
2. The general was reluctant to deploy his troops into the enemy-controlled town.
 (A) accelerate (B) retreat (C) send (D) withdraw
3. Using the cover of darkness, the soldiers infiltrated the enemy's defenses.
 (A) examined (B) discovered (C) extended (D) penetrated
4. The concept of evolution did not originate with Darwin.
 (A) elaborate (B) begin (C) blossom (D) terminate
5. A small controversy erupted among the women about who had the best recipe.
 (A) contest (B) decision (C) debate (D) fight
6. The famous miser Ebenezer Scrooge would hoard his money and never spend it.
 (A) store (B) give (C) invest (D) count
7. The young boy tucked the coin into his pocket.
 (A) dropped (B) grabbed (C) opened (D) folded
8. He set off the security alarm with his artificial hip implants.
 (A) manmade (B) flexible (C) recent (D) inserted
9. Dinosaurs became extinct after their food sources were depleted.
 (A) ridiculous (B) extreme (C) vanished (D) nomadic
10. The key was ensconced under the welcome mat.
 (A) uncovered (B) concealed (C) dropped (D) extracted

B Match each word with the correct definition.

- | | | |
|----------------|---|--|
| 1. merge | • | • a. the rate of occurrence |
| 2. ventilation | • | • b. to bite persistently |
| 3. plume | • | • c. to mix; to mingle |
| 4. frequency | • | • d. the process of being gradually worn away or destroyed |
| 5. recruit | • | • e. someone who is incapable of moving his legs or lower body |
| 6. gnaw | • | • f. a powdery substance that contains the fertilizing agent from male |
| 7. accelerate | • | • g. freely circulating or moving air |
| 8. pollen | • | • h. a member enlisted to help |
| 9. erosion | • | • i. to speed up; to quicken |
| 10. paraplegic | • | • j. a spreading cloud of smoke or vapor |

This part provides lists of important vocabulary words in each unit. They are essential words for understanding any academic texts. Many of the words are listed with their derivative forms so that students can expand their vocabulary in an effective way. These lists can be used as homework assignments.

Vocabulary Wrap-up



Unit 1 • Vocabulary

● Step A

<input type="checkbox"/> alter	<input type="checkbox"/> balk at	<input type="checkbox"/> betray	<input type="checkbox"/> breakthrough
<input type="checkbox"/> candid	<input type="checkbox"/> constraint	<input type="checkbox"/> controversy	<input type="checkbox"/> convey
<input type="checkbox"/> counterpart	<input type="checkbox"/> crucial	<input type="checkbox"/> decline	<input type="checkbox"/> defective
<input type="checkbox"/> demise	<input type="checkbox"/> denounce	<input type="checkbox"/> dissolve	<input type="checkbox"/> divine
<input type="checkbox"/> embrace	<input type="checkbox"/> empirical	<input type="checkbox"/> espouse	<input type="checkbox"/> exponent
<input type="checkbox"/> exposé	<input type="checkbox"/> flourish	<input type="checkbox"/> fraudulent	<input type="checkbox"/> heredity
<input type="checkbox"/> influx	<input type="checkbox"/> inherit	<input type="checkbox"/> inhumane	<input type="checkbox"/> monopoly
<input type="checkbox"/> offspring	<input type="checkbox"/> overtake	<input type="checkbox"/> perceive	<input type="checkbox"/> pernicious
<input type="checkbox"/> perspective	<input type="checkbox"/> phenomenon	<input type="checkbox"/> pivotal	<input type="checkbox"/> preeminent
<input type="checkbox"/> profound	<input type="checkbox"/> protagonist	<input type="checkbox"/> proxy	<input type="checkbox"/> quest
<input type="checkbox"/> racketeer	<input type="checkbox"/> reign	<input type="checkbox"/> relegate	<input type="checkbox"/> replenish
<input type="checkbox"/> satirical	<input type="checkbox"/> specimen	<input type="checkbox"/> stagnant	<input type="checkbox"/> surplus
<input type="checkbox"/> tenet	<input type="checkbox"/> trigger	<input type="checkbox"/> upheaval	<input type="checkbox"/> well suited to

● Step B

Noun	Verb	Adjective	Adverb
<input type="checkbox"/> acquisition	<input type="checkbox"/> acquire	<input type="checkbox"/> acquisitional	
<input type="checkbox"/> adherence	<input type="checkbox"/> adhere	<input type="checkbox"/> adherent	<input type="checkbox"/> adherently
<input type="checkbox"/> condemnation	<input type="checkbox"/> condemn	<input type="checkbox"/> condemning	<input type="checkbox"/> condemningly
<input type="checkbox"/> corruption	<input type="checkbox"/> corrupt	<input type="checkbox"/> corruptive	<input type="checkbox"/> corruptively
<input type="checkbox"/> deduction	<input type="checkbox"/> deduce	<input type="checkbox"/> deductive	<input type="checkbox"/> deductively
<input type="checkbox"/> erosion	<input type="checkbox"/> erode	<input type="checkbox"/> erosive	
<input type="checkbox"/> extension	<input type="checkbox"/> extend	<input type="checkbox"/> extensive	<input type="checkbox"/> extensively
<input type="checkbox"/> interference	<input type="checkbox"/> interfere	<input type="checkbox"/> interferential	
<input type="checkbox"/> isolation	<input type="checkbox"/> isolate	<input type="checkbox"/> isolated	<input type="checkbox"/> isolatedly
<input type="checkbox"/> mandate	<input type="checkbox"/> mandate	<input type="checkbox"/> mandatory	<input type="checkbox"/> mandatorily
<input type="checkbox"/> prosperity	<input type="checkbox"/> prosper	<input type="checkbox"/> prosperous	<input type="checkbox"/> prosperously
<input type="checkbox"/> sequence	<input type="checkbox"/> sequence	<input type="checkbox"/> sequential	<input type="checkbox"/> sequentially
<input type="checkbox"/> suspicion	<input type="checkbox"/> suspect	<input type="checkbox"/> suspicious	<input type="checkbox"/> suspiciously
<input type="checkbox"/> transcendence	<input type="checkbox"/> transcend	<input type="checkbox"/> transcendent	<input type="checkbox"/> transcendently
<input type="checkbox"/> variation	<input type="checkbox"/> vary	<input type="checkbox"/> variational	<input type="checkbox"/> variationally

Unit 2 • Reference

◎ Step A

<input type="checkbox"/> accompany	<input type="checkbox"/> aggregate	<input type="checkbox"/> alliance	<input type="checkbox"/> antique
<input type="checkbox"/> combustible	<input type="checkbox"/> constantly	<input type="checkbox"/> culminate	<input type="checkbox"/> currency
<input type="checkbox"/> decree	<input type="checkbox"/> denomination	<input type="checkbox"/> ensure	<input type="checkbox"/> enlist
<input type="checkbox"/> equivalent	<input type="checkbox"/> exceed	<input type="checkbox"/> falter	<input type="checkbox"/> hostile
<input type="checkbox"/> inadequacy	<input type="checkbox"/> inherent	<input type="checkbox"/> institute	<input type="checkbox"/> internal
<input type="checkbox"/> monetary	<input type="checkbox"/> nurture	<input type="checkbox"/> obscure	<input type="checkbox"/> offset
<input type="checkbox"/> ornamentation	<input type="checkbox"/> overthrow	<input type="checkbox"/> overturn	<input type="checkbox"/> plummet
<input type="checkbox"/> polished	<input type="checkbox"/> preach	<input type="checkbox"/> premise	<input type="checkbox"/> preside
<input type="checkbox"/> prominent	<input type="checkbox"/> prompt	<input type="checkbox"/> quell	<input type="checkbox"/> traverse

◎ Step B

Noun	Verb	Adjective	Adverb
<input type="checkbox"/> adornment	<input type="checkbox"/> adorn	<input type="checkbox"/> adorned	
<input type="checkbox"/> attainment	<input type="checkbox"/> attain	<input type="checkbox"/> attainable	<input type="checkbox"/> attainably
<input type="checkbox"/> constitution	<input type="checkbox"/> constitute	<input type="checkbox"/> constitutional	<input type="checkbox"/> constitutionally
<input type="checkbox"/> counteraction	<input type="checkbox"/> counteract	<input type="checkbox"/> counteractive	<input type="checkbox"/> counteractively
<input type="checkbox"/> domination	<input type="checkbox"/> dominate	<input type="checkbox"/> dominant	<input type="checkbox"/> dominantly
<input type="checkbox"/> elaboration	<input type="checkbox"/> elaborate	<input type="checkbox"/> elaborate	<input type="checkbox"/> elaborately
<input type="checkbox"/> emission	<input type="checkbox"/> emit	<input type="checkbox"/> emissive	
<input type="checkbox"/> exaltation	<input type="checkbox"/> exalt	<input type="checkbox"/> exalted	<input type="checkbox"/> exaltedly
<input type="checkbox"/> facilitation	<input type="checkbox"/> facilitate	<input type="checkbox"/> facilitative	
<input type="checkbox"/> fortification	<input type="checkbox"/> fortify	<input type="checkbox"/> fortifying	
<input type="checkbox"/> incorporation	<input type="checkbox"/> incorporate	<input type="checkbox"/> incorporative	
<input type="checkbox"/> manipulation	<input type="checkbox"/> manipulate	<input type="checkbox"/> manipulative	<input type="checkbox"/> manipulatively
<input type="checkbox"/> negotiation	<input type="checkbox"/> negotiate	<input type="checkbox"/> negotiatory	
<input type="checkbox"/> prevalence	<input type="checkbox"/> prevail	<input type="checkbox"/> prevalent	<input type="checkbox"/> prevalently
<input type="checkbox"/> reconciliation	<input type="checkbox"/> reconcile	<input type="checkbox"/> reconcilable	<input type="checkbox"/> reconcilably
<input type="checkbox"/> reduction	<input type="checkbox"/> reduce	<input type="checkbox"/> reducible	<input type="checkbox"/> reducibly
<input type="checkbox"/> retraction	<input type="checkbox"/> retract	<input type="checkbox"/> retractable	<input type="checkbox"/> retractably
<input type="checkbox"/> sustainability	<input type="checkbox"/> sustain	<input type="checkbox"/> sustainable	<input type="checkbox"/> sustainedly
<input type="checkbox"/> stimulation	<input type="checkbox"/> stimulate	<input type="checkbox"/> stimulative	<input type="checkbox"/> stimulatively

Unit 3 • Factual Information

● Step A

<input type="checkbox"/> aesthetics	<input type="checkbox"/> anarchy	<input type="checkbox"/> attributable	<input type="checkbox"/> boost
<input type="checkbox"/> clash	<input type="checkbox"/> criterion	<input type="checkbox"/> crust	<input type="checkbox"/> depict
<input type="checkbox"/> debris	<input type="checkbox"/> dissolvable	<input type="checkbox"/> divert	<input type="checkbox"/> encompass
<input type="checkbox"/> ethnic	<input type="checkbox"/> extensive	<input type="checkbox"/> fertile	<input type="checkbox"/> frivolous
<input type="checkbox"/> inequity	<input type="checkbox"/> irrational	<input type="checkbox"/> outlaw	<input type="checkbox"/> pigment
<input type="checkbox"/> plateau	<input type="checkbox"/> precipitation	<input type="checkbox"/> premier	<input type="checkbox"/> proportional
<input type="checkbox"/> portray	<input type="checkbox"/> pursuit	<input type="checkbox"/> ravage	<input type="checkbox"/> secede
<input type="checkbox"/> secure	<input type="checkbox"/> seep	<input type="checkbox"/> simmer	<input type="checkbox"/> split
<input type="checkbox"/> surge	<input type="checkbox"/> succumb	<input type="checkbox"/> temporary	<input type="checkbox"/> texture
<input type="checkbox"/> treaty	<input type="checkbox"/> ultimately	<input type="checkbox"/> vegetation	<input type="checkbox"/> vent

● Step B

Noun	Verb	Adjective	Adverb
<input type="checkbox"/> absorption	<input type="checkbox"/> absorb	<input type="checkbox"/> absorptive	<input type="checkbox"/> absorptively
<input type="checkbox"/> abstraction	<input type="checkbox"/> abstract	<input type="checkbox"/> abstract	<input type="checkbox"/> abstractly
	<input type="checkbox"/> allege	<input type="checkbox"/> alleged	<input type="checkbox"/> allegedly
<input type="checkbox"/> assignment	<input type="checkbox"/> assign	<input type="checkbox"/> assignable	<input type="checkbox"/> assignably
<input type="checkbox"/> assumption	<input type="checkbox"/> assume	<input type="checkbox"/> assumptive	<input type="checkbox"/> assumptively
<input type="checkbox"/> conception	<input type="checkbox"/> conceive	<input type="checkbox"/> conceptional / -tive	<input type="checkbox"/> conceptionally / -tively
<input type="checkbox"/> degenerateness	<input type="checkbox"/> degenerate	<input type="checkbox"/> degenerate	<input type="checkbox"/> degenerately
<input type="checkbox"/> derivation	<input type="checkbox"/> derive	<input type="checkbox"/> derivative	<input type="checkbox"/> derivatively
<input type="checkbox"/> disruption	<input type="checkbox"/> disrupt	<input type="checkbox"/> disruptive	<input type="checkbox"/> disruptively
<input type="checkbox"/> ejection	<input type="checkbox"/> eject	<input type="checkbox"/> ejective	<input type="checkbox"/> ejectively
<input type="checkbox"/> emanation	<input type="checkbox"/> emanate	<input type="checkbox"/> emanative	<input type="checkbox"/> emanatively
<input type="checkbox"/> enforcement	<input type="checkbox"/> enforce	<input type="checkbox"/> enforceable	<input type="checkbox"/> enforcedly
<input type="checkbox"/> eruption	<input type="checkbox"/> erupt	<input type="checkbox"/> eruptive	<input type="checkbox"/> eruptively
<input type="checkbox"/> estimation	<input type="checkbox"/> estimate	<input type="checkbox"/> estimative	
<input type="checkbox"/> exhibition	<input type="checkbox"/> exhibit	<input type="checkbox"/> exhibitive	<input type="checkbox"/> exhibitively
<input type="checkbox"/> relief	<input type="checkbox"/> relieve	<input type="checkbox"/> relievable	<input type="checkbox"/> relievedly
<input type="checkbox"/> submission	<input type="checkbox"/> submit	<input type="checkbox"/> submissive	<input type="checkbox"/> submissively
<input type="checkbox"/> termination	<input type="checkbox"/> terminate	<input type="checkbox"/> terminative	<input type="checkbox"/> terminatively

Unit 4 • Negative Factual Information

◎ Step A

- | | | | |
|---------------------------------------|---|---|---------------------------------------|
| <input type="checkbox"/> arbitrarily | <input type="checkbox"/> asteroid | <input type="checkbox"/> bisect | <input type="checkbox"/> blast |
| <input type="checkbox"/> bombard | <input type="checkbox"/> celestial | <input type="checkbox"/> circumnavigate | <input type="checkbox"/> clarity |
| <input type="checkbox"/> complex | <input type="checkbox"/> coordinate | <input type="checkbox"/> critical | <input type="checkbox"/> dehydration |
| <input type="checkbox"/> dense | <input type="checkbox"/> diverse | <input type="checkbox"/> garment | <input type="checkbox"/> gigantic |
| <input type="checkbox"/> gradual | <input type="checkbox"/> gravitational | <input type="checkbox"/> harsh | <input type="checkbox"/> humility |
| <input type="checkbox"/> immense | <input type="checkbox"/> indigenous | <input type="checkbox"/> infirm | <input type="checkbox"/> inhospitable |
| <input type="checkbox"/> nomadic | <input type="checkbox"/> phonological | <input type="checkbox"/> pinpoint | <input type="checkbox"/> plot |
| <input type="checkbox"/> polygamy | <input type="checkbox"/> porous | <input type="checkbox"/> primitive | <input type="checkbox"/> prompt |
| <input type="checkbox"/> propel | <input type="checkbox"/> proportion | <input type="checkbox"/> rigid | <input type="checkbox"/> scar |
| <input type="checkbox"/> shatter | <input type="checkbox"/> substantial | <input type="checkbox"/> superimpose | <input type="checkbox"/> supplant |
| <input type="checkbox"/> tacked on to | <input type="checkbox"/> unintelligible | <input type="checkbox"/> vitrification | <input type="checkbox"/> withstand |

◎ Step B

- | Noun | Verb | Adjective | Adverb |
|---------------------------------------|------------------------------------|--|--|
| <input type="checkbox"/> adjustment | <input type="checkbox"/> adjust | <input type="checkbox"/> adjustable / -ted | <input type="checkbox"/> adjustably |
| <input type="checkbox"/> collision | <input type="checkbox"/> collide | <input type="checkbox"/> collisional | <input type="checkbox"/> collisionally |
| <input type="checkbox"/> compulsion | <input type="checkbox"/> compel | <input type="checkbox"/> compelling | <input type="checkbox"/> compellingly |
| <input type="checkbox"/> condensation | <input type="checkbox"/> condense | <input type="checkbox"/> condense | |
| <input type="checkbox"/> conduction | <input type="checkbox"/> conduct | <input type="checkbox"/> conductive | <input type="checkbox"/> conductively |
| <input type="checkbox"/> conversion | <input type="checkbox"/> convert | <input type="checkbox"/> convertible | <input type="checkbox"/> convertibly |
| <input type="checkbox"/> exploration | <input type="checkbox"/> explore | <input type="checkbox"/> exploratory / -tive | <input type="checkbox"/> exploratively |
| <input type="checkbox"/> evaporation | <input type="checkbox"/> evaporate | <input type="checkbox"/> evaporative | <input type="checkbox"/> evaporatively |
| <input type="checkbox"/> generation | <input type="checkbox"/> generate | <input type="checkbox"/> generative | <input type="checkbox"/> generatively |
| <input type="checkbox"/> immersion | <input type="checkbox"/> immerse | <input type="checkbox"/> immersible | |
| <input type="checkbox"/> intrusion | <input type="checkbox"/> intrude | <input type="checkbox"/> intrusive | <input type="checkbox"/> intrusively |
| <input type="checkbox"/> origination | <input type="checkbox"/> originate | <input type="checkbox"/> originative | <input type="checkbox"/> originatively |
| <input type="checkbox"/> resemblance | <input type="checkbox"/> resemble | <input type="checkbox"/> resemblant | <input type="checkbox"/> resemblingly |
| <input type="checkbox"/> reverence | <input type="checkbox"/> revere | <input type="checkbox"/> reverent | <input type="checkbox"/> reverently |
| <input type="checkbox"/> rotation | <input type="checkbox"/> rotate | <input type="checkbox"/> rotational | <input type="checkbox"/> rotationally |
| <input type="checkbox"/> subsistence | <input type="checkbox"/> subsist | <input type="checkbox"/> subsistent | <input type="checkbox"/> subsistingly |
| <input type="checkbox"/> volunteer | <input type="checkbox"/> volunteer | <input type="checkbox"/> voluntary | <input type="checkbox"/> voluntarily |

Unit 5 • Sentence Simplification

● Step A

- | | | | |
|--|---|---------------------------------------|--|
| <input type="checkbox"/> ancient | <input type="checkbox"/> archaeological | <input type="checkbox"/> be aware of | <input type="checkbox"/> be endowed with |
| <input type="checkbox"/> carnivore | <input type="checkbox"/> consequence | <input type="checkbox"/> convention | <input type="checkbox"/> debate |
| <input type="checkbox"/> diversity | <input type="checkbox"/> drain | <input type="checkbox"/> drastically | <input type="checkbox"/> durable |
| <input type="checkbox"/> enormous | <input type="checkbox"/> exceptional | <input type="checkbox"/> facet | <input type="checkbox"/> feces |
| <input type="checkbox"/> flap | <input type="checkbox"/> fossil | <input type="checkbox"/> frigid | <input type="checkbox"/> furnace |
| <input type="checkbox"/> gauge | <input type="checkbox"/> herbivore | <input type="checkbox"/> hitch | <input type="checkbox"/> measure |
| <input type="checkbox"/> migratory | <input type="checkbox"/> monocular | <input type="checkbox"/> mound | <input type="checkbox"/> nutrient |
| <input type="checkbox"/> overall | <input type="checkbox"/> perch | <input type="checkbox"/> pest | <input type="checkbox"/> properly |
| <input type="checkbox"/> regardless of | <input type="checkbox"/> reptilian | <input type="checkbox"/> retina | <input type="checkbox"/> significantly |
| <input type="checkbox"/> soil | <input type="checkbox"/> superb | <input type="checkbox"/> surroundings | <input type="checkbox"/> swoop |

● Step B

- | Noun | Verb | Adjective | Adverb |
|---|--------------------------------------|--|---|
| <input type="checkbox"/> abundance | <input type="checkbox"/> abound | <input type="checkbox"/> abundant | <input type="checkbox"/> abundantly |
| <input type="checkbox"/> approximation | <input type="checkbox"/> approximate | <input type="checkbox"/> approximate | <input type="checkbox"/> approximately |
| <input type="checkbox"/> argument | <input type="checkbox"/> argue | <input type="checkbox"/> argumentative | <input type="checkbox"/> argumentatively |
| <input type="checkbox"/> captivity | <input type="checkbox"/> captivate | <input type="checkbox"/> captive | |
| <input type="checkbox"/> circulation | <input type="checkbox"/> circulate | <input type="checkbox"/> circulatory | |
| <input type="checkbox"/> colony | <input type="checkbox"/> colonize | <input type="checkbox"/> colonial | <input type="checkbox"/> colonially |
| <input type="checkbox"/> cooperation | <input type="checkbox"/> cooperate | <input type="checkbox"/> cooperative | <input type="checkbox"/> cooperatively |
| <input type="checkbox"/> destruction | <input type="checkbox"/> destroy | <input type="checkbox"/> destructive | <input type="checkbox"/> destructively |
| <input type="checkbox"/> exposure | <input type="checkbox"/> expose | <input type="checkbox"/> exposed | |
| <input type="checkbox"/> interaction | <input type="checkbox"/> interact | <input type="checkbox"/> interactive | <input type="checkbox"/> interactively |
| <input type="checkbox"/> liquefaction | <input type="checkbox"/> liquefy | <input type="checkbox"/> liquefying | |
| <input type="checkbox"/> maintenance | <input type="checkbox"/> maintain | <input type="checkbox"/> maintainable | |
| <input type="checkbox"/> navigation | <input type="checkbox"/> navigate | <input type="checkbox"/> navigational | <input type="checkbox"/> navigationally |
| <input type="checkbox"/> nourishment | <input type="checkbox"/> nourish | <input type="checkbox"/> nourishing | |
| <input type="checkbox"/> purification | <input type="checkbox"/> purify | <input type="checkbox"/> purifying / -fied | |
| <input type="checkbox"/> representative | <input type="checkbox"/> represent | <input type="checkbox"/> representative | <input type="checkbox"/> representatively |
| <input type="checkbox"/> reproduction | <input type="checkbox"/> reproduce | <input type="checkbox"/> reproductive | <input type="checkbox"/> reproductively |
| <input type="checkbox"/> threat | <input type="checkbox"/> threaten | <input type="checkbox"/> threatening | <input type="checkbox"/> threateningly |

Unit 6 • Rhetorical Purpose

◎ Step A

- | | | | |
|---|--|---------------------------------------|---|
| <input type="checkbox"/> accurately | <input type="checkbox"/> appraise | <input type="checkbox"/> aspect | <input type="checkbox"/> be prone to-V |
| <input type="checkbox"/> camouflage | <input type="checkbox"/> collapse | <input type="checkbox"/> compact | <input type="checkbox"/> costume |
| <input type="checkbox"/> cure | <input type="checkbox"/> deadly | <input type="checkbox"/> degenerative | <input type="checkbox"/> enclosed |
| <input type="checkbox"/> encounter | <input type="checkbox"/> farce | <input type="checkbox"/> furthermore | <input type="checkbox"/> graze |
| <input type="checkbox"/> have access to | <input type="checkbox"/> herpetologist | <input type="checkbox"/> hygiene | <input type="checkbox"/> hypodermic |
| <input type="checkbox"/> impact | <input type="checkbox"/> lush | <input type="checkbox"/> nevertheless | <input type="checkbox"/> opposite |
| <input type="checkbox"/> plough | <input type="checkbox"/> predator | <input type="checkbox"/> proximity | <input type="checkbox"/> psycholinguistic |
| <input type="checkbox"/> regard | <input type="checkbox"/> rodent | <input type="checkbox"/> shed | <input type="checkbox"/> sophisticated |
| <input type="checkbox"/> span | <input type="checkbox"/> sprawl | <input type="checkbox"/> suffix | <input type="checkbox"/> sustenance |
| <input type="checkbox"/> unity | <input type="checkbox"/> unsanitary | <input type="checkbox"/> unwittingly | <input type="checkbox"/> venomous |

◎ Step B

- | Noun | Verb | Adjective | Adverb |
|---|-------------------------------------|---|---|
| <input type="checkbox"/> administration | <input type="checkbox"/> administer | <input type="checkbox"/> administrative | <input type="checkbox"/> administratively |
| <input type="checkbox"/> classification | <input type="checkbox"/> classify | <input type="checkbox"/> classifiable | <input type="checkbox"/> classifiably |
| <input type="checkbox"/> controversy | <input type="checkbox"/> controvert | <input type="checkbox"/> controversial | <input type="checkbox"/> controversially |
| <input type="checkbox"/> coordination | <input type="checkbox"/> coordinate | <input type="checkbox"/> coordinate | <input type="checkbox"/> coordinately |
| <input type="checkbox"/> criticism / critic | <input type="checkbox"/> criticize | <input type="checkbox"/> critical | <input type="checkbox"/> critically |
| <input type="checkbox"/> degradation | <input type="checkbox"/> degrade | <input type="checkbox"/> degradative | |
| <input type="checkbox"/> emergence | <input type="checkbox"/> emerge | <input type="checkbox"/> emergent | <input type="checkbox"/> emergently |
| <input type="checkbox"/> expansion | <input type="checkbox"/> expand | <input type="checkbox"/> expansive | <input type="checkbox"/> expansively |
| <input type="checkbox"/> inhabitance | <input type="checkbox"/> inhabit | <input type="checkbox"/> inhabitable | |
| <input type="checkbox"/> injection | <input type="checkbox"/> inject | <input type="checkbox"/> injectable | |
| <input type="checkbox"/> paralysis | <input type="checkbox"/> paralyze | <input type="checkbox"/> paralyzing | <input type="checkbox"/> paralyzingly |
| <input type="checkbox"/> reflection | <input type="checkbox"/> reflect | <input type="checkbox"/> reflective | <input type="checkbox"/> reflectively |
| <input type="checkbox"/> reversal | <input type="checkbox"/> reverse | <input type="checkbox"/> reverse | <input type="checkbox"/> reversely |
| <input type="checkbox"/> separation | <input type="checkbox"/> separate | <input type="checkbox"/> separate | <input type="checkbox"/> separately |
| <input type="checkbox"/> specification | <input type="checkbox"/> specify | <input type="checkbox"/> specific | <input type="checkbox"/> specifically |
| <input type="checkbox"/> tragedy | <input type="checkbox"/> tragedize | <input type="checkbox"/> tragic | <input type="checkbox"/> tragically |
| <input type="checkbox"/> unification | <input type="checkbox"/> unify | <input type="checkbox"/> unifiable | |
| <input type="checkbox"/> vitality | <input type="checkbox"/> vitalize | <input type="checkbox"/> vital | <input type="checkbox"/> vitally |

Unit 7 • Inference

● Step A

- | | | | |
|--|---------------------------------------|--|---------------------------------------|
| <input type="checkbox"/> adjacent | <input type="checkbox"/> advent | <input type="checkbox"/> apt | <input type="checkbox"/> artifact |
| <input type="checkbox"/> attribute | <input type="checkbox"/> beset | <input type="checkbox"/> binary | <input type="checkbox"/> cater |
| <input type="checkbox"/> chronologically | <input type="checkbox"/> clip | <input type="checkbox"/> cognitive | <input type="checkbox"/> commodities |
| <input type="checkbox"/> competency | <input type="checkbox"/> decipher | <input type="checkbox"/> decode | <input type="checkbox"/> elicit |
| <input type="checkbox"/> envision | <input type="checkbox"/> formidable | <input type="checkbox"/> formulation | <input type="checkbox"/> foster |
| <input type="checkbox"/> heyday | <input type="checkbox"/> hieroglyphic | <input type="checkbox"/> homage | <input type="checkbox"/> implement |
| <input type="checkbox"/> imprint | <input type="checkbox"/> inanimate | <input type="checkbox"/> instantaneous | <input type="checkbox"/> intricate |
| <input type="checkbox"/> intuitive | <input type="checkbox"/> lessen | <input type="checkbox"/> levy | <input type="checkbox"/> notable |
| <input type="checkbox"/> pact | <input type="checkbox"/> pedagogical | <input type="checkbox"/> pinnacle | <input type="checkbox"/> preconceived |
| <input type="checkbox"/> propensity | <input type="checkbox"/> recal | <input type="checkbox"/> recoup | <input type="checkbox"/> relevant |
| <input type="checkbox"/> retain | <input type="checkbox"/> sparsely | <input type="checkbox"/> spectacular | <input type="checkbox"/> spur |
| <input type="checkbox"/> swiftness | <input type="checkbox"/> tally | <input type="checkbox"/> template | <input type="checkbox"/> volatile |

● Step B

- | Noun | Verb | Adjective | Adverb |
|---|---------------------------------------|---|---|
| <input type="checkbox"/> ascension | <input type="checkbox"/> ascend | <input type="checkbox"/> ascendant | |
| <input type="checkbox"/> characteristic | <input type="checkbox"/> characterize | <input type="checkbox"/> characteristic | <input type="checkbox"/> characteristically |
| <input type="checkbox"/> consumption | <input type="checkbox"/> consume | <input type="checkbox"/> consuming | <input type="checkbox"/> consumingly |
| <input type="checkbox"/> elimination | <input type="checkbox"/> eliminate | <input type="checkbox"/> eliminative | |
| <input type="checkbox"/> elusion | <input type="checkbox"/> elude | <input type="checkbox"/> elusive | <input type="checkbox"/> elusively |
| <input type="checkbox"/> exclusion | <input type="checkbox"/> exclude | <input type="checkbox"/> exclusive | <input type="checkbox"/> exclusively |
| <input type="checkbox"/> indication | <input type="checkbox"/> indicate | <input type="checkbox"/> indicative | <input type="checkbox"/> indicatively |
| <input type="checkbox"/> induction | <input type="checkbox"/> induct | <input type="checkbox"/> inductive | <input type="checkbox"/> inductively |
| <input type="checkbox"/> inflation | <input type="checkbox"/> inflate | <input type="checkbox"/> inflationary | |
| <input type="checkbox"/> inhibition | <input type="checkbox"/> inhibit | <input type="checkbox"/> inhibitive | |
| <input type="checkbox"/> intervention | <input type="checkbox"/> intervene | <input type="checkbox"/> intervening | |
| <input type="checkbox"/> modification | <input type="checkbox"/> modify | <input type="checkbox"/> modifying | |
| <input type="checkbox"/> observation | <input type="checkbox"/> observe | <input type="checkbox"/> observational | <input type="checkbox"/> observationally |
| <input type="checkbox"/> orchestration | <input type="checkbox"/> orchestrate | <input type="checkbox"/> orchestrated | |
| <input type="checkbox"/> remark | <input type="checkbox"/> remark | <input type="checkbox"/> remarkable | <input type="checkbox"/> remarkably |
| <input type="checkbox"/> restriction | <input type="checkbox"/> restrict | <input type="checkbox"/> restrictive | <input type="checkbox"/> restrictively |

Unit 8 • Insert Text

● Step A

- | | | | |
|--|--------------------------------------|-------------------------------------|---|
| <input type="checkbox"/> ally | <input type="checkbox"/> amass | <input type="checkbox"/> catalyst | <input type="checkbox"/> circannual |
| <input type="checkbox"/> contend | <input type="checkbox"/> conversely | <input type="checkbox"/> crude | <input type="checkbox"/> displace |
| <input type="checkbox"/> embargo | <input type="checkbox"/> endogenic | <input type="checkbox"/> ensue | <input type="checkbox"/> entitle |
| <input type="checkbox"/> entrepreneur | <input type="checkbox"/> esteem | <input type="checkbox"/> explicit | <input type="checkbox"/> fervor |
| <input type="checkbox"/> financial | <input type="checkbox"/> fission | <input type="checkbox"/> flee | <input type="checkbox"/> fusion |
| <input type="checkbox"/> give off | <input type="checkbox"/> harness | <input type="checkbox"/> hemisphere | <input type="checkbox"/> iconic |
| <input type="checkbox"/> kinetic | <input type="checkbox"/> level off | <input type="checkbox"/> lode | <input type="checkbox"/> neglectfulness |
| <input type="checkbox"/> neural | <input type="checkbox"/> ore | <input type="checkbox"/> plague | <input type="checkbox"/> predation |
| <input type="checkbox"/> price gouge | <input type="checkbox"/> protégé | <input type="checkbox"/> rekindle | <input type="checkbox"/> renowned |
| <input type="checkbox"/> retrospective | <input type="checkbox"/> scarcity | <input type="checkbox"/> skyrocket | <input type="checkbox"/> soar |
| <input type="checkbox"/> staunch | <input type="checkbox"/> swell | <input type="checkbox"/> tension | <input type="checkbox"/> thermal |
| <input type="checkbox"/> upsurge | <input type="checkbox"/> utilitarian | <input type="checkbox"/> vicious | <input type="checkbox"/> well-heeled |

● Step B

- | Noun | Verb | Adjective | Adverb |
|--|--------------------------------------|---|---------------------------------------|
| <input type="checkbox"/> access | <input type="checkbox"/> access | <input type="checkbox"/> accessible | <input type="checkbox"/> accessibly |
| <input type="checkbox"/> amputation | <input type="checkbox"/> amputate | <input type="checkbox"/> amputating / -ted | |
| <input type="checkbox"/> conservation | <input type="checkbox"/> conserve | <input type="checkbox"/> conservational | |
| <input type="checkbox"/> contamination | <input type="checkbox"/> contaminate | <input type="checkbox"/> contaminative | |
| <input type="checkbox"/> conviction | <input type="checkbox"/> convince | <input type="checkbox"/> convincing / -ced | <input type="checkbox"/> convincingly |
| <input type="checkbox"/> enactment | <input type="checkbox"/> enact | <input type="checkbox"/> enacting / -ted | |
| <input type="checkbox"/> imposition | <input type="checkbox"/> impose | <input type="checkbox"/> imposing / -sed | |
| <input type="checkbox"/> initiation | <input type="checkbox"/> initiate | <input type="checkbox"/> initiative | |
| <input type="checkbox"/> magnification | <input type="checkbox"/> magnify | <input type="checkbox"/> magnifying / -fied | |
| <input type="checkbox"/> recess | <input type="checkbox"/> recede | <input type="checkbox"/> recessive | <input type="checkbox"/> recessively |
| <input type="checkbox"/> retrieval | <input type="checkbox"/> retrieve | <input type="checkbox"/> retrieving / -ved | |
| <input type="checkbox"/> urge | <input type="checkbox"/> urge | <input type="checkbox"/> urgent | <input type="checkbox"/> urgently |
| <input type="checkbox"/> utilization | <input type="checkbox"/> utilize | <input type="checkbox"/> utilizing / -zed | |
| <input type="checkbox"/> moderation | <input type="checkbox"/> moderate | <input type="checkbox"/> moderate | <input type="checkbox"/> moderately |
| <input type="checkbox"/> acclamation | <input type="checkbox"/> acclaim | <input type="checkbox"/> acclaimed | |

Unit 9 • Prose Summary

● Step A

<input type="checkbox"/> amplitude	<input type="checkbox"/> array	<input type="checkbox"/> astronomy	<input type="checkbox"/> atmosphere
<input type="checkbox"/> capture	<input type="checkbox"/> carry out	<input type="checkbox"/> celestial	<input type="checkbox"/> cluster
<input type="checkbox"/> component	<input type="checkbox"/> comprise	<input type="checkbox"/> conceive	<input type="checkbox"/> constellation
<input type="checkbox"/> crescent	<input type="checkbox"/> culpable	<input type="checkbox"/> current	<input type="checkbox"/> delicate
<input type="checkbox"/> diameter	<input type="checkbox"/> dip	<input type="checkbox"/> drawback	<input type="checkbox"/> embed
<input type="checkbox"/> emit	<input type="checkbox"/> encroach	<input type="checkbox"/> exterior	<input type="checkbox"/> filter
<input type="checkbox"/> galaxy	<input type="checkbox"/> gravity	<input type="checkbox"/> hypothesis	<input type="checkbox"/> igneous
<input type="checkbox"/> interstellar	<input type="checkbox"/> laterally	<input type="checkbox"/> mythology	<input type="checkbox"/> parabolic
<input type="checkbox"/> particle	<input type="checkbox"/> polished	<input type="checkbox"/> portraiture	<input type="checkbox"/> precise
<input type="checkbox"/> prior	<input type="checkbox"/> prominence	<input type="checkbox"/> property	<input type="checkbox"/> sedimentary
<input type="checkbox"/> seismic	<input type="checkbox"/> significance	<input type="checkbox"/> solution	<input type="checkbox"/> sprinkle
<input type="checkbox"/> strive	<input type="checkbox"/> subsequent	<input type="checkbox"/> symmetrical	<input type="checkbox"/> transverse
<input type="checkbox"/> tremor	<input type="checkbox"/> valuable	<input type="checkbox"/> vapor	<input type="checkbox"/> vigor

● Step B

Noun	Verb	Adjective	Adverb
<input type="checkbox"/> alternation	<input type="checkbox"/> alternate	<input type="checkbox"/> alternate	<input type="checkbox"/> alternately
<input type="checkbox"/> attachment	<input type="checkbox"/> attach	<input type="checkbox"/> attached / -chable	
<input type="checkbox"/> concentration	<input type="checkbox"/> concentrate	<input type="checkbox"/> concentrative	<input type="checkbox"/> concentratively
<input type="checkbox"/> contribution	<input type="checkbox"/> contribute	<input type="checkbox"/> contributory	
<input type="checkbox"/> delineation	<input type="checkbox"/> delineate	<input type="checkbox"/> delineating	
<input type="checkbox"/> description	<input type="checkbox"/> describe	<input type="checkbox"/> descriptive	<input type="checkbox"/> descriptively
<input type="checkbox"/> detonation	<input type="checkbox"/> detonate	<input type="checkbox"/> detonative / -table	
<input type="checkbox"/> dilation	<input type="checkbox"/> dilate	<input type="checkbox"/> dilatable	<input type="checkbox"/> dilatably
<input type="checkbox"/> dispersion	<input type="checkbox"/> disperse	<input type="checkbox"/> dispersed	<input type="checkbox"/> dispersedly
<input type="checkbox"/> evolution	<input type="checkbox"/> evolve	<input type="checkbox"/> evolutionary	<input type="checkbox"/> evolutionarily
<input type="checkbox"/> focalization	<input type="checkbox"/> focalize	<input type="checkbox"/> focalizing / -zed	
<input type="checkbox"/> radiation	<input type="checkbox"/> radiate	<input type="checkbox"/> radiative / -tional	
<input type="checkbox"/> speculation	<input type="checkbox"/> speculate	<input type="checkbox"/> speculative	<input type="checkbox"/> speculatively
<input type="checkbox"/> substitution	<input type="checkbox"/> substitute	<input type="checkbox"/> substitutional	<input type="checkbox"/> substitutionally
<input type="checkbox"/> supposition	<input type="checkbox"/> suppose	<input type="checkbox"/> supposing / -sed	<input type="checkbox"/> supposedly

Unit 10 • Fill in a Table

● Step A

<input type="checkbox"/> accessible	<input type="checkbox"/> adjoining	<input type="checkbox"/> affect	<input type="checkbox"/> anoxia
<input type="checkbox"/> artificial	<input type="checkbox"/> batter	<input type="checkbox"/> caterpillar	<input type="checkbox"/> consume
<input type="checkbox"/> crack	<input type="checkbox"/> crash	<input type="checkbox"/> deciduous	<input type="checkbox"/> deploy
<input type="checkbox"/> discard	<input type="checkbox"/> dwelling	<input type="checkbox"/> elaborate	<input type="checkbox"/> ensconce
<input type="checkbox"/> equilibrium	<input type="checkbox"/> eventually	<input type="checkbox"/> evident	<input type="checkbox"/> exodus
<input type="checkbox"/> extinct	<input type="checkbox"/> fell	<input type="checkbox"/> forage	<input type="checkbox"/> frequency
<input type="checkbox"/> gnaw	<input type="checkbox"/> harvest	<input type="checkbox"/> hoard	<input type="checkbox"/> hostility
<input type="checkbox"/> impede	<input type="checkbox"/> larva	<input type="checkbox"/> marine	<input type="checkbox"/> mature
<input type="checkbox"/> merge	<input type="checkbox"/> middleman	<input type="checkbox"/> nectar	<input type="checkbox"/> Neolithic
<input type="checkbox"/> note	<input type="checkbox"/> observe	<input type="checkbox"/> odor plume	<input type="checkbox"/> omnivorous
<input type="checkbox"/> Paleolithic	<input type="checkbox"/> paraplegic	<input type="checkbox"/> pollen	<input type="checkbox"/> precautionary
<input type="checkbox"/> prolonged	<input type="checkbox"/> recruit	<input type="checkbox"/> regarding	<input type="checkbox"/> salinity
<input type="checkbox"/> sturdy	<input type="checkbox"/> subjugate	<input type="checkbox"/> tackle	<input type="checkbox"/> tuck
<input type="checkbox"/> unsustainable	<input type="checkbox"/> vertebrate		

◎ Step B

Noun	Verb	Adjective	Adverb
<input type="checkbox"/> association	<input type="checkbox"/> associate	<input type="checkbox"/> associative	<input type="checkbox"/> associatively
<input type="checkbox"/> confrontation	<input type="checkbox"/> confront	<input type="checkbox"/> confronting	
<input type="checkbox"/> contention	<input type="checkbox"/> contend	<input type="checkbox"/> contending	<input type="checkbox"/> contendingly
<input type="checkbox"/> contradiction	<input type="checkbox"/> contradict	<input type="checkbox"/> contradictory	<input type="checkbox"/> contradictorily
<input type="checkbox"/> defoliation	<input type="checkbox"/> defoliate	<input type="checkbox"/> defoliating	
<input type="checkbox"/> depletion	<input type="checkbox"/> deplete	<input type="checkbox"/> depletive	
<input type="checkbox"/> diffusion	<input type="checkbox"/> diffuse	<input type="checkbox"/> diffusional	
<input type="checkbox"/> exploitation	<input type="checkbox"/> exploit	<input type="checkbox"/> exploitative	<input type="checkbox"/> exploitatively
<input type="checkbox"/> infiltration	<input type="checkbox"/> infiltrate	<input type="checkbox"/> infiltrative	
<input type="checkbox"/> ventilation	<input type="checkbox"/> ventilate	<input type="checkbox"/> ventilative	

Reading Section **Directions**

This section measures your ability to understand academic passages in English. It offers two sets of reading tests. Each set consists of three passages and a set of questions about each of them.

Most questions are worth 1 point, but the last question in each passage is worth more than 1 point. The directions indicate how many points you may receive.

Some passages include a word or phrase that is underlined. You can see a definition or an explanation at the end of the passage.

While working on the questions, you can go to the next question by clicking **Next**. You may skip questions and go back to them later. If you want to return to previous questions, click on **Back**. You can click on **Review** at any time, and the review screen will show you which questions you have answered and which you have not answered. From this review screen, you may go directly to any question you have already seen in the Reading section.

You may now begin the Reading section. You will read 6 passages in all. You will have 120 minutes to read the passages and answer the questions.

Actual Test



1. The word arrayed in the passage is closest in meaning to
 - (A) accumulated
 - (B) arranged
 - (C) attributed
 - (D) accrued

2. According to paragraph 1, all of the following characteristics distinguish the terrestrial planets from the Jovian planets EXCEPT:
 - (A) the rings
 - (B) the existence of magnetism
 - (C) the speed of rotation
 - (D) the size

3. The phrase the latter in the passage refers to
 - (A) the outer planets
 - (B) the ones closest to the sun
 - (C) the terrestrial planets
 - (D) Mercury, Venus, Earth, and Mars

4. According to paragraph 3, the four planets closest to the sun are called the terrestrial planets because
 - (A) they were named for the Roman god of Earth
 - (B) they are made of mixtures of gas
 - (C) they have no volcanic action
 - (D) they are all composed of rocks

5. The word subject in the passage is closest in meaning to
 - (A) resistant
 - (B) impenetrable
 - (C) susceptible
 - (D) changeable

The Terrestrial and Jovian Planets

The planets in our solar system are arrayed on nearly the same flat plane, with their orbits forming roughly concentric ellipses around the sun. But the ones closest to the sun have very different characteristics from the outer planets. The former are called the terrestrial planets, which include—in order from the sun—Mercury, Venus, Earth, and Mars. The latter are the Jovian planets, consisting of Jupiter, Saturn, Uranus, and Neptune. Compared with the terrestrial worlds, the Jovian planets are larger, rotate faster, and have stronger magnetic fields. In addition, the Jovian planets all have ring systems and many moons orbiting them.

The term Jovian is derived from the Roman god Jupiter, or *Jovis* in Latin. The planet that traditionally was considered to be the ninth and outermost planet—Pluto—fits into neither category, as it displays some traits of both groups. In 2006, scientists removed Pluto from the list of planets.

The principal distinction between the two categories of planets is their composition. The terrestrial planets primarily consist of rocks, with a metallic iron core and a silicate surface. Because Earth has those components, the four planets that are similarly composed are called terrestrial, after the Latin word for Earth—*terra*. As a consequence of their rocky surfaces, the terrestrial planets are dotted with mountains, canyons, craters, and volcanoes. Their solid cores make them subject to tectonic shifts, causing their surfaces to move over time, as with the continental drift on Earth. Because of these solid surfaces, spaceships can land on the terrestrial planets.

In contrast, the Jovian planets are called gas giants because they are largely composed of a gaseous mixture of hydrogen and helium, with traces of methane, water, and ammonia. The gas giants have a liquid core of rock or metal.

6. According to the passage, which of the following elements are the most common in the gases that make up the Jovian planets?

Click on 2 answers!

- ☐ A oxygen
- ☐ B ammonia
- ☐ C hydrogen
- ☐ D methane
- ☐ E helium

7. Which of the following best expresses the essential information in the highlighted sentence? *Incorrect* answer choices change the meaning in important ways or leave out essential information.

- ☐ A A spaceship can easily penetrate the atmosphere of a Jovian planet.
- ☐ B Because it is composed of high-pressure gases, a Jovian planet's core and atmosphere are indistinguishable.
- ☐ C The Jovian planet's rapid rotation exerts great pressure on the planet's gaseous atmosphere.
- ☐ D The solid surface of a Jovian planet is exposed to intense pressure from the gases in the atmosphere.

8. Why does the author discuss the strong magnetic field of the Jovian planets?

- ☐ A To explain why they rotate faster than the terrestrial planets
- ☐ B To explain how the ring systems formed
- ☐ C To explain why they have dense atmospheres
- ☐ D To explain why they are cooler than the terrestrial planets

9. The word obscured in the passage is closest in meaning to

- ☐ A coated
- ☐ B heated
- ☐ C hidden
- ☐ D untouched

But the core is not a solid mass; it is more like a concentration of heavy elements such as iron and silicon. And any inner core is dwarfed by the gaseous compounds that constitute most of a Jovian planet's mass. The gases are under immense pressure, so there is no clear boundary between the core of the planet and its atmosphere; thus it would not be possible to land a spaceship on these planets.

While the first two Jovian planets, Jupiter and Saturn, are classic gas giants, Uranus and Neptune are a subgroup called ice giants because they consist largely of ice, with lesser proportions of water, methane and ammonia. Ice predominates on those Jovian planets because of their greater distance from the sun.

Because the Jovian planets are much larger than the terrestrial ones, they exert a much stronger magnetic field, which in turn accounts for their denser atmospheres. Whereas the surfaces of the Earth-like planets are visible with telescopes and space probes, the cores of the Jovian planets remain obscured by thick layers of gaseous atmosphere.

The terrestrial planets are much cooler internally. Surface temperatures on Earth render it the only one of the planets hospitable to humans. The surface temperatures of the other terrestrial planets range from Mercury's 510 degrees Celsius to Mars's 36 degrees Celsius. Being much farther from the sun, the Jovian planets are cooler, ranging from minus 148 degrees Celsius on Jupiter to minus 214 degrees Celsius on Neptune.

Rotating rapidly, the Jovian planets experience wind patterns that cause bands or stripes across their outer layer of gas. The bands are high- and low-pressure regions that, unlike Earth's localized sites of low or high pressure, circle the entire planet, a result of the planet's high velocity rotation. In addition, all four planets have systems of rings and moons, with Saturn's

Actual Test 01



10. Based on the information in paragraph 7, which of the following can be inferred about Neptune?

(A) It has no rings.
(B) It is smaller than Venus.
(C) It is colder than Mars.
(D) It has a solid surface.

11. According to the passage, all of the following are true about the Jovian planets EXCEPT:

(A) Their surfaces are constantly changing due to volcanoes and earthquakes.
(B) All of them have systems of rings made of ice crystals and moons orbiting each planet.
(C) A few of them are known as ice giants because they are mainly composed of ice.
(D) They are much colder than the terrestrial planets because of their greater distance from the sun.

12. According to paragraph 8, Saturn's rings were formed by

(A) the planet's moons being torn into fragments
(B) the planet's gravity attracting passing particles
(C) volcanic ash being propelled beyond the planet's atmosphere
(D) the planet's rapid rotation dispersing its gases into space

rings being the most prominent from Earth. The rings are composed of particles of ice crystals. The origin of the rings is not well understood. The most likely origin is that the rings formed when the moons of Saturn drifted too close to the planet. The tidal forces from Saturn could have torn the moons into tiny fragments. These fragments are the current ring system. None of the terrestrial planets have rings, and they have just three moons (one for Earth and two for Mars). Jupiter alone has 63 moons, Saturn has 33, Uranus has 27, and Neptune has 13.

13. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not in the passage or are minor ideas in the passage. *This question is worth 2 points.*

The Jovian and terrestrial planets have many differences, making them distinct from one another.

-
-
-

Answer Choices

- | | |
|---|--|
| <input type="radio"/> (A) The terrestrial planets consist mainly of rocks while the Jovian planets are largely gaseous. | <input type="radio"/> (D) The Jovian planets have thicker atmospheres that prevent us from seeing their cores. |
| <input type="radio"/> (B) Pluto was taken off the list of planets because it is too small and has no moons. | <input type="radio"/> (E) The terrestrial planets lack the rings that characterize the Jovian planets. |
| <input type="radio"/> (C) The Jovian planets have traces of methane, water, and ammonia. | <input type="radio"/> (F) The Jovian planets have fewer moons than the terrestrial planets. |

Drag your answer choices to the spaces where they belong.
To remove an answer choice, click on it. To review the passage, click View Text.



14. The word absent in the passage is closest in meaning to

(A) using
(B) resisting
(C) lacking
(D) substituting

15. According to paragraph 3, which of the following is a possible cause of left-hand dominance?

(A) the dominance of the brain's left hemisphere
(B) the natural weakness of a human's right side
(C) a child's choice upon reaching school age
(D) brain trauma in birth

16. Which of the following can be inferred from paragraph 3 about a boy who throws a ball with his right hand?

(A) His brain's left hemisphere is dominant.
(B) His brain suffered trauma at birth.
(C) His brain's right hemisphere is dominant.
(D) His brain's nerves did not fully develop before birth.

17. The word adept in the passage is closest in meaning to

(A) speedy
(B) skilled
(C) careful
(D) accustomed

Right-hand Dominance

Humans are disproportionately right-handed. Scientists have not been able to agree over the exact percentages of right versus left-handers because there is no accepted standard for identifying which hand is dominant. For example, some people who write or throw with their right hands may perform other tasks with their left hands or may kick a ball with their left foot. Absent an objective measure, therefore, the range of estimates is wide. Right-handers are said to make up 85% to 95% of all people and left-handers 5% to 15%, while the remaining tiny percentage are ambidextrous, so they can use both hands with equal ability.

Perhaps the most unusual fact about right-hand dominance is how little we know about its causes. Several theories have been proposed. Some evidence exists that the phenomenon is genetic, but geneticists cannot agree on the process by which handedness may be passed on by inheritance. Social and cultural forces can also cause a preference for one hand, as when teachers or parents force a naturally left-handed child to use the right hand. And it has been observed by anthropologists that left-handedness tends to be less common in restrictive societies and more common in permissive ones. But no consensus has been reached on how that could occur.

The most credible explanations center on functions inside the brain. It has been shown that the brain's two hemispheres control the opposite side of the body. It has been suggested that the nerves in the brain cross over at neck level to the other side of the body so that the right half of the brain governs the left side of the body while the left half governs the right side. Scientists believe that the left half of the brain evolved in such a way as to predominate over the right half. As a result, the right side of the body is controlled by the more influential left hemisphere, causing the

18. According to paragraph 4, which of the following are true about the "warrior and his shield theory"?

- (A) A left-handed warrior is favored by natural selection.
- (B) A right-handed warrior holds his weapon in his left hand.
- (C) A left-handed warrior holds his weapon in his right hand.
- (D) A left-handed warrior leaves his heart unprotected.

19. The word that in the passage refers to

- (A) warrior
- (B) heart
- (C) process of natural selection
- (D) trait

20. According to paragraph 6, left-handers would have trouble handling all of the following EXCEPT:

- (A) refrigerators
- (B) violins
- (C) pencils
- (D) shirt buttons

21. The word asymmetrical in the passage is closest in meaning to

- (A) deformed
- (B) imbalanced
- (C) geometrical
- (D) variable

22. The phrase geared to in the passage is closest in meaning to

- (A) intended for
- (B) sold to
- (C) guided by
- (D) modified for

right side to be more adept at physical tasks. But when a person is born with a dominant right hemisphere, that person will be left-handed. Some researchers have argued that some left-handedness may have a pathological origin, having been caused by brain trauma during birth.

A theory grounded in evolution is the "warrior and his shield theory." This theory explains that right-handedness evolved over time to be dominant because a right-handed warrior would hold his shield in his left hand to protect his heart and to leave his right hand free to hold a weapon. A left-handed warrior, in contrast, would hold his weapon in his left hand and his shield in his right, leaving his heart exposed. Thus a right-handed warrior, with his heart protected against enemy attacks, was more likely to survive. By the process of natural selection, the trait for right-handedness became favored over that for left-handedness.

Another theory focuses on the naturally asymmetrical arrangement of the human body. Such asymmetry is evidenced by the observable facts that the right side of the face is slightly different from the left, that one leg is stronger or longer than the other, and that one foot is larger than the other one. Right-handedness, the theory proposes, is just another example of this natural asymmetry.

A A consequence of right-hand dominance is that most common consumer products are geared to right-handers only, leaving left-handers to struggle to adapt to designs not made with them in mind. **B** Some of these include scissors, doorknobs, locks, screwdrivers, automobile fixtures, refrigerators, can openers, clothes buttons and fasteners, and musical instruments. **C** The result of this design bias can be more than mere inconvenience. **D** Some left-handed soldiers shooting rifles designed for right-handers have sustained eye and head injuries

Actual Test 01



23. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

Left-handers often search for custom-made versions of these products.

Where would the sentence best fit?

Click on a square [■] to add the sentence to the passage.

24. Why does the author mention eye and head injuries suffered by some left-handed soldiers shooting their rifles?
- (A) To illustrate the "warrior and his shield theory"
 - (B) To give an example of the problems faced by left-handers
 - (C) To argue that soldiers should wear head protection
 - (D) To contrast rifle design with the design of common consumer products
25. According to the last paragraph, which of the following is true about hand dominance in animals?
- (A) It is the same as in humans.
 - (B) It is observed only in the wild.
 - (C) Animals in controlled settings adopt the hand-dominance of their handlers.
 - (D) It has been observed only with manual tasks.

from ejected shell casings.

Hand dominance does not seem to occur in non-human animal species. While some individual animals can be seen developing a preference for one hand or the other, there is no evidence that this preference is common to the species as a whole, as it is in humans. Some scientists claim to have observed such dominance in animals but only in controlled settings, such as a zoo or laboratory, and only when the animals are performing manual tasks that do not mirror how they use their hands in the wild.

26. Directions: Complete the table below to summarize characteristics of each kind of handedness. Match the appropriate statement to either right- or left-handedness. TWO of the answer choices will NOT be used. *This question is worth 3 points.*

Drag your answer choices to the spaces where they belong.

To remove an answer choice, click on it. To review the passage, click View Text.

Right-handedness

Select 3

-
-
-

Left-handedness

Select 2

-
-

Answer Choices

- | | |
|--|---|
| (A) 85% to 95% of all people are in this category. | (E) The natural asymmetry of the body may cause this trait. |
| (B) One cause may be brain trauma at birth. | (F) A specially designed pair of scissors is needed. |
| (C) The theory of the "warrior and his shield" may explain this trait. | (G) Most animals are in this category. |
| (D) This trait can be changed by electrical stimulation. | |

27. According to paragraph 1, which of the following is the most common cave?
- (A) limestone caves
 - (B) lava tube caves
 - (C) sea caves
 - (D) underground caves
28. Why does the author mention lava tube caves in paragraph 1?
- (A) To name one of the ways that caves are formed
 - (B) To note one result of volcanic eruptions
 - (C) To name one kind of limestone cave
 - (D) To show that caves occur in all parts of the world
29. The word accumulation in the passage is closest in meaning to
- (A) deterioration
 - (B) exposure
 - (C) motion
 - (D) collection
30. According to paragraph 3, which of the following can connect a cave to the surface?
- (A) calcium carbonate
 - (B) sinkholes
 - (C) the water table
 - (D) karst
31. The word saturated in the passage is closest in meaning to
- (A) overflowing
 - (B) purified
 - (C) soaked
 - (D) compatible

Limestone Caves

A cave, which is an empty, underground chamber, is formed by one of three methods. Sea caves result from the action of water, wind, and sand grinding against the rocks on a shoreline. Lava tube caves are created from volcanic eruptions as lava solidifies. Limestone caves, the most numerous of all caves, are produced by the dissolving of limestone rock by rainwater and melting snow. Occurring in all parts of the world, limestone caves are also the deepest and largest caves ever found. The longest is the Mammoth-Flint Ridge cave system in Kentucky, which is more than 306 kilometers long. The process by which such caves are formed extends over millions of years.

Limestone is rock that is created in shallow seas from the gradual accumulation of dead marine animals such as coral. After millions of years of deposits on the sea floor, the material grows into large, solid blocks of limestone that eventually rise above the water level. Rainwater and melting snow seep through cracks and passages through the top layer of soil, absorbing the carbon dioxide that is a product of decaying organic matter. The mixture of the water and carbon dioxide creates carbonic acid, which acts as a solvent of limestone. This acidic water seeks out any weaknesses in the limestone, such as cracks or holes, and it slowly dissolves the limestone around those weakened areas. The resulting solution is calcium carbonate, which in mineral form is called calcite, the mineral that resides in limestone.

The calcium carbonate then descends to the water table, which is the upper limit at which the Earth is saturated with water. As the calcium carbonate repeats this process over thousands of years, it erodes the surrounding limestone, ultimately forming channels. The dissolving process produces a distinctive land mass known as karst. Connections from the cave to the

32. The word forged in the passage is closest in meaning to

- (A) linked
- (B) created
- (C) discovered
- (D) severed

33. According to the passage, all of the following contribute to cave formation EXCEPT:

- (A) deposits of dead animals
- (B) speleotherms
- (C) the creation of carbonic acid
- (D) the erosion of limestone

34. According to paragraph 4, a cave dries out in which of the following ways?

Click on 2 answers.

- (A) Limestone dissolves.
- (B) Wind passes through the cave.
- (C) The water table drops.
- (D) Calcium carbonate drips.
- (E) An earthquake raises the cave.

35. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

The newly formed cave then undergoes a drying process.

Where would the sentence best fit?

Click on a square [■] to add the sentence to the passage.

36. The phrase the latter in the passage refers to

- (A) speleotherms
- (B) stalactites
- (C) stalagmites
- (D) cave's ceiling

surface may be forged in two ways. The rock above the cave may collapse, forming a vertical passage called a sinkhole. Or a stream may cut into the side of a cave, creating a horizontal entrance.

As the channels continue to widen and lengthen, they are able to hold even more water, which in turn dissolves even more limestone.

A The result is that the channel gets bigger and bigger until it reaches the size of a cave or becomes large enough to accommodate a human. **B** The cave may become dry in two ways: the water table may drop, leaving the cave exposed to the air, or the cave may be elevated by an earthquake or other tectonic shift. **C** When either of those events occurs, the water evaporates or drains out, allowing air to fill the cave, drying it away. **D** The cave may continue to enlarge if a surface stream passes through it, dissolving more of the limestone. And the calcium carbonate may continue to drip slowly through the ceiling of the cave, forming dried deposits of calcium carbonate called speleotherms. The best known speleotherms are stalactites and stalagmites. The former are icicle-like formations that hang from the cave's ceiling. The latter are pillars that rise from the floor.

Though natural light never penetrates the interior of a cave, cave explorers, called spelunkers, have carried artificial light into many caves, sometimes revealing spectacular formations of speleotherms. In addition to stalactites and stalagmites, the kinds of speleotherms include drapery, thin sheets of rock that hang from the ceiling, flowstone, thin sheets of dried mineral water covering walls and floors, gypsum flowers, spiral crystals that sprout from porous rock, and helictites, twisted cylinders growing out of the rock. Some of the most elaborately decorated caves have become popular tourist attractions equipped with walkways, railings, and electric lights. Two of the

Actual Test 01



37. Which of the following best expresses the essential information in the highlighted sentence? *Incorrect* answer choices change the meaning in important ways or leave out essential information.

- (A) Speleotherms can be seen only when illuminated by artificial light carried by spelunkers.
- (B) Speleotherms are formed when sunlight dries out the carbonic acid on the limestone walls of caves.
- (C) Spelunkers are guided by the natural light shining through cracks in the ceilings of caves.
- (D) Artificial light encourages the growth of spectacular formations of speleotherms.

38. According to paragraph 6, all of the following can be found inside caves EXCEPT:

- (A) bat droppings
- (B) prehistoric artwork
- (C) cave dwellers
- (D) reptiles

most interesting are Carlsbad Caverns in New Mexico and Luray Caverns in Virginia.

Caves have provided homes and shelter to humans and animals. Prehistoric people, such as Neanderthals and Cro-Magnons, were cave dwellers. The earliest known artwork has been found on the walls of caves. Today caves provide homes to many species of animals, including birds, bats, crickets, lizards, and rats. Bears often hibernate in caves. Bats sleep in caves during the day and exit at night to hunt for insects. Bat droppings, known as guano, provide food for the myriad of insects that inhabit caves.

39. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not in the passage or are minor ideas in the passage. *This question is worth 2 points.*

Limestone caves are formed through an intricate process that can take millions of years.

•
•
•

Answer Choices

- | | |
|---|--|
| (A) Limestone rock forms on the sea floor from the accumulated remains of dead animals. | (D) Water seeping through the limestone creates carbonic acid, which dissolves the limestone. |
| (B) The longest limestone cave is the Mammoth-Flint Ridge cave system in Kentucky. | (E) The process during which limestone dissolves produces a land mass called karst. |
| (C) Gypsum flowers are types of speleotherms that project from porous limestone rock. | (F) Over thousands of years, the limestone continues to dissolve, opening large channels that eventually become caves. |

Drag your answer choices to the spaces where they belong.
To remove an answer choice, click on it. To review the passage, click View Text.

- The word phenomena in the passage is closest in meaning to
 - events
 - trends
 - discoveries
 - theories
- According to paragraph 1, insects influence bird migration in which of the following ways?
 - Insects generate a magnetic field that birds can detect.
 - Insects provide a food supply that exists only in warm climates.
 - Birds follow the paths taken by flying insects.
 - Birds know when to migrate by a sudden increase in insect population.
- The word some in the passage refers to
 - insects
 - recent experiments
 - bird experts
 - birds
- According to paragraph 3, birds can detect the magnetic fields of the North and South Poles because
 - they sense the motion of electron pairs
 - they can locate the poles by following landmarks
 - they ingest metal particles that are attracted by the poles
 - they have magnetite in their brains
- The word embedded in the passage is closest in meaning to
 - implanted
 - attached
 - attracted
 - activated

How Birds Navigate During Migration

Bird migration is one of the most interesting yet least understood natural phenomena. Every fall birds from northern latitudes fly in groups to the warmer southern latitudes and then return north in the spring. Scientists agree on the main reasons for migration: to follow the food supply and to avoid harsh climate conditions. For example, insects disappear during the cold months, prompting insect-dependent birds to fly south to warm areas where insects breed. No similar consensus has emerged, however, about how birds are able to navigate. Despite many recent experiments, bird experts still do not know how birds arrive at the same destination every year and then find their way back home in the spring.

Some have suggested that birds find their way by following landmarks, such as rivers and mountain ranges. Experiments have confirmed that some species do follow such topographic features. But that method cannot explain how some birds travel at night. Other studies show that some nocturnal birds navigate by the stars. But that explanation cannot explain daytime migration or travel when the skies are cloudy.

The most popular explanation currently is that birds are guided by Earth's magnetic poles. The mechanism by which that works has not yet been proved. One theory points to the fact that some birds' brains contain magnetite, a naturally occurring magnetic compound consisting of iron oxide. Magnetite has been found in many animals, including birds. With magnets embedded in their brains, birds would be able to sense the magnetic fields of the North and South Poles.

A recent experiment with homing pigeons provided some evidence that magnetite does play a crucial role in migration. Homing pigeons are known to have the ability to return to their homes after being taken hundreds of miles away.

6. The author discusses homing pigeons in paragraph 4 in order to
- (A) provide an example of how humans can train birds
 - (B) describe an experiment showing the importance of magnetite
 - (C) show that homing pigeons return home by following landmarks
 - (D) report homing pigeons' behavior inside a cage
7. According to the passage, all of the following are theories about how birds navigate EXCEPT:
- (A) They follow landmarks like rivers and mountains.
 - (B) They are guided by their position relative to the stars.
 - (C) They feel vibrations in nerve endings in their brains.
 - (D) They respond to changes in light.
8. According to paragraph 4, the pigeons moved to the opposite end of a cage because
- (A) the magnetic field was normal
 - (B) the magnetic field was stronger at one end
 - (C) the magnetic field changed its polarity
 - (D) the magnetic field was removed
9. The word altered in the passage is closest in meaning to
- (A) reversed
 - (B) canceled
 - (C) strengthened
 - (D) detected

Researchers found that they could train homing pigeons to recognize changes in a magnetic field. When a surrounding magnetic field was normal, the birds would gather at one end of a cage. But when the field's polarity was altered, they hopped to the other end, suggesting that they were detecting and responding to changes in the magnetic field.

Another theory has been offered to explain this sensitivity to magnetic poles, a theory that draws upon quantum mechanics, which is the study of how particles move inside an atom. It relies on the fact that electrons come in pairs that orbit the nucleus of an atom. The two electrons spin in opposite directions, creating two magnets that neutralize each other. But when molecules split and react with other molecules to form compounds, the electron pairs may no longer spin in opposite directions. Instead, they may repel each other, as when two north ends of magnets are pressed together. The electrons struggle to change direction in order to achieve a stable state in which the two electrons again neutralize each other, giving off no magnetic field.

The theory is that these disturbed electron pairs are created in birds when they are exposed to changes in light. The birds can sense the efforts of the electrons in trying to reach a condition of stability because of the slight changes in the pull of the North and South Poles. In this way, the birds can detect the direction of the poles while they are in flight.

In one experiment to confirm this effect, a group of European robins were tricked by artificial light to believe that it was time for spring migration. The birds became eager to fly north. The changes in light triggered the electron-pair movement described above, exposing the robins to the magnetic field accompanying the electron pairs. The birds became disoriented and flew in all directions.

Actual Test 02



10. Which of the following can be inferred about an electron pair in two north ends of magnets?
- (A) The two electrons spin in opposite directions.
 - (B) One electron will move to the south end.
 - (C) One electron will be captured by the nucleus.
 - (D) The two electrons spin in the same direction.
11. According to the passage, the author mentions all of the following about electrons EXCEPT:
- (A) Changes in light cause electron pairs to change the direction of their spin.
 - (B) Magnetite contains electrons that repel each other.
 - (C) Electrons that spin in opposite directions neutralize each other.
 - (D) The nucleus of an atom is orbited by electron pairs.
12. Which of the following best expresses the essential information in the highlighted sentence? *Incorrect* answer choices change the meaning in important ways or leave out essential information.
- (A) The bird's failure to detect the magnetic fields led researchers to conclude that the electron pairs caused the birds' confusion.
 - (B) The birds' failure to detect the electron pairs showed that their magnetite was the cause of their disorientation.
 - (C) Experimenters found that the electron pairs were stronger than the birds' magnetite and helped them find their destinations.
 - (D) Magnetic fields that are triggered by artificial light are detected by the birds' magnetite, causing them to fly in the right direction.

The simulated magnetic fields were much too weak to be detected by the birds' natural magnetite, suggesting to the experimenters that the electron pairs, not the magnetite, were responsible for the birds' confused flying.

The current view, therefore, is that light plays an important role in guiding bird migration. This may be why birds turn their heads from side to side before flying off. Their eyes are collecting the surrounding light, which in turn allows them to process and analyze the existing magnetic fields and to keep themselves pointed in the right direction.

13. Directions: Complete the table below to summarize information about the two experiments with birds discussed in the passage. Match the appropriate statements to the type of bird. TWO of the answer choices will NOT be used. *This question is worth 3 points.*

Drag your answer choices to the spaces where they belong.
To remove an answer choice, click on it. To review the passage, click View Text.

Pigeons

Select 2

-
-

Robins

Select 3

-
-
-

Answer Choices

- | | |
|---|--|
| (A) They could be trained to detect changes in magnetic fields. | (E) They followed landmarks like rivers and mountains. |
| (B) They were tricked by artificial light. | (F) They were studied in cages. |
| (C) They became confused by artificial light. | (G) They responded to electron pairs. |
| (D) They wanted to fly south. | |



14. The word consecutive in the passage is closest in meaning to
- (A) alternate
(B) annual
(C) successive
(D) proximate
15. According to the passage, the least amount of rainfalls in which of the following deserts?
- (A) arid
(B) hyper-arid
(C) semi-arid
(D) arroyos
16. In stating that some deserts are traversed by their own permanent rivers, the author means that
- (A) some deserts are flooded by rivers
(B) rivers cross some deserts
(C) some deserts cause their rivers to dry up
(D) rivers flow around some deserts
17. According to paragraph 4, desert plants survive by
- (A) living at the bottom of reservoirs
(B) extracting moisture from the humid air
(C) sending taproots underground
(D) floating on the surface of exotic rivers
18. The word they in the passage refers to
- (A) taproots
(B) temporary lakes
(C) basins
(D) lake beds

Water in the Desert

Deserts are regions that receive less than 25 centimeters of annual precipitation. Although deserts are usually thought of as being hot, they also are found in cold climates, such as Antarctica.

Deserts are classified according to the amount of rainfall they receive. The driest deserts are called hyper-arid, where rain is absent for at least twelve consecutive months. Arid deserts experience some rainfall but receive less than 250 millimeters per year. Finally, semi-arid deserts see between 250 and 500 millimeters of rain.

Despite the long-term lack of rain, deserts occasionally are drenched by violent storms. During such downpours, dried stream channels, called arroyos, rapidly fill and spill over, sometimes causing dangerous flash floods. As the water rushes down mountains and erodes the land, it carries gravel, rock, and sand, which are deposited on the bottom of the arroyos as fan-shaped formations called alluvial fans.

Some deserts are traversed by their own permanent rivers, known as exotic rivers, which are fed by water from outside the desert. Some well-known exotic rivers are the Nile River in Egypt, the Yellow River in China, and the Colorado River in Arizona. Other sources of water include underground springs or reservoirs, which provide life-sustaining moisture to desert vegetation. Deserts abound with plant species that have adapted to the dry environment by extending taproots deep into the ground to absorb the water below.

Temporary lakes may form when rainfall is sufficient. These lakes occur in basins offering no outlet. When the lake beds dry up, they leave a flat plain encrusted with salt, an area known as a playa. Over a hundred playas dot the landscape of North American deserts, including Great Salt Lake in Utah.

19. According to the passage, which of the following can be a source of water for a desert?

(A) underground springs
(B) playas
(C) manmade wells
(D) arroyos

20. Why does the author mention potential evapotranspiration?

(A) To explain how salt forms in dried lake beds
(B) To note the most important condition for creating a desert
(C) To show how plants aid in causing evaporation
(D) To contrast it with normal evaporation

21. Look at the four squares [■] that indicate where the following sentence could be added to the passage.

A comparison of two of the largest deserts illustrates this phenomenon.

Where would the sentence best fit?

Click on a square [■] to add the sentence to the passage.

22. The word extracted in the passage is closest in meaning to

(A) obtained
(B) distilled
(C) compounded
(D) carried

A scarcity of rain does not always create a desert. There must also be a high rate of evaporation relative to precipitation—a measure known as potential evapotranspiration. That gauge totals the water lost through both normal evaporation and the evaporation that occurs from plant life. Potential evapotranspiration is the amount of water that could evaporate in any area. When this potential exceeds actual precipitation, desert-like conditions will arise.

A Thus deserts can be either very hot or very cold, so long as the potential evaporation is greater than the precipitation. **B** Icy deserts like Antarctica collect rain in frozen snow that never seeps into the ground. **C** And hot deserts like the Sahara receive little rain, so little that the amount is less than the potential evaporation. **D**

Water is responsible for the concentration of mineral deposits under the desert surface. Rainfall passes through mineral layers and re-deposits the minerals near the water table, where they can be easily extracted in mining operations. Mineral deposits also are enriched by the evaporation of water in the playas, which yield minerals such as gypsum and salt compounds such as sodium nitrate and sodium chloride. An example of such evaporation is shown by the Great Basin Desert in the western United States, which contains boron, an essential ingredient in the manufacture of drugs, water softeners, glass, and various agricultural chemicals.

The role of water in creating deserts is illustrated by the Atacama Desert in northern Chile in South America. That desert spans the area between the Pacific Ocean to the west and the Andes Mountains to the east. High atmospheric pressure over the Andes causes dry, cold air to descend to Earth. This air lacks water vapor and is easily heated by the sun, raising the ground temperatures and lowering the humidity—perfect conditions for a desert.

Actual Test 02



23. The author's description of the Atacama Desert mentions all of the following EXCEPT:

- (A) It is located between the Pacific Ocean and the Andes Mountains.
- (B) The air lacks water vapor.
- (C) Rainshadow causes extreme dryness.
- (D) Violent storms occasionally occur.

24. The word sparse in the passage is closest in meaning to

- (A) light
- (B) scanty
- (C) dense
- (D) sufficient

25. The phrase adjacent to in the passage is closest in meaning to

- (A) connecting
- (B) contrasting
- (C) neighboring
- (D) resembling

Rain is sparse in the Atacama because of a phenomenon called rain shadow. Warm, humid air from the Amazon rain forest is blocked from reaching the Atacama by the Andes. That air is cooled by the cold mountain air and condenses into rain or snow in the mountains. As the air descends the west side of the mountains, it warms up and retains its moisture, preventing it from falling to the ground. Hence the Andes Mountains have the unusual effect of causing extreme moisture in the Amazon River basin at the same time that they cause extreme dryness on the other side of the mountains. Interestingly, the driest and wettest places on Earth are nearly adjacent to each other.

26. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not in the passage or are minor ideas in the passage. *This question is worth 2 points.*

Water conditions are crucial to the formation of deserts.

-
-
-

Answer Choices

- | | |
|---|--|
| (A) Less than 250 millimeters of rain per year falls in arid deserts. | (D) The key factor in creating a desert is the rate of potential evapotranspiration. |
| (B) Despite their extreme dryness, deserts have several sources of water. | (E) The Atacama Desert demonstrates the forces that combine to make a desert. |
| (C) The Colorado River is in Arizona. | (F) Sudden violent rainstorms in the desert are called arroyos. |

Drag your answer choices to the spaces where they belong.
To remove an answer choice, click on it. To review the passage, click View Text.



27. The word ambient in the passage is closest in meaning to

- (A) surrounding
- (B) indoor
- (C) measurable
- (D) daytime

28. According to paragraph 2, all of the following are effects of tall buildings EXCEPT:

- (A) the canyon effect
- (B) the blockage of the wind
- (C) the absorption of sunlight
- (D) the cooling of surrounding air

29. Which of the following best expresses the essential information in the highlighted sentence? *Incorrect* answer choices change the meaning in important ways or leave out essential information.

- (A) Heat causes concrete and asphalt to expand, raising the ambient temperature.
- (B) Materials used to build cities retain more heat than materials used in non-urban areas.
- (C) Rural and suburban areas are hotter than cities because there are no tall buildings to block the sunlight.
- (D) Urban buildings are made of light-colored materials that reflect the sunlight up into the atmosphere.

30. The word blunted in the passage is closest in meaning to

- (A) prevented
- (B) expanded
- (C) eliminated
- (D) weakened

Urban Heat Islands

Cities are usually warmer than their surrounding suburban and rural areas, often by as much as ten degrees Fahrenheit or six degrees Celsius. Scientists attribute this to the urban heat island effect, by which several characteristics of urban areas combine to elevate artificially the ambient temperature.

The main cause of urban heat islands is architectural; the high buildings in city centers expose numerous surfaces that reflect and absorb sunlight. The reflected light hits other buildings and cannot escape into the surrounding air. The absorbed light, mostly by the dark materials covering the outside of buildings, heats up the buildings themselves. These materials, such as concrete and asphalt, have greater thermal conductivity and reflective ability than do materials used in rural or suburban construction.

This tendency of heat to be trapped between and near buildings is called the canyon effect. Another impact of tall buildings is that they block the wind, which normally blows hot air away and cools the remaining air.

Also contributing to this heat retention is the absence of evapotranspiration, the loss of water by evaporation from the ground and from the leaves of plants. This phenomenon is blunted in urban locales due to the paucity of vegetation and standing water, both of which have cooling effects.

People also play a role in creating urban heat islands. The population density in cities translates into more human heat-generating processes and technology, such as automobiles, buses, and trains, air conditioning units, and factory production. All of these activities result in air pollution, which leads to the greenhouse effect, in which hot air on the ground cannot escape through the air above it because of polluting particles in the atmosphere.

31. According to paragraph 3, evaporation is less in urban areas because of
- (A) the absence of vegetation
 - (B) the presence of standing water
 - (C) tall buildings
 - (D) asphalt and concrete
32. All of the following factors contribute to the heat island effect EXCEPT:
- (A) air conditioners
 - (B) tall buildings
 - (C) vegetation
 - (D) population
33. According to paragraph 5, the heat island effect is greater at night because
- (A) fewer cars are on the road
 - (B) upward radiating heat is blocked by buildings
 - (C) energy consumption is lower
 - (D) heat moves more slowly without sunlight
34. According to the passage, which of the following is true about the negative effects of urban heat islands?
- (A) Heat waves become longer and stronger.
 - (B) Weather conditions change globally.
 - (C) Energy supplies decrease.
 - (D) People move out of the city to avoid heat waves.
35. The word mitigating in the passage is closest in meaning to
- (A) measuring
 - (B) increasing
 - (C) accelerating
 - (D) lessening

The influence of the heat island effect seems to be greater at night. The ground and other surfaces lose heat at night by a process of radiation into the air above. But in cities, this upward radiation is blocked by the tall buildings, tending to hold the heat at the level where people live and where temperatures are measured.

Because almost half of the world's population lives in urban areas, the urban heat island effect can influence the lives of more than three billion people. Thus it is closely studied by demographers and meteorologists. Thousands die in heat waves every year, and urban heat islands increase the severity and duration of those waves. Nighttime on urban heat islands provides no relief since urban nights do not enjoy the same cool-down that occurs in areas outside the cities.

Another adverse consequence of urban heat islands is that more energy is needed to power air conditioning and refrigeration. One study concluded that the heat island effect costs the city of Los Angeles about \$100 million per year in increased energy consumption. Local weather conditions can also be affected, for example, by altered wind patterns, more clouds and fog, greater pollution, more lightening, and more rain.

One strategy for mitigating the impact of heat island effects is to use construction materials in houses, pavements, and highways that reflect, not absorb, the sunlight. Another method is to cultivate more vegetation like many city dwellers do on the roofs of their apartment buildings and offices.

Some controversy exists over whether urban heat islands contribute to global warming. One school of thought stresses that no evidence has been found that the effect is any more than a local one, as the long-term upward trend in temperatures is about the same in both urban and non-urban areas. This view gained support from a 2004 study comparing a city's

Actual Test 02



36. The author discusses vegetation in paragraph 8 in order to
- (A) illustrate how city dwellers use the roofs of their apartments
 - (B) report on vegetable consumption by city residents
 - (C) note one strategy for lessening the heat island effect
 - (D) contrast the rate of growth of urban and rural vegetation
37. The word dissenting in the passage is closest in meaning to
- (A) approving
 - (B) opposing
 - (C) prevailing
 - (D) agreeing
38. According to the passage, the conclusion that global warming is not caused by urban development is supported by which of the following?
- (A) Temperatures are increasing faster in rural areas than in cities.
 - (B) Sea levels are rising far from cities.
 - (C) Heat is retained between tall buildings.
 - (D) Windy nights and calm nights have the same temperatures.

temperatures on calm nights with those on windy nights. No difference was found in temperatures even though the urban-heat island theory would predict that windy nights should be cooler because the wind should blow the hot air away from the city. The conclusion of the study was that global temperatures have risen as much on windy nights as on calm nights, showing that overall global warming is not caused by urban development. Those with a dissenting view tend to be those who are skeptical of the reality of global warming. They contend that urban heat islands account for nearly all of the warming recorded by land-based instruments. But there have been no scientific studies substantiating this minority view.

39. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not in the passage or are minor ideas in the passage. *This question is worth 2 points.*

This passage discusses the causes and characteristics of urban heat islands.

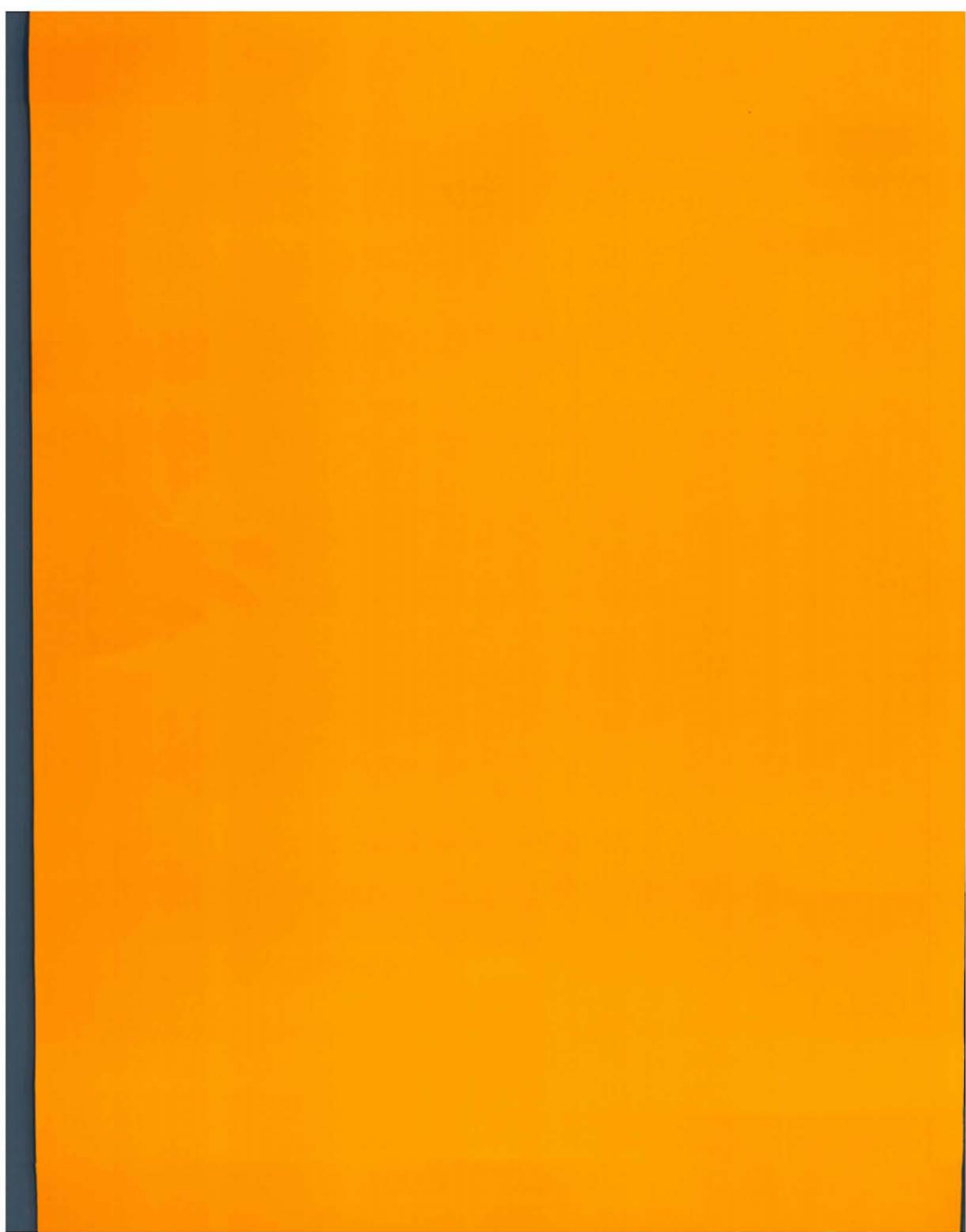
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Answer Choices

- | | |
|---|---|
| (A) The architecture of a city, with its tall buildings and heat-retaining materials, prevents daytime heat from escaping. | (D) The urban-heat island effect occurs due to low evaporation levels and the heat-producing technology needed to meet city dwellers' energy needs. |
| (B) Los Angeles spends about \$100 million every year to pay for the increase in energy consumption caused by the urban-heat island effect. | (E) The impact of urban heat islands on global warming has not yet been established though a recent study suggests no significant effect. |
| (C) The urban-heat island effect decreases at night, when the hotter daytime air radiates up into the atmosphere. | (F) Concrete and asphalt cover the ground, reducing potential evaporation and holding the heat at ground level. |

Drag your answer choices to the spaces where they belong.
To remove an answer choice, click on it. To review the passage, click View Text.





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Unit 1 Vocabulary

Skill & Drill

1. (A) 2. (B)

로잘린드 프랭클린

1962년 세 명의 남자가 DNA 분자의 구조를 발견한 공로로 노벨상을 받았다. 하지만 이 발견을 가능하게 한 것은 로잘린드 프랭클린이라는 여자였다. 프랭클린은 모리스 윌킨스와 함께 작업하는 과정에서 X선 결정학이라고 하는 기술을 사용해 DNA가 나선형 구조로 되어 있음을 밝혀냈다. 그녀의 발견은 제임스 왓슨과 프랜시스 크릭이 1953년 DNA 분자가 이중 나선 구조로 되어 있다는 결론을 내리는 데 결정적인 통찰력을 제공했다. 그 획기적인 발견 덕분에 과학자들은 유전자가 어떻게 유전되는지 탐구할 수 있었다. 1950년대 초반에는 여성 과학자들이 흔히 남성 과학자들 밑에서 일해야 했기 때문에 프랭클린이 이런 중추적인 업적도 과학 역사에 각주에 머무는 데 그쳐야 했다.

3. (D) 4. (A)

차터 스쿨

미국의 차터 스쿨 운동은 1990년대, 특히 도심지에서 공립학교들이 실패했다고 인식되면서 여기에 대한 대응으로 시작되었다. 차터 스쿨의 개념은 일반적으로 공립학교에 주는 돈을 사립학교에 주어 이 사립학교가 건물과 교사들 구하고 직접 교과과정을 짜게 하는 것이다. 차터 스쿨은 공립학교의 제재권 받지 않고 운영되며 보다 나은 결과를 얻을 수 있을 것으로 기대된다. "차터"라는 말은 학교가 충족시키도록 되어 있는, 법적으로 규정된 성과 계약을 가리킨다. 많은 학교들이 차터 스쿨로 성공적인 결과를 얻은 반면 기대했던 개선 효과만 거두지 못한 학교도 많았다. 그래서 이 교육 개혁의 지체와 효과에 대해서는 아직도 많은 논쟁이 있다.

5. (A) 6. (C)

필립 로스

평론가들이 지난 50여 년간 미국 최고의 소설가로 자주 꼽는 필립 로스는 역사에 대한 풍자적 시선과 성적 갈구뿐만 아니라 미국에서 유대인으로 사는 경험을 반영한 개인적 생각을 글로 표현했다. 그의 첫 번째 저서인 〈굿바이, 필립버스〉는 1960년 전미도서상을 수상했으며 나중에 영향력 있는 영화로 만들어졌다. 1969년에 쓴 소설 〈포트노이의 불행〉은 사춘기의 욕정과 성인기의 성욕을 꾸밈없이 있는 그대로 묘사하여 엄청난 논란을 불러일으키고 동시에 비평가들의 찬사를 받기도 했다. 그 책은 일부 지역에서는 수년간 금서 목록에 오르기도 했다. 로스는 종종 한 등장인물을 그의 분신으로 삼아 여러 소설에 등장시켰다. 예를 들어, 네이션 주커만은 1979년부터 1986년 사이 소설 다섯 권의 주인공으로 등장했으며 1997년과 2000년 사이 세 권의 소설에 다시 등장했다.

7. (C) 8. (A)

맬서스 재앙

1798년 영국의 경제학자 토머스 맬서스는 인구가 식량 생산량보다 더 빨리 증가하는 경향이 있다는 이론을 내세웠다. 그는 잉여 인구의 다수가 전

쟁이나 질병으로 사망하지만 남은 사람들도 기아와 불행의 "재앙"을 겪게 될 것이라고 예견했다. 맬서스 재앙은 자원 보충 수단이 없는 고밀 지역에서 이미 발생했다. 예를 들어, 이스터 섬의 원주민들은 섬 전체를 벌목한 탓에 토양 침식은 물론 그들이 식량으로 삼았던 동식물의 품종이 있는 후 멸종되었다. 일부 과학자들은 오늘날 더욱 광범위한 맬서스 재앙이 발생하고 있다는 징후들을 목격하고 있다면서 하이티와 르완다, 이디오피아에서 최근에 발생한 비극적 상황들을 예로 든다.

TOEFL Reading Practice

- A 1. (C) 2. (B) 3. (A) 4. (C)
11844 / 2natural selection /
31858 / 4non-scientific subjects

다윈과 월러스

일반적으로 찰스 다윈은 진화론의 창시자로 일컬어진다. 그는 1859년에 지은 〈종의 기원〉에서 처음으로 진화론을 설명했다. 생물 종들이 오랜 시간에 걸쳐 진화한다는 개념은 19세기 초반에 이미 있었다. 하지만 다윈의 위대한 통찰력은 진화 과정을 일으키는 기전인 "자연선택"을 설명했다는 데 있다. 자연선택의 과정에서는 동물이나 식물이 바람직한 형질을 후손에게 물려주어 환경에 잘 적응할 수 있는 종의 발달을 돕는 경향을 일컫는다. 이와 동시에 우성 인자를 물려받지 못한 동물은 번성하지 못하는 경향이 생긴다. 그런 식으로 유리한 특성들이 "자연적으로" 선택되게 된다.

다윈은 박물학자가 되기 위한 훈련을 받지 못했다. 사실, 그의 교육은 H.M.S. 비글호를 타고 5년 간 항해 여행을 하면서 얻은 실제적인 것이었는데, 이 항해 동안 그는 동식물의 화석과 표본을 수집하고 그가 관찰한 생물들 간의 차이점을 자세히 기록했다.

비록 다윈은 그의 이론을 발표하기 몇 년 전인 1844년에 이론을 완성했지만 이것이 종교계에 가져온 파장을 두려워했다. 인간이 영장류에서 진화했다는 생각은 전통적 종교 교리와는 충돌하는 것이었다. 왜냐하면 전통적인 종교는 신성한 존재인 신이 인간을 창조한 것으로 가르치고 있었기 때문이었다.

그래서 다윈은 그의 생각을 조용히 간직하고 있는 것으로 만족했다. 하지만 1858년 그는 편지를 주고받던 젊은 박물학자인 알프레드 러셀 월러스로부터 한 통의 편지와 논문 초고를 받고서 화가 났다. 그는 월러스가 자연선택의 우위를 포함하여 다윈의 핵심적 생각들을 그대로 반영한 진화론을 발표할 준비를 하고 있다는 것을 알고 망연자실했다. 그는 진퇴양난에 처했다. 만약 그가 서둘러 논문을 발표한다면 다른 사람의 입적을 가로챌 것으로 여겨질 것이었다. 하지만 월러스가 먼저 발표를 하게 하면 단지 자신이 발표를 두려워했기 때문에 자신의 평생 업적을 남에게 빼앗길 판이었다.

해답은 다름이 있었다. 그는 두 명의 동료 과학자들과 그 문제를 의논했는데, 동료들은 런던 과학회의 1858년 학회에서 두 사람의 논문을 모두 발표하도록 제안했다. 처음에는 두 논문 다 별로 관심을 끌지 못했다. 하지만 이듬해 다윈의 책이 센세이션을 불러일으켰고 진화론은 월러스보다는 다윈과 연결 지어지게 되었다. 이것은 부분적으로는 월러스의 착한 천성 때문이었다. 그는 대부분의 명예를 기꺼이 다윈에게 넘겼으며, 심지어 그 이론을 "다윈설"이라고까지 불렀다. 또한 월러스는 나중에 심령론과 외계 생명체와 같은 비과학적인 주제에 심취하면서 명성에 타격을 입었다.

[B] 1. (C) 2. (A) 3. (D) 4. (A)

1/laissez-faire / 2neoclassical economics /
3monetarism / 4human capital theory

경제학의 시카고 학파

지난 세기 동안 시카고대학의 경제학파는 미국 경제 사상의 선도적인 진영이었다. 그 영향력은 매우 광범위해서 거기에서 이루어진 이론적 접근법들이 학계에서 "시카고학파"로 알려지게 되었다. 이는 시카고 대학의 경제학과를 지칭할 뿐만 아니라 더 폭넓은 경제적 세계관을 일컫는다. 전 세계적으로 많은 대학과 정부 기관에서 시카고학파의 추종자들을 만날 수 있다.

시카고학파는 각각 독특한 관점을 가진 몇 가지 역사적 단계를 거쳤다. 시카고학파는 1920년대 프랭크 H. 나이트와 제임스 바이너에서 시작되었는데, 이들은 당시 유행하고 있던 경제에 대한 경합주의적 접근법에 반기를 들었다. 이 방법은 경제 지표들의 성과에 대한 자료를 분석하여 결론을 도출했다. 나이트와 바이너는 모든 사회적 행동은 경제적으로 설명 가능하다고 본 경제 제국주의를 비판했으며, 자유방임 접근법을 회의적으로 보고 대신 경제 통제를 타개하기 위한 정부의 적극적인 정책을 옹호했다. 하지만 그들은 경제의 모든 단계에 정부가 개입할 수 있게 하는 전면적인 케인즈 정책은 반대했다. 오히려 그들은 모든 경제 문제를 해결하기 위해 신고전주의 패러다임의 능력에 확신을 가졌는데, 신고전주의는 자기 이익을 극대화하기 위한 개인과 그들의 선택에 초점을 두었다.

시카고학파가 두 번째로 꽃을 피우게 된 시기는 1960년대 조지 J. 스티글리츠와 밀턴 프리드만이 와서이다. 이 제2 시카고학파는 신고전주의 경제학을 고수했으며 정부 규제에 대한 케인즈 정책을 반대했다. 이 학파는 거시경제 면에서 시카고학파와 가장 밀접한 관련이 있는 밀턴 프리드만이 진개한 통화주의를 강조한 것으로 잘 알려져 있다. 프리드만은 19세기의 "화폐수량설"을 발전시킨 이론에서, 물가는 유통되고 있는 통화량과 직접적인 관련이 있다고 지적했다. 케인즈 학설과는 달리 통화주의는 조세나 소비를 통한 정부의 직접적인 개입을 피하고 국가의 통화 공급에 제한을 가하는 것에 찬성한다. 프리드만은 인플레이션을 억제하거나 부진한 경제를 살리기 위해 필요에 따라 이자율을 올리거나 낮출 수 있는 연방준비제도가 사회의 지배적 역할을 옹호했다. 또 다른 도구로는 미국재부성장기채권의 판매를 들 수 있는데, 정부는 국민들에게 확장금융을 채권을 판매함으로써 기금을 마련할 수 있다.

거시경제 면에서 볼 때 시카고학파의 조지 스티글리츠는 신고전주의 패러다임을 유지하면서 가능하면 인제론적 이론 새로운 분야들로 확대하고자 했다. 이로 인해 거시경제에 검색론, 인적자본론, 재산권/거래비용 이론 등의 새로운 이론이 등장했다.

시카고학파는 계속해서 신고전주의를 수용함으로써 모든 사회적 정치적 현상들을 경제적 관점에서 보는 "제국주의"적 견해를 조장했다는 비판을 받았다.

[C] 1. (B) 2. (C) 3. (A) 4. (D)

1/Immanuel Kant / 2commune with nature /
3Ralph Waldo Emerson / 4Brook Farm

초월주의

초월주의는 1800년대 중반 미국 문화 르네상스의 핵심을 이루었던 철학이다. 초월주의 운동은 뉴잉글랜드를 중심으로 1836년 랄프 월도 에머슨이 쓴 수필집 <자연론>에 의해 시작되었다. 이 글에서 에머슨은 새로운 철

학의 수사적 표어가 된 "우리는 우리 자신의 발로 걷고 우리 자신의 손으로 일하고 우리의 마음을 거침없이 표현할 것이다... 누구나 모든 인간을 인도하신 신성한 영혼의 인도를 받음을 믿기 때문에" 최초의 인류 국가가 탄생하게 될 것이다."라고 썼다.

또 1836년에 에머슨과 다른 초월주의자들은 매사추세츠 케임브리지에 초월주의 클럽을 결성해 자신들의 사교의 장을 마련했다. 1840년에는 그들의 철학을 <다이얼>이라는 잡지에 발표하기 시작했다.

"초월주의"라는 용어는 지식이 실재와 관련되지 않고 실재를 아는 방식과 관련될 때 지식은 "초월적"이라고 말했던 독일의 철학자 임마누엘 칸트의 개념으로부터 나온 것이다. 우리는 일이나 예술을 통한 자연과의 교감이나 명상을 통해 우리의 감각을 초월해 진실과 아름다움을 이해할 수 있다. 이 사상은 우리가 지식을 얻기 위해 감각이나 경험에 의존해야 한다는 것을 부정하고 오히려 사물의 진정한 본질을 추구하기 위해서 우리 내부의 정신적 본질을 보아야 한다고 주장한다.

초월주의자들은 진리에 이르는 길이 우리 자신 안에 있다고 믿었다. 사회는 인간들에게 유용한 상품과 육체적 생존의 수단을 제공해주는 필요의이었다. 하지만 올바른 삶을 살기 위해서 사람들은 관습과 사회적 인습을 무시하고 자신의 이성에 의존해야 했다. 또 그들은 조직화된 종교는 신과 개인과의 관계를 방해함으로써 이 과정에 장애물이 된다고 여겼다.

초월주의는 미국 문화와 지식에 지대한 영향을 끼쳤다. 에머슨은 <자립>과 같은 수필에서 이 운동의 주장자가 되었다. 헨리 데이빗 소로는 <월든 연못에서>를 통해 사회라는 굴레에서 벗어나서 인간이 생존하고 번성할 수 있는 능력을 주장했다. 시인 월트 휘트먼과 에밀리 디킨슨은 자연을 연구해 발전할 수 있는 보편적 진리를 표현했다.

에머슨은 진정한 초월적 삶에는 도달할 수 없음을 인정했다. 그럼에도 불구하고 이 운동은 보스턴 근처의 브록팜과 같은 이상적 공동체를 낳았다. 1841년 조지 리플리가 설립한 브록팜은 비슷한 신념을 가진 사람들이 물질을 공유하고 모두를 위한 식량을 생산하면서 조화를 이루고 살 수 있다고 믿었던 조르주 푸리에의 사회주의적 관점에 영감을 받았다. 하지만 브록팜은 농사를 짓기에 부적절한 척박한 토양에 자리잡고 있었다. 보다 성공적이었던 것은 브록팜의 학교들로, 이 공동체에 유입한 수익을 얻어주었다. 본관에 화재가 발생해 이 실험은 끝이 나고 1847년 막을 내리게 되었다.

[D] 1. (C) 2. (A) 3. (C) 4. (A)

1/suburban areas / 2/blockbusting /
3/the racial composition / 4/the busing of students

백인 도피

미국의 대도시들은 백인들이 만들고 백인들이 거주했다. 남북전쟁이 끝나고 흑인들은 공장의 일자리를 찾아 북부의 도시로 이주하기 시작했다. 제2차 세계대전 동안 군수산업의 일자리를 얻기 위해 흑인들이 몰려오면서 이와 같은 흑인 인구의 유입이 늘어났다. 그로 인해 주택 부족 현상이 일어났고 민권운동이 시작되어 백인들이 지배하는 도시에서 인종간 긴장이 증가되었다. 경제적 부를 소유한 백인들은 이러한 사회 문제를 피해 근처의 교외 지역으로 빠져나가기 시작했는데, 이 현상을 "백인 도피"라고 한다.

미국인들은 전통적으로 도시나 농장에 살았다. 하지만 제2차 세계대전 후 주택 수요가 폭증하자 "교외"가 생겨나게 되었다. 교외는 주거지역으로서 종종 이전의 농지에 지어지곤 했는데, 사람들은 이곳에서 자동차를 이용해 도시의 직장으로 통근을 한다. 일부 백인들은 교외를 가난한 흑인이나 도시 학교의 몰락으로 생기는 도시적 소외가 없는 평화로운 안식처로 여겼다.

부동산업자들은 종종 흑인에 대한 백인의 반감을 이용해 백인 도피를 조장하는 데 결정적인 역할을 했다. 부동산 중개인들이 사용했던 가장 악랄한 방법은 “블록버스터”였다. 이들은 작은 직접 사들이거나 백인 대리인을 이용해 매입한 다음 흑인들에게 되파는 수법으로 백인 동네에서 몰래 집을 팔았다. 백인 집주인들은 흑인 가족이 이사해 오는 것을 보면 흑인들의 거주로 인해 집값이 떨어질 것이라고 생각해서 집을 접어먹었다. 백인들의 이런 두려움은 자기충족적이었다. 더 많은 주택 불량이 시정어, 나오자마자 가격은 내려갔다. 종종 부동산업자 외에는 구매를 하려는 사람이 없는 경우가 있었는데, 이들은 주택을 매입해서 새로운 흑인 가족에게 더욱 비판 가격에 되팔곤 했다. 그런 식으로 부동산업자들은 중개수수료뿐만 아니라 아주 잠시 소유했던 주택을 매도함으로써 차액을 챙기기도 했다.

백인 도피는 도시의 인구 구성에 변화를 주었을 뿐만 아니라 공공교육에도 큰 영향을 미쳤다. 1954년 대법원은 공립학교에서 인종차별을 금지해 백인과 흑인이 함께 공부하도록 했다. 이로 인해 사회적 동요가 일었는데, 특히 흑인을 위한 학교가 따로 있었던 오렌 전방을 가진 남부에서 심했다. 이러한 저항을 무력화시키기 위해서 나중에 법원은 학생들의 강제 버스 통학을 명했는데, 이에 따라 흑인들은 수 마일이나 떨어진 이전의 백인 학교까지 버스로 통학해야 했고 백인 학생들은 수 마일 떨어진 흑인 학교까지 버스로 통학해야 했다.

백인 학부모들은 근처에 있는 학교보다도 못한 학교에 통학버스를 타고 가느라 자녀들이 시간을 낭비하는 것을 못마땅해 했다. 이에 대한 해결책은 자녀들을 사립학교에 보내는 것이었는데, 사립학교는 조세 혜택을 받지 않아 인종 할당제를 지키지 않아도 되었기 때문이다.

- [E] 1. (C) 2. (B) 3. (C) 4. (A)
 1. fruit flies / 2. ten days /
 3. four chromosomes / 4. mutation in eye color

토머스 헌트 모건

20세기 초반에 과학자들은 유전의 물질적 근거를 알아내기 위해 애쓰고 있었다. 그들은 형질이 유전된다는 것은 알았지만 형질이 후대로 전해지는 기전은 알지 못했다. 한 가지 가능성은 1888년에 발견된 세포 핵 내에 있는 실 같은 구조를 가진 염색체였다. 하지만 어느 누구도 유전 정보 전달에 있어서 염색체의 정확한 역할을 입증해 줄 실험을 하지 못했다.

콜롬비아대학의 유전학자 토머스 헌트 모건은 염색체 이해를 위한 실험에서 자그마한 파리를 실험 대상으로 선택했다. 정식 명칭으로는 *Drosophila melanogaster*라고 하는 초파리가 모건의 실험에 이상적인 대상이었다. 그 이유는 1) 초파리는 키우고 먹이는 데 비용이 많이 들지 않았고, 2) 작은 공간에서도 많은 수로 번식 가능했으며, 3) 다 자라는 데 열흘밖에 걸리지 않았고, 4) 염색체가 네 개밖에 없어서 연구하기가 쉬웠기 때문이다.

“파리 실험실”이라는 직작한 이름이 붙은 콜롬비아대학의 작은 연구실에서 실험을 진행한 모건과 그의 팀은 초파리를 수백만 마리씩 번식시키기 시작했다. 이 과정은 만만치가 않았다. 왜냐하면 유전된 형질에 어떠한 변화가 있는지를 살펴보기 위해 파리 한 마리 한 마리를 핀셋으로 집어 확대경으로 관찰해야 했기 때문이다. 모건은 초파리를 방사선에 노출시키고 밝은 빛이나 암흑 속에서 키우고, 원심분리기에 넣어 돌리고, 오븐에 굽고 하는 과정을 통해 돌연변이라고도 하는 변종을 만들어내려고 했다. 모건은 6년 동안 열심히 실험을 했지만 파리의 새끼에게 복제하려고 했던 돌연변이를 찾지는 못했다.

1910년 실험을 막 포기하려던 때에 그는 일반적인 붉은 눈 대신 하얀색 눈을 가진 파리 한 마리를 발견했다. 이 돌연변이는 다중 세대에서 다시 출현했는데, 이는 돌연변이가 유전에 의해 전해진다는 것을 의미했다. 모건은 세대간의 형질을 추적하는 빈도 알게 되어 특정 형질이 어떻게 특정 염색체와 연결되는지도 알게 되었다. 이런 식으로 그는 마침내 염색체가 유전 인자의 전달자라는 것을 확인했다. 나중에 이 인자들은 사슬 모양의 핵산 입자 즉 유전자인 것으로 확인되었다.

모건의 연구 결과로 인해 어떤 형질은 남성 또는 여성에만 유전된다는 반성유전을 설명할 수 있게 되었다. 또한 그는 유전자가 염색체에서 특정한 자리를 차지하고 고정된 선형 순서로 염색체에 배열된다는 것도 밝혀냈다. 그의 노력 덕분에 최근의 인간 게놈 프로젝트의 성공이 가능했다. 이 프로젝트가 완성되면 모든 인간 유전자의 서열과 위치가 밝혀지게 된다. 과학자들은 이런 지식을 이용해 특정 질환을 일으키는 유전자를 찾아내고 결함이 있는 유전자를 제거하고 건강한 유전자로 대체할 수 있게 될지도 모른다.

- [F] 1. (C) 2. (B) 3. (B) 4. (A)
 1. the 1900s / 2. McClure's Magazine /
 3. food processing / 4. Pilgrim's Progress

폭로자

1800년대 후반과 1900년대 초반에 잡지 기자들과 신문 기자들은 정계와 재계의 부정부패를 폭로하는 기사를 쓰기 시작했다. 아동 노동력 착취, 식품 가공 공장의 비위생적인 처리, 제약 회사의 기만적 주장, 매춘, 노동력 착취, 비인간적 수감 시설 등이 이들의 공격 대상이었다.

이러한 개혁가 중에서 가장 유명했던 사람으로 소설가인 윌슨 스튜어트를 들 수 있는데, 그는 <정글>에서 정유업계의 비위생적인 환경을 극적으로 표현했다. 또 다른 사람으로는 제이콥 리스먼을 들 수 있는데, 그는 뉴욕 시 빈민가의 참담한 현실을 폭로한 신문기자이자 사진작가였다.

이러한 기사들에 대한 대중의 열렬한 관심이 촉발된 것은 주로 1903년 <맥클루어스>지에 실린 연재를 따랐었는데, 그 잡지는 링컨 스테인스의 시정부 비리와 아이다시, 타텐의 스탠더드 오일사의 조사 결과를 연재했다.

사회적 의식이 있는 이러한 종류의 연문을 처음 수용했던 사람은 사이더 루즈벨트 대통령이었다. 그는 의회를 설득해 순정식약품법과 육류검사법과 같은 개혁법안을 통과시키도록 했다. 하지만 1906년 데이빗 그레이엄 필립스는 <코스모폴리탄>지에 루즈벨트 대통령 측근들이 정치적 비리를 저질렀다는 내용의 연재 기사를 썼다. 루즈벨트 대통령은 반격을 했다. 그는 연설에서 일부 기자를 존 번연의 <천로역정>에서 피바람 쇠스랑을 들고 아래쪽만 보고 다니며 동물의 분노를 찾지만 하고 고개를 들어 주위의 세상을 보지 못했던 인물에 비유했다. 부정을 바로잡는 데 진심 어린 관심은 보인 작가들은 칭찬하면서도 부정을 둔채내고 자신들이 찾아낸 부정을 이슈화시키는 데만 현안이 된 작가들은 비난했다. 그는 이들을 “폭로자”라고 불렀다.

책임감 있는 조사 기사들은 루즈벨트 대통령의 이런 비난 어린 표현에 배신감을 느꼈다. 루즈벨트가 존경했던 개혁가 중의 한 사람인 링컨 스테인스는 이 연설에 격노했다. 그 다음 날 그는 루즈벨트에게 “각하께서는 각하를 만들었던 이 모든 언론 조사에 중반을 고쳐주십시오”라고 말했다.

사실, 루즈벨트의 비난으로 인해 일반적으로 긍정적인 운동이라고 받아 들여져 관심을 받고 많은 사회악을 고쳤던 이 운동은 막을 내렸다. 그럼에도 불구하고 이 운동이 번성했던 시기, 특히 1900년과 1915년 사이에는

폭로 운동이 회사의 독점을 해결하고 아동 노동력 착취를 없애고 노동자 보상법을 채택하고 식품 가공 안전도를 향상시키는 등의 성과를 거두었다.

나중에 20세기가 되어 폭로자라는 용어는 정치인들이 직면하기 싫어하는 대중의 위협에 초점을 맞춘 작가나 영화제작자와 연관된 단어가 되었다. 최근의 폭로자로는 안전성이 결여된 자동차에 관한 폭로 기사를 쓴 작가인 알프 레이더, 위티게이트 스캔들의 기록자인 밥 우드워드와 칼 번스타인, 패스트푸드 산업에 관한 영화의 제작자인 모건 스펠릭 등이 있다.

Building Summary Skills

1. Darwin and Wallace

Charles Darwin is known as the discoverer of 1the theory of evolution. He formulated his theory while on a voyage around the world, during which he observed differences among animal species. His key insight was that species evolve through a process of 2natural selection. He delayed publishing the theory for fear of 3religious controversy. 4Alfred Russel Wallace discovered the theory later and told Darwin about it. That prompted Darwin to publish his book 5On the Origin of Species.

2. The Chicago School of Economics

The University of Chicago has become 1the leading center of economic thought in the United States. Its views have become known as the 2Chicago School. In the 1960s, it was led by 3Milton Friedman, who favored a monetarist approach. He believed in controlling the economy by 4regulating the money supply. He advocated a strong role for 5the Federal Reserve in setting interest rates and selling treasury bonds.

3. Transcendentalism

1Transcendentalism was a philosophy that arose in 2New England in the mid-1800s. It was first expressed in Ralph Waldo Emerson's essay 3Nature. Transcendentalists believed in looking within oneself for 4an understanding of nature, not in society's creations such as organized religion. They preached meditation and self-reliance in order to rise above, or transcend, our physical senses. Transcendentalists attempted to 5design towns, such as Brook Farm, where they could practice their beliefs. However, all these experiments failed.

4. White Flight

1After World War II, blacks began moving north in greater numbers while looking for jobs. Whites began to move out to avoid the poverty and 2decline in school systems that they felt were caused by this black influx. Real estate agents cooperated in this white flight by secretly selling

homes to blacks in formerly white communities. Once this 3blockbusting occurred, whites would put their houses up for sale, allowing the real estate agents to 4earn more commissions. White flight caused racial disparity in the public schools. Court decisions have tried to equalize these differences by 5ordering the busing of school children.

5. Thomas Hunt Morgan

Thomas Hunt Morgan wanted to find out how 1the body passed traits to later generations. He designed experiments with 2fruit flies. When one fly was born with an uncommon eye color—a mutation, Morgan was able to reproduce it in 3the fly's offspring. This led him to conclude that eye color was passed by 4chromosomes, thread-like structures in a cell's nucleus. He determined that each trait was linked to a gene, or 5a chain of molecules inside a cell.

6. The Muckrakers

1The muckrakers were reporters and novelists who exposed some of the abuses in 2politics and business in the early 1900s. 3President Theodore Roosevelt approved of these reformers and endorsed several reform laws. But when a series of articles alleged 4political corruption by Roosevelt's friends, Roosevelt spoke out against them, calling them muckrakers. His criticism ended the movement. But the term continues to be applied in a positive way to those who reveal 5public corruption or business misbehavior.

TOEFL iBT Practice Test

1. (D) 2. (D) 3. (B) 4. (C) 5. (A)
6. (B) 7. (A) 8. Precambrian Period (A), (C) / Cambrian Period (B), (D), (E) 9. (A) 10. (B)
11. (B) 12. (D) 13. (C) 14. (A) 15. (C)
16. (B), (D), (E)

캄브리아기의 폭발

오늘날 지구상에서 발견되는 모든 동물 종은 약 5억 7천만 년에서 5억 3천만 년 전에 처음 나타난 종들에 그 기원을 두고 있다. 비교적 짧은 그 시기 동안에 화석 기록으로 발견되는 다양한 생물 종이 유례없이 증가했다. 이 급격한 진화는 지질학사의 캄브리아기 동안 일어났는데, 이것을 캄브리아기의 폭발이라고 한다.

약 6억 년 이전인 신캄브리아기에는 진화의 결과 나타난 생물 종류가 거의 없었고 구조도 단순했다. 하지만 캄브리아기의 폭발 동안 다양성과 복잡성이 갑자기 증가했다. 이 증거는 암석이나 토양 속에 보존된 생물의 잔해나 흔적인 화석에서 찾을 수 있다. 오늘날에도 과학자들은 진화상 그러한 가속이 일어났던 원인을 찾지 못하고 있다.

캄브리아기의 폭발은 찰스 다윈에게 특별한 문제를 안겨줬는데, 그는 1859년에 생물이 어떻게 진화했는지를 설명한 이론을 출판했다. 다윈의

이론은 매우 오랜 시간이 걸려 현재와 같은 다양한 생물 종이 생겨났다고 제안한다. 오늘날 발견되는 생물 종에게서 찾아볼 수 있는 작은 변화들이 일어나기까지 자연선택은 오랜 시간이 필요했다. 그러한 생각이 성립하려면 진화가 서서히 일어나야 했으며 화석 기록상으로도 이러한 점진적인 변화의 증거가 나타나야 했다. 하지만 사실 기록상으로는 캄브리아기의 폭발 동안 생겨난 종은 신캄브리아기에는 존재하지 않았다. 다윈 스스로도 이런 화석 기록의 부재가 그의 이론을 반박하는 증거가 될 수 있다는 사실을 인정했다. 실제로, 오늘날 창조론이나 지적설계론을 믿는 사람들이 그렇게 주장하는데, 그들은 생명체가 어떤 한 시기에 신성한 존재에 의해 창조되었다고 믿는다.

다윈은 신캄브리아기에도 진화가 실제로 일어났지만 화석 기록에 나타나지 않는다는 설명으로 이러한 반대 의견을 피해냈다. 다시 말해, 폭발이 곧게 전개 존재하지 않았을 수도 있다는 것이다. 오히려, 신캄브리아기의 진화 단계에서는 생물체들이 너무나 연약해서 화석으로 보존되지 못했다는 사실로 그러한 현상을 설명할 수 있을지도 모른다.

모든 생물체가 화석이 되지는 않는다. 두 가지 조건을 만족해야 한다. 첫째로, 생물체가 죽은 암석이나 토양에 흔적을 남길 만큼 단단한 부분을 가지고 있어야 한다. 신캄브리아기의 생명체는 캄브리아기에 등장한 갑각류만큼 단단한 부분이 없었을지도 모른다. 둘째로, 잔해가 용해되거나 부패하지 않을 비적대적 환경에 묻혀야만 한다. 이런 이유 때문에 신캄브리아기의 많은 표본들이 자취를 감추었을 수도 있다.

그럼에도 불구하고, 대다수 과학자들은 이전에 비해 캄브리아기에 보다 크고 빠른 변화가 일어났다는 것에는 동의한다. 그들은 진화 과정을 가속화하는 몇 가지 이유를 제시했는데, 몇 가지는 외부적 요인이며 몇 가지는 생명체의 내부적 요인이다. 한 가지 이론은 캄브리아기 직전에 대기 중 산소가 증가했다는 것이다. 산소량이 적으면 생명체가 보다 다양해지고 복잡해지기 어렵다. 또 다른 외부적 요인으로는 지각의 급격한 움직임을 들 수 있는데, 이로 인해 생물 개체군이 서로 분리되어 다른 종으로 진화했을 수도 있다.

내부적 요인으로는 유전자의 발달을 들 수 있는데, 유전자가 어떤 최소한의 복잡성을 띠 때까지는 다른 종으로 진화할 수 없다. 동물은 더 다양한 형태를 생성하기 위해 충분한 유전자 도구상자가 필요하다. 어쩌면 캄브리아기에 이르러서야 이러한 도구상자가 효과를 발휘하게 되었는지도 모른다.

비트 운동

비트 세대는 1950년대 뉴욕에서 시작된 비순응적 사회 운동에 불려진 이름이다. 비트 세대의 메시지는 그 당시 주류의 가치관을 거부했던 사람들의 통찰과 열망을 표현하기 위해 의식의 흐름 기법을 사용했던 작가들에 의해 전파되었다. 비트 세대 작가들은 영속적인 작품을 거의 내지 못했지만 그들의 대도는 1960년대 이후의 록음악 아티스트들과 사회 운동에 영감을 주었다.

비트라는 용어는 1946년 허버트 헝크가 처음 만들었다. 그는 그 말을 '피곤한' 또는 '기진맥진한'이란 의미로 사용했다. 1948년 책 케루엑이 이 단어를 사용해 비트 세대를 표현을 썼는데, 그는 그 말을 '명량한' 또는 '행복에 넘친'이라는 뜻으로 바꾸었다. 이 표현은 1952년 《뉴욕타임즈》에 실린 "이것이 비트세대다"라는 존 클레몬 호즈의 기사를 통해 마침내 대중의 의식 속에 자리잡게 되었다.

최초의 비트족은 1940년대 중반에 모인 뉴욕 출신의 친구들이었다. 여기에는 제 케루엑, 알렌 긴스버그, 날 캐서디, 윌리엄 S. 버로우즈 등이 포

합되었다. 이 핵심 그룹이 샌프란시스코로 옮겨간 후 시인인 로렌스 펄링게티와 다른 많은 이들이 합류하게 되었다.

비트 문학 가운데, 유명한 최초의 작품은 알렌 긴스버그의 장시인 《울부짖음》이다. 긴스버그는 1955년 샌프란시스코의 한 갤러리에서 이 시를 큰 소리로 낭독했는데, 마약 복용과 동성애 교사로 논란의 대상이 되었다. 그의 명성을 더해 준 것은 로렌스 펄링게티의 외설 재판이었는데, 그는 자신이 경영하던 서점에서 그 시집을 팔았다. 하지만 법정이 그의 작품에 대해 "사회적 보완 기능"을 가지기 때문에 외설 작품이 아니라는 판결을 내림으로써 그는 무죄를 선고 받았다.

가장 성공적인 비트 소설가는 제 케루엑이었다. 케루엑은 1957년에 발표한 최고의 소설 《길 위에서》를 통해 자신을 기초로 한 인물 켈 파라디스와 그의 친구 날 캐서디를 기초로 한 던 모라이티가 펼치는 자동차 미국 일주 여행을 묘사했다. 이 소설로 인해 캐서디는 무책임한 생활방식, 여성 탐닉, 무도덕성, 삶에 대한 욕정으로 알려진 문학 아이콘이 되었다.

《길 위에서》는 그 내용만큼이나 케루엑이 이 작품을 집필한 방법으로 유명하다. 케루엑은 이 작품을 썼을 당시 마약에 취해 있었으며 종이를 바꾸느라 사고의 흐름을 차단당하지 않도록 긴 두루마리 종이 위에 타이핑을 한 것으로 근거 없이 알려져 있다. 그는 "최초의 생각이 최선의 생각"이라는 믿음을 가졌다고도 하며, 한 번 쓴 내용은 절대 고치지 않는다고 주장한 것으로 알려져 있다. 비록 그가 단 3주 만에 그 책을 썼다고 말했지만, 사실 그는 수년에 걸쳐 그 작품을 계획했으며 여러 번의 초고를 썼다.

또한 윌리엄 S. 버로우즈가 쓴 소설 《발거뿔은 점심》도 영향력이 있었는데, 그 역시 외설 재판에서 살아남았다. 그 자신이 마약중독자였던 버로우즈는 그 작품에서 마약으로 인한 환상과 마약중독자와 범죄자들 사이에서의 여행을 그리고 있다.

1960년대에는 비트 철학을 따르는 사람들이 히피족 또는 이퍼족으로 알려지게 되었다. 그들의 문화는 샌프란시스코를 중심으로 시작되었는데, 이곳을 록음악, 마약 문화, 베트남전 반대시위 등의 중심지가 되었다.

비트 세대가 문화에 미친 지속적인 공헌은 그것이 인간 본성과 사회의 불패한 면들을 보여주는 주제들을 비롯한, 더욱 개인적인 주제란 다룰 수 있는 분위기를 조성한 데 있다. 비트 운동 덕분에 구어체의 대화식 표현이 인정받게 되었고 불경스런 표현 역시 인간 감정의 표현 수단이 되었다.

Vocabulary Review

- | | | | | | |
|----------|--------|--------|--------|--------|---------|
| A | 1. (B) | 2. (C) | 3. (A) | 4. (D) | 5. (B) |
| | 6. (D) | 7. (A) | 8. (B) | 9. (D) | 10. (C) |
| B | 1. e | 2. j | 3. a | 4. h | 5. b |
| | 6. i | 7. f | 8. g | 9. d | 10. c |

Unit 2 Reference

Skill & Drill

1. (A) 2. (D)

프랑스-인디언 전쟁

1700년대 중반 13개 식민지의 서쪽에 위치했던 오하이오 준주는 영국과 프랑스의 분쟁지역이었다. 양국은 각자 교역소와 기지를 건설해 그 지역의 일부를 점령한 상태였다. 양국 모두 원주민인 아메리카 인디언의 주장을 묵살했다. 1753년 영국은 당시 스물 한 살의 소령이었던 조지 워싱턴을 보내 프랑스들과 협상을 하게 했는데, 그들은 소유권을 포기하라는 워싱턴의 요구를 거절했다. 1754년 영국은 프랑스에 대한 공격을 감행했고 그것이 프랑스-인디언 전쟁의 첫 전투가 되었다. 양쪽 다 인디언 부족들의 도움을 받았는데, 인디언들은 토지에 대한 그들 자신의 권리를 유지하고자 했다. 전쟁은 1763년 조약 조인과 함께 끝이 났는데, 조약은 캐나다 전체를 영국에, 루이지애나를 스페인에 주고 프랑스의 권리를 카리브해와 뉴펀들랜드 근처에 있는 몇몇 섬으로 제한했다.

3. (B) 4. (A)

개발경제학

개발경제학이란 가난한 개발도상국들이 직면한 특수한 경제 문제에 초점을 두는 경제 분야를 말한다. 고전경제학과 달리 개발경제학은 경제 성장에 영향을 미치는 경제적, 정치적 요소를 다룬다. 그것은 제3세계의 부채 문제와 엄격한 상환 조건으로 그 부채를 유지하는 데 있어 세계은행과 국제통화기금의 역할도 다룬다. 이 분야의 학자들은 최선의 장기적 해결책은 부채의 많은 부분을 탕감해주는 것이라고 제안했다. 또한 채무국들은 안정된 정부와 자립 경제를 건설하도록 도움을 받아야만 한다. 목표는 이러한 국가들이 채권국들과 무역 파트너가 될 수 있게 돕는 것이다. 이 목표를 달성하기 위한 한 가지 주요 방법은 건설한 중산층의 성장을 장려하는 것이다. 이를 위한 방법 몇 가지는 모든 이들을 위한 교육을 보장하고 자유 무역을 허용하며 의료를 지원하는 것이다. 정부는 선거를 통한 대표 선출과 독립적인 사법 체계를 고려해야 한다.

5. (A) 6. (C)

1873년의 공황

남북전쟁이 끝난 이듬해부터 철도 건설이 호황을 맞았다. 하지만 무기꾼들의 과도한 투자와 철도 부근의 지나친 건축 공사로 인해 무질서하고 억제되지 않은 성장이 일어났다. 그 당시 연방 정부는 개인 철도 소유주들의 횡포를 막을 힘이 없었다. 또한 그랜트 대통령의 통화 공급 제한 조치 때문에 투자자들이 경제 성장을 지원하는 데 필요한 자금을 대출 받기가 더욱 어려워졌다. 이 위기는 1873년의 공황에서 절정을 맞았는데, 그 때 선도적인 투자 금융회사가 파산을 선언했다. 그것이 도미노 효과를 불러일으키면서 철도가 폐쇄되었고 실업률이 급증했으며 뉴욕증권거래소의 주가가 폭락하면서 6년에 걸친 불황이 시작되었다. 1877년 무렵에는 임금 삭감과 열악한 근로 환경 때문에 노동자들이 파업에 돌입했다. 철도 파업으로 기차가 멈춰 서자 해리스 대통령은 파업을 끝내기 위해 연방군을 파견했다.

7. (B) 8. (C)

비고츠키의 근접발달영역 이론

두 가지 경쟁 이론이 아동의 발달을 설명하기 위해 제시되어왔다. 한 가지는 아동은 물려받은 형질의 산물(선천적)이라고 보는데 반해 다른 이론은 아동이 환경에 의해 규정된다(후천적)고 주장한다. 러시아의 심리학자인 비고츠키는 근접발달영역(ZPD) 이론을 제안해 이 두 가지 방법을 화합시켰다. 근접발달영역은 아동의 현재의 실질적 능력과 잠재 능력 사이의 격차를 말한다. 근접발달영역의 기준선은 아동이 도움을 받지 않고 문제를 해결하고 임무를 수행할 수 있는 능력이다. 근접발달영역의 상한선은 아동이 교사나 어른의 도움을 받아 도달할 수 있는 수준이다. 비고츠키는 훌륭한 지도자의 안내로 단계적 지도가 이루어지는 비계설정이라고 하는 과정에 의해 아동이 근접발달영역을 통과하여 발달하게 된다고 제안했다. 그런 식으로 아동의 독립적 능력이 향상되고 잠재 능력이 증가하면서 근접발달영역이 지속적으로 바뀌게 된다.

TOEFL Reading Practice

A 1. (D) 2. (A) 3. (B) 4. (B)

¹Bernoulli's Principle / ²offsets lift /

³propels a plane forward / ⁴friction between air and metal

비행 역학

비행기는 양력, 중력, 추진력, 항력의 네 가지 힘을 조절하는 능력 때문에 날 수 있다. 첫 번째 힘인 양력은 비행기가 이륙하고 비행 상태를 유지하게 하는 힘은 양력이다. 양력은 뉴턴의 제3 운동법칙으로 설명되는데, 그것은 모든 작용이 반대 방향으로 동일한 크기의 반작용을 낳는다는 것이다. 비행기 날개가 공기를 가를 때 날개의 각을 조정하여 스쳐 지나가는 공기를 누르도록 할 수 있다. 뉴턴의 법칙에 따라 그렇게 아래로 내리누르는 힘은 동일한 크기로 위로 밀어 올리는 힘 즉 양력을 만들어서 비행기를 뜨게 한다.

양력은 또한 베르누이의 원리를 써서 이해할 수도 있다. 베르누이의 원리에 따르면 공기와 같이 더 빨리 움직이는 유체는 더 느리게 움직이는 유체에 비해 낮은 압력을 받는다. 비행기 날개의 위쪽 부분은 곡면으로 되어 있기 때문에 공기가 날개의 평평한 아래 부분을 통과하는 공기보다 더 먼 거리를 움직이게 된다. 하지만 양쪽 공기는 날개의 끝 부분에 동시에 도달하는데, 이는 위쪽을 지나는 공기가 평평한 아래쪽을 통과하는 공기보다 더 빨리 움직이므로써 날개 위쪽의 압력을 낮춰서 날개를 들어올린다는 것을 의미한다.

비행기에 작용하는 두 번째 힘은 중력이다. 중력은 양력을 상쇄시켜 비행기가 반대쪽으로 움직이도록 한다. 만약 중력이 양력보다 크면 비행기는 날 수가 없다. 비행기 설계자들의 과제는 비행기를 뜨게 만들 만큼 튼튼하면서 또 장거리를 고속으로 날 수 있을 만큼 유선형인 날개를 만드는 것이다.

또 다른 힘은 추진력 즉 비행기를 앞쪽으로 미는 힘을 말하는데, 프로펠러나 제트엔진에서 얻어진다. 추진력이 충분하지 않으면 공기가 비행기 날개의 상하 부분을 지나가지 않게 되고 양력이 없어져서 비행기가 추락하게 된다.

마지막으로, 비행기는 항력을 이겨내야 한다. 비행기는 공기를 가르고 움직일 때 진행 방향의 공기를 밀어내는데, 이때 급속히 공기와 접촉하면서 마찰력이 생긴다. 그 마찰력이 항력이 되어 비행기의 속도를 떨어뜨린다.

항력을 없애기 위해 고속 비행기나 미사일은 얇은 날개를 가지고 있는데, 이것이 항력을 최소화한다. 반면에 농약 공중 살포 비행기 같은 저속 비행기들은 양력이 항력보다 더 중요한 역할을 하기 때문에 날개가 두터운다.

비행하는 동안 이 네 가지 힘이 정확하게 조절되어야 한다. 조종사는 이를 움직이거나 방향이나 속도를 바꾸거나 착륙을 하고자 할 때 조종 장치를 조작한다. 추진력이 항력보다 크면 비행기는 가속되고 양력이 중력보다 크면 상승한다. 조종사가 착륙기어를 내리거나 부익을 올려서 추진력을 감소시키고 항력을 증가시키면 비행기의 속도가 느려진다. 착륙기어와 부익을 원위치 시킴으로써 비행사는 비행기를 상승시키거나 가속시킬 수 있다.

- [B] 1. (D) 2. (B) 3. (A) 4. (C)
 1surviving / 2long-lasting /
 3Thomas Chippendale / 4Europeans

식민지 시대 미국의 가구

1600년대에 신세계에 도착한 초기의 미국 정착자들은 정교한 가구를 만들 수 있는 자원이거나 관심이 거의 없었다. 그들은 몇 개의 벤치, 테이블, 바닥 위의 매트리스 및 개로 만족했다. 식량을 경작하고 때때로 적대적인 인디언을 상대하는 것과 같은 기본적인 생존 문제를 해결하고 나자 그들은 집을 보다 편안한 곳으로 만드는 일에 관심을 쏟았다. 단풍나무, 벚나무, 호두나무, 참나무 등이 있는 천연의 숲 속에 살았기 때문에 식민지 개척자들은 최고 품질의 나무를 이용해 가구를 만들 수 있었다. 사실, 그런 최고의 목재를 이용했기 때문에 식민지 시대의 가구들은 오늘날 고품질 수집가들에게 대단히 인기가 높다.

예를 들어, 단풍나무는 끈튼하고 오래 가며 나무에 아무런 손상을 입히지 않고 작업할 수 있다. 또한 단풍나무는 뒤틀려서 매우 광택이 나는 마무리가 가능하다. 벚나무는 단풍나무만큼 단단하지는 않지만 절이 좋고 감촉이 좋아 작업하기가 쉽다.

초기의 미국 가구들은 주로 정착자들이 직접 손으로 만들었다. 직접 작업을 했던 정착자들은 조각 기술이 뛰어났다. 가장 인기 있었던 조각 형태는 단풍나뭇잎이었다. 얼마 지나지 않아 숙련된 고급 가구 제작자들이 유럽에서 건너왔고 그들은 직선으로 된 장식이 거의 없는 무거운 가구를 쓰는 영국의 관습을 모방했다. 디자인은 필요에 의해 단순하게 유지되었는데, 이는 식민지 시대의 주택이 작고 천장도 낮고 창문도 작았기 때문이었다. 등받이가 있는 의자보다는 등받이가 없는 의자가 더 실용적이었다. 테이블은 단단한 목판을 사용했고 풍나무로 만든 네모진 다리로 받쳤다.

식민지 시대의 가정 생활은 벽난로를 중심으로 이루어졌다. 벽난로는 매서운 겨울 날씨에 온기를 불어넣어 주는 유일한 곳이었다. 가구는 등받이가 높은 의자나 뒷개가 달린 아기 요람과 같이 추위와 싸우는 보호 역할을 할 수 있는 형태를 띠었다.

1700년대의 가구 양식에 가장 큰 영향을 주었던 것은 영국의 가구 제작자였던 토머스 차펜데일의 작품이었다. 차펜데일은 1754년에 책을 출간했는데, 이 책은 통해 대단히 창의적인 그의 작품이 미국에 소개되었다. 그는 문이 달린 책장과 높은 서랍장, 주전자 스탠드, 현수판식 테이블과 같은 많은 새로운 디자인을 개발했다. 필라델피아의 윌리엄 셰이브리와 같은 미국 디자이너들은 차펜데일의 스타일을 채택해 가장자리 장식이 화려하고 디테일이 긴 차펜데일 장풍을 만드는 데 이용했다.

미국 가구 제작자들의 솜씨는 당시의 유럽 가구 장인보다 낫다고 여겨지는데, 이는 이 가구들이 고품질로서 수요가 많은 또 다른 요인이 된다. 그러나 공급보다 수요가 많아 초기 미국 가구는 가격도 비싸고 찾기조차

쉽지 않다. 이러한 수요를 충족시키기 위해 가구 제작자들은 초기 제품과 동일한 목재와 기술을 사용해 복제품을 만들기도 한다. 초기의 미국 가구는 21세기에 살고 있는 주택 소유자들 사이에서 여전히 인기 있는 품목이다.

- [C] 1. (A) 2. (D) 3. (C) 4. (A)
 1100 yuan / 2dual-track system /
 31980s and 1990s / 4security features

인민폐

중화인민공화국의 공식 화폐는 인민폐로, 이는 "인민의 통화"라는 뜻이다. 그것은 흔히 줄여서 RMB로 표기한다. 인민폐의 기본 단위는 위안인데, 위안은 중국어로 "통글다"라는 뜻으로 중국 동전이 전통적으로 둥근 모양을 하고 있었던 것을 반영한다. 1위안은 10자이오이고 1자이오는 10펜이다. 따라서 6.35위안은 64위안, 3자이오, 5펜이다.

인민폐의 가장 큰 단위는 100위안 짜리 지폐이며 가장 작은 것은 1펜 짜리 동전 또는 지폐이다. 물가가 오르면 펜이나 자이오는 점점 쓸모가 없어진다. 거래세가 소매품의 소비자 가격에 포함되어 있기 때문에 물가는 9.95위안 대신 10위안 등의 정수로 표시된다.

인민폐 지폐에는 여러 개의 언어가 적혀 있다. "중화인민은행"이라는 말과 금액이 중국어뿐만 아니라 몽골어, 위구르어, 주앙어, 티베트어로도 적혀 있다.

인민폐는 1949년 공산주의자들이 중국 본토를 차지하기 직전에 처음 발행되었다. 급속한 인플레이션 때문에 중국 정부는 인민폐의 재평가를 포고했으며 그 이후로 여러 차례 재평가가 있었다. 공산 정부가 경제에 엄한 규제를 가한 시기 동안 통화의 가치는 서양 통화에 비해 비현실적으로 낮게 책정되었다. 1978년 중국 경제가 개방되면서 이중 시스템이 시행되었다. 국내에서는 인민폐를 사용하되 외국과의 거래에는 외환태환권을 사용했다. 인위적으로 낮게 만든 국내 환율 때문에 통화 암시장이 생겼으며 여기에서는 실제 시장 가격이 더 잘 반영되었다.

1960년대 후반과 1990년대 초반에는 중국인민은행에서 이중 시스템을 없애고 환율이 실질적 수준까지 오르도록 했다. 하지만 인민폐와 외국 통화 사이의 윌버한 태환성이 아직까지는 이루어지지 못했다. 정부는 태환성을 주요 목표로 삼았지만 1998년 아시아의 금융 위기로 중국 금융 시스템이 외국 통화의 유입에 잘 대처할 수 있을지에 대한 의문이 제기되었다.

1948년과 2005년 사이에 다섯 차례의 인민폐 지폐와 동전이 발행되었다. 처음 세 번째까지의 통화는 더 이상 법원적 효력을 갖지 못하지만 네 번째와 다섯 번째 통화는 아직도 사용된다. 1949년 공산혁명의 지도자인 마오쩌둥의 사진이 여러 가지 꽃들과 함께 아직도 유통되는 모든 지폐를 장식하고 있다.

다섯 번째 시리즈의 화폐는 위조 방지를 위해 고안된 새로운 안전 장치를 사용했다. 대부분의 지폐에는 금속 선이 있고 일정 각도에서 보게 되면 몇 개의 숫자 색깔이 변하며 섬유사를 제거하고 볼출입로 인쇄법을 사용했다.

- [D] 1. (C) 2. (B) 3. (C) 4. (B)
 1greenhouse gases / 2locally /
 3sustainable / 4combustible

수소 기술

화석 연료에 에너지를 의존하는 경제는 미래가 불확실하다. 석유, 석탄, 천연가스는 일단 사용해 버리면 대체 불가능하다. 화석 연료를 연소시키면 연

은 몸속에 빠져 있다. 경계를 허물기 위해 나는 주의를 기울여 한다.

1936년에 나온 그의 저작 <고용, 이직 및 화해의 임의성>에서 케인즈는 경제활동의 원인을 분석했다. 그는 정부가 경제활동을 파악하기 위해 은 목적의 한을 수해야 한다고 결론지었다. 그는 경제 생활들은 소비자의 임, 정부의 소비에 특정한 것은 상품에 대한 수요에 따라 결정된다고 전 해졌다. 소비자가 더 많이 지출하고 더 소비할수록 기업 수입은 감소해 기 인 자재의 소비와 투자를 감소시키게 된다. 이러한 소비의 감소로 경제

부이다.

결과를 살펴보는 거시경제학이라는 새로운 분야를 탄생시켰다.

1930년대 대공황이 일어났기 전 이념과 고전파 경제학은 자영업자국의 이론을 실패했다. 자영업자국의 이론은 정부에 경제에 어떠한 역할도 해서는 안 된다는 것이었다. 자영업자국의 경제는 규제가 없는 시장은 완전 고용, 저인플레이션의 방향으로 경제를 끌어갈 것이라고 예상했다. 하지만 1929년에 시작된 경제황혼은 그러한 불균형장착주의의 부적합성을 보여주었다. 경제가 어떻게 움직여야 하는지에 대한 고전파 이론은 좌절받아서 더 많은 영국 경제학자인 존 메이너드 케인즈였다. 그의 혁신은 경제를 움직여 주는 정부의 역할을 강조한 것이었다. 그러한 국가는 국가 경제의 전체적인

조메이도 카기야마 쿄

1macroeconomics / 2more money / 3public-works projects / 4New Deal

- F** 1. D 2. A 3. C 4. D

$$T_{\text{eff}} = T_{\text{eff}}^{\text{eff}} + T_{\text{eff}}^{\text{eff}}$$

오르면서 200년에 걸친 로마의 평화시대가 시작되었다. 아우구스투스는 로마제국의 국강을 떠나라며 땅을 강화하고 표창적인 통치를 하는 정장관들을 파견해 행정 기관을 두어 외치를 관리했다. 역사학자들이 아우구스투스 황제 시대라고 일컫는 그의 지배 시기 동안에는 로마를 누린 융성한 황제들이 그 뒤를 이었다. 하지만 160년경부터 로마 제국은 케르만족과 동쪽의 파르티아인들로부터 끊임없는 공격을 받았 다. 로마제국의 거대한 크기 때문에 땅을 확대하는 것이 점점 더 어려워졌

자신을 로마의 유일한 지도자로 선포했다. 기원전 44년 문화원의 부흥을 기도했던 사람들이 사자를 암살했다. 로마 지배권을 둘러싸고 수년에 걸친 내전이 있은 후 기원전 27년 사자의 양아들인 옥타비아누스가 로마 초대 황제가 되었으며 아우구스투스라는 이름을 택했다. 아우구스투스는 라틴어로 '고귀하다'라는 뜻이다. 그가 왕위에

다. 나라에서 거둔 세금만큼 로마 시민들을 지원하게 되면서 로마 공화정은 내부로부터 비틀거리기 시작했다. 귀족으로 불리는 부유한 로마 사람들은 번영을 누렸지만 평민으로 불리는 가난한 시민들은 새로 획득한 부에서 아무 것도 받지 못했다. 로마 안팎의 갈등은 내부의 군사 충돌을 낳았고 결국 줄리아스 시저를 포함한 로마인들의 독재자를 등장하게 되었다. 시저는 기원전 51년 골 제방을 점령하고 기원전 45년

[illegible]

기원전 275년 무렵 로마는 이탈리아 반도 전체를 지배했다. 제국이 되기 위한 로마의 군사 원정은 기원전 마지막 200년 동안 일어났다. 로마의 주요 경쟁국은 아르르가 북부 해안에 있던 해상세력인 카르타고였는데, 로마는 카르타고를 상대로 세 차례에 걸친 포니에 전쟁을 치렀다. 로마는 결국 승리를 거두어 아르르와 스해인 해안에 대한 지배권을 얻고 지중해 수로 및 무역로를 장악하게 되었다. 또한 로마는 동쪽으로 세력을 펼쳐 기원전 133년경에는 그리스, 마케도니아, 터키를 손에 넣었다. 처음 상대로 로마가 승리를 거둘 수 있었던 데는 두 가지 요인이 있었다.

포미는 기원전 약 1000년경 세워졌다. 기원전 590년에 로마 시민들에
드루리아 왕국을 타도하고 로마 공화정을 세웠다. 그 후 200년간 로마는
이탈리아 반도의 대부분에 세력을 넓혀서, 정복한 도시에 시민권을 주고
그에 대한 보상으로 각 도사가 로마에 더 많은 병사를 제공하도록 요구했다.

음료 판매처명

¹a republic / ²three wars / ³44 B.C. / ⁴476 A.D.

- E** 1. C 2. A 3. A 4. D

회는 이 시도 계획에 들어갈 예산을 승인했다.

용하는 연료 전지의 비용은 10만 달러가 될 것이라고 한다.

모양이고 있다. 수조 기술을 비판하는 사람들은 대단히 가소성이 높은 기체인 수소에 대해서는 위험을 경고한다. 생산 과정에서 수소를 안전하게 취급할 수 있도록 설비를 갖춰야만 하는 것이다. 한 가지 추정에 따르면 2012년경 그러한 차임에 사용

할 수 있다. 이 과정에서 수사와 일문법이나 생가례, 이것을 재조합하여 문법학을 만들 수 있다. 캐나다의 한 학자는 이 처리 과정과 관련된 연구를

세 번째로, 물에서 수소를 얻을 경우 이는 자수가 아닌 생수인 산소가 된 다. 물은 물에 전류를 통과시키는 전기분해에 의해 산소와 수소가 분해된다. 전류는 비전압이나 태양전지, 조타와 같은 재생가능한 에너지원로부터 얻을 수 있는데, 이 에너지원들은 석유에 의존하지 않는다는 또 다른 장점을 갖고 있다. 하지만 이들 에너지원의 단점은 그것을 언제나 사용할 수는 없다는 것이다. 바람이 잦아들 수도 있고, 태양이 구름에 가려질 수도 있고, 조력은 아직까지 완전히 개발되지 못했다. 그 점에서 수소는 해당이 되는데, 일단 전기분해로 수소가 생성되면 연료 전지에 저장해서 재생가능한 에너지원이 되려는 것은 어려운 일이다. 또한, 물을 공급할 수 있다. 수소는 전기분해뿐만 아니라 광물(물) 폐기물의 화학 반응으로도 생산

을 제외하고는 자체적인 모임활동을 세우할 수 있다.

이것이 아닌 것은 무엇인가? 유한한 부속물은 유한하다.

조각은 조각가, 조각품, 조각가적 세계를 요망시키는 매체가 아니다. 조각가적 세계는 조각품을 요망하는 것인데, 이 가치는 화석 연료에서 생기는 몇 가지 문제를 피할 수 있다. 첫 번째로, 수소는 오염 물질을 적다. 연료전지에서 산소와 결합한 수소는 전기 에너지를 생산하는 데, 이 에너지는 사용에 연전에 오염물질을 배출하고 건물 난방을 위한 열을 낼 수 있다. 수소와 산소 결합에서 가장 좋은 점은 온실효과보다 더 많은 오염물질을 배출한다.

케인즈는 경제불황을 막기 위해서는 정부가 소비를 늘리고 이자율을 낮추어야 한다고 제안했다. 그렇게 되면 기업과 소비자들은 대출을 받기가 쉬워지고 이로 인해 소비가 늘어날 것이다. 그 결과 소비재에 대한 수요가 증가해 투자가 늘어나고 고용이 증가할 것이다.

수요를 증가시키고 고용을 늘릴 수 있는 또 다른 국가 정책은 정부가 공공사업 계획에 더욱 많은 사람을 고용하는 것이라고 케인즈는 제안했다. 그러한 생각은 프랭클린 루즈벨트의 뉴딜 정책의 철학적 근거가 된 것으로 여겨진다. 이 프로그램의 핵심적 요소는 연방정부가 지원하는 건설 공사와 경제불황에 상처 입은 미국인들을 다시 직장으로 돌아가게 하는 문화 프로그램이었다.

케인즈 경제학은 현대 경제학의 지배적 정책으로 남아있다. 하지만 케인즈의 가정 가운데 일부는 맞지 않는 것으로 밝혀졌다. 그는 고용이 확대되면 노동 생산성이 감소한다고 가정했다. 하지만 실험을 통해 그 반대 현상이 일어난다는 것이 밝혀졌다. 또한 그는 고용이 증가하면 실질임금이 감소한다는 그릇된 가정을 하기도 했다. 그리고 그는 인플레이션이 완전고용 근처에서만 일어난다고 생각했다. 하지만 역사적으로 큰 때 인플레이션은 때때로 스테그플레이션이라고 불리는 상태인 고실업 시기에 발생하기도 하는 것으로 나타났다.

Building Summary Skills

1. The Mechanics of Flight

¹Four forces combine to make airplane flight possible. Lift enables a plane to ²take off and stay in the air. Weight offsets lift and must be overcome by lift in order to ³keep the plane in flight. Thrust ⁴moves the plane forward. Drag is air resistance that ⁵slows the plane down. The pilot must precisely manage each force in order to take off, change direction and speed, or land.

2. Furniture in Colonial America

¹Early American settlers had to focus on survival, leaving no time for furniture design. As they prospered, they turned to making plainly designed furniture that was suited to their small homes. Colonial furniture is valued today because it was made from ²the finest quality wood. It was handmade with simple designs that would fit in ³the small colonial houses. Many artisans were influenced by the work of an English furniture maker, ⁴Thomas Chippendale. Today colonial furniture is ⁵expensive and in great demand, creating a market in reproductions.

3. The Renminbi

The *renminbi* is the official currency of ¹the People's Republic of China. It was first issued in ²1949 and has been reevaluated many times since ³the communists took control. It is not yet fully convertible with foreign currency. The latest series of banknotes have many security features, such as ⁴metallic strips and raised-ink printing. The base

unit is ⁵the yuan, which is equal to 10 *jiao*, which in turn equals 10 *fen*.

4. Hydrogen Technology

¹Hydrogen technology may be a good replacement for ²fossil fuels as a source of energy. It causes ³less pollution, can be produced locally, and can be stored in ⁴fuel cells. Sources of hydrogen include water, methane, gasoline, coal, or wind and solar energy, but ⁵hydrogen technology is expensive and will not be affordable for many years. In 2003, the U.S. government announced a plan to invest in ⁶hydrogen-powered fuel cells.

5. The Rise of the Roman Empire

¹The Roman Republic was born in 509 B.C. It extended its control over the Italian peninsula and eventually the major powers bordering ²the Mediterranean Sea. Its initial success was due to its ability to use the cities it conquered as a source of manpower for its armies. And it held onto power by establishing ³an efficient system of government. But it declined when it was unable to govern its own citizens. The unrest led to the start of the Roman Empire in ⁴27 B.C., with Augustus as the first emperor. The empire lasted until ⁵476.

6. John Maynard Keynes

John Maynard Keynes proposed that governments should ¹take more active roles in the economy. He believed that governments could avoid depressions by ²increasing spending and lowering interest rates. He also favored public-works projects to ³lower unemployment. President ⁴Franklin Roosevelt used that strategy to help America out of ⁵the Great Depression. Keynes's belief that inflation occurs only in times of high employment has been proved incorrect.

TOEFL iBT Practice Test

1. (C) 2. (A) 3. (C) 4. (C) 5. (B)

6. (B) 7. (A) 8. (C), (D), (F) 9. (D)

10. (D) 11. (A) 12. (C) 13. (A) 14. (A)

15. (B) 16. Pottery as art (B), (D), (G) / Pottery as tools (A), (E)

미국 식민지 시대의 신문

미국 식민지 시대 최초의 신문은 1690년 보스턴에서 발행되었다. 그것은 〈퍼블릭 어퍼텐시즈: 국제 및 국내 소식〉이었다. 그러나 이 신문은 단 한번 발행된 후 영국에 의해 폐간되었다. 그 뒤 두 번째 신문이 나온 것은 14년 후로, 〈보스턴 뉴스레터〉라고 하는 주간지였다.

초기 신문에는 다른 신문들, 특히 런던에서 발행된 신문에서 가져온 기사를 외에는 실린 내용이 거의 없었다. 그 결과 편집자들은 선장들이 유럽에서 신문을 가져올 때까지 기다려야 했기 때문에 대부분의 "뉴스"가 여러 달씩 묶은 내용이었다. 선장들은 때로 뉴스를 전달해주는 정보원이 되기도 했는데, 자연재앙을 직접 목격하거나 멀리서 일어난 사건을 간접적으로 듣고 전해주기도 했기 때문이다. 일부 뉴스는 식민지 전역에 있는 서신 기자들한테서도 받았는데, 그들은 각자 지역에서 발생하는 사건을 기술하였다.

제임스 프랭클린은 신문을 사회적, 정치적 논평의 수단으로 삼은 최초의 편집자였다. 벤자민 프랭클린의 형이었던 제임스 프랭클린은 <뉴잉글랜드 키턴트>를 발행했다. 그의 친구들은 시사 문제와 지역 사회에 관해 해학과 풍자가 넘치는 글을 써서 많은 이들을 화나게 했지만 신문에 오라기능을 더하기도 했다.

하지만 18세기 초기의 편집자들은 언론의 자유를 누리지 못했다. 한 가지 예로, 제임스 프랭클린은 영국 정부를 비판하는 사실을 쓴 뒤 감옥에 수감되었다. 그가 석방되었을 때는 더 이상 신문을 출판할 수 있도록 금지 조치를 당했다. 하지만 13살 된 남동생 벤자민이 신문 발행과 배달을 맡아 곧 형 대신 편집장이 되었다.

프랭클린은 1729년에 인수한 <펜실베이니아 가제트>지를 운영하기 위해 펜실베이니아로 떠났다. 프랭클린은 이 신문에 제지와 풍자를 담아 가공의 인들을 만들어, 웃기면서도 때로는 신랄한 일상생활의 단편들을 담았다.

식민지 시대의 신문사 사무실에는 보통 주인과 견습생 두 사람밖에 없었다. 견습생은 신문 만드는 일을 배우기 위해 주인과 함께 살고 일했다. 견습 기간은 보통 12살에서 21살까지였다. 주인은 견습생을 사유 재산이라고 생각하여 잔혹하게 대하는 일이 잦았다. 그 당시의 신문에는 달아난 견습생의 소재를 알려주면 보상을 하겠다는 광고가 많았다. 견습생이 21살이 되고 충분한 돈을 저축해 둔 경우에는 자신의 신문사를 열 수 있었다. 여성은 견습생이 될 자격이 주어지지 않았다.

1440년에 구텐베르크가 금속 활자를 발명한 뒤로 인쇄술은 많이 발전하지 못했다. 식민지 시대의 신문들은 인쇄기 반대(紙背)에 압반을 내리기 위해 지레를 사용한 나사가 있는 목판인쇄기로 인쇄를 했다. 견습생은 나무 막대 끝에 있는 공 모양의 양모로 목판 활자에 잉크를 발랐다. 압반을 내리는 작업은 매번 손으로 해야 했는데, 가장 빠른 경우 시간당 약 200번 정도 찍어낼 수 있었다.

1750년대 중반 무렵 신문들은 영국의 지배에 대해 점점 커져가는 적개심을 표출하며 독립을 향한 욕망을 자극하는 역할을 했다. 예전 같았으면 팜플렛으로 배포되었을 의견들이 신문에 등장하기 시작했다. 1776년 7월 4일 서명한 독립선언서가 이름 뒤 <필라델피아 이브닝 포스트>지에 실렸다. 1789년 제헌회의의 지도자 가운데 제임스 매디슨, 알렉산더 해밀턴, 존 애디슨 등은 두 신문에 "연방주의자 기고 모음집"을 발표해 그들의 견해에 관한 대중의 지지를 얻고자 했다.

애리조나의 고대 인디언 도기

오늘날의 애리조나 주에 해당하는 지역의 아메리카 인디언들이 처음 북아메리카로 온 것은 기원전 약 25,000년경이다. 이들은 아시아에서 와서 알래스카의 베링해협을 건너 서서히 캘리포니아, 애리조나, 멕시코로 해안을 따라 내려왔다. 이들은 약 2천 년 전까지 유목생활을 하다가 이 때부터 농사를 짓기 시작했다. 일단 한 곳에 정착하게 되자 그들은 도기를 만드는 기술을 익혔다. 도기 유물은 고대 인디언들의 생활방식과 시대를 이해하

는 데 중요한 실마리를 제공하는데, 종종 그것이 여전히 손상되지 않고 남아있는 유일한 공예품이기 때문이다. 점토는 구우면 시간이 지나도 품질이 변하지 않는다.

우리는 인디언들이 어떻게 그리고 왜 도기를 만들기 시작했는지 확실치 않지는 못한다. [학자들은 여러 가지 설명을 제시해왔다.] 가장 널리 수용되는 이론은 우연히 발견하게 되었다는 것이다. 인디언들은 그들이 엮은 바구니 위에 점토를 덮었다. 그들은 바구니를 불 위에 얹어서 그 안에 든 옥수수나 다른 곡식을 말리곤 했다. 그 열처리 과정이 점토를 단단하게 만들었다. 그래서 인디언들은 점토로 형태를 만들고 불 위에서 굽고 식히는 과정을 통해 그 형태를 영구적으로 만들 수 있다는 것을 알게 되었다. 이 이론에 대한 입증 자료가 되는 것이 고대 도자기에 보이는 바구니 자국인데, 이것은 도기가 천으로 된 바구니 물레를 감싸서 성형되었음을 나타낸다.

초기의 도기들은 예술작품으로 만들려는 의도가 없이 집안일을 하는 데 사용되었다. 농경 생활을 하면서 씨앗과 곡식을 저장하고 식량을 운반할 그릇이 필요했다. 또한 도기들은 불에 올려도 부서지지 않았기 때문에 조리 도구로도 사용되었다. 이런 초기의 도기들은 단순하고 비대칭적이었다. 하지만 결국 애리조나의 고대 인디언들은 상징물과 심화로 도기를 장식하기 시작했다.

장식 디자인의 의미가 항상 현대 학자들에게 분명한 것은 아니다. 인디언들은 그 의미를 외부인들에게 기꺼이 설명하려고 하지 않았다. 하지만 삽화들이 인디언의 전통과 역사, 의식, 전설을 반영하고 있다는 사실만은 알 수 있다. 일반적인 주제로는 새, 사슴, 물소, 인간, 신 등이 있었다.

인디언들이 바퀴의 이점을 이미 알고 운송이나 도구로 사용하고 있었지만 물레를 만들지는 않았다. 그들은 감아올리고 빚어올리는 수고스러운 방법을 써서 도기를 만들었다. 한 가지 이론에 따르면 그들은 손으로 직접 작업하여 자연과 조화를 이루는 과정을 더 선호했기 때문에 의도적으로 물레를 사용하지 않았다고 한다.

애리조나 인디언들은 조상에게서 물려받은 비밀 장소에서 점토를 채취했다. 완성된 도기는 표면을 매끄럽게 한 다음 끓인 식염수나 미세하게 간 암석에서 얻은 염료로 색칠을 했다. 전까지 흙을 섞어서 빛을 만들었다.

도기를 제작한 애리조나 최초의 인디언족 가운데 하나는 호호캉족이었는데, 이 종족은 약 200년경부터 존재했다. 이들이 만든 작품은 붉은색이나 담황색의 사용, 기하학적 무늬, 뿔, 불고기, 제식 무용의 추상화 등이 특징이다. 또 다른 종족인 아나사지 인디언들은 흑백 디자인을 사용했다. 그들의 도기는 대칭적 디자인, 독특한 무늬, 문양의 정확한 반복 등이 특징이다. 아나사지 도기는 400년부터 1500년까지 존재했다.

950년경 뎀브레스 인디언들은 특이하고 덜 현실적인 양식을 채택했는데, 이는 애리조나 종족들의 예술적 방법에 중요한 변화가 생겼음을 나타낸다. 뎀브레스 인디언들은 그들의 신화, 전설, 역사를 묘사하기 위해 인간과 동물의 모습을 하나로 결합했으며, 종종 학자들이 해석할 수 없는 우스꽝스러운 그림이 발견되기도 한다.

Vocabulary Review

- | | | | | | |
|-----|--------|--------|--------|--------|---------|
| [A] | 1. (C) | 2. (A) | 3. (B) | 4. (C) | 5. (D) |
| | 6. (A) | 7. (B) | 8. (D) | 9. (C) | 10. (C) |
| [B] | 1. j | 2. g | 3. a | 4. e | 5. h |
| | 6. c | 7. i | 8. b | 9. d | 10. f |

Unit 3 Factual Information

Skill & Drill

1. (B) 2. (A)

존 스미스와 제임스타운 식민지

1606년 영국의 제임스 1세는 버지니아를 식민지로 만들기 위해 세 척의 배를 보냈다. 국왕에게는 두 가지 목적이 있었는데, 보물을 발견하는 것과 아메리카 인디언들에게 기독교를 전파하는 것이었다. 1607년 배가 버지니아에 도착했을 때 정착자들은 제임스타운을 식민지로 선택했고 국왕이 존 스미스를 지도자로 임명했다. 제임스타운은 물이 깨끗하지 못한 늪지에 있었기 때문에 생존을 위해 사투를 벌여야 했다. 105명의 정착자 가운데 3분의 2정도가 말라리아, 영양실조, 이질로 사망했다. 스미스의 강력한 지도력 덕분에 식민지는 한동안 유지될 수 있었다. 하지만 식민지 개척자들은 끊임없이 인디언들과 전쟁을 치러야 했고 1609년에는 스미스가 전투에서 부상을 당해 영국으로 돌아가야만 했다. 식민지 개척자들은 스스로 식량을 생산하는 법을 배우고 완급작원인 담배를 발견하게 되면서 1600년대를 버텨낼 수 있었다.

3. (C) 4. (A)

누진세

소득세는 누진세이거나 단일세이다. 단일세는 소득액에 비례하는 세금으로, 소득 수준에 상관없이 세율이 일정하다. 하지만 누진세의 경우는 소득에 따라 세율이 증가한다. 더 높은 세율을 부과하는 이유는 단일세의 불평등을 피하기 위한 것이다. 이 불평등은 모든 사람에게 동일한 세율을 부과할 때 부유한 사람이 저소득자에 비해 더 적은 퍼센트의 세금을 내기 때문에 발생한다. 그 이유는 소득이 적은 사람일수록 소득의 더 많은 부분을 의식주와 같은 필수품에 사용하기 때문이다. 일단 더 부유한 납세자들은 동일한 필수품에 대한 비용을 지불하고 나면 저축, 사치품, 여가생활 등에 쓸 수 있는 여윈돈이 더 많이 남게 된다. 누진세는 세금을 더 낼 능력이 있는 사람에게 더 큰 부담을 지운다는 이론을 배경에 깔고 있다.

5. (D) 6. (B), (E)

고대 이집트 회화

이집트 회화는 약 5천 년 전 비옥한 나일 계곡을 중심으로 발달한 문명에서 시작되었다. 기후가 대단히 더웠던 탓에 많은 고대 이집트 회화가 오늘날까지 보존될 수 있었다. 회화는 죽은 사람들을 위한 내세의 동반자 역할을 하기 위해 제작되었기 때문에 죽은 사람을 묻었던 무덤 안에서 발견되었다. 죽은 사람이 잘 아는 사람들과 장소를 보고 편안함을 느낄 수 있도록 화가는 그 사람이 살았던 시대와 정확히 묘사하려고 애썼다. 또한 내세로 가는 여정과 내세에서 만나게 될 신들이 회화의 주제가 되었다. 이집트 사회는 대단히 종교적이었기 때문에 많은 회화에 신과 여신뿐만 아니라 역시 신으로 여겨졌던 그들의 통치자 파라오가 등장했다. 회화 양식은 정돈된 느낌을 주도록 깔끔하고 단순한 선과 모양을 사용했다.

7. (A) 8. (C)

호주와 대륙아동설

2백만 년 전 지구의 모든 땅은 판게아라고 하는 하나의 땅 덩어리였다. 지질학 연구에 따르면 약 1억 8천만 년에서 1억 6천만 년 전에 지구의 지각이 여러 개의 판으로 쪼개져 다른 방향으로 이동했다고 한다. 이 과정은 대륙 이동이라고 하는데, 이를 통해 지구는 대륙으로 갈라지게 되었다. 약 6천 5백만 년 전에 호주는 남극, 남아메리카, 아프리카 등과 함께 그 땅 덩어리의 남반구에서 떨어져 나왔다. 그 이후 1억 년 간 호주는 나머지 두 대륙과 붙어 있었다. 그러나 약 4천 5백만 년 전 호주는 다른 대륙들에서 따로 떨어져 나왔다. 호주가 다른 대륙들에서 떨어져 나오면서 특유의 동식물이 자라게 되었다. 호주의 건조한 평야나 산맥과 같은 다양한 지형은 역시 이 대륙 이동 과정에서 생긴 대변동의 결과이다. 호주는 지금도 해마다 약 10밀리미터의 속도로 북쪽으로 이동하고 있다.

TOEFL Reading Practice

[A] 1. (A) 2. (C) 3. (B) 4. (A)

1reason and logic / 21916 to 1920 /

3Marcel Duchamp / 4surrealism

다다이즘

다다이즘은 1916년 스위스 취리히에서 시작된 문화 저항 운동이다. 다다이즘은 전통적 사회 가치, 특히 이성과 논리에 대한 반항으로 인식되는데, 다다이스트들은 이상과 논리를 도덕적으로 파산했으며 세계를 파괴적인 제1차 세계대전으로 몰아넣은 원인으로 보았다. 그들의 해답은 무정부주의와 불합리를 수용하는 것이었다. 그들은 결합 있는 가치 체계의 파괴를 통해 보다 인간적인 전망의 인도를 받는 새로운 체계를 만들 수 있다고 믿었다.

다다이즘 운동은 1916년 휴고 발이 취리히에 있는 카페 볼테르에서 최초의 다다이즘 선언문을 낭독하면서 시작되었다. 다다이스트들은 문화에 대한 확신을 상실했음을 선포하면서 기존 질서를 파괴하고 재건하겠다고 선언했다. 그들은 공격적이고 난폭한 예술과 문화 작품을 만들어서 대중에게 충격을 가하는 것으로 다다이즘 옹호 운동을 시작했다. 그들은 "반예술" 작품들로 자신들을 표현했는데, 이는 그들이 미학을 무시하고 아무런 내재적 의미도 없으며 대중을 화나게 만들려 했음을 의미한다.

질정기에 해당된 1916년에서 1920년 사이 다다이즘은 유럽 전역에 퍼져서 다다이즘적 견해를 표출하는 장구 역할을 하던 많은 정기 간행물에 영향을 미쳤다. 가장 영향력이 컸던 다다이스트로는 프랑스 조각가인 마르셀 뒤샹을 들 수 있다. 그는 이른바 레디메이드 즉 사전에 바퀴나 새장과 같은 일상용품을 예술작품으로서 전시했다. 예술은 어떤 심오한 메시지를 전달해야 한다는 사고를 바꿀려는 것이 그의 의도였다. 뒤샹의 가장 유명한 작품은 소변기인 "샘"이었다. 1917년 뒤샹이 이 작품을 처음 선보였을 때 예술계는 이를 인정하지 않았다. 하지만 나중에 이 작품은 다다이즘 운동을 대단히 잘 반영한 작품으로 인정받게 되었다. 2004년 이 작품은 "현대미술품 가운데 가장 영향력이 큰 작품"으로 선정되어 영국에서 상을 받았다.

제1차 세계대전 후 뒤샹을 비롯한 많은 다다이스트가 뉴욕에서 활동했다. 뒤샹은 미국 예술가인 앤 레이가 활동하던 집단에 합류했다. 뉴욕의 유명 사진작가 알프레드 스티글리츠가 그들 작품의 대부분을 촬영했다. 다다이즘 운동에서 더 진지했던 유럽파와 달리 뉴욕파는 유머와 아이러니를 아용

해 전통적 가치를 부정했다.

1920년대 중반 무렵에는 다다이즘 운동이 독창성을 잃어버리고 초현실주의나 사회주의 리얼리즘을 비롯한 다른 문화적 흐름에 흡수되었다. 제2차 세계대전 동안 많은 유럽파 다다이스트들이 미국으로 건너갔다. 다른 이들은 히틀러의 강제수용소에서 죽음을 맞았다. 히틀러는 그들의 작품을 "타락한 예술"이라고 비난했다.

"다다"라는 말은 기원이 불분명하다. 어떤 이들은 이 말이 아무 의미가 없다고 말한다. 또 다른 이들은 이 말이 "맞아, 맞아"를 뜻하는 "다, 다(da, da)"에서 왔다고 말한다. 또 다른 견해는 다다이즘의 창시자들이 이 용어를 붙여 사전에서 골랐다는 것이다. "다다"는 불어로 아이들이 타고 노는 장난감 목마를 말한다.

[B] 1. (C) 2. (A) 3. (B) 4. (C)

1underground spring / 2heated rock /
3cone geysers / 474 minutes

간헐천

간헐천이란 뜨거운 지하 온천을 말한다. 그것은 주기적으로 공중으로 뜨거운 물줄기와 증기를 내뿜는다. 간헐천은 지구상에서 몇 군데에만 존재하는 독특한 지질학적 요인이 필요하기 때문에 매우 드물다. 오늘날 발견되는 간헐천은 불과 1,000개 정도로, 그 가운데 절반이 미국의 옐로스톤 국립공원에 있다.

표층수가 지하로 흘러 들어가 마그마 즉 화산의 용융암에 의해 데워진 암석에 닿으면 온천이 형성된다. 온천은 지하 암석층 사이의 틈을 통해 지표로 올라온다. 올라오는 물이 지하수와 지표층을 연결하는 좁은 통로 속으로 압축되어 들어가면 물은 간헐천의 일부가 된다. 물은 지표로 나오면서 식어서 아래쪽의 더 뜨거운 물에 하방 압력을 가하게 된다. 뜨거운 물은 지하의 단단한 암석층에 갇혀 빠져나갈 곳이 없다. 그 결과 물에 가해지는 압력과 열기가 더해져 물은 95.6°C까지 과열된다.

필필 끓는 물은 지표로 이어진 구멍을 통해 뿜어나온다. 물이 이렇게 빠져나가게 되면 아래쪽 물에 가해지는 압력이 낮아져서, 과열된 물이 분출구를 통해 공중으로 빠져 나와 간헐천의 최종 결과로 보게 되는 물보라가 생기게 된다. 물보라는 몇 분간 계속된다. 마침내 이러한 압력 방출로 남아있는 물이 끓는점 아래로 내려가고 지하수가 다시 지하로 스며들면서 분출이 끝나게 된다. 이러한 순환은 주기적으로 반복된다.

간헐천은 두 종류가 있다. 분수형 간헐천은 용융암에서 분출하는데, 보통 연속적으로 격렬하게 터져 나온다. 원추형 간헐천은 간헐석이라고 하는 광물 피적층 더미에서 나온다. 이 간헐천은 몇 초에서부터 몇 분까지 계속되는 지속적인 물보라를 형성한다.

가장 유명한 간헐천은 옐로스톤 국립공원에 있는 "올드 페이스프"이라는 원추형 간헐천이다. 이런 이름이 붙여진 것은 대단히 규칙적으로 분출하기 때문이다. 평균적으로 매 74분마다 분출하며 1회 분출의 지속 시간은 1.5에서 5분이다. 분출되는 물의 높이는 100~180피트로 다양하다.

간헐천이 희귀한 것은 간헐천이 형성되는 데 필요한 조건이 특수하기 때문이다. 간헐천이 지표로 이어지는 풍모의 벽을 만들고 강화하는 데 필요한 광물 피적층이 형성되려면 화산암이 뜨거운 물에 용해되어야 한다. 분출구에 어떠한 방해물이란도 있으면 간헐천은 형성될 수 없다. 예를 들어, 사람들이 만든 쓰레기와 부스러기 때문에 많은 간헐천이 사라졌다. 그런가 하면 근처의 발전소에서 간헐천의 물을 다른 방향으로 뿜었기 때문에 사라진 간헐천도 있다.

[C] 1. (A) 2. (C) 3. [A], [B] 4. (C)

1Great Depression / 230 hours /

3public-works projects / 4waste of tax

공공사업국

1930년대 미국에서는 대공황 시기 동안 많은 공장들이 문을 닫으면서 수백만 명이 일자리를 잃었다. 실업자들은 공적 구조 자금에 의존해야 했다. 1935년에 프랭클린 D. 루즈벨트 대통령은 구조 자금에 의존해 생활하는 사람들에게 정부 지원 자금으로 마련한 일자리를 제공하는 공공사업진흥국을 신설했다. 나중에 공공사업국(WPA)으로 개명된 이 기관은 루즈벨트의 경제 부흥 계획인 뉴딜정책에서 가장 규모가 큰 기관이었다.

이 기관의 초대 국장을 맡은 사람은 해리 L. 트루먼이었다. 그는 3백 5십만 명이 WPA를 통해 일할 수 있으며 노동자 한 명당 연간 1200달러가 필요할 것으로 추정했다. 의회는 40억 달러의 예산을 승인했다. 임금은 지역과 현지 임금 수준, 요구되는 기술 등에 따라 달리 책정되었다. 노동자 수를 최대한 늘리기 위해 1인당 노동 시간이 주당 30시간을 넘지 못하도록 했다.

그 시대의 문화를 반영해 WPA는 아내와 남편 두 사람이 동시에 일하지 못하도록 했다. 한 가정의 가장이 남자이기 때문에 여성이 일을 하게 되면 남성의 일자리를 빼앗게 된다고 여겨졌기 때문이다. 일자리를 가진 여성은 보통 병원이거나 고아원에서 쓸 물건이나 옷을 만드는 바느질 일을 할당 받았다.

WPA가 제공한 일자리의 대부분은 정부 건물, 공항, 다리, 국립공원, 고속도로, 댐, 하수도, 도서관, 레크리에이션 시설 등과 같은 공공사업 분야의 일이었다. 하지만 WPA는 또한 연방예술사업, 연방작가사업, 연방연극사업 등을 통해 문화 사업도 지원했다. 일자리를 잃었던 많은 배우들과 극작가들이 갑자기 재능을 발휘할 수 있는 기회를 얻게 되었다. 화가들은 공공 건물의 벽화를 그리는 일자리를 얻었다. 작가들은 주와 지역 안내 책자 시리즈를 발간하는 일자리를 얻었다. 연방작가사업에 참가했던 작가 가운데는 나중에 노벨상 수상자가 되었든 솔 벨로우도 있었다.

흑인들이 특히 WPA의 혜택을 많이 받았는데, WPA에서는 개인 고용주에게 받는 것보다 고용 차별이 덜했기 때문이다. WPA는 특별히 화이트칼라의 직책에 흑인을 우선적으로 고용했다.

WPA는 정치 보수파들의 비판을 받았는데, 이들은 이 계획이 공원에서 나뭇잎을 긁어 모으는 것과 같이 불필요하고 하찮은 일에 납세자들의 돈을 낭비한다고 주장했다. 그리고 보다 교육 수준이 높은 노동자들의 다수가 좌익 또는 공산주의 성향을 가졌다. 비판자들은 시업과 기금의 배정에 정치권의 영향이 크다고 주장했다. 루즈벨트 대통령을 지지하는 의회 지도자들이 해당 지역에 더 많은 WPA 일자리를 배정 받는다는 게 그들의 주장이었다.

WPA의 영향은 1940년경 줄어들기 시작했다. 1941년 미국이 제2차 세계대전에 참전하면서 공정의 고용이 증가해 이 기관의 필요성이 줄어들게 되었기 때문이다. 공공사업국은 1943년 폐쇄되었다.

[D] 1. (B) 2. (B) 3. (A) 4. (C)

1Buon fresco / 2red pigment /

3a secco / 4Michelangelo

프레스코화

프레스코는 축축한 회벽에 직접 염료를 칠하는 기법을 말한다. "프레스코"라는 말은 "신선하다"라는 뜻을 가진 이탈리아어 "아프레스코(a fresco)"

에서 나왔다. 프레스코화는 축축한 회반죽에 그리는 “부운 프레스코”와 마른 회반죽에 그리는 “세코 프레스코”가 있다. 세코 프레스코는 일반적으로 마른 부운 프레스코화에 마무리 손질을 하거나 잘못된 부분을 수정하는 데 사용된다.

화가는 “아리치오”라고 하는 마른 회반죽으로 된 거친 바탕층 위에 자신이 만든 구도로 윤곽을 그려서 프레스코화를 그릴 준비를 한다. 이 스케치에는 흔히 “시노피아”라고 하는 붉은 염료를 사용한다. 그런 다음 “인토나코”라고 하는 축축한 회반죽 층을 바른다. 화가는 그림을 그리기 위해 이 위층을 매끄럽게 만든다.

그런 다음 화가는 자기가 그리려고 하는 실물 크기의 밑그림을 그린 종이판을 꺼낸다. 그는 축축한 인토나코에 이 밑그림을 베껴 그리고 이것을 길잡이 삼아 색칠을 하기 시작한다. 끝없는 석회수에 갈아 넣은 분말 염료로 되어 있다. 젖은 회벽이 염료를 흡수하면 염료는 회반죽과 함께 건조된다. 회반죽의 화학 성분이 회반죽과 염료를 굳혀주기 때문에 아무런 접합제도 필요하지 않다. 매끄러운 식회의 광택이 색채를 돋보이게 하는 풍부한 질감을 만들어낸다.

부운 프레스코화는 회반죽이 마르기 전에 작업을 끝마칠 수 있도록 그림 그리는 시간을 조절해야 하기 때문에 어려운데, 젖은 회반죽은 약 10~12 시간이 지나면 건조된다. 일반적으로 화가는 한 시간 후부터 작업을 시작해 회반죽이 완전히 건조되기 약 2시간 전까지 작업을 한다. 그렇기 때문에 미리 작업 계획을 세워 부분을 나누고 언제 어떤 부분을 작업할 것인지 결정해야 한다. 화가가 하루에 작업할 수 있는 면적은 “조르나타” 즉 “하루 작업량”이라고 한다. 한 벽은 여러 개의 조르나타로 되어 있기도 한데, 이것들은 현대 어우러져 처음에 보면 잘 눈에 띄지 않는다. 하지만 수백 년이 지나면 이러한 부분들이 구별되게 된다.

일단 조르나타가 건조되면 날카로운 도구를 사용해 마른 회반죽을 제거하거나 또 다른 젖은 회반죽을 바르지 않는 이상 수정이 불가능하다. 사소한 수정은 세코 기법으로 가능한데, 그 기법은 염료를 벽에 집착시키기 위해 달걀과 같은 접합제가 필요하다. 때로는 조르나타 사이의 경계를 없애기 위해 세코 프레스코 기법을 쓰기도 하는데, 시간이 지나면 이 경계는 사라지게 된다.

프레스코는 이집트 무덤 벽화에서 처음으로 발견되었는데, 여기에는 세코 기법이 사용되었다. 반면에 로마인들은 부운 프레스코 기법을 사용했다. 프레스코화는 이탈리아 르네상스 시대에 가장 번성했으며, 가장 훌륭한 예는 미켈란젤로가 시스티나 성당 천장에 그린 프레스코화이다.

- E** 1. (D) 2. (C) 3. (C) 4. (A)
 1high plateau / 2Bonneville Salt Flats /
 3temporary lakes / 412,000 years ago

그레이트 베이슨

그레이트 베이슨은 미국 서부에 있는 20만 평방 마일의 사막 지역이다. 그레이트 베이슨은 유타 주와 네바다 주의 많은 부분과 주변에 있는 주들의 일부 지역을 포함하는 산맥 사이에서 고원을 형성한다. 이곳은 가장 가까운 바다인 태평양으로 가는 출구가 없기 때문에 베이슨 즉 물을 담은 기둥이 된 용기라고 불린다.

그레이트 베이슨을 둘러싸고 있는 지역의 지질학적 명칭은 베이슨 앤드 레인지 지역이다. 이 지역은 역사적으로 효율적인 배수 시스템 역할을 해 온 지하 단층이 있다. 빙하기 동안 이 지역에는 지금은 말라버린 큰 호수가 많았는데, 본질 습트 플랫과 같은 광대한 평지가 남아 여기에서 자동차 경

주가 열린곤 한다. 비와 눈은 건조한 사막 기후에서 재빨리 증발한다. 증발하지 않은 강우는 지하로 스며들거나 서서히 말라버리는 일시적 호수에 모인다. 또한 물의 흐름도 그 지역을 둘러싸고 있는 산맥에 의해 차단된다. 그래서 그 지역으로 유입된 물은 바다로 연결되는 강이나 시내에 의해 빠져나올 수가 없다. 이런 내부 배수 시스템 때문에 건조한 기후 조건에서도 그레이트 베이슨이 유지될 수 있다.

지질학자들은 그레이트 베이슨이 균열과 팽창의 과정을 겪고 있어 최상층이 시간을 두고 점점 얇아지고 있다고 말한다. 그들은 이 힘들로 인해 결국에는 그레이트 베이슨이 결국 중 하나를 따라 쪼개져 해양으로 가는 물길이 열릴 것으로 예상한다.

그레이트 베이슨에 분포하는 야생동물로는 아메리카뿔뿔끼, 코요테, 다람쥐, 북아메리카큰쥐, 퓨마 등이 있다. 야생마나 땅나귀와 같은 비자생 동물들도 성공적으로 수입되었다. 이 지역은 대부분의 땅에 초목이 자라고 있어서 소와 양 사육이 일반적이다.

사람들이 처음으로 그레이트 베이슨에 거주하기 시작한 것은 약 12,000년 전이다. 유럽인들이 신세계를 발견했을 때 이 지역에는 쇼쇼족이나 유포족과 같은 아메리카 인디언들이 살고 있었다. 1700년대 말에는 스페인 탐험가들이 도착했고, 그 후 모피 사냥꾼들이 이곳에 정착했다.

미국은 두 조약을 통해 영토를 획득했다. 1846년의 오리곤 조약으로 영국은 그레이트 베이슨 일부에 대한 권리를 포기했다. 1848년 과달루페 이달고 조약으로 멕시코 전쟁이 끝났고, 이전에 멕시코의 일부였던 땅이 미국에게 넘어갔다. 몬몬고도들은 1840년대 말 샬트 레이크 시티를 건설해 최초로 이 지역에 거대한 정착촌을 만들었다. 1848년 캘리포니아에서 금이 발견되자 많은 개척자들이 한 말쑥 잡초리 가는 길에 그레이트 베이슨을 가로지르면서 이 지역의 많은 부분을 개발하게 되었다. 결국 이 지역은 오늘날 그레이트 베이슨을 이루는 몇 개의 주로 나뉘었다.

- F** 1. (A) 2. (C) 3. (B) 4. (D)
 11800s / 2French Revolution /
 3ethnic group / 4Yugoslavia and Soviet Union

민족주의의 기원과 발전

약 1800년까지 전 세계의 대다수 지역 사람들은 그들과 가족들이 사는 곳에 충실했다. 대다수의 사람들은 자신을 보다 큰 주나 국가의 일부로 보지 않았다. 하지만 산업의 발달과 군대 양성을 위한 필요성 때문에 통치자들은 국민에게 국가의 정체성과 대외명분에 대한 자각을 심어주고자 했다. 개인이나 그룹보다는 국가의 이익을 우선시하려는 이러한 경향은 “민족주의”라고 알려지게 되었다. 지난 200년 간 세계사는 새로운 민족국가로 정치 지도를 새로 그리는 작업이었다는 말로 설명될 수 있다.

많은 역사가들은 현대 민족주의가 1700년대 말 프랑스혁명에서 비롯되었다고 말한다. 프랑스 군주제는 공화제로 바뀌었는데, 공화제에서는 시민들이 더 이상 왕의 신하가 아니었다. 오히려 그들은 프랑스를 모국이라고 보는 추상적 개념에서 자신들의 정체성을 찾았다. 다음 세기 동안 이 과정은 유럽 전역에서 되풀이되었다. 제2차 세계대전 말 오스트리아-헝가리 제국과 오트만 제국의 분열로 유럽은 독립 국가들의 대륙이 되었다. 그러나 소수 민족 전통과 언어적 전통은 국가 내 집단들에 의해 계속 존중되었다.

민족주의를 이루는 철학적 기초는 국가가 사회, 경제 생활의 가장 중요한 단위이며 인간의 모든 다른 활동과 욕구보다 국가가 우선시 되어야 한다는 것이다. 국기, 음식, 스포츠, 전통, 역사, 민간 설화, 음악, 문학, 문화 등은 국민적 자긍심을 높이는 데 도움이 된다. 심지어 국교가 있는 경우도 있다.

민족주의자들은 공통된 언어나 문화, 가치관과 같이 한 국가를 다른 국가와 구별해주는 기준을 지적한다. 이러한 특징들은 종종 한 국가의 거의 모든 국민이 속하는 단일 민족으로 나타난다. 하지만 많은 국가의 경우 다양한 소수 민족이 더불어 살며 때로는 폭력적인 결말이나 정치적 분열을 가져오기도 한다. 유고슬라비아나 소련과 같은 예전 국가들은 소수 민족의 충돌로瓦解되었다. 현재 이라크도 오래된 종교 분쟁으로 인해 황폐해졌다. 이라크와 이스라엘 간의 오랜 분쟁도 서로 상대방이 자신들의 영토에 대한 소유권이 있는 진정한 국가가 아니라는 주장에 의해 시작되었다.

일부 소수 민족 집단은 자치를 위해 국가를 인정하지 않고 탈퇴하기를 바라기도 한다. 캐나다의 퀘벡과 스페인의 바스크 지역 분리독립운동은 수년 동안 활발했지만 아직까지 성공을 거두지는 못했다.

국민들이 동일한 언어를 사용하도록 하는 요구는 국가 정체성을 강화하는 중요한 수단이 되었다. 신생국에서는 종종 소수 집단의 언어를 법으로 금지하기도 한다. 국가의 언어는 상류층이 말하는 언어인 경향이 있어서, 그 결과 상류층 언어가 하류층 언어를 대체하게 된다.

Building Summary Skills

1. Dadaism

Dadaism was a cultural movement that arose at 1the end of World War I as a protest against reason and logic. Dadaists felt that 2a more humane world could be created once the traditional system was dismantled. The movement was joined by artists who condemned art that fit 3the current fashion or conveyed meaning or beauty. They created art works out of 4common objects that had no serious artistic message. By the 1920s, Dadaism was absorbed into 5other cultural movements.

2. Geysers

A geyser is 1a hot underground spring that ejects streams of water and steam. It is formed when water is heated by 2volcanic rocks and is subjected to pressure from the cooler water above it. The water boils and escapes through passageways in the ground. It erupts into the air 3in the form of spray. The eruption ends when 4the water cools. The cycle repeats itself at 5predictable intervals.

3. Works Projects Administration

The Works Projects Administration (WPA) helped put Americans back to work during 1the Great Depression. It was created by President 2Franklin D. Roosevelt and was the largest agency of the New Deal, his economic recovery program. It provided 3government-funded jobs for those receiving relief payments. Most WPA jobs were on public-works projects, such as 4bridges, highways, libraries, and dams. But it also funded 5cultural projects, giving work to writers, actors, and artists.

4. Fresco Painting

In buon fresco painting, the artist applies paint directly onto wet plaster. The work is done in four stages: an outline is drawn 1on dry plaster (ariccio); a layer of wet plaster is applied (intonaco); the final version is drawn on paper and traced onto a cartoon (intonaco); and 2the artist begins painting with the cartoon as a guide (painting). The paint consists of powdered pigments mixed with 3lime water, which is easily absorbed by wet plaster. Frescos must be carefully 4planned and timed so that the work is finished before the plaster dries. Once it dries, no changes can be made until the dried plaster is removed and 5a fresh layer of wet plaster applied.

5. The Great Basin

The Great Basin is a desert plateau mostly in 1the mountains of Utah and Nevada. It was formed during 2the Ice Age. Humans first populated it 12,000 years ago, and Spanish explorers found 3Native American Indian tribes there in the 1700s. Its underground drainage system and hot, dry climate prevent water from 4escaping to the Pacific Ocean. The region was populated in 5the mid-19th century after the Mormons founded Salt Lake City and gold was discovered in California.

6. Nationalism

A sense of national pride, or nationalism, arose around the time of 1the French Revolution. Industrialization and the need to raise armies led to people identifying themselves as being from a country as opposed to from 2a tribe or region. Nations are often united by 3a common language, culture, and values. When a nation includes different 4ethnic or religious groups, however, 5political conflict or violence can result.

TOEFL iBT Practice Test

- | | | | | |
|-------------------|---------|---------|---------|---------|
| 1. (A) | 2. (B) | 3. (C) | 4. (D) | 5. (D) |
| 6. (A) | 7. (C) | 8. (B) | 9. (D) | 10. (C) |
| 11. (A) | 12. (A) | 13. (B) | 14. (C) | 15. (A) |
| 16. (B), (C), (F) | | | | |

“아무것도 몰라요” 당

1840년대 미국에서 태어난 일부 미국인들이 두 개의 주요 정당인 민주당과 휘그당이 특히 대도시에서 이민자들의 수를 제한하는 데 충분한 역할을 하고 있지 못하다고 판단했다. 이 이민 배척주의자들은 주로 아일랜드 카톨릭교도였던 새로운 이민자들에 의해 그들의 삶이 위협 받고 있다고 느꼈다. 그들은 교황 비오 9세가 자신에게 충성을 다하는 사제와 주교를 임명해 미국을 지배하려 한다는 음모설을 퍼뜨렸다. 그렇게 되면 사제들은 카

돌려 신도들에게 순종을 요구할 것이었다.

미국에 새로 도착한 이민자들은 뉴욕과 같은 도시에서 민주당을 지지하는 경향이 있었다. 이민자들의 수가 늘어나면서 정치적 영향력도 커져서 이민 백척주의자들은 이들이 미국의 최선의 이익을 위해 행동하는 대신 교황의 명령에 맹목적으로 복종할 것을 두려워했다.

이민 백척주의 운동은 1843년 뉴욕에서 미국 공화당이라고 하는 정당을 창당했다. 이 당의 영향력이 전국으로 퍼지면서 1845년 당명을 원주민당으로 바꾸었다.

이민자들의 비위를 맞추려 안달이었던 민주당에 불만을 품은 이민 백척주의자들은 비밀 단체를 결성하기 시작했다. 선거일에 이 단체의 회원들은 그들과 견해를 같이 하는 후보에 소용돌이 지지표를 던졌다. 그들은 이 비밀 조직에 관해 질문을 받으면 "아무것도 몰라요"라고 대답하곤 했다. 그래서 이들은 "아무것도 몰라요 당원"이라고 불리게 되었다.

이 집단은 새 이민자들의 영향력을 감소시킬 수 있는 특별법에 찬성했다. 그들은 연간 이민자 수, 특히 카톨릭 국가에서 오는 이민자의 수를 제한하려고 했다. 그들은 이민자들이 공직에 출마하지 못하게 하자고 촉구했다. 또 이민자들이 시민권을 얻기 위해서는 21년을 기다리는 제도를 옹호했다. 그들은 일요일 주류 판매 금지를 찬성했다. 또한 공립학교에 대해 신교도 교사들만 채용하고 학교에서도 신교에서 쓰는 성경만 읽도록 해야 한다고 주장했다. [그러나 그들이 제안한 대부분의 법안이 묵살당했다.]

휘그당이 점차 세력을 잃으면서 양당 체제가 붕괴되어 아무것도 몰라요당이 정치 세력으로 부상하는 결정적인 계기가 되었다. 휘그당의 몰락으로 아무것도 몰라요 당에는 잠재적 전향자들이 생겼다. 그리고 마침 시기적으로도 이민 백척주의에 대한 충구를 제공해 줄 당을 찾고 있었다.

아무것도 몰라요 당은 마침내 1854년 선거에서 정치 권력을 얻었다. 범죄 처벌, 주일 술집 영업 금지, 미국 태생의 미국인들에게만 공직 임명의 기회 부여 등의 정책을 선택해 이들은 여러 도시에서 시장으로 선출이 되고 일부 주 의회 의원 자리를 차지했으며 일부 당원을 의회로 보내기도 했다. 1855년 그들은 "미국당"으로 개명했다. 그들은 양당 체제 가운데 한 당으로서 민주당과 손을 잡을 것처럼 보였다.

이 운동은 1856년 선거에서 절정을 이루었다. 이 당의 후보였던 이전 대통령 밀러드 필모어는 국민투표에서 22%를 득표했으며 민주당과 공화당에 이어 3위를 차지했다. 그러나 이 당은 곧 노예 문제를 둘러싸고 분열의 조짐을 보였다. 노예제를 찬성하는 사람들은 민주당에 합류했고 반대하는 사람들은 아브라함 링컨이 이끄는 공화당에 합류했다. 1860년 선거에서는 미국당이 더 이상 정치적인 세력을 얻지 못했다.

아무것도 몰라요 운동은 미국 정치에 관한 두 가지 교훈을 주는데, 이 교훈은 역사를 통해 계속 되풀이되었다. 첫 번째는 소수 민족과 종교에 대한 편견이 정치에 영향을 미친다는 것이다. 두 번째는 기존 정당이 사회적 격변에 좌절된 사람들에게 발언권을 주지 못할 경우 정치적 불만이 생긴다는 것이다.

인류의 베링해협 횡단

인간은 4만 년 전에 아프리카에 최초로 살았다. 그들이 어떻게 아메리카 대륙에 도착했는지는 인류학자들 사이에서 논쟁거리이다. 오늘날 가장 그럴듯한 설명은 베링 대륙교설이다. 하지만 최근에 발견된 증거들을 보면 다른 경로를 통해서도 이주가 있었던 것으로 보인다.

베링해협은 러시아의 시베리아와 캐나다 서쪽 알래스카 사이의 좁은 통로이다. 1856년 사무엘 헤이븐이 약 2만 년 전 빙하기 때는 물이 빙하 속에 갇혀 해수면이 낮았다는 주장을 내놓았다. 해수면이 오늘날보다 60미

터 가량 더 낮았다. 이로 인해 베링해협 아래의 땅이 드러나 인간과 동물들이 시베리아에서 알래스카로 걸어서 이동할 수 있었다. 이러한 대륙교의 증거는 해협에서 채취한 토심에서 나왔는데, 그 시기 동안 땅이 전조한 평원이었다는 것을 알 수 있다. 명치 큰 포유류의 잔해도 발견되었는데, 이는 사냥을 했던 아시아의 종족이 이 동물들을 따라 약 12,000년 전에 북아메리카로 이동해 왔다는 것을 의미한다. 사자나 치타 같이 아프리카와 아시아에 자생하던 포유동물들이 나중에 북아메리카에서 진화하다가 멸종했다. 그리고 북아메리카에서 멸종된 북아메리카 케멀리드는 아시아에서 낙타로 진화했다.

고고학적 기록에 따르면 이주는 서쪽에서 동쪽으로 이루어졌다. 대륙교는 폭이 약 2,000킬로미터 정도였다. 유목 생활을 했던 이 사냥꾼들은 알래스카에서부터 태평양 해안선의 엄습이 없는 길은 따라 북아메리카까지 내려왔다. 그런 다음 일부 집단이 동쪽으로 로키산맥을 지나 대서양 해안까지 갔다. 다른 종족들은 남쪽으로 중앙아메리카와 남아메리카까지 이동하기도 했다.

베링해협을 건너간 사람들은 뉴멕시코의 클로비스라는 마을의 이름을 따서 클로비스족이라고 불리는데, 1932년 그 마을에서 그들이 쓰던 창끝이 발견되었다. 클로비스 창끝은 독특한 모양을 하고 있다. 비슷한 창끝이 미국 동부해안과 칠레 남부에서도 발견되었다. 일부 학자들은 클로비스족이 북아메리카와 남아메리카의 각지로 계속 이동했다는 이론을 제시한다.

하지만 클로비스족보다 적어도 1,000년 전에 일부 인간들이 도착했다는 증거도 나왔다. 이 발견으로 인해 일부 사람들은 베링해협을 건너는 방법이 아닌, 어쩌면 배를 타고 남태평양을 건너는 방법으로 아메리카 대륙에 인간이 거주하게 되었을 것으로 생각한다. 고고학자들은 호주와 일본에서 25,000년에서 40,000년 전에 이미 배를 사용했다는 증거를 찾았다. 그들은 일부 사람들이 아메리카 대륙의 해안과 더 아래로 태평양 해안까지 항해를 할 수 있었을 것으로 추정한다. 만약 그렇다면 증거가 될 만한 많은 해안 지역이 수면 아래로 가라앉아 버려서 고대 항해자들이 남긴 증거를 찾기가 어렵게 되었다.

인간의 움직임을 추적해 보아도 여러 가지 이주 경로가 있었음을 알 수 있다. 아메리카 원주민들은 아시아인들과 같이 어마가 넓고 광대뼈가 튀어나와 있다. 하지만 다른 두개골들은 두개골이 좁고 얼굴이 평평해 폴리네시아인이나 유럽인들과 일치한다.

분자유전학 분야의 최근 연구에서 아메리카 인디언들이 아시아인과 기원이 같다는 사실이 확인되었다. 하지만 새로 발견된 DNA 계열에서는 아시아와 관련이 없는 경우도 있었다. 또한 DNA 조사를 통해 아메리카인들은 고고학적 증거를 통해 알려진 것보다 훨씬 빠른 20,000년 전에 시베리아인으로 부터 유전학적으로 갈라져 나왔다는 사실이 밝혀졌다.

Vocabulary Review

- | | | | | | |
|----------|-------------|-------------|-------------|-------------|--------------|
| A | 1. <u>C</u> | 2. <u>A</u> | 3. <u>C</u> | 4. <u>A</u> | 5. <u>D</u> |
| | 6. <u>C</u> | 7. <u>B</u> | 8. <u>C</u> | 9. <u>D</u> | 10. <u>A</u> |
| B | 1. g | 2. j | 3. a | 4. h | 5. b |
| | 6. i | 7. d | 8. e | 9. f | 10. c |

Unit 4 Negative Factual Information

Skill & Drill

1. (C) 2. (A)

미국의 목화 재배

1800년 이전에는 대부분의 미국인들이 모직물이나 리넨으로 된 옷을 입었다. 목화는 실을 짓으려면 씨를 제거해야 했기 때문에 값도 비싸고 노동력도 많이 필요했다. 농장주들은 목화 씨를 제거할 수 있을 정도로만 경작량을 한정해야 했다. 하지만 1793년에 엘리 휘트니가 목화 섬유의 씨를 제거해 주는 톱니가 달린 기계인 조면기를 발명했다. 갑자기 한 사람의 일꾼이 하루에 50파운드의 목화 씨를 제거할 수 있게 되었는데, 이는 조면기가 발명되기 전에 가능했던 작업량의 두 배였다. 이전에는 담배나 쌀 농사를 지었던 농장이 목화 농장으로 바뀌면서 목화 생산량이 급증했다. 플랜테이션 농사가 절정에 달했던 1850년대에는 남부 주에 있는 모든 노예의 75%인 약 180만 명의 사람들이 목화 농장에서 일했다. 1850년대는 목화 왕의 시대라고 불렸다. 하지만 1860년 남북전쟁이 발발하면서 남부 농장주의 번성기는 막을 내렸다.

3. (D) 4. (B)

행성의 위성

태양계에는 행성과 소행성 주위를 도는 240개의 자연 위성이 있다. 가장 큰 위성은 목성과 토성의 위성이며 그 다음이, 지구의 위성인 달이다. 위성은 그것이 궤도를 그리며 도는 더 큰 천체와 동시에 형성된다. 일부 위성은 탄생 과정에서 행성으로부터 떨어져 나갔고, 일부 위성은 처음부터 행성의 인력에 끌려와 붙잡힌 혹성이며, 또 달과 같은 일부 위성은 다른 천체와의 엄청난 충돌로 폭발되어 궤도 속에 던져지기도 했다. 달과 같이 대부분의 위성은 자전을 하지 않고 기조력으로 묶인 상태가 되는데, 이는 위성의 한 쪽 면이 항상 행성을 향하고 있다는 의미이다. 위성이 충분히 크면 달이 지구의 해양에 영향을 미쳐 조수가 생기는 것처럼 행성에 중력을 가하게 된다. 위성은 항성과는 달리 스스로 빛을 내지 못하기 때문에 태양빛을 반사시켜 밤에만 빛나는 것처럼 보인다.

5. (A) 6. (C)

생화학

생물체 내부의 화학 과정을 다루는 학문을 생화학이라고 한다. 유기체는 세포 내 활동을 통해서 성장하고 기능을 수행한다. 생화학은 단백질, 탄수화물, 지방질, 핵산과 같은 세포 성분에 초점을 둔다. 단백질은 다른 입자에 연결된 아미노산으로 되어 있으며 세포 성장과 복구를 돕는다. 세포는 효소라고 하는 특수 단백질에 의해 조절된다. 탄수화물은 에너지를 저장하고 세포 구조를 만든다. 지방질에는 왁스, 지방, 스테로이드와 같은 화합물이 있다. 핵산은 DNA(다옥시리보핵산)와 RNA(리보핵산)로 가장 잘 알려져 있으며 유전 정보를 운반한다. 최근에는 기술의 발달로 생화학 분야가 발전해서 세포의 구조와 기능을 더욱 확실히 밝혀내게 되었다. 이 새로운 기술에는 전자현미경학, 석층 분석, 방사성 동위원소 표지법 등이 있다. 암 연구는 생화학에서 얻은 단서에 의존한다.

7. (C) 8. (D)

호피 인디언 문화

농업은 호피 문화의 핵심 요소이다. 농사는 생계수단이기도 하지만 호피 신화의 일부이기도 하다. 호피족은 지구상에서 그들의 시대가 "생명의 네 번째 길"이며, 그들이 호피족의 신인 마소에게서 옥수수를 받았을 때 그 길로 들어섰다고 믿는다. 다른 종족들이 먼저 밀치고 나가면서 가장 큰 옥수수들을 가지고 가버려서 호피족은 가장 작은 옥수수를 받게 되었다. 그들은 이것을 호피족 삶의 상징으로 여긴다. 그들은 미국의 건조한 남서부 지역에서 삶의 역경을 이겨내야 했다. 옥수수는 검은, 협동, 존경, 땅에 대한 경외심 등을 나타낸다. 농사에 기반을 둔 그들의 삶에 기술이 침투해 들어오면서 호피족의 문화도 변했다. 전기, 자동차, 소비자 등이 그들과 땅의 영적 결속을 약화시키고 그들의 눈을 소비주의로 돌려게 했다. 하지만 그들은 아직도 카치나 인형과 도기를 만들어 판매하면서 전통적 가치를 지켜 나가고 있다.

TOEFL Reading Practice

A 1. (D) 2. (B) 3. (C) 4. (D)

1,000 / 2sign language /

8eight languages / 4polysynthesis

아메리카 인디언 언어

유럽인들이 북아메리카에 도착하기 전 아메리카 인디언들은 천 개가 넘는 언어를 사용했다. 서로 100마일 정도 거리에 사는 다른 종족 출신의 인디언 세 명이 모여도 수화 외에는 의사소통 수단이 없는 경우도 있었다. 일반적인 고정관념과는 달리 인디언어는 원시적이지도 단순하지도 않다. 많은 언어들의 경우 문법과 음운 구조가 복잡하다.

현재 미국에 해당하는 지역에 수백 개의 언어가 존재하지만 언어화자들은 이를 몇 개의 대어족과 더 많은 소어족으로 나눈다. 어족이란 공통된 기원을 가지고 있지만 긴 시간에 걸쳐 다른 언어로 발달한 언어들을 말한다. 예를 들어, 영어와 네덜란드어, 러시아어가 인도유럽 어족에서 나온 것처럼 아파치어와 나바호어는 아메리카 인디언어의 이타바스칸 어족에 기원을 두고 있다. 다른 어족으로는 알곤펀, 이리쿼이, 수, 무스코기, 에스키모-알류트 어족이 있다.

유럽인들이 정복한 결과 대부분의 토착어가 서서히 사라졌다. 인디언 인구가 약 2천만 명에서 2백만 명으로 감소하면서 언어 역시 사라졌다. 많은 언어들이 그 종족의 최고령지들에 의해서만 사용되고 있는 실정이다. 그들이 죽으면 언어도 함께 사멸할 것이다. 미국과 캐나다에는 사용자가 수천 명 정도에 불과한 언어가 여덟 개만 남아 있다. 가장 사용자 수가 많은 언어는 나바호어로 약 148,000명의 사용자가 있다. 다른 언어로는 코리(60,000명), 오지브와(51,000명), 체로키(22,500명), 다코타(20,000명), 아파치(15,000명), 블랙풋(10,000명), 족토(9,200명)가 있다.

아메리카 인디언어는 언어학적으로 다양하다. 하지만 이 가운데 많은 언어들이 인도유럽 어족과는 구별되는 공통된 특징이 있다. 영어의 "어오" 소리의 가운데 음치럼 상태를 잠깐 닫아 내는 소리인 성문 폐쇄음이 흔하다. 여러 인디언어에서 비모음을 사용한다. 중국어와 마찬가지로 어떤 언어에서는 음조와 고저를 사용해 다른 단어를 나타낸다.

아메리카 인디언어의 특징 가운데 잘 알려진 것으로는 포함(包含)을 들 수 있는데, 이는 어근에 여러 가지 요소를 결합시킨 한 단어로 복잡한 사고

를 표현하는 것이다. 그렇기 때문에 동사에 보통 접두사의 형태로 주어나 목적어가 붙어 있기도 하다. 또한 동사의 시제가 단어의 어미로 표시된다. 복수는 "-s"와 같은 종결부분을 사용하는 대신 단수형을 반복해 사용한다. 그래서 어떤 언어의 경우 토끼(ma)의 복수형이 ma ma가 된다.

아메리카 인디언 언어는 다른 모든 언어와 마찬가지로 근처의 언어군으로부터 차용을 했으며 영어 역시 인디언 어휘를 차용했다. 영어에는 모카신, 터보전, 초콜렛, 타바코 등과 같이 인디언어에 기원을 둔 일상 낱말들이 많다. 시가코, 맨하탄, 위스콘신, 델라웨어, 아오와, 애리조나와 같은 많은 주와 도시들이 인디언의 단어나 종족 이름을 사용했다.

- [B] 1. (C) 2. (B) 3. (A) 4. (D)
14.9 billion / 2surface water /
3tectonic movement / 4magnetic field

화성과 지구

지구와 화성은 대략 같은 시기에 생성되었다. 약 49억 년 전 두 행성은 모두 만들어진 지 얼마 되지 않은 태양을 둘러싼 뜨거운 거대 가스 구름으로부터 압축되었다. 두 행성은 태양으로부터 서로 이웃하는 순서로 자리잡았다. 지구는 태양으로부터 약 9천 2백만 마일, 화성은 약 1억 4천 2백만 마일 떨어져 있다. 두 행성 다 지각이 단단하며 핵의 밀도가 높다. 그리고 다른 비율로 이루어진 했지만 동일한 화학적 조성을 가지고 있다.

두 행성은 기원과 조성이 비슷하긴 해도 결정적인 차이가 있어서 한 행성에서만 생물이 존재할 수 있다. 한 가지 차이는 크기이다. 화성은 지구 질량의 10분의 1에 불과한데, 이는 화성의 중력이 지구 중력의 약 38%로 지구보다 훨씬 작다는 것을 의미한다. 그 결과 화성은 대기와 표층수의 많은 부분을 잃어버려서 더 빨리 냉각된다. 이러한 급속한 냉각 덕분에, 화성은 핵 부분이 여전히 매우 뜨거운 지구에 비해 화산 활동이 훨씬 적다.

지구의 중심 부분이 더 뜨겁기 때문에 지표면은 판구조에 의해 끊임없이 변화가 일어난다. 지각 아래의 판이 서로 부딪치면서 새로운 지각이 지표로 올라오고 오래된 지각은 지구의 내부로 삼켜지게 된다. 화성은 초기 5억 년 전 판구조에 의해 형성된 반면 그러한 힘들은 화성의 내부가 냉각될 때 멈춰버렸다. 그 결과 화성에서는 4억 년 된 암석을 볼 수 있는 반면 지구에서는 거의 볼 수 없는데, 지구에서는 끊임없이 새로운 암석이 지표로 올라오고 오래된 암석이 지각 안으로 들어가 버리기 때문이다. 대개층이 보다 얇은 화성에서는 바람이 거의 밀지 않아 표면이 태고 상태를 유지하는 반면 지구의 암석은 바람에 의해 침식이 된다.

화성 표면의 반은 충돌분화구의 흔적으로 덮여 있다. 그 분화구들이 수십억 년 동안 그대로 남아있음을 볼 때 행성학자들은 분화구가 형성되기 전에 지질 운동이 멈추었다는 것을 알 수 있다. 그들은 지대한 화산의 존재에 대해서도 같은 결론을 내린다. 화산의 크기나 높이를 볼 때 이 화산들은 수십억 년 전에 만들어진 후 분출이 멈추었다는 것을 알 수 있다. 반면에 지구의 화산은 오늘날에도 여전히 지구의 지형을 바꾸고 있다.

물도 화성 표면을 만드는 데 일정한 역할을 했다. 하지만 밝혀지지 않은 이유로 물은 약 38억 년 전 자취를 감추었다. 마른 강 바닥과 빙하의 흔적이 지금도 발견된다. 그와 대조적으로 지구는 표면의 3분의 2 이상이 물로 덮여 있으며 지구 온난화로 인해 일부가 증가하고 있다.

화성에는 전기를 띤 위자 즉 태양풍으로부터 지구를 보호해주는 자기장이 없다. 그렇기 때문에 95%의 이산화탄소로 이루어진 화성의 대기는 생물체가 살기에 적당하지 않다. 지구 대기는 대부분 생명체가 살기에 적당한 78%의 질소와 21%의 산소로 이루어져 있다.

- [C] 1. (B) 2. (A) 3. (A) 4. (C)
1water molecules / 2350 to 500 /
3impurities / 4gassy substance

도기의 화학

점토를 굽는 과정은 탈수와 유리화의 두 단계로 이루어진다. 점토를 원하는 형태로 만들면 회화수라고 하는 여분의 수분 입자가 표면으로 스며 나온다. 이 과정은 흙이나 점토 내의 좁은 통로를 통해 물이 올라오는 모세관 현상에 의해 생긴다. 수분이 입단 표면에 이르면 점토에 열이 가해지는 동안 수분이 증발한다.

이 과정의 화학동역학은 다음과 같다. 점토의 화학 성분은 두 분자의 규소와 결합한 두 분자의 물 그리고 한 분자의 알루미늄(산화알루미늄)이다. 탈수 과정 동안 전체 점토의 약 14%를 차지하는 물 분자가 증발한다. 탈수가 시작되기 위해서는 온도가 350℃가 넘어야 한다. 온도가 약 500℃에 이르면 탈수 과정이 끝난다.

500℃가 넘으면 규소와 알루미늄 입자가 단단하게 결합되기 시작한다. 이 결합으로 인해 수분이 증발하고 남은 공간이 채워지게 된다. 또 이로 인해 점토가 단단해지고 딱딱해지게 된다. 이 단계에서 점토는 더 이상 수분을 흡수하지 못하고 부드러웠던 가단 상태로 돌아갈 수 없게 된다.

다음은 유리화 단계인데, 이 단계에서는 표면이 유리처럼 매끈해진다. 온도가 500℃를 넘게 되면 산화철과 같은 점토의 불순물이 녹게 된다. 이러한 불순물은 한데 결합하여 유리 같은 물질을 만들고 그것은 알루미늄 분자 주위로 흐르면서 분자들을 결합하여 단단한 결속을 이룬다. 온도가 더 올라가게 되면 규산알루미늄이 많아지면서 유리질 표면과 섞이게 된다. 이러한 혼합으로 인해 점토에 아주 단단한 결정 구조가 생기게 된다. 이와 같은 화학적 구조 때문에 석기나 도기 제품을 치면 특유의 울림이 나타나게 된다.

완성된 점토의 화학적 결합 때문에 점토는 팽창할 수가 없다. 그래서 점토를 불 위에 굽게 되면 불꽃 위의 부분이 다른 부분보다 더 빨리 팽창하면서 불균일하게 팽창한다. 그 결과 내부에 가해지는 압력이 커져서 도기는 부서지게 된다. 아프리카의 도기장들은 저온에서 도기를 구워서 규소와 알루미늄이 결합하지 못하게 한다. 이러한 저온 소성(燒成) 때문에 아프리카 도기는 불꽃 위에서 고르지 못한 가열도 견뎌낼 수 있다. 그렇게 하면 또한 도기에 더 많은 구멍이 생기는데, 이는 열이 서서히 도기에서 빠져나가 도기를 냉각시키는 역할을 하기 때문이다.

도기 공예품의 자질과 시대를 정확히 알아내기 위해 고고학자들은 화학 분석법을 사용한다. 도기를 전단하는 방법에 비해 화학 분석법은 도기 작품을 손상시키지 않고 아주 작은 부분으로도 결과를 얻을 수 있다는 이점이 있다. 화학 분석법에서 흔히 사용하는 한 가지 기술은 샘플을 신에 녹여 보는 것이다. 이 과정에서 원자가 녹으면 분광사진기를 이용해 도기에 들어 있는 성분을 알아낼 수 있다.

- [D] 1. (C) 2. (B) 3. (D) 4. (A)
1nomadic / 2kayak /
3whales, seals, and walruses / 4clothes and tools

알래스카 에스키모 문화

알래스카 원주민은 크게 에스키모(54,761명), 툴링잇-하이다(22,365명), 이사벨스칸(18,839명), 알류트(16,978명)의 네 부류로 구분된다.

가장 수가 많은 에스키모는 알래스카의 북극 지방의 수북 생장 한계선 위

에 사는 모든 부족을 이르는 광범위한 용어이다. 여기에는 인누이트족과 유픽족이 포함된다. 에스키모라는 말은 "날고기를 먹는 사람들"이란 뜻이다. 에스키모는 유목민으로 북미 산순복과 해양동물들을 따라 계절마다 이동한다. 에스키모의 금기 가운데 하나는 바다 동물과 육지 동물을 섞지 않는 것이다. 에스키모인들은 이 두 가지를 부엌의 각기 다른 곳에 보관한다.

가혹한 기후 때문에 에스키모는 수준 높은 도구를 개발했다. 그들은 교룡용 카약을 만들었으며 얼어붙은 눈 밑에서 얼음로 이글루를 만들었다. 대다수 에스키모들은 작은 바울을 이루어 살며 물고기를 사냥해 식량으로 사용한다. 실업률은 높다. 1960년대 이후 석유 개발로 일부 에스키모들에게 일자리가 생겼다. 하지만 동시에 석유 개발로 인해 에스키모들의 전통적 생활 양식이 위협받기도 했다.

에스키모인들은 미국의 아메리카 인디언보다는 동아시아인을 더 닮았다. 이것은 그들이 배령 대륙교를 건넌 최초의 이주자들보다 훨씬 나중에 알래스카에 정착했기 때문이다. 대륙교는 에스키모들이 아시아로부터 건너 오기 전에 물에 잠겨 버렸기 때문에 그들은 물림없이 배를 이용해 배령교를 건넌 것이다.

전통적인 에스키모인들은 사냥과 어업 활동을 했다. 유럽인들이 카약이라고 부르는 카자잇을 타고 고래, 표범, 바다코끼리를 잡았다. 물결이 일어 칠으면 에스키모들은 얼음에 구멍을 내고 물거나 바다코끼리가 숨을 쉬기 위해 수면으로 나오기를 기다렸다. 육지에서 에스키모인들은 한 팀의 허스키 전이 끄는 개썰매를 타고 이동했다.

에스키모인들은 동물에 의존해 생활했다. 동물은 식량뿐만 아니라 의복과 도구를 제공해주는 원천이었다. 에스키모 여성들은 동물 뼈로 만든 바늘과 동물 내장으로 만든 실을 이용해 동물 가죽으로 옷과 신발을 만들었다. 무거운 외투는 파카였다. 여성들은 벨벳을 이용해 임마의 등에 아기를 업을 수 있도록 파카의 모자를 크게 만들었다. 신발은 순록이나 늑대의 가죽을 이용해 만들었다. 남성과 여성의 역할은 정확하게 구분되었다. 남성은 사냥과 어업 활동을 하고 여성은 자녀 양육과 의복, 도구 만들기 그리고 요리를 담당한다. 결혼은 항상 일부일처제인 것은 아니었다. 일부 남성들은 여러 명의 아내를 두기도 했다.

미국인들이 일반적으로 잘못 생각하고 있는 것 가운데 하나가 에스키모들은 늑어나 멧돼지 천적들을 얼음 위에 내버려두어 얼어 죽게 한다는 것이다. 하지만 사실은 더 이상 노동을 할 수 없어 공동체에 도움을 줄 수 없는 사람들이 때때로 자발적으로 이런 식의 사망 방법을 선택했다.

- [E] 1. (C) 2. (C) 3. (D) 4. (B)
 1) location of stars / 2) 1958 /
 3) altitude/azimuth / 4) solar system

은하좌표계

지구상의 지역은 경도와 위도를 사용해 나타낼 수 있다. 동일한 방식으로 우리의 은하계도 은하좌표계를 사용해 위치를 나타낼 수 있다. 이것은 1958년 국제천문연맹에 의해 제정되었다. 이것은 더 잘 알려진 지구좌표계와 비슷하게 고도와 방위각을 사용하는 좌표계이다. 일차 방정식을 이용해 지구좌표계를 은하좌표계로 바꿀 수 있다.

은하 적도는 위도 0도선이다. 이 선은 은하계 평면의 전체적 방향과 평행하다. 그렇기 때문에 0도 근처의 은위(銀緯)는 은하계의 팔에 위치하게 된다. 양의 은위를 가진 물체는 은하 북반구인 팔의 위쪽에 위치하게 되며 음의 은위를 가진 물체는 은하 남반구에 해당하는 팔 아래쪽에 위치하게 된다.

은경(銀經)은 은하의 중심 방향으로 임의적으로 규정된다. 경도는 0도에

서 360도까지 존재한다. 경도선은 은하구의 꼭대기에서 볼 때 반시계 방향으로 움직인다. 우리의 태양은 그 구의 중심에 위치하는데, 그 지점에서 위도 0도가 경도 90도를 양분한다. 은하 북극은 위도 90도에 위치하며 은하 남극은 위도 -90도에 위치한다.

우리 은하의 경계를 이루는 가상의 구 위에 이러한 좌표계를 놓고 천문학자들은 경도와 위도로 된 격자 위에서 천체를 찾을 수 있다. 예를 들어, 지구 하늘에 보이는 별 가운데 가장 밝은 별은 시리우스인데, 이 별은 은위 227도, 은경 -8.4도에 있다. 그렇게 은하좌표를 이용해서 천문학자들은 별에 관해 조사하고 은하계를 통과하는 천체의 움직임을 추적할 수 있다. 또한 은하적도로부터의 거리에 따라서 별의 밀도가 어떻게 변하는지 또는 원반 모양의 은하계가 가장자리에서는 얼마나 납작한지도 알 수 있다.

은하좌표계는 태양계에서 멀리 떨어진 물체의 위치를 표시하는 데 유용하다. 지구에서 태양계 바깥에 있는 항성까지는 거리가 너무 멀어서 지구가 태양 주위를 공전한다는 사실이 멀리 떨어진 천체의 위치를 파악하는 데는 거의 영향을 미치지 못한다. 하지만 동일한 궤도 운동이 은하좌표계 아래서는 우리 은하계 내의 천체 측정 수치를 부정확하게 만든다.

은하계 바깥의 천체는 함께 자전하지 않는다. 그래서 우리는 이 천체들의 위치가 많이 바뀌는 것으로 인식한다. 하지만 그것들은 은하좌표계와 관련해서 예측 가능하게 바뀐다. 자전하는 은하계와 관련해 측정할 경우 다른 은하들은 2억 2천만 년마다 한 번씩 태양계 주위를 공전한다.

- [F] 1. (C) 2. (C) 3. (C) 4. (A)
 1) speed of light / 2) solid objects /
 3) voice transmission / 4) electrolytic detector

전해 탐지기

1800년대 말 장거리 통신의 유일한 수단은 우편 서비스 이외에 전보와 전화였다. 하지만 두 가지 다 신호를 보내기 위해서는 전선이 필요했다. 무선 전송의 가능성은 공상과학 소설에나 나올 법한 꿈 같은 얘기였다. 그러나 1900년대 초반 무선방송은 현실로 나타났다.

19세기에는 무선방송을 가능하게 만든 몇 가지 발견들이 있었다. 최초의 획기적 발견은 1831년 영국의 물리학자였던 마이클 패러데이가 했다. 그는 전류가 한 전선을 통과할 때 서로 닿아 있지 않더라도 다른 전선에 전류를 발생시킨다는 사실을 발견했다. 1864년 제임스 맥스웰은 전자기파로 이루어진 이 전류가 광속으로 이동한다는 것을 보여주었다. 헤르츠는 전자기파가 고체를 통해 이동한다는 사실을 입증했다. 이러한 발견과 함께 무선방송 시스템을 개발하기 위한 경쟁이 시작되었다.

이러한 경쟁자 가운데는 캐나다 발명가인 레지널드 페센덴이 있었다. 그는 음성 전송이 가능하다는 것을 보여주기 위해 전파탐지기로 실험을 하고 있었다. 1900년 그는 최초로 음성을 전송하는 데 성공했지만 파장이 지속적으로 짧아져 소리를 알아들을 수가 없었다. 그는 AM(진폭 변조) 신호를 수신하기 위해 "교환기"를 뜻하는 불어에서 이름을 딴 배터리 탐지기를 발명했지만 감도가 충분하지 못했다. 1901년 어느 날 그는 우연히 전선 필라멘트를 산에 너무 오래 담가 두었다가 결국 필라멘트의 끝 부분만 산과 닿아 있게 되었다. 페센덴은 전선을 산에 담그면 배터리가 근처의 지속적인 전파에 대단히 민감해진다는 것을 알게 되었다.

페센덴은 자신의 발명품을 액체 배터리라 불렀지만 이 발명품은 전해 탐지기로 알려지게 되었다. 이 탐지기는 몇 개의 부분을 연결시킨 전기 회로로 되어 있었다. 질산이나 황산으로 채우고 땅에 연결시킨 작은 백금 컵에 은을 입힌 백금선을 담겼다. 전선과 산 사이에 배터리를 연결해 탐지기

에 전류가 흐르도록 했다. 감지기에 연결된 헤드폰을 끼면 쇠뿔기리는 소리를 들을 수 있었다. 이 소리는 밤을 때까지 다이얼을 돌려 조절할 수 있었다. 비로 그 지점에서 탐지기는 들어오는 전파에 대단히 민감해졌다.

이 음식 장치는 산에 적신 비피복선의 이름을 따 비피복점 전해 탐지기로 알려지게 되었다. 발상 전해 탐지기는 이보다 더 발전된 형태인데, 이는 탐지기를 유리로 밀봉되어서 안정적이었기 때문이다. 그래서 산이 엷질러 지거나 증발되지 않았다. 페센덴은 1903년 탐지기에 대한 특허를 얻었다. 이 장치는 초기 무선 수신기에 사용되었다. 이 장치는 1915년 진공관으로 대체될 때까지 무선 수신기 감도의 표준이 되었다.

Building Summary Skills

1. Native American Indian Languages

Native American Indians spoke over a thousand languages. But the European conquest of America began the slow extinction of most ¹Native Indian languages. Today just ²eight languages remain with more than a thousand speakers. The largest are Navajo, Cree, Ojibwa, and Cherokee. The languages are characterized by ³polysynthesis, in which a single word can express many ideas with ⁴endings or prefixes added to a root word. Many common English words were borrowed from Indian languages, such as ⁵tobacco and chocolate.

2. Mars and Earth

Earth and Mars share similar ¹origins and compositions. They both condensed from a cloud of gas around the sun and are made of ²the same chemical elements. But Mars is much smaller, resulting in ³a weaker force of gravity, a thinner atmosphere, and ⁴a lack of water. While volcanic activity continues to shape Earth today, the Martian surface is no longer changed by ⁵tectonic movements. Without the kind of magnetic field that protects Earth, Mars is bombarded by electrically charged particles from the sun.

3. The Chemistry of Pottery

Pottery is made by exposing clay to ¹high temperatures. The process involves two stages. In the dehydration stage, the clay is heated to between 350 and 500 degrees Celsius. As the clay heats, it dehydrates and hardens. In the vitrification stage, the clay is heated above ²500 degrees Celsius, which removes the impurities and gives the clay ³its glassy surface. Pottery may shatter during heating, as its chemical bonds hinder ⁴expansion. Heating at a lower temperature can avoid this problem. Chemical analysis can detect ⁵the age and source of a pottery shard.

4. The Culture of the Alaskan Eskimo

The Eskimo are the largest group of ¹Alaskan Indians. They are nomadic, moving with the seasons to follow their food

supply of ²caribou and sea animals. They have adapted to the harsh environment by ³inventing kayaks for water travel, ⁴dog sleds for land travel, and igloos for shelter. Men do the hunting and fishing while women do the domestic chores and childcare. Animals provide not only food but also clothing and tools. Women sew outer garments called ⁵parkas, which are made from animal hides. Some men marry more than one wife.

5. Galactic Coordinates

Celestial objects in our Milky Way galaxy can be mapped with ¹the galactic coordinate system, which was invented in 1958 by the International Astronomical Union. Lines of latitude and longitude are imposed on an imaginary grid over ²the Milky Way. Using these lines, ³astronomers can assign locations to stars and track their movements through ⁴the galaxy. The system also permits the mapping of objects outside the Milky Way, as they move in predictable ways relative to ⁵the galactic coordinates.

6. Electrolytic Detector

Radio transmission was made possible by ¹the electrolytic detector, which was invented by ²Reginald Fessenden in 1901. The detector formed ³an electric circuit when a platinum wire was dipped in acid. The circuit could detect ⁴incoming radio waves. A person wearing headphones connected to the detector could hear the hissing sound of the radio waves. The device was used in early radio receivers until ⁵1915.

TOEFL iBT Practice Test

1. (C) 2. (D) 3. (B) 4. (C) 5. (B)
6. (C) 7. (D) 8. (C), (D), (E) 9. (C)
10. (A) 11. (A) 12. (B) 13. (D) 14. (C)
15. (A) 16. (A), (C), (F)

화성 생명체설

1700년대 중반 천문학자들은 화성의 만년설을 관찰했다. 윌리엄 허셀은 제철에 따라 만년설의 크기가 달라진다는 것을 발견했다. 지구에서 발견되는 특징인 물과 계절의 존재는 화성에도 생명체가 존재할지 모른다는 추측을 낳았다.

19세기에는 망원경의 발달로 이러한 추측에 불이 붙었다. 고성능 망원경을 사용해 화성 표면의 특징들을 관찰했다. 1877년에는 이탈리아 천문학자인 지오바니 스기아파렐리가 22cm 망원경을 사용해 최초의 화성 지도를 그렸다. 지도에는 긴 선이 그려져 있었는데, 그는 이 선들을 이탈리아어로 "수로"를 뜻하는 카날리라고 명명했다. 하지만 그가 사용했던 용어는 영어로 옮겨질 때 잘못해서 "운하"로 번역되었다. 수로는 보통 자연적으로 생기고 운하는 인공적인 경우가 많기 때문에 이 실수로 인해 그 이후 100년간 화성 생명체에 대한 여러 가지 상상력 넘치는 이론들이 나왔다.

화성에 운하가 만들어졌다는 설을 지지했던 사람들 가운데 중요한 인물로 미국 천문학자인 퍼시벌 로웰을 들 수 있다. 애리조나 플래그스태프의 강기가 맑고 높은 고도에 위치한 로웰 천문대에서 그는 화성을 광범위하게 연구해 표면의 특징들을 자세히 그렸다. 그는 1906년 《화성과 운하》 그리고 1908년 《화성, 생명체의 거주지》를 포함해 화성에 관한 책들을 발표했다. 로웰은 오래 전에 존재했던 분명이 정교한 관개 시설로 이 운하를 건설했다고 주장했다. 운하를 이용해 극지방의 물을 화성의 건조한 주저 지역으로 운반했다. 로웰의 생각은 대중 문화에 반영되었다. 영국의 소설가인 H.G. 웰스는 화성 생명체에 관한 가장 유명한 소설인 《우주전쟁》을 썼다. 그는 화성인들이 화성에서의 멸망을 피하기 위해 지구를 침공했다는 상상을 했다.

20세기 들어 보다 크고 성능이 좋은 망원경이 등장했지만 로웰이 관찰했던 특징들이 실제 운하라는 것을 입증하지 못했다. 사실 이 특징들은 착시로 밝혀졌다.

1965년부터 시작해 화성 생명체설에 보다 큰 일격이 가해졌다. 미국은 화성 사진을 찍고 대기를 조사하기 위해 마리너호를 발사해 화성 근접 비행을 시도했다. 이 탐사로 인해 화성에는 주로 이산화탄소로 된 대기가 있으며 극지방의 만년설은 물이 아니라 결빙 상태의 이산화탄소라는 것이 밝혀졌다. 화성 사진에는 아무런 강도 바다도 생명의 흔적도 보이지 않았다. 과학자들은 화성의 대기층이 얇고 자기장이 약해 해로운 우주 방사선에 취약하다고 결론지었다. 1976년에는 바이킹 탐사계획에서 생물학적 실험과 토양 실험을 했다. 과학자들이 본래 기대도 실험 결과 화성 표면에는 유기물이 전혀 없는 것으로 나타났다. 그 결과 현재의 견해는 화성은 예전에는 열풍형 생명체가 있었을지 모르지만 지금은 죽은 행성이라는 것이다.

1996년부터 시작해 미국은 화성에 대단히 성공적인 일련의 착륙을 실시했다. 아무런 생명체도 발견하지 못했지만 이로 인해 화성의 지질과 화학에 대해 보다 많은 사실들이 밝혀졌다. 2001년의 로버 탐사 장치들을 이용해 화성 지형을 찍은 놀라운 사진을 지구에서 받아볼 수 있었다. 다른 탐사에서는 수소와 메탄이 감지되었다. 2004년의 화성 탐사에서는 먼 과거에 물이 있었다는 결정적 증거가 나왔다. 2009년까지 추가적인 미국의 우주 탐사 계획이 진행 중이다. 유럽우주국은 2035년 화성에 인간을 착륙시킬 계획을 하고 있다. 2004년에는 미국 대통령이 우주여행을 화성에 착륙시켜 탐사하겠다는 계획을 발표했다.

미국의 조경학

조경학이란 인간이 사용하고 즐길 수 있도록 토지를 설계하고 개발하는 것을 말한다. 19세기 중반 이전에는 조경이 직업이 아닌 예술로만 행해졌다. 고대부터 조경은 부유층만의 향유물이었다. 로마에는 인텔리, 페르시아에는 정원사, 이탈리아에는 도시 광장이, 프랑스에는 궁전 부지가 있었다. 미국 식민지 시대의 상류층은 영국의 조경 양식, 특히 정교한 정원을 채택했다. 대부분의 조경 계획에는 정원이 포함되어 있기 때문에 조경사들을 조경 정원사라고 불렀다.

조경이라는 용어를 만들어 낸 사람은 윌버트 팅 베슨이었는데, 그는 1828년에 발표한 책에다 그 용어를 썼다. 그는 처음으로 자연 조경과 건축 설계 원칙 간의 관련성에 대한 관심을 불러일으켰다. 미국에서는 프레데릭 로 옴스테드가 이 용어를 채택해 최초로 직업으로 삼았다.

옴스테드가 건축가 칼버트 보스와 함께 뉴욕의 센트럴파크 설계 공모전에 응모하면서 이 분야에 혁명이 일어났다. 1800년대 초반 뉴욕의 인구가 급증하면서 뉴욕의 지도자들은 대중을 위한 열린 공간인 공원을 마련할 필요를 느끼게 되었다. 뉴욕 입법부는 도시 한가운데 직사각형 모양의 대형 공원 설립을 위한 예산을 승인했다. 1858년에 옴스테드와 보스의 설계가

채택되어 이후 15년에 걸친 공사가 진행되었다.

옴스테드의 계획은 공원을 민주주의와 평등주의 이상의 상징으로 만드는 것이었다. 그는 공원을 누구나 갈 수 있고 일상 생활의 압박으로부터 벗어나 명상과 휴식을 즐길 수 있는 공간으로 만들기를 원했다. 그의 새로운 설계 아이디어는 보행자, 말을 탄 사람, 마차와 같은 각기 다른 계층의 사용자를 위해 “분리된 순환 시스템”을 만드는 것이었다. 조경을 해치지 않기 위해 공원을 통과하는 차량은 길가로 가려진 옹골 들어간 도로를 이용해야 했다. 오늘날에는 여기에 달리기 코스, 아이스 스케이트장, 야생생물 보호구역, 야구장, 운동장, 세계적으로 유명한 레스토랑인 테번 온 더 그린이 있다.

옴스테드는 또한 워싱턴 D.C.의 미국 국회의사당 부지도 설계했다. 그는 건물 측면부에 돌출한 대리석 테라스를 설치했다. 국회의사당을 찾는 일부 방문객들이 말에게 물을 먹일 장소가 없다고 불평했다. 그는 이 문제를 해결하기 위해 야외 벽돌 건물인 서머 하우스를 지었는데, 여기에는 말이 물을 마실 수 있는 샘이 있었다.

조경사들은 1899년 미국조경가협회 설립했다. 오늘날 조경사는 의사나 변호사와 마찬가지로 높은 학력과 자격증이 요구되는 직업이다. 이 분야는 여러 전문 분야로 이루어져 있다. 조경사는 수학, 과학, 공학, 미술, 기술 등을 잘 알아야 한다. 또한 작업을 사회적 맥락에서 이해할 수 있어야 하고 정치가, 공공 기관, 정부 기관 등을 상대하는 데도 능숙해야 한다.

조경사라는 직업은 점점 더 전문화되어 가고 있다. 조경 설계사와 조경 기술자는 조경 사업을 계획하고 실행에 옮긴다. 조경 관리사는 장기적인 조경의 관리를 담당한다. 이들은 조합이나 자연보전, 부지 관리 등을 맡는다. 조경하지는 토양이나 수리학, 식물학 등과 같은 분야의 기술적인 문제에 대해 조경사와 협력 작업을 한다. 공공 정책과 기획 전략은 조경 계획사의 도움을 받아 수립한다. 정원 설계사는 역사적인 정원의 보존뿐만 아니라 사유지의 정원을 관리한다.

Vocabulary Review

- | | | | | | |
|---|------|------|------|------|-------|
| A | 1. A | 2. C | 3. D | 4. C | 5. A |
| | 6. B | 7. C | 8. A | 9. D | 10. A |
| B | 1. d | 2. h | 3. e | 4. i | 5. j |
| | 6. a | 7. f | 8. b | 9. g | 10. c |

Unit 5 Sentence Simplification

Skill & Drill

1. A

해수면과 육지

해수면이란 육지와 비교한 바다의 평균 높이를 말한다. 바다는 한 지점의 높이가 다른 지점에 비해 2미터 정도까지 더 높을 수 있어서 바다의 높이를 측정하기란 쉽지 않다. 또한 달의 위치 변화로 생기는 조수 때문에 해수

면이 올라갈 수도 있다. 반조는 육지에 비해 해수면이 높을 때를 말하는데, 반조가 되면 바다 근처의 해변이 거의 없어진다. 간조는 육지에 비해 바다가 낮아져서 해변의 크기가 넓어지는 때이다. 빙산이 녹아도 해수면이 올라간다. 빙산은 지구에서 가장 온도가 낮은 바다에 떠다니는 거대한 얼음 덩어리를 말한다. 지구온난화 때문에 빙산이 녹아 지구 전체의 평균 해수면이 올라가게 된다. 빙산의 해빙 때문에 일부 섬들이 바다 속으로 가라앉고 있다.

2. (B)

철새

해마다 가을과 겨울이 되면 새들은 남쪽 나라로 이동한다. 이 장거리 여행에는 여러 가지 이유가 있다. 철새들은 식량이 더욱 풍부한 곳을 찾거나 더 편안한 보금자리를 찾거나 안전하게 알을 낳을 수 있는 장소를 찾아서 이동한다. 철새들은 종종 여름 동안 북쪽 지방에 머무르다가 기온이 떨어지기 시작하면 남쪽으로 이동한다. 철새들은 따뜻한 남쪽 지역에서 겨울을 나고 기온이 너무 더워지기 시작하면 다시 북쪽으로 돌아온다. 이동의 장점은 북쪽의 긴 여름 동안에는 새끼에게 보다 오랜 시간 먹이를 먹일 수 있고 먹이가 되는 곤충도 많다는 것이다. 날씨가 추워지면 보다 따뜻한 지역으로 돌아오는데, 이곳은 낮의 길이와 먹이의 양이 매우 차이가 난다. 이동의 단점은 이동이 위험한 여정이 될 수 있고 엄청난 양의 저장된 에너지가 있어야 한다는 것이다.

3. (C)

사막의 날씨 변화

사막에서는 단 하루 사이에도 날씨가 급격히 변한다. 예를 들어, 오후 2시에는 40°C까지 오르지만 같은 날 새벽 3시에는 영하 15°C까지 떨어지기도 한다. 낮 동안에는 햇빛이 모래에 반사되어 모래와 기온이 대단히 뜨겁다. 이는 더운 날 해변을 따라 걸으면 발 아래 모래가 타는 듯이 뜨겁게 느껴지는 것과 같은 원리이다. 사막도 같은 원리가 적용된다. 모래는 낮 동안 태양열을 전혀 흡수하지 않기 때문에 밤이 되면 기온이 크게 내려간다. 숲과 초원에서는 낮 동안 나무와 잔디가 태양열을 흡수하기 때문에 기온이 밤에도 사막만큼 내려가지 않는다. 하지만 사막에는 나무와 잔디가 거의 없다. 그래서 열기가 흡수되지 않아서 낮에는 대단히 뜨겁고 밤에는 얼어붙을 정도로 춥다.

4. (B)

초식 동물에 대한 식물의 방어 기전

식물은 여러 가지 방법으로 자신을 먹이로 삼는 동물을 방어할 수 있다. 이 막한 다양한 방어 기전 덕분에 식물은 초식동물이 많은 곳에서도 살아남을 수 있다. 식물의 방어 기전으로는 장미의 가시와 같이 식물 표면에 있는 보호장치, 동물이 소화하기 힘든 물질, 초식동물을 죽이거나 아프게 만드는 독 따위가 있다. 또한 식물은 초식동물을 사냥해서 잡아먹는 육식동물을 끌어모아 자신을 보호하는 놀라운 방법을 쓰기도 한다. 예를 들어, 어떤 식물은 초식동물의 포식자들이 좋아하는 냄새를 내거나 육식동물에게 먹이나 보금자리를 제공하기도 한다. 방어기전은 항상 식물에게 존재할 수도 있고 아니면 식물이 초식동물에게 공격을 받은 뒤에 발달하기도 한다. 이런 식물 종이든지 초식동물로부터 자신을 보호하는 여러 가지 방어 기전을 가지는 경우가 흔하다. 그렇기 때문에 수명이 수백만 년 된 식물 종도 많다.

TOEFL Reading Practice

A 1. (B) 2. (C) 3. (A) 4. (D)

1^{thigh up} / 2^{foveae} / 3^{in motion} / 4^{compound eyes}

여러 종에서의 눈의 변이

인간의 경우 정상 시력 기준은 스넬슨 시력검사서에서 기준선을 기침없이 읽어들 수 있는 20/20이다. 시력은 약 6m 떨어진 곳에서 각기 다른 크기의 글자를 얼마나 잘 읽어들 수 있는가 하는 것이다. 하지만 다른 종의 경우에는 시력 검사표의 제일 아래 선을 읽을 수 있는 정도로는 정상 측에도 들 수 없다. 대부분의 새들은 우리 인간을 시각 장애가 있는 것으로 볼 것이다. 예를 들어, 매의 경우 앰피아이 스테이트 발달의 꼭대기에 있어서도 인도에 떨어진 10원짜리 동전을 볼 수 있다. 매는 만약 1평방밀리미터 당 백만 개의 추상체가 있기 때문에 대단히 시력이 좋다. 그리고 물 속의 경우 인간은 원시가 되지만 물총새는 물체의 구별을 가능하게 하는 추상체로 주로 이루어진 부분인 중심체가 두 개나 있기 때문에 하늘로부터 내려 뿜쳐 물고기를 낚을 때 공중과 물속에서 다 잘 볼 수 있다. 새가 날고 있는 상태에서 사는 중심체와 하나로 한번에 한쪽 눈으로 아래쪽 물을 볼 수 있다. 이것을 단안시라고 한다. 일단 물 표면에 닿게 되면 나머지 중심체와 가세해 생안경처럼 물총새는 동시에 먹이에게 양쪽 눈의 초점을 맞춘다. 개구리의 눈에는 물체가 계속해서 영화처럼 보인다. 개구리의 눈에 있는 고도로 발달된 곤충 탐지기과 알려진 세포는 움직이는 물체에만 주로 반응한다. 그래서 사람들은 죽은 곤충 위에 앉아 있는 개구리는 자신이 먹이 위에 앉아 있다는 것을 알지 못한 채 굶어 죽을 것이라고 말한다.

별은 점눈이 있어 비행에 사용한다. 김눈에는 눈에 보이는 것을 점 모양 즉 포지셔너로 나누는 15,000개의 개인(細胞)이 있다. 벌은 이런 시력이 있기 때문에 태양을 하나의 점으로 보고 계속해서 기준점으로 삼는다. 그래서 벌의 눈은 태양에 대한 비행선의 각을 끊임없이 측정하는 항해 도구가 된다. 벌의 눈은 또한 비행 속도를 측정하는 역할도 한다. 인간의 20/20 완전 시력이 무색할 만큼은 아니라고 하더라도 벌은 인간이 보지 못하는 자외선을 볼 수 있다. 그래서 인간이 완전 시력이라고 간주하는 것도 사실 다른 종과 비교하면 상당히 한계가 있는 시력이다. 하지만 인간의 눈을 훨씬 더 특별하게 만드는 것이 있다. 모든 동물 가운데 인간과 일부 영장류만이 칼라로 세상을 볼 수 있다.

B 1. (E) 2. (C) 3. (A) 4. (C)

1^{termite} / 2^{nourish forests} /

3^{shorter-legged} / 4^{reproduction}

흰개미

영어권에서 흰개미는 터마이트(termite)라는 이름으로 더 잘 알려져 있다. 흰개미라는 이름이 붙은 것은 어느 정도 개미처럼 보이기 때문이다. 하지만 식성과 생활방식은 개미와 완전히 다르다. 흰개미들은 대부분 죽은 초목이나 나무를 먹기 때문에 사람들이 나무를 이용해 집을 지은 곳에서는 해충이 될 수 있다. 또한 흰개미들은 농작물에 해를 끼치기도 한다. 그런데도 하얀 죽은 초목과 나무를 다시 생체로 돌아가게 만든다는 전에서는 아주 유용한 동물이다. 죽은 초목과 나무를 먹기 때문에 광물 성분이 풍부한 분비물로 숲을 기름지게 만드는 역할을 한다.

흰개미는 보통 개미들과 크기나 사회적 습성이 비슷하지만 더 이상의 유사성은 없다. 흰개미는 개미보다 더 부드럽고 희고 다리도 짧고 더 동등하

며 움직임이 훨씬 느리다. 놀랍게도 흰개미들은 사마귀나 바퀴벌레와 같은 뿔에 속한다. 흰개미는 입의 일부를 사용해 죽은 나무를 씹기 때문에 이빨이 상당히 튼튼하다. 대부분 어두워진 보금자리나 굴 속에 살면서 생활할 새로운 보금자리나 굴을 만들거나 식량을 구하기 위해서가 아니고는 보금자리를 떠나지 않는다.

흰개미는 수백 마리의 수백 마리의 군락을 이루고 산다는 점에서 대단히 사회적이다. 그들은 자신들이 필요한 먹이뿐만 아니라 군락 전체가 필요한 먹이를 찾고 모으기 위해 서로 협력한다. 또한 군락에서 어떤 역할을 할지가 아주 잘 조직화되어 있다. 병정개미, 빈식 역할만 하는 수컷미, 알을 낳는 여왕개미도 있던 하지만 대부분의 흰개미들은 일개미이다.

일부 지역에서는 흰개미가 하늘로 치솟는 둥근 형태의 거대한 보금자리를 만들기도 한다. 많은 아프리카 국가에서는 때로 6미터나 되는 이런 엄청난 토포미들을 군데군데에서 볼 수 있다. 흰개미들은 수평보다는 똑바로 수직으로 보금자리를 만드는 경향이 있다. 일부 과학자들은 이것이 큰 동지 내의 공기 순환을 더 좋게 하기 위해서라고 한다. 공기 순환이 더 잘 되면 내부 기온이 외부 기온과는 상관없이 하루 종일 거의 일정하게 유지된다. 기온 변화가 심해 흰개미 알이 부화하기도 전에 죽을 수 있기 때문에 온도를 일정하게 유지하는 것은 중요하다. 또한 개미집 안에는 복잡한 굴이 있어 작업을 보다 쉽고 조직적으로 할 수 있다. 대부분의 굴은 특별한 기능이 있으며 흰개미들은 항상 어떤 특정한 작업을 해야 할 경우 어느 길로 가야 하고 어떤 굴을 이용해야 하는지 아는 것처럼 보인다. 어떤 면에서는 흰개미가 사람보다 더 똑똑해 보인다.

- [C] 1. (B) 2. (C) 3. (B) 4. (A)
 1Southern Germany / 2150 million /
 3body temperature / 4glide down

시조새 화석

시조새 화석은 고고학자들이 해낸 대단히 중요한 발견이었다. 시조새는 독일 남부에서 발견되었는데, 이곳에는 보존이 잘 된 화석이 많이 있다. 시조새 화석은 고대 새의 화석으로 약 1억 5천만 년 전의 것이다. 많은 과학자들이 시조새가 최초의 조류였을 것으로 믿는다. 시조새는 오늘날의 조류와 별로 비슷하지 않다. 과학자들은 시조새에는 깃털과 날개가 없기 때문에 부분적으로는 조류, 부분적으로는 공룡이었을 것으로 보며 고대 공룡들과 마찬가지로 파충류의 특징도 가졌다고 생각한다. 오늘날의 조류와는 달리 시조새는 이빨이 다 있었으며 가슴이 납작했고 꼬질의 꼬리가 있었으며 날개에 새 개의 발톱이 있어 먹이를 공격하거나 나무를 붙잡을 때 사용했을 것으로 보인다. 사실, 시조새 화석을 보면 조류라기보다는 공룡에 더 가깝다.

시조새의 깃털이 어떤 용도로 사용되었는지에 관해서는 학자들 사이에 상당한 논란이 있다. 일부 학자들은 깃털을 사용해 체온 조절을 했을 것으로 믿고 일부 학자들은 비행에 사용했다고 믿는다. 학자들은 어떻게 해서 동물이 처음으로 날게 되었는지를 알고 싶어하기 때문에 이것은 중요한 문제이다. 최초의 비행 그리고 시조새가 깃털을 어떤 용도로 사용했는지와 관련해 두 가지 설이 있다. 첫 번째 주장은 나무에서 뛰어내리다가 날게 되었다는 설로 이것은 고대 새가 깃털을 사용해 오늘날 날다람쥐들이 하는 것처럼 나무에서부터 땅으로 활공해 내려왔다는 것이다. 다른 설은 땅에서 뛰어오르다가 날게 되었다는 설로 고대 새들이, 육지에서 살면서 필요할 경우마다 깃털을 이용해 나무로 길게 뛰어올랐다는 것이다. 예를 들어, 포식동물로부터 달아나야 할 경우 먼 거리에서 나무로 뛰어 올라 발톱으로 나무를 붙잡을 수 있었다는 것이다.

학자들은 고대 조류가 현대 조류들과 같이 왜 날개짓을 했을까 궁금해한다. 그들은 일부 공중이 강력한 앞발을 사용해 먹이를 아래쪽으로 잡아 붙드는 것과 관련이 있을 것으로 믿는다. 만약 시조새가 이렇게 했다면 강력한 앞발을 사용해 날개짓을 하면서 더 오래 공중에 떠 있을 수가 있다는 것을 알게 되었을 것이다. 수백만 년에 걸쳐 시조새는 점점 더 오래 공중에 떠 있을 수 있었을 것이고 마침내는 현대 조류들처럼 날 수 있게 되었을 것이다.

- [D] 1. (C) 2. (D) 3. (C) 4. (B)
 1plants, animals, and minerals / 2in harmony /
 3destroyed / 4maintain harmony

생태계

생태계란 생태상의 시스템을 말한다. 생태계는 일정 지역 내의 자연 안에 있는 모든 자연적인 것들 그리고 광물과 동식물의 습성의 조절 과정 등을 이르는 말이다. 한 가지 예가 사막 생태계이다. 사막은 밤에는 아주 추워지기도 하지만 대부분 덥고 건조하다. 다시 말해, 사막에 서식하거나 존재하는 모든 것들과 환경 사이에 사막 생태계의 조화가 있다. 생태계의 크기에는 제한이 없다. 조화가 존재하는 한 생태계가 존재한다.

전 세계의 많은 생태계가 파괴되고 있기 때문에 생태계는 현대 정치와 환경주의가 그들 사이에서 중요한 이슈가 되었다. 최근에는 세계 전 국가라 해도 될 170개국의 대표들이 생물다양성협약이라는 국제 협약에 조인했다. 이 협약에는 모든 국가와 개인은 생태계와 자연 서식지를 보호하고 모든 생태계 내에 존재하는 동식물의 개체 수를 유지하기 위해 노력해야 한다고 명시하고 있다. 또한 한 생태계 내의 모든 부분은 조화를 이루어 전체적으로 움직이기 때문에 하나의 단위 또는 신체와 같다고 명시하고 있다. 신체의 일부가 잘려나가 죽게 되면 몸 전체가 제대로 기능을 하지 못한다. 생태계의 어느 부분이 파괴되면 그 생태계가 파괴되거나 정상적 기능이 불가능해질 것이다.

생태계 내에서 어떻게 조화와 균형이 유지되는지를 아는 것은 중요하다. 생태계 내의 여러 부분 간의 많은 상호작용을 통해 균형이 유지된다. 예를 들어, 숲에 모기가 너무 많으면 개구리가 모기를 많이 잡아먹는다. 개구리는 모기를 많이 잡아먹어 더 튼튼해지고 새끼를 더 많이 낳게 된다. 그러나 개구리의 수가 너무 많아져 다른 동물들이, 보다 많은 개구리를 잡아먹게 된다. 마침내 생태계의 조화가 생길 때까지 이 순환은 계속된다. 일부 동물과 식물은 생존을 보다 쉽게 하기 위해 서로 돕는다. 흰개미와 같은 곤충은 죽은 나무를 분해해 영양분이 토양으로 돌아가게 만든다. 생태계 내에는 균형과 조화를 유지시키기 위해 수백만 가지 현상들이 일어난다. 하지만 생태계의 일부가 인간이 환경에 미치는 영향으로 파괴되면 전체 생태계에 끔찍한 결과를 가져오게 된다.

- [E] 1. (C) 2. (A) 3. (D) 4. (B)
 1large brains / 2cerebral cortex /
 3swim in groups / 4creative behavior

돌고래의 지능

많은 학자들은 돌고래의 뇌가 크고 독특한 행동을 하고 독창적이라는 이유로 돌고래의 지능이 아주 높다고 믿는다. 이 모든 요소들로 인해 돌고래는 매우 매력적인 연구 대상이 되었다. 일부 학자들은 돌고래를 연구함으로써 인간이 어떻게 해서 그렇게 지적인 동물이 되었는지를 알아낼 수 있다고 생각한다.

돌고래의 뇌는 다른 동물에 비해 꽤 큰 편이다. 사실 체중을 고려했을 때 돌고래의 뇌는 인간보다 크다고 할 수 있다. 하지만 전체적인 몸 크기를 비교하면 인간의 뇌가 약간 더 크다. 역시 지적인 동물로 간주되며 많은 이들이 인간과 관련이 있다고 믿는 침팬지와 비교했을 때 병코돌고래의 뇌는 네 배나 더 크다. 동물 뇌의 한 부분을 이루는 대뇌 피질은 인간에 비해 돌고래가 40%나 더 크다. 화자들은 이 부분에서 많은 복잡한 사고들이 일어난다고 믿는다.

돌고래의 복잡한 습성을 볼 때 돌고래의 지능이 대단히 높다는 것을 알 수 있다. 예를 들어, 돌고래는 6마리에서 12마리씩 떼를 지어 함께 헤엄을 친다. 연구자들은 돌고래들이 무리 내에서 서로를 구별할 수 있다고 생각한다. 스코틀랜드의 몇몇 학자들은 인간이 끈끈한 우정을 맺는 것과 비슷하게 두세 마리의 돌고래들이 서로 간에 긴밀한 유대감을 형성하는 것을 보여주었다. 또한 돌고래는 하나의 단위를 이루어 움직이면서 서로 잘 생존하고 생활하도록 돕는다. 상어가 다가오면 돌고래들은 위험을 피하기 위해 정확히 같은 시각에 함께 행동한다. 일부 학자들은 돌고래들끼리 경고문을 하기 위해 콧물 소리를 낸다고 믿는다. 돌고래들은 함께 행동하며 항상 주변 상황을 파악하는데, 사람들도 종종 이렇게 하지 못한다.

돌고래는 독창성 면에서도 특별한 동물이다. 케렌 프라이어라고 하는 미국 과학자는 포위 상태의 돌고래를 대상으로 얼마나 독창적인지를 실험했다. 그녀는 돌고래들에게 여러 가지 재주를 가르친 후 돌고래들이 창의적으로 행동할 수 있는지를 보고 싶어했다. 예를 들어, 돌고래들이 독창적인 방법으로 재주를 부리면 생선을 더 주는 방법을 택했다. 하지만 이전과 똑같은 재주를 부리면 생선을 주지 않았다. 돌고래들은 시간이 지나자 독창적인 재주를 부리면 생선을 받는다는 사실을 알게 되었고 점점 더 독창적이고 창의적인 재주를 부리기 시작했다. 프라이어는 돌고래들이 자신들에게서 원하는 게 무엇인지를 파악하는 데 걸리는 시간을 측정했다. 그녀는 그 후 인간들에게 간단한 재주를 가르치고 창의적으로 재주를 부릴 경우 포상을 하는 실험을 했다. 흥미롭게도 인간의 경우도 자신에게서 원하는 게 무엇인지를 파악하는 데 돌고래와 거의 동일한 시간이 걸렸다.

- [F] 1. (B) 2. (D) 3. (B) 4. (A)
 1carbon / 2conduct electricity /
 3aluminum / 41,900 degrees

규소

규소는 탄소와 비슷하고 지구상 거의 모든 곳에서 발견되는 대단히 중요한 원소이다. 지각은 4분의 1이상이 규소로 되어 있어 규소는 지구상에서 두 번째로 풍부한 원소이다. 규소는 단독으로 존재하지 않는다. 규소는 점토나 모래, 암석 등과 같은 광물 속에 들어 있다. 암석이나 모래, 다른 광물에서 규소를 채취하면 금속처럼 보인다. 쉽게 쪼개지고 부서진다는 점에서 유리와 비슷하다. 규소는 전기와 다른 형태의 에너지로 쉽게 전달하기 때문에 반도체 생산에 이용된다는 것이 중요하다.

규소는 컴퓨터 그리고 반도체와 같은 많은 컴퓨터 부품들을 만드는 데 사용되기 때문에 중요하다. 하지만 반도체 생산에만 사용되는 것은 아니다. 규소는 쓰임이 많다. 사실, 훨씬 더 많은 규소가 컴퓨터가 아닌 알루미늄을 만드는 데 사용된다. 사실 전세계적인 규소의 사용량 가운데 55%가 자동차 부품의 알루미늄을 만드는 데 사용된다. 두 번째로 많이 사용하는 것은 실리콘 생산으로 실리콘은 플라스틱이나 고무와 비슷한 내구재이다. 세 번째 용도가 반도체 생산이다. 규소는 그 외에도 수백 가지 용도로 사용된다. 규소는 지구상에서 가장 많이 사용되는 물질 가운데 하나이다.

규소는 암석이나 모래, 점토, 또는 다른 광물을 대단히 뜨거운 용광로 속에 넣어서 얻는다. 용광로가 1,900°C 이상으로 데워지면 규소가 함유된 광물이 녹아서 약간의 탄소와 함께 액화 규소만 남게 된다. 용광로의 아랫 부분에 규소가 모이면 이를 추출해 냉각시킨다. 규소는 식히면 고체로 변한다. 이 규소는 순도가 98%로 나머지는 탄소이다. 이 상태의 규소는 자동차 부품에 만들기에 좋다. 하지만 고품질의 반도체를 만들기 위해서는 순도가 거의 100% 가까이 되어야 한다. 그래서 컴퓨터 부품에 사용할 규소는 정제된 시켜야 한다.

규소 정제는 복잡한 과정이다. 오늘날 과학자들과 기술자들은 컴퓨터 부품 생산에 사용할 규소를 정제하기 위해 화학 과정을 사용한다. 지멘스 프로세스라고 하는 방법에서는 불순물이 섞인 규소를 다시 한번 고온에서 특수 기체에 노출시킨다. 이 과정에서 규소 입자는 크기가 훨씬 더 커지고 상대적으로 탄소 입자는 작아지게 된다. 그러면 규소는 불순물이 없는 거의 순수한 상태가 된다.

Building Summary Skills

1. Eye Variation Among Different Species

While humans consider 120/20 eyesight to be perfect, this is not true for members of the animal kingdom, which see in different ways. 2Hawks can see extremely small objects from distances high in the sky. The kingfisher uses 3monocular vision, where it uses just one eye to see above and under the water. Frogs see things only 4when they move. And bees have 5compound eyes that see everything as a mosaic of dots.

2. The White Ant

1Termites are sometimes called white ants, but they are very different from them. They are considered pests because they 2eat wood, which can bother humans. They do not resemble ants at all, but are members of 3the mantis and cockroach family. They are 4social insects that live in communities of up to several million insects. They have enormous nests that can be up to 5six meters high.

3. The Archaeopteryx Fossil

The Archaeopteryx fossil was first found in 1Germany. It was a bird that lived over 2150 million years ago. It did not resemble modern birds, having 3a full set of teeth, a flat chest, a long, bony tail, and 4three claws on its wings. There are a couple of theories that attempt to explain how Archaeopteryx used 5its feathers. Scientists want to know about this so that they can learn how birds first learned to fly.

4. Ecosystems

The ecosystem refers to all natural things and processes that control the behavior of 1plants, animals, and minerals in a certain part of nature. All living things must

²achieve a harmony to survive in their own ecosystem. ³Environmentalists and countries are becoming more involved in ⁴caring about ecosystems. Many countries signed ⁵the Convention of Biological Diversity recently. It is important to know about the ecosystem in order to keep it functioning properly.

5. The Intelligence of Dolphins

Scientists believe dolphins are intelligent because of ¹their large brains and ability to be creative. In fact, dolphins have larger brains than ²humans and chimpanzees. They form bonds like friendship, and this helps when ³predators attack. ⁴Karen Pryor, a scientist, experimented with them and discovered that they have the ability to engage in creative behavior. Dolphins can also learn tricks ⁵at about the same rate as humans.

6. Silicon

Silicon is a ¹highly abundant and extremely common element that can be found almost everywhere on Earth. It has many qualities, particularly its ability ²to conduct electricity, which makes it ideal for manufacturing. It has many different uses, including computers, computer parts ³like semiconductors, and ⁴aluminum parts in cars. It must be purified by heating it to ⁵extreme temperatures. After it hardens, it can be used to manufacture various items.

TOEFL iBT Practice Test

1. (B) 2. (A) 3. (C) 4. (D) 5. (B)
6. (C) 7. (D) 8. (B) 9. (B) 10. (B)
11. (C) 12. (C) 13. (A) 14. (B) 15. (C)
16. (A)

생물학적 해충 구제

많은 농업 전문가들은 정원과 농지의 해충과 질병을 퇴치하기 위해 화학 살충제 대신 생물학적 방법을 이용하고 있다. 생물학적 해충 구제는 일정 지역에 포식 동물이나 곤충을 투입하여 농작물에 피해를 입히는 기생충을 잡아 먹게 하는 방법이다. 또 다른 생물학적 해충 구제 방법으로는 질병과 파괴 현상을 가져오는 것으로 알려진 기생충을 자연적으로 막아주는 다양한 식물을 정원이나 농지에 심는 것이다.

이런 식의 해충과 질병 퇴치는 유기농법의 원칙을 이용한다. 유기농법으로 농사를 짓는 사람들은 농사에 화학약품을 최소로 사용하거나 아예 사용하지 않으려고 한다. 화학약품을 쓰는 전통적인 방법은 해로운 생물과 유익한 생물을 둘 다 무차별적으로 죽이는 것으로 알려져 있다. 하지만 이 체계적인 방법을 사용하면 농지의 서로 다른 동식물간의 상호작용을 이용할 수 있다는 이점이 있다.

이런 식으로 농사를 지을 경우 농지의 생물다양성이 증가되어 전체적으로 농지의 질이 향상된다고 알려져 있다. 이러한 생각은 생물다양성이, 중

가하면 해충과 질병이 제거되지는 않지만 관리 가능한 수준으로 감소되는 지속 가능한 생태계가 만들어진다는 원칙에 바탕을 두고 있다. 이 점에서 생물학적 해충 구제의 목적은 농지의 생태계가 자립적으로 작용하여 번성할 수 있는 견제와 균형의 체계를 만드는 것이다. 이러한 자립 상태를 평형 상태라고 한다.

화학 살충제를 써서 생태계에 피해가 생기는 좋은 예는 모기를 죽이기 위해 살충제를 분무하는 경우이다. 이 경우 살충제 때문에 잠자리도 죽는다. 잠자리는 모기와 모기 유충을 잡아먹는 중요한 생물 구제 곤충이다. 이러한 살충제 분무 방법은 장기적으로 볼 때 모기의 수를 늘어나게 하는 경우가 흔한데, 이는 부화하는 모기 유충을 잡아먹을 잠자리가 주위에 없기 때문이다.

풍부한 생물학적 구제 곤충은 무당벌레와 그것의 유충이다. 무당벌레는 농작물을 파괴하는 진드기, 초록진딧물, 진드기, 애벌레와 같은 많은 곤충들을 잡아먹는다. 많은 농업 전문가들은 이러한 유익한 곤충을 농지에 투입해 농작물을 보호한다. 때때로 무당벌레가 더 많이 서식하고 번식할 수 있는 무당벌레 제방이라는 식물 덩굴을 만들기도 한다. 이 유익한 곤충들은 대부분의 원래 가계에서 구입 가능하다.

일부 식물들 역시 농지나 작물을 보호하는 데 쓰일 수 있다. 이 특별한 생물학적 해충 구제 식물은 여러 가지로 도움이 될 수 있다. 조절 식물은 농작물 근처에 심거나 농작물과 섞어 심어 작물을 가리는 역할을 한다. 이렇게 하면 해충은 혼란을 느껴 중요 작물에 가까이 가지 못한다. 또한 후각적 억제제를 내어 해충을 끄는 냄새를 바꾸고 중요 작물로부터 해충을 쫓는 신호를 해충의 후각샘을 통해 보내기도 한다. 이러한 식물은 또한 유익한 곤충이 번식할 수 있는 장소를 제공하기도 한다.

그런 생물 구제 식물로는 파리와 모기를 쫓는 나뭇잎, 벼룩잎벌레를 쫓는 개박하, 일종팽이를 쫓는 마늘 등을 들 수 있다. 이러한 식물 가운데 가장 유익한 식물은 금잔화과 백시코무당벌레, 민달팽이 및 다른 해충들을 쫓는 역할을 한다. 이런 식물을 이용하면 그것이 유익한 포식 곤충들과 상호작용을 해서 화학약품을 전혀 사용하지 않고도 해충의 피해가 최소화되는 안정 상태를 만들어낸다.

생물학적 해충 구제는 경제적으로 매우 도움이 되는 것으로 알려졌다. 수 년 전에 걸친 실험에서 비용 대비 이익의 비율이 일반 화학약품의 경우는 13:1에 불과한 데 비해 유기농법의 경우 32:1인 것으로 나타났다.

툰드라 식물

툰드라는 지면 아래의 토양층이 영구적으로 얼어있는 지역을 말한다. 짧은 하기 동안에 지면이 녹긴 하지만 하층토는 영구동토층 상태로 남는다. 이 토양과 기후 조건은 툰드라에서 자랄 수 있는 식물의 종을 결정짓는 역할을 한다.

툰드라에서는 강한 바람이 불며 강우가 거의 없다. 대부분의 수분은 눈의 형태로 내린다. 툰드라 지역은 서막 지역과 비슷한 정도의 강수가 내린다. 하기 동안에는 식물이 성장하고 번식할 수 있을 정도로 영구 동토층이 녹는다. 하지만 지면 아래의 하층토는 얼어 있기 때문에 밑으로 꺼지지는 않는다. 하절기 동안에는 이 갇힌 물이 녹아 호수와 소택지가 만들어진다.

툰드라의 하절기 동안에는 지면의 눈이 녹을 정도로 기온이 오르지만 지하의 눈은 녹지 않는다. 기온이 낮고 성장 기간이 짧은 탓에 이곳에서는 나무가 거의 자라지 않는다. 수목 성장 한계선이라고 하는 자연적인 수목 장벽에 의해 툰드라와 삼림지대가 구분된다. 툰드라 지역에서 가장 흔히 볼 수 있는 초목은 풀과 이끼이다. 이러한 식물들은 혹한의 긴 동절기를 견뎌낼 수도 있고 성장기에 해당하는 짧은 하절기 동안 재빨리 자랄 수도 있다.

문드라의 확실한 특징 중 하나는 생물다양성이 대단히 낮다는 것이다. 1,700종 미만의 식물과 48종의 육상 포유류가 이 지역에 서식한다. 영구 동토층의 상층이 녹아 습지가 만들어지는 하절기 동안에만 수천 종의 곤충이 문드라에 서식한다.

문드라는 세계적으로 여러 곳에 존재한다. 대부분은 남극과 북극의 극지 방과 고도가 높은 지역에서 발견된다. 문드라는 북극문드라, 남극문드라, 고산문드라로 나눌 수 있는데, 각각 고유한 특징이 있다.

북극문드라는 극지 북반구에 있는 타이가 지대 북쪽의 황량하고 광활한 지역이다. 이곳은 거의 일년 내내 완전히 얼어 있다. 캐나다와 러시아 북부의 광활한 지역뿐만 아니라 라플란드 북부가 북극문드라에 해당된다. 여기에서는 수목이 자랄 수 없다. 땅은 초목이 거의 없고 바위 투성이다. 바위 위에는 이끼가 자라고 자갈과 돌멩이 사이에서 가끔씩 풀이 약간씩 자라기도 한다. [이곳에는 동물의 식량이 될 만한 것이 거의 없다.] 식물이 왕성한 몇몇 종만 다수 번식할 수 있다. 순록, 북극여우, 북극곰, 나그네쥐, 사향소 등이 이에 해당된다.

남극문드라는 북극문드라의 지구 반대편에 있다. 남극문드라는 몇몇 남극 섬이나 아남극 섬뿐만 아니라 얼음으로 된 남극에서도 찾을 수 있다. 남극반도의 암석 토양은 남극에서 식물이 자랄 수 있는 유일한 지역이다. 이곳에서는 수백 종의 이끼와 우산이끼가 지한다. 많은 육생 조류 및 해조류가 자라기도 한다. 한화식물은 단 두 종이 있는데, 남극좁새풀과 남극개미자리가 그것이다. 생물이 서식하기에 좋지 않은 환경을 가진 문드라 지역에는 땅과 물과 같은 포유동물이 서식하고 있다.

고산문드라는 전 세계적으로 고도가 높은 산악지대에 분포한다. 이 문드라에는 나무가 자랄 수 없다. 고도가 낮은 일부 고산문드라에는 영구 동토층이 있는데, 이는 영구 동토층이 산의 경사면 아래로 흘러내릴 수 있기 때문이다. 케어앵무, 마모트, 아생염소, 친칠라, 새양토끼와 같은 동물들이 고산문드라에 서식한다. 하지만 전 세계적으로 많은 고산문드라 지역에 다양한 종의 동물과 식물이 분포하고 있다.

Vocabulary Review

- A** 1. (B) 2. (D) 3. (C) 4. (B) 5. (D)
6. (A) 7. (A) 8. (C) 9. (B) 10. (D)
- B** 1. f 2. j 3. a 4. g 5. b
6. i 7. c 8. e 9. d 10. h

Unit 6 Rhetorical Purpose

Skill & Drill

1. (C) 2. (A)

원숭이 떼의 사회적 털 고르기

원숭이는 대단히 사회적인 동물이다. 이를 잘 보여주는 예가 그들이 서로 털 고르기를 해준다는 사실이다. 사회적 털 고르기는 인간이 우정을 쌓는

것과 비슷하게 서로 가까이 사는 동물들이, 다른 개체와 유대감을 강화할 수 있는 방법이다. 사회적 털 고르기는 또한 다른 원숭이에게 사과하거나 싸움을 피하는 방법으로도 이용될 수 있다. 그뿐만 아니라 몸을 청결히 하는 방법이기도 하다. 원숭이는 털이 많기 때문에 흔히 곤충이나 나뭇잎, 흙, 잔가지 등이 털에 잘 붙는다. 원숭이들이 다른 원숭이의 털을 골라 쓸 때 털 고르기를 해 주는 원숭이는 흙과 벌레, 다른 몸체들을 떼어낼 때 동시에 그 개체와 중요한 유대감을 형성한다. 인간에게 우정이 중요한 역할을 하는 것과 마찬가지로 원숭이의 사회 생활에서 이러한 유대감은 중요한 역할을 한다.

3. (A) 4. (C)

사회 집단의 정의와 종류

사회학에서 집단이란 어느 면에서 유사성을 지니며 상호작용을 하고 일정한 사회적 책임을 느끼고 공통된 정체성을 지닌 사람이나 동물의 모임을 말한다. 이 정의에 따르면 인간의 문명은 사회 집단으로 간주될 수 있다. 사회학에는 1차 집단, 2차 집단, 준기 집단의 세 가지 사회 집단이 있다. 1차 집단은 매우 감밀한 관련을 갖는 소규모 집단이다. 친한 친구나 가족이 1차 집단의 구성원이다. 2차 집단은 더 큰 집단으로서 학교 친구나 직장 동료 간의 관계와 같이 관계가 좀 더 형식적이거나 일정한 사회적 상황에 근거를 둔다. 준기 집단은 실제 구성원은 없지만 개인들이 소속되어 있다고 생각하는 집단이다. 예를 들어, 어떤 사람들은 어두운 색 옷을 입고 회장을 진하게 하며 자신들을 형식상 존재하지도 않는 사회 집단인 "고트족"이라고 생각한다.

5. (B) 6. (A)

문학 비평

문학 비평이란 문학 작품을 연구, 토론, 해석하는 행위이다. 요즘에는 대다수 문학 비평가들이 어떤 종류의 문학 이론을 이용해 소설, 시, 희곡 등을 비평한다. 문학 이론은 책이나 시를 토론할 때 비평가들이 사용하는 어떤 철학적 사고에 기초를 두고 있다. 이 철학적 사고에는 마르크스주의, 페미니즘, 현상주의 등이 있다. 대다수의 전문 문학 비평가들은 대학 교수이거나 문학 잡지에 글을 쓰는 기자들이다. 마르크스주의 문학 비평가의 예로서, 경제학자이자 철학자였던 칼 마르크스가 만든 사회 이론에 기초해 <어떤 왕자>를 연구한 대학 교수를 들 수 있을 것이다. 이 교수는 인간은 기본적으로 타락스럽기 때문에 어떤 왕자가 여행 중에 만나는 모든 인물들이 타락스럽게 행동한다는 주장을 펼칠 것이다. 이것은 칼 마르크스의 사상을 단순화시킨 것이다.

7. (B) 8. (D)

아일랜드 만담가, 서나차이

고대 아일랜드에는 책이 존재하기 전에 서나차이라고 하는 사람들이 있었다. 서나차이는 아일랜드 게일어로 "만담가"를 뜻한다. 이들은 이 마을 저 마을로 옮겨 다니며 이야기를 해 주고 돈을 벌었다. 이들은 흔히 고대 아일랜드 전설에 관해 이야기했다. 때로는 이전 마을에서 들은 이야기를 전하기도 했다. 나중에 영국인들이 아일랜드를 점령해서 아일랜드인들에게 아일랜드 게일어 대신 영어를 쓰게 했어도 서나차이들은 계속해서 자신들의 모국어인 이야기를 하며 이 마을 저 마을을 떠돌아다녔다. 시간이 흐르자 그냥 아일랜드 게일어를 말한다는 것이 이야기 자체보다 더 중요해졌는데, 그것이 아일랜드어를 유지하는 수단이 되었기 때문이다. 오늘날은 아일랜드

드 게일어를 말하는 토박이들이 별로 많지 않지만 아일랜드의 특정 지역에 일부가 살고 있다. 게일어는 또한 학교에서도 가르치고 있다. 서너차이는 이 언어가 존속하는 데 중요한 역할을 했다.

TOEFL Reading Practice

1. (D) 2. (C) 3. (A) 4. (B)

¹small rodents / ²flat, grassy lands /

³farm machinery / ⁴soften ground

프레리도그

프레리도그는 북아메리카의 초원에 사는 작은 설치류이다. 프레리도그는 가족을 이루고 사는 대단히 사회적인 동물로, 가족은 한 마리의 수컷과 2~4마리의 암컷으로 구성되어 있다. 초원은 여기저기 야생 잡곡과 자라는 넓고 평평한 지대를 말한다. 프레리도그는 초원에서 구멍과 굴을 파고 산다. 이 설치류는 평균적으로 12~16인치쯤 자라고 키가 4인치밖에 되지 않는 작고 마른 동물이기 때문에 작은 구멍이나 깊은 이 설치류가 살기에는 그 만이다. 프레리도그가 파는 굴은 서로 연결되어 있으며 때로는 동일한 굴을 20년에서 30년 정도 이용하기도 한다.

굴은 아주 넓다. 프레리도그들이 같이 사용하는 굴 안에는 잔을 자고 먹고 새끼를 돌보는 방이 따로따로 있다. 굴은 먼 거리에 걸쳐 있기도 하며 땅 속으로 33피트 아래까지 내려가기도 한다.

굴은 또한 포식자로부터 프레리도그를 보호하는 역할도 한다. 프레리도그는 포식자가 오고 있지는 않은지 살피려고 종종 굴 구멍 주위의 풀이나 잡초를 들춰기도 한다. 만약 포식자가 보이면 높은 소리로 가족 구성원들에게 위험을 알린다. 사실 일부 학자들은 이들이 각 포식자의 종류에 따라 다른 경고음을 낸다고 믿는다. 경고음이 들리면 지상 위로 나와 있던 가족들은 즉시 위험을 피할 수 있는 굴 안으로 뛰어든다.

농부들은 프레리도그를 해충으로 보고 농사와 관련된 문제가 일어나지 않도록 가능한 한 많은 프레리도그를 죽이려고 한다. 이것은 특히 농기계나 소에 해당된다. 프레리도그의 굴은 지반을 약하게 해서 땅을 가는 데 사용되는 무거운 트랙터가 손상되거나 소가 프레리도그의 굴에 빠져 다리가 부러지는 일이 있을 수 있기 때문이다.

그럼에도 불구하고 전문가들은 프레리도그가 초원의 생태계에 없어서는 안될 존재라고 믿는다. 프레리도그는 많은 독수리와 매, 여우들에게는 주요 먹이 공급원이 된다. 들소나 사슴과 같은 야생동물들은 프레리도그가 사는 초원에서 풀을 뜯기를 더 좋아하는데, 그곳의 야생풀이 더 건강하고 무성하기도 하고 소가 풀을 뜯으면서 단단해진 땅을 프레리도그의 굴이 더 부드럽게 만들기 때문이다. 또한 굴 때문에 빗물이 땅속 깊이 스며든다. 이 덕분에 홍수를 예방할 수도 있고 초원의 토양 침식을 막을 수도 있기 때문에 프레리도그의 굴은 중요한 역할을 한다.

1. (C) 2. (D) 3. (B) 4. (E)

¹negative impact / ²urban sprawl /

³unsanitary conditions / ⁴good educations

로스앤젤레스의 도시화

도시화는 오랜 시간에 걸쳐 도회지나 도시 지역의 크기 또는 인구가 증가하는 것을 말한다. 비평가들은 도시화로 인해 많은 문제가 발생했으며 도시에 사는 사람들의 삶의 질도 급격히 떨어졌다고 말한다. 미국에서는 도

시화가 경제, 사회, 도회지와 마을 주변 생태계에 심각한 부정적 영향을 미쳤다. 특히 캘리포니아의 로스앤젤레스는 도시화로 인해 많은 문제들이 생겼다. 도시가 타락하고 게토가 증가했다.

로스앤젤레스는 차지하는 면적으로 볼 때 미국에서 가장 큰 도시이다. 이 곳에서 일어난 도시화의 부정적 효과에는 난개발이 포함된다. 난개발이란 대도시 안쪽 또는 주변의 무계획적이고 무절제한 개발 확산을 말한다. 로스앤젤레스를 비판하는 사람들은 난개발로 인해 많은 오염물질과 폭력 범죄를 낳는 흉물스럽고 안전하지 못한 건물과 장소들이 생겨났다고 지적한다. 로스앤젤레스의 도시 계획자들은 도시의 크기를 서둘러 키우는 바람에 건물과 마을을 재빠르고 빈틈없이 지었는데, 이 결과 일련의 불행은 마을과 환경들이 생겨났다. 그로 인해 이 지역 거주자들은 파란한 환경을 반영이라도 하듯 대부분 부정적인 태도를 갖게 되었다. 부정적인 태도는 폭력 행위의 형성이나 마약과 알코올 복용의 증가 등과 같은 부정적인 행동으로 나타났다. 게다가 각 마을에 사는 사람들의 수가 증가하면서 이러한 도시 지역을 특징짓는 불결한 생활 조건과 오염도 증가했다.

경제적인 면에서 볼 때 도시화는 도시로 이주해 오는 모든 이들을 위한 경제적 기회를 제공하기 위한 목적이었다. 미국에서 도시 계획자들은 시민들이 보다 나은 일자리와 교육, 시장을 향유하게 될 것으로 생각했다. 하지만 로스앤젤레스와 같은 도시에서는 도시 공간과 주택이 제한되어 일부 지역은 생활하기에 상당히 비싸졌다. 그래서 빈민층 사람들은 좋은 마을에 살 수 없게 되어 게토라고 하는 곳으로 모두 옮겨졌다. 게토에 사는 사람들은 보통 경제적 능력이 없기 때문에 보다 나은 교육을 받을 수가 없으며 나중에는 더 나은 직업을 구할 수도 없다. 게토에 사는 사람들의 경우 스스로 더 나은 삶을 개척해 그곳을 떠나기가 쉽지 않다. 이것은 아마도 도시화의 가장 부정적인 효과일 것이다.

1. (D) 2. (C) 3. (A) 4. (A)

¹16-18th centuries / ²similar and repetitive /

³time, action, place / ⁴Molière

신고전주의 연극

신고전주의 연극은 16세기에서부터 18세기까지 서유럽 특히 프랑스에서 가장 중요한 형태의 극이었다. 과장된 연기, 공통된 주제의 일관된 유지, 연기의 방법과 마찬가지로 정교한 장면과 의상은 신고전주의 극장에서 대단히 중요했다. 신고전주의 연극에서는 오늘날 드라마가 그렇듯이 줄거리가 비슷하고 반복적이었다. 또한 많은 소극과 비극이 사용되었다.

신고전주의 연극은 16세기 프랑스에서 발전했는데, 극작가들이 극을 쓰는 방식에 변화를 가져왔다. 또한 배경을 설계하는 방식과 제작 방식에도 변화가 생겼다. 프랑스의 신고전주의 연극은 대체적으로 "일체성"에 기초를 두었다. 일체성이란 시간, 행위, 장소, 그리고 다른 요소들의 일체성을 말한다. 다시 말해, 프랑스의 신고전주의 극작가들은 극의 시간, 장소, 행위가 일체가 되어 보다 실제적으로 보이기를 원했다. 그래서 신고전주의자들에 따르면 실제와 마찬가지로 일물과 일출이 없는 극에서 날짜가 바뀔 수가 없었다. 또한 극의 행위가 이루어지는 장소가 바뀌면 배경도 바뀌어야 했다. 신고전주의 연극의 또 다른 중요한 점은 소극을 사용했다는 것인데, 중요한 상황이나 인물을 우스꽝스럽게 보이게 만들었다. 소극의 반대에 해당하는 비극 역시 신고전주의 연극에 흔히 사용되었다. 비극은 사람들이 슬픈 상황을 더 슬프게 만드는 극의 기법을 말한다.

가장 인기가 있었던 세 명의 신고전주의 극작가는 피에르 코르네유, 장 라신느, 몰리에르였다. 그들은 각자 다른 스타일의 극을 썼으며, 동시대에

파리에서 생활하며 작업했다. 파리의 관객들은 세 스타일의 곡을 관람하고 서로 비교하는 것을 좋아했다. 코르네유가 제일 먼저 곡을 쓰기 시작했는데, 그의 작품은 많은 논란을 불러일으켰다. 그의 작품 가운데 가장 유명한 1637년의 작품 <르 시드>는 기존 신고전주의 연극의 일체성을 지키지 않았기 때문에 인기도 있었고 논란도 많았다. 오늘날까지도 비평가들은 이 작품을 신고전주의 연극으로 분류해야 할지 말아야 할지에 관해 논쟁을 한다. 장 라신느는 코르네유와는 달리 가능한 한 신고전주의 연극의 원칙을 지키려고 노력했다. 그의 작품 가운데 가장 유명한, 1664년에 쓰여진 비극 <안드로마케>는 아마 신고전주의 연극의 가장 좋은 예라고 할 수 있을 것이다. 한편 몰리에르는 소극의 왕이었으며 가장 영향력 있는 신고전주의 극작가였다. 그는 극중 인물들을 이용해 실제 인물을 묘사했으며 가능한 한 많은 인간 약점의 실재를 보여주려 했다.

[D] 1. (B) 2. (A) 3. (A) 4. (C)

1old people / 2conversations /
3Biogerontology / 4slow down

노인학

노인학은 노인 그리고 노화의 과정을 연구하는 학문이다. 노인학 연구에는 사회적, 생물학적, 심리학적 연구가 있다. 이러한 연구들에는 사람들이 나이가 들에 따라 나타나는 신체적, 정신적, 사회적 변화 그리고 노령 인구가 사회에 미치는 영향 등이 포함된다. 노인학자들은 배운 내용을 노령층을 지원해 주는 정부 정책이나 프로그램에 적용한다.

많은 노인학자들은 다양한 교육적 배경을 가지고 있다. 게다가 그들은 병원, 대학, 정부 기관 등에서 일한다. 더불어, 노인학자들은 사회학, 의학, 심리학, 심지어 경영학을 전공한 경우도 있다. 경영과 관련하여 노인학자들은 노령층에게 도움이 될 프로그램을 개발하고 서비스를 조정한다.

이 모든 전문가들은 노령 인구의 삶을 이해하고 향상시키기 위한 노력에서 연구를 한다. 이들은 노령인 개인들을 직접 상대하기도 하고 그들의 가족들을 상대하거나 동년배인 다른 노령층을 그룹으로 상대하기도 한다. 노령 인구의 삶을 향상시키기 위한 공간과 활동을 설계할 때 이런 연구와 노인과의 대화를 통해 얻은 정보를 이용한다. 또한 노인학자들은 잡지에 기사를 쓰기도 하고 책을 출판하기도 해 다른 전문가들이 노령층과 그들의 가족의 특별한 관심사에 대해 보다 많은 것을 알 수 있도록 한다.

노인학 분야에는 생물노인학 또는 생물의학 노인학이라고 하는 하위분야가 있다. 이 분야는 의학 치료를 통해 노화 과정을 느리게 만들거나 조절할 수 있는 기능성들을 다룬다. 이 분야의 노인학 전문가들은 특별한 의학적 배경과 목적을 가진다. 이들을 생물노인학자 또는 생물의학 노인학자라고 한다. 생물노인학자들은 치매를 일으키는 노화의 생물학적 과정을 연구한다. 치매란 노인들이 더 이상 정확한 사고를 하지 못하고 다시 아이가 된 듯이 행동하는 것을 말한다. 노망은 일종의 이상의 퇴화 과정으로 보인다. 그런가 하면 생물의학 노인학자들은 사람과 동물의 노화 과정을 조절, 예방, 역전시키기 위해 연구하는 사람들이다. 이 두 종류의 전문가들은 노화 방지 분야에서 일하는데, 이 분야는 현대에 와서 대단히 인기 있는 분야가 되었다.

오늘날에는 노화를 조절하고 역전시킬 수 있는 사람들에게 대한 수요가 높아져서 이 분야에서 혁신적 발전을 할 경우 그러한 의학 전문가들에게 큰 부를 가져다 줄 수 있다. 어쩌면 노화 치료제라는 것이 결코 없을 수도 있지만 생물노인학자와 생물의학 노인학자들은 노화 과정의 속도를 늦출 수 있으며, 그로 인해 사람들이 나이를 아주 많을 때까지 더 오랫동안, 더 보람 있는 삶을 살 수 있다고 확신한다.

[E] 1. [B], [C] 2. (C) 3. (D) 4. (A)

1born live / 2temperature changes /
3defensive / 4Western Diamondback

애리조나의 방울뱀

방울뱀은 북아메리카와 남아메리카 전역에 서식하는 독사이다. 다른 파충류와는 달리 방울뱀은 알 대신 새끼를 낳는다. 이 새끼 방울뱀은 치명적 독을 잔뜩 가진 채 태어난다. 몇 번 허물을 벗은 뒤에 뱀은 방울이 생긴다. 방울은 뱀의 꼬리 부분에 죽은 피부 조직이 발달한 것이다. 방울뱀은 위험을 느끼면 방울을 흔든다. 또한 꼬리의 방울을 이용해 다른 방울뱀과 의사소통을 하기도 한다.

방울뱀은 눈과 콧구멍 사이에 안면공기라고 하는 발달된 피부막이 있다. 이 기관은 멀리서 일어나는 진동과 기온 변화를 탐지할 수 있다. 방울뱀은 귀가 있지만 안면공기를 이용해 소리를 듣고 혀를 사용해 공기 입자를 포착해 포식자를 감지할 수 있다.

방울뱀의 독아는 의사들이 사용하는 피하주사기 비늘과 비슷하다. 독아는 자신을 공격할지도 모르는 공격자의 몸에 독을 주입하는 방어 장치이다. 이 독으로 상대방을 마비시키거나 때로는 죽일 수도 있는데, 독의 성능은 독을 뽑는 방울뱀의 종류에 따라 다르다. 치명적인 방울뱀에 물리고도 살아남은 사람들은 초기의 상처에서 회복된다고 하더라도 종종 운동 신경이나 조직이 손상되기도 한다.

애리조나에는 17종의 방울뱀이 서식하고 있다. 가장 흔한 종은 서부다리아몬드방울뱀이다. 이 뱀은 위장을 위한 무늬를 가지고 있어 주변 환경과 섞이기 때문에 발견하기가 매우 어렵다. 그렇기 때문에 이 뱀은 하이킹을 가는 사람들이나 이 뱀의 서식지 주변을 걸어 다니는 사람들에게 특히 위험하다. 많은 사람들이 모르고 이 뱀을 밟았다가 물리곤 한다.

Three-stepper 또는 Greenback snake라고 알려지기도 한 모하비방울뱀은 북아메리카에 서식하는 방울뱀 가운데 가장 강한 독을 가지고 있다. 이 뱀의 독은 서부다리아몬드방울뱀과 같은 보통 방울뱀의 독보다 20배나 강해서 북아메리카에서 방울뱀에 물려 죽은 사람들의 대부분이 이 모하비방울뱀에 물려 사망한다. "Three-stepper"라는 별명은 방울뱀에 물리고 나서 쓰러져 죽기까지 보통 몇 발자국을 갈 수 있는지를 나타내는 것이다.

단지 한 종의 방울뱀만 파란색 눈을 가지고 있다. 이 뱀은 애리조나침박이방울뱀이다. 이 뱀의 눈은 흰색에서부터 회색, 파란색을 띠는 것으로 알려져 있는데, 붉은색 바위에 물러싸이면 붉은 색을 띠기도 한다. 이 뱀은 모하비방울뱀만큼 치명적이지는 않지만 서부다리아몬드방울뱀의 독보다 2배나 강한 독을 가지고 있으며 박쥐를 잡아먹는 것으로 알려져 있다.

하지만 일반적으로 뱀은 사람을 먼저 공격하지도 않고 기피한다. 있다면 거의 대부분 달아난다고 한다. 사실 일부 전문가들은 방울뱀은 사람이 근처에 오면 사람의 의도를 파악해 그에 따라 행동한다고 믿는다. 예를 들어, 한 대조연구에 따르면 폐쇄된 공간 내의 방울뱀은 방울뱀을 죽이기 쉬운 농장주에게 보다 방어적으로 반응하고 방울뱀을 좋아하고 위협하지 않는 파충류학자들에게는 보다 수동적으로 반응하는 것으로 나타났다.

[F] 1. (A) 2. (C) 3. (A) 4. (D)

1plural forms / 2imaginary words /
3verbs and possessives / 4grammatical systems

진 버코 글리슨의 워그 테스트

1958년 미국의 심리언어학자인 진 버코 글리슨은 워그 테스트라고 하는

실험을 창안했다. 이 실험은 영어에서 cats, dogs, horses와 같은 명사의 복수형을 만드는 법을 아동들이 어떻게 배우는지를 조사했다. 아동들에게 상상의 단어를 단수 형태로 주고 그 단어들을 복수로 고쳐도록 했다. 영어에서는 복수 명사 뒤에 오는 "s"는 /z/, /s/, /iz/의 세 가지로 발음이 된다. 가장 흔한 경우가 dogs의 경우와 같은 /z/ 발음, 다음이 cats의 경우와 같은 /s/ 발음, 그 다음이 horses와 같은 /iz/ 발음이다.

실험에서 한 아동에게 가짜 동물 그림을 보여주었다. 그리고는 그 동물 이 "위그(wug)"라고 말해 주었다. 실험자는 "이것은 위그야"라고 말했다. 그리고는 위그가 그려진 또 한 장의 카드를 꺼내어 "이제 여기에 두 마리가 있네. 이것은 두 마리의...?"라고 말했다. "g"로 끝나는 단어의 복수형을 제대로 이해하는 아동이라면 "그것은 두 마리의 위그(two wugs)예요"라고 /z/ 발음을 넣어 발음할 것이다. 아주 어린 아동들의 경우 혼란을 느껴 "two wug"라고 답했다. 일반적으로 4세 이상의 아동들은 기대한 답을 말했다. 조사자들은 또한 /s/와 /iz/로 끝나는 복수형이 나오도록 다른 몇 가지 실험을 한 결과 이 단어들의 경우 /z/ 발음만큼 보편적이지 않기 때문에 보통의 경우 아동들이 이 규칙들을 나중에 배우게 된다는 것을 발견했다.

위그 테스트는 또한 "이것은 롬의 자전거야(This is Rob's bike)"와 같이 동사와 소유격의 올바른 용법을 아동이 잘 이해하는지를 알아보기 위한 질문을 냈다. 소유격이란 소유를 나타내는 문법 성분이다. 또한 아동들은 운전을 하는 사람을 "driver"라고 하는 것과 같이 어떤 일을 하는 사람이라는 것을 나타내기 위해 접미사 -er을 사용하게 하는 실험도 했다. 다시 한 번 아동들에게 아무런 의미가 없는 "zib"이라는 단어를 주었다. 조사자는 아동에게 "zib하는 사람은..."이라고 물었다. 몇몇 어린 아동은 "zibber"라고 대답했지만 많은 어린 아동들이 "zibman"이라고 답했다.

위그 테스트는 심지어 아주 어린 아이들조차도 이전에 전혀 들어본 적이 없는 단어의 복수형, 소유격, 기타 형태를 만들 수 있는 기존 문법 체계가 있다는 것을 보여주었다. 이 실험은 아이들이 문법을 배울 필요 없이 자연적으로 언어 기술을 습득한다는 것을 보여준 최초의 실험이었다.

Building Summary Skills

1. Prairie Dogs

Prairie dogs are small, slender 1social animals that burrow complex tunnels in the large flatlands of North America. Many farmers consider prairie dogs to be pests because their tunnels can cause damage to 2machinery and cattle. But scientists recognize that prairie dogs are important to 3the ecosystem. For example, prairie dogs are the food source for some predator species, and their intricate tunnels create the conditions needed to grow preferred grasses for cattle and keep 4grazer-tamped ground soft. Furthermore, the tunnels help to channel rainwater that could cause 5erosion to the soil.

2. Urbanization in LA

Urbanization is 1the spread of cities accompanied by the increase in population in those areas. The city of Los Angeles in America is a good example of urban sprawl. Urban sprawl is 2the uncontrolled and unplanned development that takes place in city areas. In Los Angeles,

many neighborhoods were constructed 3cheaply and quickly. As a result, unattractive, unsafe, and crowded neighborhoods, called ghettos, gave rise to 4unsanitary conditions and violent crime among the poor. There, opportunities for 5better education and jobs are seldom seen.

3. Neoclassical Theater

Neoclassical theater was the most important form of theater from 1the 16th to the 18th century in Western Europe, especially in France. 2French neoclassical dramatists wanted the 3time, place, and action of the play to be unified and to be more like real life. Playwrights used costumes and scenery to evoke a sense of real time and place in their productions, and they employed 4methods of farce to make important situations seem ridiculous or methods of tragedy to make sad situations even sadder. The most influential neoclassical playwright was 5Molière, who used farce to highlight human weaknesses.

4. Gerontology

Gerontologists are scientists who are concerned with 1issues of the elderly. They come from various backgrounds. Many gerontologists research, study, and plan the day-to-day conditions and needs of the elderly, which include the development of 2old age homes and recreational activities as well as administrative services and the publication of 3related health information. Two particular types of gerontologists are biogerontologists and biomedical gerontologists. Biogerontologists study 4the aging process while biomedical gerontologists try to find ways to 5control, prevent, or even reverse the process of aging.

5. Rattlesnakes in Arizona

Rattlesnakes can be found all over 1North and South America. Their unique physical characteristics such as pits and 2an ability to bear live young set them apart from other snakes and help them to adapt to their environments. 3Seventeen types of rattlesnakes have been identified in Arizona alone. Among them are the Western Diamondback, the Mohave, and the Arizona speckled rattlesnake. Although rattlesnake venom is often fatal to humans, studies have shown that rattlesnakes are not 4naturally aggressive. In fact, rattlesnakes only seem to attack humans as 5a defense mechanism.

6. Jean Berko Gleason's Wug Test

In 1958, Jean Berko Gleason, 1an American psycholinguist, conducted experiments to find out 2how children learn language. One experiment was the Wug Test. In order

to examine children's appropriate use of plurals, each child was shown a toy creature called a "wug" and then prompted to finish the sentence, "These are two ...?" In a separate experiment, each child was asked to change verb forms of words to noun forms as related to occupations. For example, a person who drives is a driver. The results of the experiment proved that children learn language naturally without being taught grammar rules.

TOEFL iBT Practice Test

1. (A) 2. (B) 3. (A) 4. (C) 5. (D)
6. (C) 7. (B) 8. (D) 9. (B) 10. (D)
11. (B) 12. (C) 13. (A) 14. (C) 15. (B)
16. Social Interactionism (A), (D), (G) /
Critical Period Hypothesis (B), (E)

막스 베버

막스 베버는 현대 정치학과 경제학에도 큰 공헌을 했지만 현대 사회학의 창시자 가운데 한 사람으로 간주된다. 베버의 경력은 종교의 사회학 연구로 시작되었다. 그는 서양과 동양 국가들 사이에 나타나는 문화 차이의 주된 이유 가운데 하나가 종교라고 주장했다. 또한 종교와 문화가 여러 나라의 정치 체제를 결정짓는 주된 요인이라고 생각했다. 그뿐만 아니라 그는 특정 종교를 가진 사람들에게 공통적으로 나타나는 특성의 중요성을 강조했다. 예를 들어, 베버는 많은 서유럽인들이 강한 직업 윤리를 갖고 있다고 느꼈다. 흥미롭게도, 베버는 전체 인종들을 일반화시켜 규정했고, 특히 서유럽인의 직업 윤리를 "프로테스탄트 윤리"라고 명명했다. 베버의 연구에서 핵심적인 명제는 자본주의가 서양인들의 종교의 결과 서양에서 탄생했으며, 같은 원리로 자본주의는 종교의 차이 때문에 동양에서는 결코 성공을 거둘 수 없다는 것이었다.

종교의 사회학에 관한 베버의 업적은 그의 가장 유명한 에세이인 <프로테스탄트 윤리와 자본주의 정신>과 함께 시작되었다. 이 책이 발표된 이후 그는 세계의 모든 주요 종교에 대한 글을 썼다. 그 모든 글에서 그가 주장한 세 가지 주제는 종교 사상이 경제 활동에 미치는 영향, 사회 계급과 종교 사상 사이의 관계, 그리고 서양 문명을 동양 문명과 구분 짓는 특징이었다. 그의 연구 목적은 왜 동양과 서양의 문화가 다르게 발달했는지를 밝혀내는 것이었다. 하지만 그는 동료들이 그랬던 것처럼 한 문명이 다른 문명보다 낫다고 생각하지는 않았다. 그의 생각은 단순히 관찰에 기초했다. 베버는 저서에서 프로테스탄트의 종교적 사고로 인해 서유럽과 미국의 경제 체제가 발달했다고 주장했다. 서양의 경제 체제를 탄생시킨 다른 현상으로는 과학적 발전과 수학적 발견, 법률 제도 마련, 정부의 조직, 소기업 설립 등이 있다. 베버는 사회 조직, 종교, 현대 경제의 발달 등을 통해 서양인들이 이원적이고 미신적인 믿음에서 벗어나고 있다고 믿었다.

이와는 대조적으로, 베버는 동양의 종교는 서양 종교와는 근본적으로 다르며 이 때문에 중국에서는 자본주의가 발달할 수 없다고 했다. 베버는 서양 종교는 원시적 미신을 극복한 반면 유교와 도교, 힌두교 같은 동양 종교는 이러한 원시적 믿음을 체계화시켰고 그것이 그들 종교의 중요한 부분이 되었다고 생각했다. 또한 유교와 도교에서는 "군자"는 부자가 되려고 해서 는 안 되며 되도록 최선을 다해 사회에 봉사만을 해야 했다. 베버에게는 이

것이 많은 동양 국가에서 자본주의가 발달할 수 없음을 의미했다. 또한 그는 동양 국가들에서는 사회가 교육을 받은 자와 그렇지 못한 자로 이분된다고 생각했다. 교육을 받은 자는 끊임없이 선각자처럼 행동하려고 한 반면에 교육을 받지 못한 자들은 살아가는 데만 급급했고 추수를 받았다. 그래서 베버는 중국과 일본 같은 동양 국가에서는 실용적 경제가 탄생할 수 없다고 믿었다.

아동의 언어 습득

언어 습득은 모국어든지 후속 언어든지 상관없이 사람들이 언어를 배우는 방식을 말한다. 요즘 언어학자들 사이에서 뜨거운 논쟁거리가 되는 것은 아동이 자연적 언어 습득 능력을 가지고 태어나느냐 환경으로부터 언어를 이해하는 법을 배우느냐 하는 것이다. 이 논쟁은 "생득론 대 비생득론" 논쟁으로 알려져 있다.

생득론을 지지하는 언어학자들은 아동이 언어의 법칙을 조작하는 자연적 능력을 통해 언어를 습득하지만 대화를 나눌 사람이 없는 경우에는 이 능력을 사용할 수 없다고 믿는다. 생득론에 따르면 아이들은 출생하는 순간부터 두뇌가 언어를 학습할 준비가 되어 있기 때문에 언어 습득 과정에서 어떤 종류의 훈련도 필요하지 않다. 갓 태어난 아기는 기초적으로 문법을 이해하는 능력을 타고 있기 때문에 언어를 이해할 수 있다고 생득론자들은 주장한다. 아이는 자라면서 생득적 문법 지식을 이용해 세상을 이해하고 복잡한 방식으로 사고를 표현하고 해독한다. 이 이론이 맞다면 사람들은 아기 때부터 유전자 안에 언어를 그냥 이해하도록 도와주는 약간의 기초 지식을 가지고 있음에 틀림없다.

그렇다면 어떤 사회적 상호작용론이라고 하는 가장 인기 있는 이론을 포함한 여러 가지 다른 비생득론도 있다. 사회적 상호작용론자들은 성인이 아동의 언어 습득에 중요한 역할을 한다고 생각한다. 이 언어학자들은 부모, 특히 엄마가 형식적인 언어 교육과 비슷한 방식으로 아동에게 말을 걸며, 아이들이 쉽게 언어를 배우는 것처럼 보이지만 사실은 거의 항상 일어나는 언어 교육을 받은 결과라고 생각한다. 그뿐만 아니라 사회적 상호작용론자들은 아이들이, 심대 청소년이나 성인에 비해 훨씬 빠르게 속도로 학습하는 능력을 지녔다고 생각한다. 하지만 어머니가 아이에게 말을 많이 하지 않아도 아이가 금세 말을 유창하게 하는 사회가 세상에 많이 존재하기 때문에 이 이론은 도전을 받는다.

아동의 언어 습득에 관한 또 다른 중요한 이론은 결정적 시기 가설이다. 이 이론을 지지하는 언어학자들은 주로 모국어 습득과 관련이 있는 유창함 또는 심오함을 이용해 언어를 학습하는 태생적 능력이 보통 12세 정도에 끝난다고 주장한다. 이들은 그 이후에는 누구도 언어를 심오하게 학습할 수는 없다고 믿는다. 이 이론을 지지하는 사람들은 야생 소년이라고도 불리는 지니라는 여자 아이를 예로 든다.

지니는 고립된 상태에서 지냈다. 그녀의 아버지는 정신이상자여서 지니를 다른 사람들과 격리시켜 키우기로 하고 지니에게 단 한 번도 말을 걸지도 않았고 아무것도 배우지 못하게 했다. [사실, 지니는 빛이 거의 들어오지 않는 방에 갇혀있어 대부분의 시간을 유아용 변기에 묶인 채 지냈다.] 그녀는 13세에 발견되어 아버지로부터 격리되었다. 그녀가 겪은 상황은 대단히 끔찍했지만 언어학자들은 소녀를 통해 결정적 시기 가설과 생득론이나 비생득론을 실험해 볼 수 있었기 때문에 소녀에게 약간의 언어 기술을 가르칠 기회가 생겼다는 사실에 흥분했다. 지니는 정상적인 13세 아동이 하는 수준까지는 결코 도달하지 못했지만 어느 정도 언어를 습득했다. 생득론과 비생득론 가운데 어느 쪽에 해당하는지에 관해서는 여전히 논란이 있지만 언어학자들은 지니의 경우가 결정적 시기 가설을 입증한다고 생각한다.

Vocabulary Review

- A** 1. (B) 2. (C) 3. (A) 4. (A) 5. (B)
6. (C) 7. (D) 8. (C) 9. (A) 10. (A)
- B** 1. h 2. e 3. a 4. f 5. j
6. i 7. b 8. c 9. g 10. d

Unit 7 Inference

Skill & Drill

1. (D) 2. (C)

시베리아

환경보호론자들은 지구온난화의 원인과 영향에 관심이 있기 때문에 시베리아의 황량한 자연 경관에 주의를 돌렸다. 매서운 기온과 얼음, 눈으로 잘 알려져 있는 시베리아는 러시아의 반 이상을 차지하며 아시아의 북동부 위쪽 끝자락을 제외한 모든 지역을 둘러싸고 있다. 시베리아는 캐나다, 스칸디나비아, 알래스가의 일부 지역과 더불어 북극권드라를 이룬다. 거기에는 수목이 없는 상태에서도 수천 년 간 초목과 동물이 전통적인 생계수단이 되어왔다. 이러한 생계수단에는 순록 방목, 사냥, 어업 등이 있다. 하지만 오늘날에는 그러한 환경이 바뀌고 있다. 북극의 경관은 지구의 중위도에서 올라오는 오염물질의 양을 늘리는 대규모 산업 부지와 주변 도시들의 본거지가 되었다. 이러한 증가는 북극권드라의 섬세한 생태계에 중대한 영향을 미쳤을 뿐만 아니라 지구 전체에도 심각한 위험이 되고 있다.

3. (C) 4. (A)

제이컵 레비 모레노

제이컵 레비 모레노는 계량사회학, 사이코드라마, 집단 심리치료의 아버지이다. 그는 1889년 루마니아에서 출생했지만 비엔나에서 자랐고 1925년에는 미국으로 건너갔다. 모레노는 칼 융의 원칙을 연구하고 확장시켰지만 치료 방법을 환자 개인의 사적인 공상에 국한시켰던 지그문트 프로이트의 이론은 도외시켰다.

모레노는 프로이트와는 달리 대중적 치료나 사회적 치료에 초점을 두었다. 그는 학습과 삶을 사회적 구조의 경험으로 보았으며 환자가 비판적이지 않고 안전한 집단 안에서 멀리 보이는 문제를 해결하는 법을 배울 수 있다면 일상생활에서 일어나는 실제 문제도 보다 잘 해결할 수 있을 것이라고 생각했다. 만약 실제 문제를 쉽게 풀어낼 수 있다면 환자의 삶도 더 행복해질 것이다.

5. (B) 6. (B)

로제타 스톤

로제타 스톤은 1799년 이집트의 항구도시인 로제타 근처에서 발견되었다. 이것은 고대 문서를 해독하는 데 필요한 결정적 열쇠가 되었기 때문에 인류학자들에게는 소중한 발견이었다. 기원전 196년의 것으로 보이는 문용

빛을 띤 회색의 석판은 신관들이 새겨서 이집트 파라오인 푼레마이오스 5세에게 찬양의 봉헌물로 바친 것이다.

신관들은 모든 사람이 읽을 수 있도록 당시의 보편적인 세 가지 표기 방식이던 상형문자, 그리스어, 민용어를 써서 이집트어와 그리스어로 찬성의 맹세를 필사했다. 상형문자는 종교적 규범을 적는 데 쓰여서 양식화한 그림으로 중요한 의미를 나타냈고, 그리스어는 지배계급의 언어였으며, 민용어는 일반 대중이 일상생활에서 말하고 쓰는 데 사용되었다. 그리스어와 민용어는 번성했지만 상형문자는 잊혀졌고 이집트 공예품의 뜻은 미스터리가 되었다.

하지만 1822년 그리스어를 포함해 여러 개의 언어를 구사했던 젊은 역사가 장사였던 장 프랑수아 샹폴리옹이 같은 내용이 적힌 문서들을 비교한 끝에 어려운 상형문자의 비밀을 풀게 되었다.

7. (A) 8. (D)

애플래치아산맥

애플래치아산맥은 북아메리카 대륙에서 가장 오래된 산맥이다. 이 산맥은 북쪽으로 캐나다에서 남쪽으로는 미국까지 약 19,884마일에 걸쳐 있다. 전체 산맥은 크게 세 부분으로 나누어진다. 북쪽 부분은 캐나다의 뉴펀들랜드에서 허드슨 밸리까지이다. 중간 부분은 허드슨 밸리에서부터 버지니아의 뉴리버 밸리와 웨스트 버지니아까지이고, 남쪽 부분은 뉴리버 밸리에서 시작하여 중부 앨라배마에 있는 산맥의 끝까지 이어진다. 애플래치아산맥은 대서양과 나란히 뻗어있기 때문에 미국의 동부 해안과 중서부 지역 사이의 자연적 분할선이 된다.

TOEFL Reading Practice

- A** 1. (C) 2. (A) 3. (B) 4. (A)

¹Sensorimotor / ²symbolic thought /

³seven to eleven / ⁴abstract and ideological

장 피아제의 인지 발달 단계

스위스 심리학자인 장 피아제는 인지 발달 과정을 감각운동기, 전조작기, 구체적 조작기, 형식적 조작기의 네 단계로 구분했다. 이 단계들은 시간순으로 일어나며 대체적으로 연령과 관련이 있다. 몇 단계의 특징들이 같은 시간대 내에서 중첩되긴 하지만 각 단계에 해당하는 나이는 그 시기 동안의 현실에 대한 대략적인 이해도를 반영한다.

감각운동기는 지식 구성이 감각 정보와 운동 활동 경험으로 제한되는 유아기 동안에 해당된다. 이 단계는 두 가지 주요 특징이 있다. 첫 번째는 자아와 타인과의 구별이며, 두 번째는 물체가 보이거나 만지지거나 소리가 들리는 것과는 상관없이 물체나 사건이 존재한다는 물체의 영속성이다.

전조작기는 2세와 7세 사이에 일어난다. 언어발달과 함께 현실의 상징적 표현이 중요해지며 상징적 사고 단계와 직관적 사고 단계의 두 가지 연속적인 하위단계로 구성된다. 상징적 사고 단계는 2세와 4세 사이에 일어난다. 이 단계는 자기중심주의와 애니미즘으로 제한되는 가상놀이와 이름 붙이기가 특징이다. 자기중심주의는 다른 사람의 관점에서 인식하지 못하도록 하고 애니미즘은 무생물에도 인간과 같은 느낌과 행동이 가능하다고 생각하는 것이다.

4세와 7세 사이에는 직관적 사고가 상위인지의 형태를 띠기 시작한다. 직관적 사고 덕분에 아동은 알기 시작하지만 어떻게 지식이 추론되는지를 이해하지는 못한다. 이 현상은 모든 다른 것은 제외시키고 일면이나 한 가

지, 생각에 집중함으로써 생기며 물체의 모습이 변할 때 물체의 고유한 특징을 아동이 머리 속에 간직할 수 없는 것이 특징이다.

구체적 조작기는 7세에서 11세 사이에 일어난다. 이 시기에 해당하는 아동은 정보를 논리적으로 해석하기 시작한다. 물체를 공룡인 또는 관련된 특징에 따라 분류하며 연속 배열과 이행 과정을 역전시킬 수도 있다. 연속 배열이란 연속적인 양을 따라 자극을 순서대로 배열하는 과정이다. 이행성이란 "만약 ...라면 ...하다" 식의 구체적인 시나리오에서 사용되는 문제 해결 전략이다.

형식적 조작기는 11세에서 15세 이상까지에 해당되는 시기이다. 이 시기는 자기평가와 타인에 대한 판단을 유발하는 강화된 자의의식에 해당되는 사춘기적 자기중심주의뿐만 아니라 추상적이고 관념적인 추론 과정이 특징이다. 이 시기에 속하는 아동들은 사고와 가설 검증의 경향이 있으며 논리적 결론에 도달하기 위해 광범위한 체계적 알고리즘을 만들고 실행할 수 있다. 이 능력 덕분에 사춘기의 아동들은 예상되는 사고를 보다 완고하게 고집하는 구체적 조작기 아동에 비해 보다 큰 가능성들을 탐구할 수 있다.

인지 발달 단계에 대한 피아제 이론은 1950년대 소개된 이후로 서로 다른 발달 수준에 있는 아동 능력에 대한 편향한 평가 그리고 한 단계에서 다음 단계로의 진행 정도와 속도에 사회적 담화, 문화, 교육을 포함하지 않았다는 점 때문에 비판을 받았다. 그뿐만 아니라 최근의 연구에 따르면 유도되는 지식의 영역에 따라 몇 가지 단계가 동시에 일어나기 쉽다는 것이 밝혀졌다. 그럼에도 불구하고 피아제의 단계는 교육학적 추세에 여전히 지대한 영향을 끼치고 있다.

- [B] 1. (A) 2. (C) 3. (A) 4. (D)
1abstract concepts / 2symbols /
3multiplicative system / 4Hindu-Arabic

숫자 기호

수는 개념이다. 수는 추상적이다. 보이지도 않고 들리지도 않고 느껴지지도 않으며 맛을 보거나 냄새를 느낄 수도 없다. 숫자는 수를 나타내기 위해 만든 기호인데, 한 수는 여러 가지 방법으로 나타낼 수 있다. 수의 분류에는 서수와 기수가 있다. 서수는 한정사의 역할을 하며 "어떤 것?"이라는 질문에 답이 될 수 있다. 또한 순서를 나타내기도 한다. 기수는 수효를 나타낸다.

숫자는 수를 나타내는 기호이다. 기수법은 수를 기호로 나타내는 방법이다. 기수법에는 단순기수법, 승법적 기수법, 위치기수법의 세 가지가 있다. 단순기수법은 밑수에 같은 승을 사용하며 각 숫자를 더한다. 예를 들어, 여섯 줄에 있는 수를 더해 총합이 나온다. 승법적 기수법은 밑수와 밑수의 기호를 정한 후 한 번 이상 기호를 사용하지 않도록 승수를 사용한다. 일반적으로 수는 승수 뒤에 묶음 기호를 사용하는 식으로 짝을 지어 쓰인다. 밑수에 도달할 때마다 새로운 기호를 사용한다. 만약 밑수가 4라면 출3나 신을 사용해 1, 2, 3, 4를 나타내지만 5에는 새로운 기호를 사용하고 또 계속 된다. 어떤 기호 배열이든지 한데 더해서 합을 구한다. 위치기수법은 자리값 개념을 넣어 승법적 기수법을 개선시킨 것이다. 자리값이 있기 때문에 기호는 다시 사용할 수 있지만 기호에서 차차하는 위치나 순서에 기호해 다른 수를 나타내게 된다.

역사적으로 각기 다른 기호와 밑수를 사용해 수를 표시했던 문화마다 각기 다른 기수법을 사용했다. 예를 들어, 초기 이집트 문명은 10진법의 단순기수법을 사용했다. 이집트 숫자를 읽기 위해서는 긴 기호를 정리해 더해야 했다.

그런가 하면 중국-일본식 체계는 승법적 기수법을 사용했다. 이집트 기수법과 같이 10진법을 사용했다. 하지만 승수로 한 가지 기호만 사용하는 대신 이 기수법은 이집트처럼 왼쪽에서 오른쪽으로가 아니라 세로로 직힌 아홉 개의 기호를 사용했다.

바빌로니아에서는 60진법의 변형된 위치기수법을 사용했다. 1을 나타내는 기호와 10을 나타내는 기호의 두 가지 승수 기호가 있었는데, 이 승수 기호들은 자리값으로만 사용했다. 0을 나타내는 기호는 없었다. 바빌로니아의 기수법은 각 숫자 배합마다 여러 가지 해석이 가능하기 때문에 수 체계가 약하다.

마야의 변형된 위치기수법은 20진법을 기초로 한다. 이 기수법에는 0이 있었으며 세로로 표기했다. 가장 밑의 숫자는 일의 자리단 표시했으며 순라칸수와 값이 컸다. 하지만 세 번째 자리는 20×20에서 20×18로 바뀌어 연속된 자리값이 바뀌었다.

힌두-아라비아 기수법은 가장 발달된 기수법이다. 이 기수법은 10진법을 기초로 한 위치 기수법이다. 10개의 승수가 사용된다. 각 승수단 디지털(digit)이라고 한다. 10개의 숫자는 0, 1, 2, 3, 4, 5, 6, 7, 8, 9이다. 각 수는 하나의 기호로 표시되고 각각 다른 수들과 다르다. 수가 특별한 자리를 가지면 그 자리값이 몇 개가 있는지를 표시한다. 그래서 힌두-아라비아 기수법은 정교할 뿐만 아니라 사용하기도 편리하다. 또한 일정한 밑수를 가진 모든 위치기수법은 힌두-아라비아 기수법으로 바꿀 수 있다. 예를 들어, 힌두-아라비아 기수법은 오늘날의 컴퓨터 프로그래밍에 사용되는 2진법의 근을 제공했다.

- [C] 1. (B) 2. (C) 3. (B) 4. (D)
1freshwater lake / 2Great Lakes /
3water temperature / 410%

슈피리어호

슈피리어호는 북아메리카에 있는 세계에서 가장 큰 담수호로 미국과 캐나다의 자연적 경계가 된다. 휴런호, 온타리오호, 미시간호, 이리호와 더불어 5대호를 이룬다. 북쪽과 동쪽은 캐나다 온타리오, 남쪽으로는 미시간 주와 위스콘신 주, 서쪽으로는 미네소타 주와 닿아 있다. 5대호 가운데 슈피리어호가 가장 북서쪽에 위치해 있다. 슈피리어호는 숲이 우거진 상당히 외진 곳에 위치하며 이곳에 거주하는 사람은 얼마 되지 않는다.

슈피리어호는 너무나 커서 5대호를 이루는 나머지 호수들(휴런호, 온타리오호, 미시간호, 이리호)과 이리호 크기의 호수 세 개를 채울 수 있다. 이 호수에는 약 2,900입방마일 즉 12.11×10¹⁵리터의 물이 있다. 길이는 350마일, 폭은 160마일이며 최고 수심이 거의 1,333피트에 이른다. 표면 고도는 600피트이다. 슈피리어호는 300개 이상의 시내와 강이 모여 휴런호로 흘러 들어간다.

슈피리어호는 엄청난 크기와 깊이 때문에 5대호 가운데 가장 온도가 낮으며 항상 화씨 40도 정도의 온도를 유지한다. 호수의 온도는 주변 지역의 기후를 조절해 여름에 더 시원하고 겨울에도 더 따뜻하다. 또한 슈피리어호는 호수를 표피로 내리는 눈이 가장 많다. 때로는 눈이 내륙으로 20~30마일까지 이르기도 하며 일부 지역에서는 16.5피트 정도의 눈이 내리기도 한다.

슈피리어호는 면적으로는 가장 큰 담수호이며 부피로는 세 번째로 크다. 면적은 대략 32,000평방마일이다. 지구 전체 담수 공급량의 20%가 5대호에서 나오는데, 딱 10%가 슈피리어호에서 나온다. 지구 전체 물의 3%만이 담수이며 그 가운데 3분의 2가 빙하와 만년설의 형태로 얼어있기 때문에 이 사실은 특히나 중요하다. 다른 종류의 물에는 인간에게 해로운 염분

과 같은 성분이 함유되어 있고 인간을 포함해 많은 종은 살아남기 위해 담수가 필요하기 때문에 담수는 중요하다.

슈퍼리호에서 나오는 물은 주변 지역에 사는 4천 만 명 이상의 주민에게 식수를 공급하며 보다 최근에는 병에 담겨 해외로 수출되고 있다. 수도를 유지할 수 있도록, 원치 않는 불순물을 제거하고 식수 공급을 향상시키기 위해 1972년 미국과 캐나다 사이에 조약이 체결되었다. 현재는 국제슈퍼리호조절위원회에서 수위를 관찰하고 조절한다.

[D] 1. (B) 2. (D) 3. (B) 4. (B)

¹retrieval / ²attention / ³sensory memory / ⁴automatic

기억 인지 이론

기억에 관한 이론들은 사람들이 어떻게 배우는지를 알게 해 주기 때문에 중요하다. 학습은 행동이나 지식 그리고 경험을 통해서 정보를 얻어낼 때 생기는 사고 기술에 상대적으로 영구적인 영향을 미치며, 경험은 사실이나 사건의 관찰 또는 물리적 접촉을 통해 가능하다. 때문에, 기억은 경험으로부터 습득되어 머리 속에 유지되는 정보이다.

기억 형성에는 세 가지 주요 과정이 있다. 그것은 부호화, 저장, 인출이다. 부호화된 정보를 검색하는 순간 정보를 흡수하는 과정이다. 저장이란 정보를 머리 속에 담고 그리는 과정이다. 인출은 특정한 관련 과제에 필요해서 정보를 불러내는 과정이다.

부호화는 학습과 주의를 통해 이루어진다. 학습이 감각기관을 통해 어떤 경험을 해석하는 것이라면 주의를 구체적인 일에 정신을 집중시키고 초점을 맞추는 것을 말한다. 주의에는 한 가지 활동에서 다른 활동으로 옮겨갈 수 있는 능력과 관련된 목표를 이루기 위해 여러 가지 기술을 사용할 수 있는 능력이 포함된다. 예를 들어, 문장을 쓰는 데 주의를 기울이기 위해서는 종이 위에 글자를 쓰는 법과 정확한 철자를 쓰는 법뿐만 아니라 글자의 목적에도 집중해야 한다. 문장을 쓰는 일을 제대로 해내기 위해서는 대문자의 올바른 사용, 문법, 맞춤법 등에 신경을 써야 한다. 관련 있는 무엇인가에 주의를 기울이는 데는 노력이 필요하다.

저장은 나중의 인출을 위해 경험을 기억으로 분류하는 점진적인 과정이라 할 수 있다. 감각기억, 단기기억, 장기기억의 세 가지 형태의 저장이 있다. 감각기억은 순간적으로만 지속되며 정보를 원래 형태대로 실제로 접한다. 예를 들어, 뜨거운 냄비를 만지거나 천둥이 치는 소리를 들으면 감각기억이 생긴다. 경험이 즉각적인 탓에 정보를 기억하기 위해서는 반드시 관련된 정보에 주의를 기울여야만 한다.

단기기억은 보통 30초까지 지속된다. 이 기억은 개인이 한 번에 저장할 수 있는 정보량에 의해 제한을 받는다. 정보를 보다 오래 기억하기 위해서는 기계적으로 반복해 학습하거나 연상작용을 사용해야 한다.

장기기억은 여러 가지 도식에 연결된, 상대적으로 영속적인 정보를 말한다. 도식이란 개인의 머리 속에 존재하며 정보를 조직화하고 해석하는 지식의 구조 또는 개념을 말한다. 일련의 정보가 장기기억 장치로 들어가면 그 정보를 사용하고 그곳에서의 배치를 강화시켜주는 광대하고 복잡한 사고망에 연결된다.

인출은 관련된 정보를 검색하는 과정이다. 부호화와 마찬가지로 인출은 자동적으로 일어나기도 하고 개인의 노력 및 추적이 요구되기도 한다. 모든 경험이 전부 기억 속에 보존되지는 않기 때문에 정보의 저장은 인출의 용이성과 기능성에 영향을 미친다.

이론가들에 따르면 기억은 개인에 의해 능동적으로 형성될 수 있다. 기억 과정이 어떻게 일어나는가를 이해하는 것은 새로운 개념을 이해하는 데

필요한 기초 지식의 습득 및 인출을 돕는 새로운 교수 및 학습 전략을 짜는데 도움이 되기 때문에 교육자나 학생들에게 중요하다.

[E] 1. (A) 2. (B) 3. (D) 4. (C)

¹mid-1800s / ²Donald McKay /

³wind resistance / ⁴Rainbow

패속법선

패속법선은 1800년대 초반부터 중반까지 전성기를 맞았다. 동인도회사의 해적과 캘리포니아 골드 러시의 도래로 박자가 가해진 패속법선은 부패하기 쉬운 화물을 빠르고 효과적으로 운송할 수 있는 수단이었다.

동양에서 온 상인들은 시골러 상품을 서부의 캘리포니아로 가져가서 팔기 어려울 정도로 낮은 가격에 판매하고자 했다. 거기에서는 뉴욕에서 4달러 하던 밀가루 한 배럴이 샌프란시스코에서는 40달러에 팔렸으며 네 달이 지난 필라델피아 신문이 1달러였다. 가장 긴급한 밀수품 가운데 하나는 중국의 차였다. 차는 신선할 때 더 좋은 맛이 나는 인기 있는 식품이었다. 느린 항해는 중국 항구를 출발해 뉴욕항에 장막하고 케이프 혼을 돌아 미국 서해안에서 끝이 났는데, 그 결과 차는 사람이 먹을 수 없는 상태가 되었다. 미국인들은 차를 대단히 좋아해서, 기꺼이 값을 치를 용의가 있었기 때문에 선주들은 새로운 선박 설계에 투자한 돈은 수익을 올려서 얼마든지 회수 가능하며 그 정도 수익은 감수할 만하다고 확신했다.

많은 역사가들은 닷 필머, 에드워드 콜린스, 도널드 맥케이, 존 윌리스 그리피스를 새로운 종류의 배의 발명가로 본다. 노련한 선원이자 신장이었던 닷 필머는 그 당시 유행하던 V자 모양의 형태 대신 바닥이 납작한 법선을 최초로 고안한 인물이다. 에드워드 콜린스는 이 계획의 투자자로 선박 회사를 소유하고 있었으며 새로운 구조의 선박에 모험을 할 용의가 충분히 있었다. 뛰어난 장인이자 조선소 소유자였던 도널드 맥케이가 실질적 조선 작업을 위해 고용되었다. 유명한 천재였던 존 윌리스 그리피스는 과학과 고등 수학의 원칙에 기초를 두고 종이에 계획을 짜 나갔다.

시간을 단축한다고 해서 패속법선이라는 적절한 이름이 붙은 이 배는 잔 모양의 선수로 물살을 쉽게 갈랐으며 선체가 좁아서 배가 쉽게 움직일 수 있었고 돛대가 높아 배가 스치고 지나갈 수 있는 바함을 전부 모을 수 있었다. 그리피스는 갑판 위의 모든 것을 제거해 배의 속도를 늦추는 역할을 했던 공기저항을 감소시켰다.

그 최종 결과는 근사한 유선형의 "레인보우"호였다. 레인보우호는 최초의 진정한 패속법선이었다. 이 배는 속도로 세상을 놀라게 한 신세대 선박의 진형이 되었으며 사람들이 배의 우아한 선의 움직임에 낭만적으로 묘사하는 데 영감을 주었다.

[F] 1. (D) 2. (C), (E) 3. (A) 4. (C)

¹active volcanoes / ²Mount St. Helens /

³glaciers / ⁴temperate rainforests

미국 북서해안의 특징

미국 북서해안은 가장 발달한 캐스케이드산맥이 특징이다. 하이 캐스케이드라고도 알려진 이 높은 활화산 산맥은 캐나다의 브리티시 콜롬비아에서부터 워싱턴과 오리건까지 이른다. 이 산맥은 캐나다와 미국의 국경을 가로지르며 태평양산계의 북쪽 3분의 1을 이룬다. 이 산계는 코스트산맥이라고 알려진 캐나다 지역에서부터 미국으로 들어가면서 태평양 해안의 만곡을 따라 150에서 200마일까지 내륙으로 들어가 있다. 남쪽으로 캘리포

나아로 들어가면서 시에라 네바다와 합치진다. 시에라 네바다는 베이슨 레인지와 만나 완전한 산맥을 이룬다.

캐스케이드산맥은 눈으로 덮인 폭발 직전의 거대한 화산으로 잘 알려져 있다. 여기에는 베이커산, 레이니어산, 아담스산, 세인트 헬렌산, 후드산 등이 포함된다. 베이커산, 레이니어산, 아담스산, 세인트 헬렌산은 위성된 주에 위치해 있다. 후드산은 오리건 주에 위치해 있다. 이 거대한 자연 지형은 단독으로 우뚝 솟아 있으며 사이에 광활한 고원들이 끼여 있다. 지그재그로 깊게 파인 흔적들이 있는데, 이는 빙하가 남긴 흔적이다.

거대한 화산들 외에 비화산도 많이 있다. 이 가운데 가장 유명한 것은 캐나다 바로 남쪽의 위성된 북쪽 캐스케이드산맥에 있는 150마일에 이르는 고원지대이다. 이 압적 산봉우리들은 화산에 비하면 작아 보이지만 시에라 네바다의 높은 편에 속하는 정상보다도 고도가 높은 수백 개의 정상으로 이루어져 있다.

북서해안은 지형도 특이하지만 코스트산맥 주변에서 발생하는 지속적인 기후 경정도 특이하다. 캐스케이드산맥은 광활한 빙하와 폭설뿐만 아니라 낮은 구름과 온대성 폭우가 자주 발생하는 것으로도 유명하다. 그러한 조건은 온대우림을 형성하는 데 도움을 준다.

두꺼운 우림층이 특히 서쪽에서 산맥을 둘러싸고 있는 깊고 좁은 계곡을 덮고 있으며 알래스카에서부터 캐나다를 거쳐 캘리포니아 북부까지 이어진다. 뿐만 아니라 지구상에서 가장 큰 온대지역을 이루는 북아메리카 태평양 온대우림에 속한다. 서쪽을 향하는 해안 산맥에만 있는 이 우림에는 전형적으로 세계에서 가장 큰 나무가 자라며 북아메리카의 대부분을 둘러싸고 있는 신북구 생태계의 일부를 이룬다.

Building Summary Skills

1. Jean Piaget's Stages of Cognitive Development

Swiss psychologist Jean Piaget introduced a theory about the four stages of cognitive development. They are the sensorimotor stage, the pre-operational stage, the concrete operational stage, and the formal operational stage. Each of the stages is roughly age related and occurs in chronological order. Although Piaget's theory gained wide acceptance in the 1950s, today it is criticized for its narrow view of children's competencies and its failure to address social and cultural influences on learning as well as the possibility that stages are apt to co-occur.

2. Numeric Symbols

Because numbers are abstract concepts, different cultures have used distinct symbols and systems to represent them. The symbols that are used to represent the numbers are called numerals, and they are typically arranged in one of three kinds of numeration systems: simple, multiplicative, and positional. Of these, the positional Hindu-Arabic system is the most advanced. It is the simplest to use and can be adapted to any base.

3. Lake Superior

North America's Lake Superior, a natural boundary between the United States and Canada, is the largest freshwater lake in the world. It was formed from the remnants of glaciers and provides a significant portion of the Earth's freshwater supply. Freshwater that is free of salts and other unhealthy pollutants is needed by humans and many other species for survival. For that reason, the United States and Canada work together to protect the lake from pollutants and to monitor and improve its water supply.

4. Memory Theories

Memory theories focus on how experiences are encoded, stored, and retrieved. There are three types of memory storage: sensory memory, short-term memory, and long-term memory. Since the encoding and retrieval processes that surround memory storage can be controlled by the learner, understanding memory processes is influential in the development of teaching and learning strategies. Such strategies seek to engage learners so that new learning finds stable connections to past experiences.

5. Clipper Ships

As a result of the breaking up of the East India Trading Company and the California Gold Rush, merchants sought a quick and efficient means to transport commodities to the west coast of the United States. This was particularly true for merchants who wanted to ensure that perishable items like tea reached the coast in a timely fashion. In answer to this unprecedented need, American innovators applied scientific and mathematical principles to create the first true clipper ship, the *Rainbow*. The *Rainbow* became a prototype for the new swift and streamlined merchant vessels.

6. The Characteristics of the Northwest Coast of the U.S.

The Cascade Mountain Range runs along the Northwest coast of the United States and into Canada. It makes up the northernmost third of the Pacific Mountain System and is comprised of volcanic and non-volcanic mountains. Although the Cascade Mountain Range is best known for its glaciers and heavy snowfalls, it also houses temperate rainforests that grow under the low clouds and heavy warm weather rains that are inherent to the mountain region.

TOEFL iBT Practice Test

1. (A) 2. (D) 3. (C) 4. (A) 5. (B)
6. (D) 7. (A) 8. Behaviorism (F) / Freudianism
(A), (G) / Humanistic Psychology (B), (E) 9. (A)
10. (A), (D) 11. (C) 12. (A) 13. (A) 14. (D)
15. (C) 16. (B)

에이브러햄 매슬로우의 욕구 위계설

에이브러햄 매슬로우는 1908년 브루클린에서 태어났다. 유대인 이민 가족의 장남이었던 그는 당시의 가장 위대한 사회사상가들과 교류할 정도로 뛰어난 지능을 소유했다. 프로이트주의자들은 개인의 잠재의식이 행동에 미치는 영향을 선전했고, 행동주의자들은 행동에 영향을 미치는 외부의 처벌과 보상을 강조했으며, 계슈탈트 이론가들은 전체가 어떻게 여러 요소들로 구성되어 있는지를 알아내려고 했다. 매슬로우는 간절히 기다리지는 토론으로 이루어진 꾸준한 토론에 매료되어 이렇게 이질적이면서 자주 충돌하기도 하는 사상의 하파들을 결합하여 인간 동기화에 관한 새로운 개념을 정립하고자 했다.

매슬로우의 관점은 인도주의적이었다. 그는 개개인이 인지적으로 성장할 수 있는 내재적 능력과 자신의 운명을 선택하고 그에 따라 행동할 수 있는 자유, 그리고 삶의 질에 영향을 미치는 다른 긍정적인 특성들을 지니고 있음을 강조했다. 1948년 매슬로우는 사람들의 내적 욕구와 그것이 어떻게 충족되는가를 다루는 논문을 발표했다. 논문 제목은 <특수성과 일반성의 인지>와 <기본적 욕구 충족의 정치적 결과>였다. 매슬로우는 논문에서 주류를 이루는 프로이트 사상가들과 행동주의자들이 제시하는 생리적 욕구보다 더 큰 욕구가 있다고 주장했다. 그는 계슈탈트적 관점과 더불어 결고기에 대립적으로 보이는 그 두 학파들을 통합해서 필요가 채워진 개인의 인정되지 않은 자질들을 규명했다. 그는 기본적인 욕구가 충족된 개인이 다른 사람들과 달리 행동한다는 것을 관찰했다.

매슬로우의 신조와 핵심에는 욕구의 위계가 있다. 그 위계는 사람들이 그에 따라 삶을 영위해나가는 가치관을 구별하기 위한 관찰에 기초하고 있다. 매슬로우는 개인이 정치적 생동권을 통해 성취하는 일개의 능력을 타고 나는 것이 아니라 오히려 위대성 또는 적어도 성공을 이루는 데 필요한 도구를 부여 받거나 받지 못한다는 것을 입증하고자 했다. 사람들이 낮은 단계의 욕구에서 저지당하거나 좌절을 경험할 때 어떠한지를 생생히 묘사했던 프로이트주의자나 신프로이트주의자와는 달리 매슬로우는 사람들의 욕구가 충족되었을 때의 최종 결과와 그 결과에 도달하는 방법을 살펴보고자 했다. 그는 정신 건강을 연구할 때는 병든 사람들이 아니라 건강한 사람들을 다뤄야 한다고 주장했다.

매슬로우는 각 개인마다 기아, 갈증, 수면, 피해로부터의 안전, 사회적 영역에서의 소속감과 사랑, 그리고 긍정적이고 바람직한 자부심과 결부된 신체적 건강을 포함하는 일단의 기본적 욕구를 갖고 있다고 주장했다. 그는 또한 이러한 욕구는 특별한 순서나 위계로 배열된다고 주장했다. 우선 음식과 수면에 대한 욕구가 충족되어야 하고, 그 다음에는 안전, 사랑 등의 순이다. 위계의 마지막 단계는 자아실현이다.

자아실현은 인간으로서 자신의 잠재력을 충분히 개발하려는 동기를 포함하며 모든 하급 욕구가 충족된 뒤에야 가능하다. 매슬로우에 따르면 대부분의 사람들은 일단 높은 자긍심이 생기면 더 이상 성숙하지 않기 때문에 자아실현 지점에 결코 도달하지 못한다. 사실, 매슬로우는 일단 하급 욕구들이 충족되면 위계에서 더 높은 곳으로 올라가고자 하는 동기가 약해

진다고 했다. 그는 저 높은 단계의 욕구는 더 약하고 더 뚜렷하게 인간적인 데 반해 낮은 단계의 욕구들은 더 강하고 더 동물적이라고 결론지었다.

북아메리카 지역 영국 식민지의 해운업과 조선업

북아메리카의 영국 식민지에서 초기 조선업은 조약하고 지루했다. 모든 신체 외환을 손으로 톱질했으며 부피가 큰 부품들은 끼끼, 벌뚝을 도끼, 대대 등을 사용해 모양을 만들고 다듬었다. 반겨로운 과정의 일부로서 구멍이 뚫리고 그 위에 가로질러 발판을 놓았다. 두 사람이 짝을 지어 밑고 당기며 톱질을 할 수 있도록 발판 위에 통나무를 놓았다. 한 사람은 구멍이 안에 들어가고 한 사람은 발판 위에 서서 통나무가 발판으로 쪼개질 때까지 톱질을 했다. 이 작업을 하는 데는 대단한 기술이 필요했기 때문에 톱질꾼은 인정 받는 직업이 되었다.

1600대의 초기 정착지에서는 영국의 조선공들이 초빙되어 견습생을 훈련시켰다. 제2수는 조선공을 돕는 조수 역할을 했는데, 두 사람은 함께 작업을 했다. 제3수는 통나무의 마름질이 발판에 너무 가깝게 보이거나 새로운 마름질을 시작할 때 통나무를 선반으로부터 이동시키는 일을 했다. 조선업 덕분에 돛, 로프, 돛, 돛, 체인 제작과 같은 다른 분야의 산업이 가능해졌지만 목재를 쓸모 있는 널빤지로 만드는 데 드는 비용이 너무 엄청나서 조선업자들은 목재를 거의 보유하고 있지 않았고 배를 만드는 데 다양한 재료를 사용했다.

[배의 제작과정은 느리긴 했지만 꾸준하고 이문이 많이 남는 방식으로 진행되었다.] 1650년대 중반 무렵 대다수 식민지들은 3년에 한 번 이상 선박을 건조하는 일이 없었다. 조선업자들은 선박을 출항시켜 목적지에 도착하던 진폭 실은 화물뿐만 아니라 선박도 영국이나 외국의 선주에게 팔아버렸다. 속도가 느린 이 배들은 인기 있는 영국과 덴마크 스타일의 400톤 된 전통 선체의 선을 철저히 따랐다. 배의 넓은 바닥 면에는 세 대의 돛과 네모 반듯한 모양의 사구가 있었지만 대개는 크기가 훨씬 작았다. 그럼에도 불구하고 1600년대 말경의 식민지 조선업자들은 조선업과 해상무역에서 강력한 경쟁자들이었으며 엄청난 물량이 거래되는 대서양 횡단 무역이 발전하는 데 일조했다.

식민지 보스턴은 영국의 통상 업적 가운데 가장 빛나는 업적이 되었다. 청교도적 관리 하에서 보스턴의 항구와 풍부한 물자는 신생 미국 식민지들에는 당면지사가 될 견실한 통상 경제를 보장해 주었다. 모피 사냥, 철 생산, 직물 생산의 재료가 되었던 해안과 대륙의 자원은 그 신생 식민지(보스턴)의 무한한 수출품으로 보였던 어류와 목재의 풍부한 공급량에 비하면 하찮게 보였어 보였다. 심지어 어업을 포함한 어떤 무역도 지속적인 일자리를 제공하지 못했지만 이러한 자원은 해운업과 조선업을 부리내리게 해준 안전한 경제 혜택의 기반을 마련했다.

1700년대 초반 무렵 보스턴 항구는 미국 제일의 항구이자 영국 대서양권에서는 세 번째로 큰 항구가 되었다. 이문이 많이 남는 소금에 절인 대구의 거래는 조선업자, 어부, 상인 간의 강한 결속을 낳았고 그 약명 높은 삼각무역 형로를 열어 준 새로운 조선 혁명을 가져왔으며 1760년대 내내 보스턴을 미국에서 가장 크고 가장 부유하며 가장 영향력 있는 도시로 되게 했다.

Vocabulary Review

- (A) 1. (C) 2. (A) 3. (A) 4. (B) 5. (C)
6. (A) 7. (D) 8. (A) 9. (B) 10. (D)
(B) 1. h 2. a 3. i 4. g 5. i
6. c 7. d 8. b 9. f 10. e

Unit 8 Insert Text

Skill & Drill

1. A

바우하우스 운동

바우하우스 운동은 국립 바우하우스라고 하는 독일 예술학교에서 비롯되었으며 근대주의 건축과 인테리어 디자인에서 가장 큰 영향력을 행사한 운동 가운데 하나였다. [이 운동의 철학은 사물이 가치가 있으려면 유용해야 한다는 믿음에 기초를 두고 있다.] 아이러니컬하게도, 이 학교는 1919년부터 1933년까지 제1차 세계대전과 제2차 세계대전 사이의 비교적 짧은 기간 동안, 그리고 미국에서는 1937년부터 1938년까지 매우 짧은 기간 동안만 운영되었다. 학교 지도부의 끊임없는 교체와 권력 투쟁으로 인해 학교의 초점, 기술, 강사, 정책 등이 계속 바뀌었다. 이 실용주의 운동의 자극제가 된 것은 1908년 비평가 아돌프 로스가 발표한 <장식과 범죄>라는 책이었는데, 그는 책에서 표면 장식이 원시적이라고 주장했다. 이 학교의 창립자였던 건축가 발터 그로피우스는 개교 성명서에서 학교의 목표는 "장인 과 예술가 사이에 거대한 장벽을 쌓는 계급의 구별이 없는 새로운 장인 조합을 창설하는 것"이라고 선언했다.

2. B

시장 규제

시장 규제는 정부가 법 적용을 통해 특정한 시장의 일부 또는 전부를 조정하려 할 때 발생한다. 정부는 중앙 계획적인 시장을 만들거나 시장의 실패를 개선하려는 것과 같은 여러 가지 목적을 달성하기 위해 시장을 규제한다. [그러나 그러한 조치가 항상 모든 민간 부문의 최선의 이익을 위한 것은 아니다.] 시장 규제는 부패한 정부가 연줄이 있는 기업이나 정치가에게 혜택을 주기 위한 목적으로 시행되기도 한다. 흔히 규제를 받는 시장의 한 가지 유형이 공적 서비스 시장이다. 이러한 시장 규제는 수익을 극대화하면서 공적 서비스를 받는 사람들의 이익을 최대화하는 상반된 이해 관계의 균형을 맞추기 위해 발생한다. 이것의 좋은 예는 주류와 처방약 시장에 대해 정부가 가하는 규제이다. 대다수 국가들은 이들 제품의 안전성을 확보하고 반드시 적절한 고객에게만 판매될 수 있도록 이 시장을 규제하려 한다.

3. A

인지과학

인지는 지성이나 지능의 작용 즉 "사고"를 하는 과정으로 정의된다. [거기에는 자각, 인식, 논리 추론, 판단 등이 포함된다.] 인지과학은 이 과정을 이해하기 위해 심리학, 신경과학, 언어학, 철학, 컴퓨터과학, 인류학, 생물학 등을 이용하는 학제간 연구 분야이다. 인지과학은 인간의 뇌 연구와 동물의 뇌 연구로 구별되기도 한다. 인지과학에는 상징적, 연결주의적, 역동적 시스템의 세 가지 주요 연구 방법이 있다. 상징적 접근법은 상징에 쓰이는 작용을 통해 인지를 설명하는 방법이다. 이 작용은 디지털 컴퓨터의 작용과 유사하게 일어나며 명시적인 계산 이론과 정신적 과정의 양상으로 표현된다. 이 정신적 과정은 신체적인 뇌 수준에서는 고려되지 않는다. 연결주의적 접근법은 신체적인 뇌 특성의 수준에서 존재하는 인공 신경망 모델을 통해 인지를 살펴본다. 세 번째 접근법은 역동적 시스템 접근법이다. 이

방법은 모든 요소가 상호 연결된 지속적인 역동적 시스템의 형태로 인지를 가장 잘 설명할 수 있다고 주장한다.

4. C

알렉산드리아의 히파티아

알렉산드리아의 히파티아는 이집트의 철학자이자 수학자이며 천문학자였다. 그녀는 370년에 태어난 것으로 추정된다. 히파티아가 쓴 저작이 아무 것도 남아 있지 않기 때문에 역사가들이 그녀에 관해 알 수 있는 것이라고는 다른 작가가 쓴 개인사에 나타난 몇 가지 묘사나 한 제자가 그녀에게 쓴 편지 밖에는 없다. 역사가들은 이 자료를 통해 히파티아가 대단히 존경받는 학자이자 알렉산드리아의 지성 공동체의 일원이었다는 것을 알 수 있다. [그녀의 관심 덕분에 많은 것이 발명되었다.] 히파티아는 플라톤 학파의 철학을 추종했으며, 별의 위치를 그리는 데 사용되는 아스트롤라베와 지금도 액체의 비중을 알아내는 데 쓰이는 액체비중계를 발명한 것으로 알려져 있다. 415년에 이교도였던 히파티아는 부흥하고 있던 기독교 운동에 저촉된다는 이유로 광포한 폭도들에게 살해당했다.

TOEFL Reading Practice

A 1. B 2. A 3. 1D 4. 2B

¹Yom Kippur War / ²price of oil /

³stock exchange / ⁴speed limit

1973년 석유 위기

1973년 석유 위기는 그 당시 이집트와 시리아 그리고 이스라엘 간에 발생한 욤키프 전쟁 때문에 시작되었다. 석유수출국기구(OPEC)의 회원국이었던 이집트와 시리아는 이 조직의 아랍 회원국들에게 이스라엘을 지원하는 국가들에 석유 공급을 중단하도록 설득했다. 이러한 수출 금지 조치는 즉각적으로 미국, 캐나다와 서유럽의 많은 동맹국에 영향을 주었다.

아랍 산유국들은 서방 세계에 대단히 필요한 석유 공급을 줄임과 동시에 전 세계의 유가를 인상시켰다. 이러한 급격한 유가 상승은 전 세계 경제에 엄청난 인플레이션 효과를 가져왔다. 이스라엘의 든든한 지지자였던 미국과 네덜란드가 특히 이 수출 금지 조치의 표적이 되어 즉각적인 경제 효과를 실감했다.

이 조치의 가장 즉각적인 효과는 배럴당 유가가 4배로 뛰었다는 것이다. 아랍 정치인들과 다른 지도자들은 순식간에 벼락 부자가 되었다. 이렇게 갑작스레 부유해진 많은 산유국들은 새로 생긴 부를 무기에 투자했고 이로 인해 중동 지역의 긴장감은 더욱 고조되었다.

이 석유파동은 서구 사회의 혼란을 가져왔다. 휘발유의 갤런당 소매 가격이 폭등하면서 뉴욕증권거래소의 주가는 6주 동안 970억 달러가 떨어졌다. 아랍에서 미국으로의 석유 공급은 하루 120만 배럴에서 불과 19,000배럴로 떨어졌다. 이로써 미국은 제2차 세계 대전 이후 최악의 연료 부족을 경험하게 되었다. [미국 정부는 공공 부문과 민간 부문에 가해지는 석유 위기의 충격을 완화하기 위해 여러 가지 조치를 취했다.]

휘발유를 사기 위해 주유소에 늘어 선 줄과 이로 인한 바가지 요금을 규제하기 위해 미국은 여러 가지 조치를 취했다. 그 중의 한 가지는 탱사를 격려하기 위해 "새 석유"의 가격 결정은 하지 않은 채 이미 발견된 "기존 석유"의 가격을 제한하는 것이었다.

또 다른 조치는 흡수 번호판을 단 차량의 운전자는 그 달의 흡수일에만

취발유를 구입할 수 있게 하는 것이었다. 대신 적수 번호판을 단 차량의 운전자는 그 달의 적수일에만 취발유를 구입할 수 있었다.

미국 정부는 또한 국민들에게 취발유 사용을 줄이고 가능한 한 에너지를 절약하도록 권고했다. 이를 위해 전국의 속도 제한이 시속 55마일로 낮춰졌다. 조명이 필요한 시간을 줄이기 위해 써머타임제도 시행되었다. 사람들이 에너지 사용을 줄이도록 하기 위한 에너지 절약 표어 중 인기 있었던 표어는 "에너지를 낭비하는 바보가 되지 마시다 (Don't Be Fuelish)"였다.

[그럼에도 불구하고 석유 위기의 충격은 광범위한 영향을 미쳤다.] 1974년 3월에 용 키푸르 전쟁은 끝이 나고 리비아를 제외한 석유수출국기구의 모든 아랍 회원국들은 미국에 대한 수출 금지 조치를 해제했다. 석유 공급이 늘어나고 유가는 떨어졌지만 이미 시작된 인련의 경제 불황은 1980년대까지 걸쳐 많은 서부 국가에 고통을 안겨 주었다.

[B] 1. (C) 2. (B) 3. (D) 4. (2A)

1genetically inclined / 2sense of restlessness / 3caged birds / 4genes and cognitive ability

철새의 이동

많은 철새들이 장거리를 이동하는 것으로 알려져 있다. 많은 종들이 북반구의 온화한 지역에 가서 번식을 하고 풍부한 먹이를 먹으며 여름을 난다. 겨울철이 오면 철새들은 남쪽으로 날아와 따뜻한 열대 지역이나 남반구 지역에서 겨울을 난다.

이러한 철새의 습성은 육지에 서식하는 육상 종에게 가장 흔히 일어난다. 이러한 다양한 종들은 엄청난 거리를 이동하는 것으로 알려져 있다. 철새들은 가을과 겨울이 되면 북반구에 먹이가 부족해지기 때문에 먹이를 찾아 이동을 한다. 이러한 새들은 *Zugunruhe*라고 하는 독일어로 표현되는 철새의 불안정성을 만족시키기 위해 이동에 따르는 위험을 유전적으로 감수한다.

*Zugunruhe*는 이주를 해야 한다는 환경적 암시가 주어지지 않는 폐쇄된 새장 안에 갇힌 새들의 경우에도 관찰되었다. 이 본능적 증상은 포획 상태의 새들이 야생 상태의 새들이 이주하는 것과 동일한 방향으로 날고자 하는 것에서 알 수 있었다. 이 철새들은 심지어 같은 종의 야생 상태 새들이 이동을 하는 것과 동일한 시기에 동일한 방향으로 날고자 했으며 야생 새들이 비행 경로를 바꾸 때마다 이 새들도 방향을 바꾸는 것이 관찰되었다.

[관찰 가능한 자료는 날개 표식 조사, 가락지 부착 연구, 이동 경로를 알아내는 데 도움이 되는 개인적 관찰 등을 통해 수집되었다.] 이러한 관찰 결과에 근거해 과학자들은 철새의 이동을 완벽히 이해하지는 못하지만 철새가 해마다 동일한 이동 경로를 찾을 수 있는 것은 새의 유전자 속에 있는 1년 주기의 내생적 프로그램 그리고 인표와 서식지에 대한 기억에 기초한 조악한 심지도를 만드는 새의 인지능력이 결합된 결과라고 믿는다.

이 철새의 이동로가 새들의 유전적 구조 속에 프로그래밍되긴 하지만 여러 가지 이유로 이동 경로를 바꾸기도 하는 것으로 알려졌다. 이러한 이유 가운데는 공적역학적 효용성을 높이거나 날씨 변화에 대응하거나 포식의 위험을 피하기 위해서이다. 한 가지 종인 엘레오라송알라는 번식기를 상당히 늦추어 이동 패턴에 적응해 참새목의 새들이 겨울을 나기 위해 남쪽으로 이동할 때 함께 날면서 이 새들을 시낭하는 것으로 알려져 있다.

[물론, 과학자들은 더 짧은 거리를 이동하는 철새들의 습성도 조사했다.] 장거리를 이동하지 않는 철새들로는 수리, 독수리, 말뚝가리, 황새와 같이 날개가 큰 새들이다. 이러한 큰 새들은 상송하는 따뜻한 공기의 열기둥에 의해서만 위로 날아올라갈 수 있다. 열기둥은 지상 위에서만 발생하기 때문에 이 새들은 평평한 바다를 건너 비행을 할 수 없다. 넓은 바다를 건너

수 있기 때문에 이 새들은 이동 주기 동안 육상에서 가장 단거리를 이동한다. 한 가지 예로 엄청난 수의 육식조와 황새 무리를 들 수 있는데, 이들은 겨울철을 나기 위해 유럽에서부터 남쪽으로 아프리카까지 가는 이동에서 지브랄타 해협이나 보스포리스 해협과 같은 지중해의 가장 좁은 부분에서 지중해를 건너가는 것이 관찰된다.

[C] 1. (C) 2. (B) 3. (1B) 4. (2A)

1natural images / 2Wisconsin /

3Alfred Stieglitz / 4New Mexico

조지아 오키프

조지아 오키프는 20세기의 가장 영향력 있는 미국 예술가 가운데 한 사람이다. 그녀는 추상과 구상을 나타내기 위해 꽃이나 바위, 조개, 풍경, 동물의 뼈와 같은 자연물의 이미지를 이용한 그림으로 유명하다. 1928년 오키프가 그린 여섯 점의 카라 시리즈는 25,000달러에 팔렸다. 이 금액은 당시 현존하는 미국 화가가 그린 그림 시리즈에 지불된 금액으로는 최고 액수였다.

오키프는 1887년 위스콘신에서 7남매 중 둘째로 태어났다. 낙농업을 했던 그녀의 부모는 그녀가 어렸을 때 재능을 발견하고 아주 일찍부터 미술 교육을 받게 했다. [사실, 오키프는 8세 때 화가가 되기로 마음먹었다.] 그녀의 첫 번째 선생님은 사라 만이라고 하는 그 지역의 수채화가였다.

오키프는 고등학교를 졸업한 뒤 시카고미술대학을 다녔고 나중에는 뉴욕의 아트 스튜디오 리그를 다녔다. 바로 이 뉴욕에서 그녀는 알프레드 스티글리츠 소유의 291이라는 화관에서 열린 로댕의 수채화 전시회에 갔다가 그를 만났는데, 그는 몇 년 뒤 그녀의 남편이 될 사람이었다.

그 이후 몇 년간 오키프는 질병과 재정 문제로 힘든 나날을 보냈다. 1908년 그녀는 그림으로는 생계를 이어나갈 수 없다고 생각하고 그림을 완전히 접었다. [대신, 그녀는 텍사스 주 이마릴로에서 교사직을 수락했다.] 그러다가 1912년 버지니아대학의 서머스쿨에서 미술 수업을 받던 중 그녀의 창조성은 다시 불타오르기 시작했다. 그곳의 강사였던 알론 비엔트는 그녀에게 선, 색채, 모양의 조화로운 상호작용을 통한 디자인에 대한 새로운 사고를 일깨워주었다. 이러한 사고는 창의적 미술 과정에 대한 오키프의 사고에 지대한 영향을 미쳤고 큰 변화를 가져왔다.

마침내 알프레드 스티글리츠는 그녀가 화가의 길을 다시 걸을 수 있게 도와 줌으로써 오키프의 삶에 다시 발을 들여놓았다. 그는 그녀가 뉴욕에서 살 수 있는 아파트를 마련해 주었다. 그곳에서 그들은 깊은 사랑에 빠졌고 스티글리츠는 그녀와 결혼하기 위해 아내와 이혼했다. 그들이 결혼한 직후 스티글리츠는 몇몇 누드 사진을 포함해 오키프의 사진을 찍기 시작했다. 이 사진들은 그의 회고전에 전시되었으며 곧바로 대중의 관심을 불러일으켰다.

오키프는 그 뒤로 수년 동안 초기 미국 모더니스트 예술계의 일원이 되었다. 이즈음, 오키프는 수채화를 이용한 예전 작업에서 유희로 옮겨갔다. 미지 망원경 렌즈를 통해 보기라도 하듯이 자연을 대단히 환로조악한 상태로 대규모로 묘사한 새로운 스타일을 개발해냈다. 그녀의 남편인 스티글리츠는 그녀 작품을 자신의 갤러리에 전시하기 시작했다. 오키프는 화가로서 빛을 발하기 시작해 1928년의 카라 그림 판매와 같은 대단한 상업적 성공을 거두었다.

그러면 1929년 여름 오키프는 한 친구와 뉴멕시코를 찾았다가 그 지역의 독특한 건축 형태와 풍경을 발견했다. 1929년부터 1949년까지 오키프는 매년 일정 시간을 투자해 뉴멕시코에서 수집한 동물 뼈에서 영감을 얻어 작업을 했으며 그곳에서의 두 번째 여름에 관한 그림을 그렸다. 소의 해골, 광활한 창공, 웅장불충한 바위 산의 이미지가 그녀의 작품 속에까지 등

장한 가장 기억에 남는 영상이 되었다. 결국 그녀는 애틀랜타 북쪽에서 내지 않은 발전해 유명 목장이라고 이름을 붙였다. 주위의 화려한 사막 풍경과 이 지역의 값어치 큰 철석과 언덕은 그녀의 예술 활동 내내 영감을 주었다.

- [D] 1. (A) 2. (D) 3. 1D 4. 2C
 1gold fever / 2Yukon Territories /
 3California Gold Rush / 4Jack London

19세기의 골드 러쉬

1800년대 미국은 금과 은 시굴자들에게 의해 엄청난 부를 얻어 주었다. 19세기는 금과 은이 풍부한 몇몇 광산이나 광맥이 발견된 때이다. 이러한 소식이 대중에 알려지자 골드 러쉬라고 하는 활발한 이주가 시작되었다.

러쉬란 수천 명의 시굴자들이 자신들도 이런 광맥을 발견해 때로는 벌과 자 발견지 근처로 옮겨가는 현상을 말한다. 이 과정은 캐나다 북부의 유콘, 알래스카, 캘리포니아, 네바다 준주와 같은 서부 변경지에 백인들의 정착을 가속화시켰고 이미 진행 중이었던 것보다 훨씬 빠른 속도로 원주민들을 쫓아내고 그들의 문화를 몰아내는 결과를 초래했다.

이 시굴자들은 교육 수준이 최저인 보다 하층 계급의 노동자에서부터 부유한 사업가까지 다양했다. 모든 탐사의 핵심에는 부유해지고 싶은 욕망이 자리잡고 있었다. 많은 시굴자들이 엄청난 부를 얻을 수 있었지만 그뿐이 아닌 사람들이 더 많았고 이 탐사 과정에서 죽은 사람도 부지기수였다. 부자들 가난뱅이든, 젊은이든 늙은이든 모든 시굴자들은 탐사 기간 동안의 모진 고난을 견뎌야 했다. 음식과 물은 부족했고 뜨거운 사막 기온 때문에 발과 노새가 그 거리에 쓰러져 죽기도 했으며 겨울철이면 시지를 절단해야 할 정도의 동상을 앓았기 때문에 고통은 더 심했다.

미국 역사상 최초의 주요 골드 러쉬는 캘리포니아 골드 러쉬로, 이것은 1848년 캘리포니아 서터스 밀에서 금이 발견되면서 시작되었다. 1948년 도착했던 초기의 시굴자들을 "포터 에이저"라고 하는데, 이들 중 많은 사람들이 요리꾼이나 캘리포니아의 다른 지역과 같은 근교에서 왔다. 이 항운의 시굴자들은 개울에서 매일 쉽게 수천 달러어치의 금을 캐냈다. 하지만 1949년에 도착한 "포터 나이더"의 경우는 이미 쉽게 캐낼 수 있는 금의 상당 부분이 캐내진 상태였기 때문에 훨씬 어려웠다.

1855년경 약 30만 명의 시굴자들이 미국 전역과 해외에서 캘리포니아로 왔다. 그들은 포장마차나 선박을 이용해 캘리포니아로 왔는데, 이들 다수가 개울 바닥, 흐르는 물 아래에서 금가루를 캐내는 데 아주 단순한 방법을 사용했다. [이 시굴은 풍화작용의 결과 자연적으로 주광맥에서 나왔다.] 이 단순한 과정을 "패닝"이라고 한다.

북아메리카 골드 러쉬의 또 다른 주요 사건은 1896년 스쿠름 잠 마운이라고 하는 원주민과 그 일행이 캐나다의 북쪽 유콘 준주에 있는 클론다이크강에서 풍부한 사금 광상을 발견한 것이었다. 이 당시 유콘 준주는 일년의 대부분이 폭설로 덮여 있을 만큼 날씨가 추웠기 때문에 백인들이 거의 거주하지 않았다. 다시 한 번 이 발견의 소식이 전해지자 금을 캐 때돈을 벌겠다는 기대감으로 엄청난 수의 백인 시굴자들이 말쑥스럽게 이 지역으로 몰려들기 시작했다.

1898년 클론다이크강 주위의 인구는 수천 명에서 4만 명으로 불어나면서 기아와 오염된 식수로 인한 장티푸스의 위험을 받게 되었다. [하지만, 이번에는 북서 기마 순찰대가 사금지주의 안전과 질서를 지키기 위해 시굴자들의 활동을 감시했다.] 잭 런던의 <늑대개>나 <야생의 부름> 그리고 그의 가장 유명한 단편 소설 <모파상>과 같은 클론다이크 골드 러쉬 문학에 포착된 것처럼 다시 한번 엄청난 금이 발견되었으며 몹시 가혹한 기후 조건

때문에 한 사람의 사자가 탄생하기 위해 수백 명의 사람들이 고통을 겪었다.

- [E] 1. (B) 2. (A) 3. 1C 4. 2B
 1Oklo mine / 2nuclear fission /
 3dangerous and unhealthy / 4thermalization

원자로

최초의 원자로는 인간이 만든 것이 아니라 자연적으로 발생했다. 아프리카 서부, 가봉에 있는 오클로 광산에 있는 우라늄 광산 안에서 15개의 천연 핵분열로가 발견되었다. 과학자들은 이 원자로들이 약 1억 5천만 년 동안 열과 빛 그리고 다른 종류의 방사선을 내뿜고 있는 것으로 추정한다. 오클로 화석 원자로라고 알려진 이 우라늄 광산은 1972년 프랑스 물리학자 프랑시스 페랑에 의해 발견되었다. 이 광산은 활동을 했을 당시 평균 100킬로와트의 전력을 내었을 것으로 추정된다.

현대의 원자로는 유용한 전력 생산을 위해 핵 연쇄 반응을 일으키는 장치이다. 이것은 서서히 핵 분열을 일으키고 제어하고 유지시켜서 일어난다. [핵분열은 전혀 공급원으로서 여러 가지 잠재적인 활용 분야가 있다.] 원자로의 제일 중요한 용도는 전력을 발생시키는 것이지만, 무기급 플루토늄과 방사성동위원소를 생산하는 실험에서, 빔라인을 이용해 연구를 하거나 심지어 핵추진 잠수함이나 선박을 앞으로 나아가도록 하는 데도 이용된다.

핵분열은 안전하면서도 오염물질이 없는 전력 공급원으로 알려져 있기 때문에 오늘날 상업적으로 사용하고 있는 유일한 핵반응 과정이다. 그와는 반대로 핵융합 반응은 현재 실험적인 기술로, 많은 과학자들이 핵융합으로 야기될 수 있는 건강과 안전상의 위험 때문에 핵융합은 중요하게 생각하지 않는다. [이러한 이유로 과학자들은 전력을 생산할 수 있는 보다 안전한 방법을 선택한다.] 제어된 핵 반응을 일으키는 또 다른 방법은 방사성 동위원소 열전기 발전기의 원자로 전지이다. 이 두 가지 다 파동적 방사성 붕괴를 통해 열과 전력을 발생시킨다.

상업적인 핵분열 전기를 발생시키기 위해서는 여러 가지 원자로 기술이 사용된다. 이 방법들은 핵분열 연쇄 반응을 유지시키기 위해 사용하는 전자의 에너지에 따라 고속원자로와 저속원자로의 두 가지로 분류된다.

저속원자로는 열중성자라고도 하며 느린 중성자를 이용한다. 이 중성자는 주위 입자의 평균 운동 에너지 까까, 도달할 때까지 전자의 속도를 느리게 만드는 물질에 의해 감속이 된다. 이 과정을 열운동화라고 한다. 이것은 전력 생산에 쓰이는 가장 흔한 원자로이다. 최초의 상용 플루토늄 원자로들은 여기에 속했으며 감속제로 흑연을 사용했다.

고속원자로들은 빠른 중성자를 이용해 필요한 핵분열 연쇄 반응을 일으키고 유지시키기 저속원자로에서 사용되는 감속제가 없다. 이 종류의 원자로들은 우라늄 238의 양을 가능한 한 최소화하여 방사능 오염을 피하기 위해 무기급 플루토늄과 같은 상당히 농축된 연료를 사용해야 한다. 초기의 원자로 발전소뿐만 아니라 초기의 일부 러시아 선박과 잠수함 추진 장치에는 고속 원자로를 이용했다. 하지만 아직까지 고속원자로가 계속 만들어지고는 있지만 모든 분야에서 저속원자로가 거둔 성공을 거두지는 못했다.

- [F] 1. (C) 2. (B) 3. 1A 4. 2D
 1the middle class / 2Samuel Adams /
 3Benjamin West / 4George Washington

미국 식민지 시대의 위대한 초상화가

미국 식민지 시대의 가장 유명한 초상화가 가운데 두 사람으로 존 싱글턴 코

폴리와 길버트 스튜어트를 꼽을 수 있다. 키에라와 사진술이 등장하기 전인 이 시기 동안에는 사실적인 초상화가들만이 중요한 인물과 장소의 시각적 역사 기록을 남길 수 있는 유일한 존재였기 때문에 이들이 매우 중요했다.

존 상글턴 코플리는 보스턴 태생의 화가로 혁신적인 양식으로 잘 알려져 있다. 그의 초상화 대부분은 중상층의 남녀뿐만 아니라 식민지 시대 뉴잉글랜드의 주요 인물들의 초상화였다. 이러한 초상화들은 볼을 쓴 목수나 책을 든 교사의 경우와 같이, 일반적으로 그들의 삶을 잘 보여주는 물체들을 가지고 포즈를 취한 채 그려졌다.

코플리가 그린 가장 유명한 초상화 중의 몇 점은 독립전쟁의 영웅인 사무엘 애덤스와 폴 리비어의 초상화였다. 하지만 1774년 독립전쟁이 발발했을 때 코플리는 전쟁을 피해 유럽으로 옮겨가 그림 기술을 갈고 닦았다.

이 시기의 또 다른 주요 화가로 길버트 스튜어트가 있다. 화가로서의 인생이 코플리만큼 순탄하지는 않았는데, 코플리는 그에게 큰 영향을 미쳤다. 하지만 종국적으로는 스튜어트의 그림이 코플리보다 훨씬 더 높이 평가받고 있다. 스코틀랜드 화가인 코스모 알렉산더의 수하에서 교육을 받은 뒤 길버트 스튜어트는 존 상글턴 코플리의 전철을 밟아 독립전쟁을 피해 유럽으로 건너가 그림을 계속했다. 하지만 화가로서 자리를 잡으려는 초기의 노력은 성공하지 못했다.

초기에 여러 번의 실패를 경험한 후 스튜어트는 런던에서 벤자민 웨스트의 후견을 받게 되었다. 1777년경 스튜어트는 왕립미술원에서 작품을 전시할 수 있게 되어 마침내 성공과 찬사를 누리게 되었다. 스튜어트의 그림은 순식간에 급격히 가격이 뛰었으나 이러한 성공에도 불구하고 그는 습관적으로 금전 관리를 제대로 하지 못했다. 금전 관리에 부주의했던 탓에 그는 채무자 감옥에 가는 것을 피하기 위해 1787년 아일랜드로 도망을 가지 않으면 안 되었다.

1793년 미국으로 돌아가자마자 스튜어트는 필라델피아에 스튜디오를 열었다. 여기에서 그는 미국 주요 인물들의 초상화를 그리면서 영구적 명성을 떨쳤다. [그렇지만 그는 구세계에서 온 여러 소재들을 그리기도 했다.] 그의 작품 가운데 가장 유명한 작품은 아마도 조지 워싱턴의 초상화 시리즈일 것이다. 이 새로운 명성 덕분에 스튜어트는 수년 동안 바쁘게 지냈고 부유한 생활을 했다. 조지 워싱턴을 꼭 빼놓은 가장 유명한 작품은 "이테나 이온 두상"이라고 알려져 있는데, 현재 미국의 1달러짜리 화폐에 등장한다.

스튜어트가 그린 워싱턴의 초상화 가운데 가장 유명한 작품은 백악관의 이스트룸에 걸려 있는 대형 그림이다. 이 초상화는 영국 군인들이 대몽병 관저를 불태운 1812년 전쟁 동안 그 당시 영부인이던 돌리 매디슨에 의해 위기를 모면했다.

스튜어트는 화가 생활을 접을 때까지 천 명도 넘는 미국 정치가의 초상화를 그렸다. 그의 스타일은 환기와 자연스러움이 있다는 칭찬을 받고 있다. 위대한 미국 건국의 아버지이자 대통령이었던 존 애덤스는 보통 초상화를 그리려면 끔찍할 정도의 불편을 감수해야 하지만 스튜어트의 경우는 여유 있는 태도와 즐거운 대화 덕분에 초상화 작업이 즐겁다고 말했다고 한다. [사실, 편안한 태도 덕분에 스튜어트에게는 헌신적인 추종자들이 있었다.] 그는 또한 스케치를 하지 않고 캔버스 위에 바로 그림을 그리기 시작한 것으로도 유명하다.

Building Summary Skills

1. The 1973 Oil Crisis

In 1973, during the Yom Kippur War, ¹Syria and Egypt

tried to stifle support for Israel. They convinced the Arab members of the OPEC to ²withhold petroleum from the United States, Canada, and many of their allies in Western Europe. ³The U.S. government took many steps to ease the effects of the shortage while elite Arabs grew rich from their increased profits and invested much of their newfound wealth in ⁴the purchase of weapons. Meanwhile, although the Yom Kippur War ended in 1974, the ramifications of the oil crisis included ⁵a series of recessions in many western countries throughout the 1980s.

2. Bird Migration

Many land-dwelling bird species have ¹migratory patterns. According to scientists, these patterns are the result of ²genetic programming as well as environmental factors. Both short and long-distance migration patterns have been studied. Although both types are generally associated with birds that take flight to warmer climates for ³food and other basic needs during cold weather months, short-distance migrators, like buzzards and vultures, which are typically broad-winged, must rely on ⁴thermal columns of air to travel. Migration is instinctual; the urge to migrate—known by the German word ⁵Zugunruhe—has been found even in birds raised in cages.

3. Georgia O'Keeffe

Georgia O'Keeffe is one of the most well-known painters of the 20th century. Her works include ¹natural objects and landscapes. She adopted a unique style of ²painting natural scenes close up as if they were magnified. Her career was aided by her husband, ³the photographer Alfred Stieglitz, for whom she posed nude. Recognized as a great talent during her own lifetime, O'Keeffe reportedly garnered the highest compensation of that time for ⁴a set of six calla lily paintings that earned her \$25,000. Later, inspired by the colorful images of ⁵New Mexico, she moved to reside there and reflected those images in her work.

4. The Gold Rush of the 19th Century

During the mid-19th century, ¹discoveries of gold ore sparked the imaginations of thousands of prospectors. These greedy, courageous, and starry-eyed adventurers rapidly migrated to California and the Yukon Territories of North Canada. Suffering great hardships to overcome ²the insurmountable odds of striking it rich, ³great rushes of whites infiltrated sparsely populated areas and brought with them the threat of ⁴frostbite, famine, and plague. Author ⁵Jack London captured this period in his famous works that include *White Fang*, *Call of the Wild*, and *To Build a Fire*.

5. Nuclear Reactors

Nuclear reactors can be natural or manmade. Natural reactors have been found in 1uranium deposits in West Africa. In order to generate electrical power, scientists have designed 2nuclear reactors that initiate, control, and sustain nuclear fission at a steady rate. Unlike nuclear fusion, nuclear fission is considered to be 3a safe and pollution-free source of power, and it is used commercially. Nuclear reactors are classified as fast or slow. This classification is based on 4the energy of neutrons employed in the reaction process. Although slow 5thermal reactors are the most common and successful, the construction of fast reactors still continues.

6. The Great Portrait Painters of Colonial America

John Singleton Copley and Gilbert Stuart are recognized as the most outstanding portrait painters of 1the American Colonial Period. Although both men fled to Europe to avoid the trials of 2the American Revolution, each became renowned for his masterful portraits of the politically elite. Copley's subjects included 3Samuel Adams and Paul Revere. Stuart's included 4George Washington and John Adams. Although they were contemporaries and Copley was a major influence on Stuart, the painters never met. Ironically, Stuart's reputation for 5fine work eventually surpassed Copley's.

TOEFL iBT Practice Test

1. (B) 2. (D) 3. (A) 4. (B) 5. (A)
6. (C) 7. (C) 8. Pottery Wheel (A), (G) /
- Wood-fired Kiln (B), (D), (E) 9. (A) 10. (C)
11. (A) 12. (D) 13. (B) 14. (C) 15. (C)
16. (B)

도기의 발달

전 세계적으로 원시인의 문화에서 도기의 출현은 인류 역사에 중요한 이정표가 되었다. 때로 용기의 혁명이라고도 일컬어지는 도기는 원시인들이 음식을 끓이고 쪄 수 있게 해주었고 이로 인해 새롭고 보다 다양한 재료에서 영양분을 얻을 수 있게 되었다. 또한 토크하면서도 끓이 새지 않는 도기 덕분에 빗물이나 깨끗한 강과 호수에서 물을 받아 저장할 수도 있게 되었다.

최초의 도기는 서로 독립적으로 발달한 것으로 보이는 소수의 문명으로 거슬러 올라간다. 역사가들에게 알려진 가장 오래된 도기는 대략 기원전 10,500년경 일본의 조몽인들의 것이다. 도기가 독립적으로 발달했다는 증거는 기원전 10,000년경 북아프리카의 도기와 기원전 7,000년경 남아메리카의 도기를 보면 알 수 있다.

고고학자들이 수집한 도자기 파편은 고대 문명의 발달 정도를 확인하는 가장 좋은 방법으로 밝혀졌다. 특히 문자가 없어 역사적 기록을 남길 수 없었던 문자시대 이전의 도기가 그렇다. 고고학자들은 여러 지층에서 여러

개의 파편을 파내어 한 문명의 발달 단계를 쉽게 추정할 수 있다. 이는 도기 조각의 양식과 장식을 살펴봄으로써 가능하다. 뿐만 아니라 이러한 연구자들은 미량원소 분석을 통해 도기를 만드는 데 쓰인 점토를 정확히 알아낼 수 있다.

초기의 도기는 수세공이라고 하는 기술로 만들어졌다. 수세공 도기는 손으로 점토를 긴 띠 모양으로 꼬아 용기의 몸통을 만든다. 이러한 초기의 도기들은 수세공의 특성상 생기는 불규칙성 때문에 어떤 도기도 하나밖에 없는 제품이 된다. 이러한 원시 도기들은 손으로 모양을 빚은 후 원시 가마에서 구웠는데, 이 가마는 장작살에 더 가까웠을 것이다.

다음으로 중요한 도기의 발전은 기원전 6,000년에서 기원전 2,400년 사이에 메소포타미아에서 물레가 발명되면서 이루어졌다. 이 장치는 세계 최초 도시들의 점진 커져가는 수요를 충족시킬 수 있도록 직물을 대량생산할 수 있게 해주었기 때문에 도기 생산에 혁명을 가져왔다. 물레는 발판을 이용하여 매우 빠른 속도로 점토를 돌리는 회전 테이블로 도공이 회전 대칭을 이용해 도기의 모양을 만들 수 있었다. 그 결과 수공예품에 비해 보다 규칙적인 도기 작품들이 나왔다.

[유약의 발달도 도기의 품질을 향상시키는 데 기여했다.] 기원후 800년경 사마라와 바그다드의 이슬람 도공들은 납으로 만든 유약을 사용해 도기의 마무리 손질을 더 정교하게 했다. 이 유약 처리 과정은 로마에서 시작되어 지중해와 북아프리카로 전해졌다. 이 도공들은 또한 그 당시 인기가 있었던 중국의 백자를 모방하는 과정에서 새로운 형태의 유약 처리법을 발견하기도 했다. 그들은 중국의 자기를 아주 근접하게 모방하긴 했지만 실험 과정에서 납 대신 산화주석을 이용한 새로운 유약 처리법을 발견했다.

도기를 단단하게 굽히기 위해서는 도기를 아주 고온 상태의 가마에서 구워야만 한다. 중국인들은 도기 역사의 아주 초기에 나무를 때는 효율적인 가마인 장작 가마를 개발했다. 이 유용한 장치 덕분에 석탄을 쓰지 않고도 필요한 온도를 유지할 수 있었고, 이는 곧 한국과 일본으로도 전해지게 되었다.

진정한 대량 생산이 가능해진 도기 공장의 시대가 도래한 것은 1785년 영국의 도시인 스톡 온 트렌트에서였다. 이 도시는 도기 제작을 1차 산업으로 삼았던 최초의 산업 도시였다. 이 도시에는 2만 명 이상을 고용했던 200개 이상의 도기 공장이 있었던 것으로 알려졌다. 이 도시는 도기로 대단히 유명해져서 "더 포터리즈"라는 별명을 얻기도 했다.

프레더릭 윈슬로 테일러

프레더릭 윈슬로 테일러는 문제를 해결하는 "한 가지 최선의 방법"이 언제나 존재한다고 믿었다. 그는 과학적 관리 이론을 만들었다. 효율성에 관한 그의 사고와 연구는 전 세계의 관리자들과 노동자들의 작업 환경과 관리 방법에 변화를 가져왔다. 그는 20세기 초반 효율성 운동의 최전두에 섰던 미국의 기술자였다. 이 운동은 세계에서 가장 강대한 국가에서 산업주의를 낳았다.

공학 분야에서 효율성을 향한 테일러의 노력은 그가 시력이 나빠서 하버드대에 진학할 수 없게 되었을 때 시작되었다. 그 대신 그는 1874년에 철강 기계공이 되었다. 이 시기 동안 그는 공장의 상황을 직접 체험할 수 있었다. 공장 노동자로 일하면서도 그는 기계공학에서 학위를 땀다. 그는 스티븐스공대의 문신 교육을 통해 학점을 이수하고 1883년 졸업했다.

효율성에 관한 테일러의 신념의 핵심은 어떤 종류의 작업이든 세심한 과학적 분석을 통해 "한 가지 최선의 방법"을 찾아낼 수 있다는 생각이었다. 그는 이 원칙에 기초를 두고 시간과 동작 연구라고 하는, 그의 가장 유명한 실험을 고안했다. 이 실험은 한 공정을 기본 구성 요소로 분해해 각 작업을 초 단위까지 측정했다.

테일러가 했던 그런 연구 가운데 가장 유명한 것이 삼을 이용한 연구였다. [그러나 그 당시에는 그 연구로 전적 명성을 얻지 못했다.] 그는 노동자들이 다른 재료에 동일한 삼을 사용하고 있는 것을 보고 연구를 시작했다. 그들의 동작을 자세히 분석한 후 가장 효과적인 양이 약 10킬로그램 정도 된다는 것을 알아냈다. 그런 다음 그는 각기 다른 재료를 정확히 그 양만큼 퍼 올릴 수 있는 삼을 개발해냈다. 그러나 아이러니컬하게도 테일러는 자신의 생각을 실제 공장에 적용하려 할 때마다 거의 매번 실패했다. 그가 인정받게 된 것은 그의 가르침을 따르는 추종자들이 그의 생각을 받아들여 번식부터였다.

테일러는 자신의 원칙 적용에 실패한 탓에 그가 일했던 대규모 철강 회사에서 해고되어 관리 방법에 관한 책을 집필하기 시작했다. 그는 당시의 일반적인 관리 방법이 아마추어식이라는 믿음을 강하게 가졌다. 또한 그는 경영이 학문으로 연구되어야 하며 올바른 경영이 이루어지면 노동자가 관리자와 협력하게 되어서 노동조합이 필요 없게 될 것으로 확신했다.

테일러는 1900년경 다트머스대학의 텍 경영대학원의 교수가 되었다. 거기에서 그는 주요 저작인 《과학적 관리 원칙》을 발표했다. 이 책에서 그는 과학적 관리의 네 가지 주요 원칙을 설명했다. 그 원칙들은 (1) 업무를 과학적으로 연구해서 나온 방법들로 주먹구구식 작업 방법을 대체할 것, (2) 노동자들이 혼자서 일을 배우게 하지 말고 각 노동자를 과학적으로 교육, 훈련, 개발시킬 것, (3) 과학적으로 개발된 방법을 따를 수 있도록 노동자와 협력할 것, (4) 노동자들이 과학적 관리 원칙을 이용해 적업할 하는 동안 관리자들도 작업 계획 전략에 동일한 원칙을 이용할 수 있도록 관리자와 노동자 사이에 일을 균등히 분배할 것 등이었다.

1908년경 하버드대학은 테일러의 네 가지 과학적 관리 원칙뿐만 아니라 그의 생각에 기초를 둔 교과과정을 경영학과와 대학원 과정에서 가르치기 시작했다. 헨리 포드가 만든 대량생산의 개념과 함께 테일러의 사고는 스위스, 프랑스, 특히 소련과 같은 나라들을 포함해 전 세계적으로 대단한 영향을 끼쳤다. 테일러의 사고를 수용한 전 세계의 관리자들은 이것을 테일러의 원칙이라 부르며 간혹 알잡아서 테일러주의라고 부르기도 한다.

Vocabulary Review

- [A] 1. (C) 2. (A) 3. (B) 4. (A) 5. (C)
6. (A) 7. (C) 8. (D) 9. (D) 10. (B)
- [B] 1. h 2. j 3. e 4. c 5. i
6. a 7. f 8. g 9. d 10. b

Unit 9 Prose Summary

Skill & Drill

1. (A), (B), (D)

지진파의 종류

지진파는 지진의 결과 땅 속을 통과해 진행하는 파를 말한다. 지진파에는 두 종류가 있다. 하나는 땅 속으로 내부로 통과하는 "실체파"이고 다른 하

나는 지구의 바깥층 바로 아래를 통과하는 "표면파"이다.

지진이 일어나면 느끼게 되는 초기 진동은 실체파 때문인데, 실체파는 P파와 S파로 이루어진다. 이 두 파가 지나가는 경로는 땅의 조성과 밀도에 따라 달라진다. P파는 압축과 팽창이 확실하게 교대로 나타난다. 반면에 S파는 횡진동을 하며 지나간다.

표면파는 주파수가 낮으며 지속 시간이 길고 진폭이 크다. 지진의 가공할 파괴력이 생기는 것은 표면파 때문이다. 표면파에는 두 가지 종류가 있다. 레일리파는 땅에 물결처럼 완만한 기록을 생기게 하고 러브파는 수평으로 진행한다.

2. (B), (D), (E)

소행성 1989 FC

소행성은 태양계 내에 떠다니며 태양 주위의 궤도를 도는 천문학적 물체를 말한다. 한 종류의 소행성은 태양 주위의 지구 궤도에 매우 가깝기 때문에 NEA 즉 지구절근소행성이라고 한다. 일부 NEA는 지구와 궤도가 교차해 충돌의 위험이 있다.

1994년 3월 23일에는 그러한 NEA 때문에 지구가 심각한 위험을 받기도 했다. 나중에는 1989 FC로 알려진 아폴로 소행성 4581 아스클레피우스는 400,163마일 차이로 지구와의 충돌을 간신히 피했다. 이것은 근소한 차이가 아닌 것처럼 보였지만 크게 보았을 때 소행성 1989 FC는 지구가 불과 6시간 전에 통과했던 똑같은 위치를 지나갔다. 소행성이 지구와 부딪혔더라면 인간이 알고 있는 가장 큰 폭발이 일어났을 것이다. 그 충격은 연속 50일간 초마다 대형 원자폭탄이 폭발하는 것과 같았을 것이다.

3. (A), (D), (F)

식물과 탄수화물

살아남기 위해서 사람은 다양한 음식물을 섭취해야 한다. 우리가 먹는 모든 종류의 음식물은 단백질, 지방, 탄수화물의 세 가지의 주요 영양소로 나눌 수 있다. 각 영양소는 몸을 유지하는 데 중요한 역할을 하지만 주요 에너지원이 되는 것은 탄수화물이다.

탄수화물은 체내의 에너지 저장과 운반을 돕는 생명분자이다. 탄수화물은 당 또는 당류라고도 알려져 있다. 탄수화물의 기본 단위는 단당류로, 단당류는 무한한 방법으로 결합해 다당류나 포도당과 같은 다른 탄수화물을 만든다.

음식물과 관련해 이야기할 때 영양학자들은 탄수화물을 두 가지 부류로 나눈다. 즉 복합탄수화물을 함유한 식품과 단순탄수화물을 함유한 식품이 그것이다. 복합탄수화물은 단순탄수화물에 비해 체내에서 분해되는 데 더 오랜 시간이 걸린다. 탄수화물 함량이 높은 식품으로는 쌀, 감자, 빵, 곡물 등을 들 수 있다.

4. (A), (B), (F)

변성암

변성암은 다른 종류의 암석, 예를 들어 화성암이나 퇴적암 같은 암석이 극심한 열이나 압력을 받아 조성에 변화가 생길 때 형성된다. 이 과정을 변성작용이라고 하는데, 열이나 압력이 가해지기 전에 있던 기존의 암석을 원암이라고 한다. 예를 들어, 대부분이 퇴적암으로 이루어진 셰이 있는데 갑자기 화산 폭발이 일어난다고 하자. 화산 폭발 동안 퇴적암(원암)이 열과 압력을 받아 암석이 변하게 된다. 그렇게 되면 퇴적암은 변성암이 된다.

과학자들은 변성암을 연구함으로써 지각의 구조에 대해 많은 것을 알아

낼 수 있는데, 이는 변성암이 지구의 내부 온도와 압력 그리고 지구가 지질 연대에 걸쳐 어떻게 변화했는지를 보여주는 소중한 정보를 알려주기 때문이다. 변성암의 빛 가지 예로는 집판암과 대리석을 들 수 있다.

TOEFL Reading Practice

- [A] 1. (A) 2. (A) 3. (B), (C), (F)

¹big time increments / ²aeons, eras, and periods / ³Nicholas Steno / ⁴layers of rock

지질 연대 측정법

지질 연대는 과학자들이 지구의 역사 동안 일어났던 사건의 시간과 관계를 설명하기 위해 사용하는 시간 단위이다. 지구는 45억 7천 만년 이상이 되었기 때문에 우리가 시간을 표시하기 위해 사용하는 날, 년, 세기 등의 단위는 지구 시간을 측정하는 데 사용하기에는 너무 작은 단위이다.

지질 연대는 다양한 시기에 일어난 특정 사건에 따라 여러 단위로 나뉘어진다. 일반적으로 지질 연대표의 시기는 공룡의 멸종이나 인간의 출현과 같은 지질학적 주요 사건들에 의해 서술된다.

지질 연대의 단위는 또한 누대, 대, 기의 세 가지 주요 시간 요소로 나뉜다. 누대는 시간의 가장 큰 단위이다. 누대는 여러 개의 대로 나누어지며 대는 여러 개의 기로 나누어진다. 기는 일반적으로 상부, 중부, 하부로 나누어진다. 상부와 하부 대신 후기와 전기를 사용하기도 한다. 예를 들어, 고고학자와 지질학자가 특별한 암석에 묻힌 공룡의 뼈를 발견했다고 하자. 고고학자는 실험실에서 공룡 뼈의 구조를 보고 지질연대표를 사용해 뼈가 진화한 누대, 대, 기를 분류하고자 할 것이다. 어쨌든 지질학자에게 “이 공룡은 한생누대에 해당하는 중생대 상부 쥐라기의 화석입니다.”라고 말할지도 모른다. 지질학자는 그 암석이 뼈와 동일한 누대, 대, 시의 “상부 쥐라기 사람”이라는 것을 알아낼 것이다.

지질연대표는 17세기 말 덴마크의 지질학자 니콜라스 스테노에 의해 최초로 고안되었다. 스테노는 지구에서 발견되는 암석층은 일정 기간 동안 묻혀 있었기 때문에 암석의 형태와 구성을 연구함으로써 지구의 지질연대표를 만들 수 있다고 결론지었다. 그는 또한 특정 층의 암석은 아마도 그 위층의 암석보다는 오래되고 아래층의 암석보다는 더 새로운 암석이라는 것을 지적했다.

스테노 뒤의 많은 과학자들이 지질연대표 형성에 소중한 연구와 자료를 제공했다. 영국의 지질학자들은 이 과정을 주도했는데, 몇몇 시기의 이름을 보면 그들의 영향을 알 수 있다. 캄브리아와 실루리아는 영국의 부족 이름이었던 반면 데본기는 영국의 마을 이름인 데본셔에서 나왔다.

결론적으로, 전 세계의 과학자들이 여러 종류의 암석과 화석의 관계에 기초해 지질연대표를 만들었다. 이 연대표 덕분에 과학자들은 지구 역사에 관한 정확한 가설을 세울 수 있게 되었다.

- [B] 1. (C) 2. (A) 3. (A), (C), (F)

¹open star / ²440 light years / ³Reflection nebulae / ⁴Aztec

플레이아데스 성단

플레이아데스 성단은 성간으로부터 만들어져 중력으로 서로 느슨하게 결합된 수천 개의 별들이 일종의 “산개성단”이다. 플레이아데스 성단은 특히 황소자리란 이루는 산개성단을 말한다. 플레이아데스 성단은 또한 M45

또는 “칠자매별”로도 알려져 있다.

플레이아데스 성단을 이루는 별들은 최근 1억 년 동안에 형성되었기 때문에 천문학상으로는 비교적 어린 별에 속한다. 이 별들은 특히 청색색 별이라고 불리는 별인데, 이 종류는 성운에서 가장 뜨겁고 강한 빛에 속한다. 이 별들은 너무나 강하기 때문에 플레이아데스 성단은 매우 빨리 타 버려서 단기간 동안밖에 존재하지 못한 것으로 추정된다. 이 별 무리는 2억 5천 만 년 정도 더 살다가 성운 내의 다른 중력 때문에 흩어져 나뉠 것으로 생각된다. 거리 면에서 플레이아데스 성단은 지구에서부터 약 440광년 떨어져 있으며 전체 지름은 12광년 정도이다.

플레이아데스 성단은 별로만 이루어진 것이 아니라 반사성운이라고 하는 것도 포함하고 있는데, 반사성운이란 근처의 별에서 나오는 빛을 반사하는 먼지구름이다. 반사성운은 또한 플레이아데스 성단의 전체적 밝기에도 영향을 미친다. 한때는 플레이아데스 성단을 둘러싼 먼지 입자가 이 성단을 형성한 성간운의 일부라고 여겨졌지만 현재는 이 성단이 단지 성운의 특별히 먼지가 많은 부분을 통과하고 있는 것이라고 여겨진다.

플레이아데스 성단은 역사상 여러 문명에 중요한 역할을 했다. 고대 그리스인들은 플레이아데스 성단을 별자리로 생각했으며 호머의 고전인 《일리아드》와 《오디세이》에도 언급되었다. 플레이아데스 성단은 성경에 세 차례 언급되었으며 그리스 신화 덕분에 “칠자매별”이라는 이름을 얻었고 힌두교 신화 덕분에 “칠모별”이라는 이름도 얻었다. 고대 아즈텍인들은 플레이아데스 성단의 별 가운데 몇 개가 보이는지를 이용해 서로의 시력을 측정했다. 호주 원주민들은 이 성운이 달에 있는 남자에게 강간당하고 있는 여성이라고 믿었다. 플레이아데스 성단을 둘러싼 수많은 신화들을 볼 때 이 성단이 밤하늘에서 얼마나 눈에 띄고 밝게 빛나는지를 알 수 있다.

- [C] 1. (B) 2. (D) 3. (B), (C), (E)

¹negative / ²Louis Daguerre / ³silver halide / ⁴mercury vapors

은판사진법

은판사진은 제작 과정이 매우 복잡하고 힘든 사진 가운데 하나이다. 은판 사진은 할로겐화은 입자를 뿌려 박은 입힌 연마된 은 표면에 영상을 직접 노출시킬 때 얻어진다. 이 사진 과정의 주요 결점은 음화가 없다는 것으로, 이는 정확한 영상이 재생되지 않는다는 말이다.

은판사진을 뜻하는 영어 단어 다게레오타입은 은판사진을 발명한 프랑스 화학자 루이 다게르의 이름을 딴 것이다. 루이는 빛의 다양한 성질에 관심을 가진 화학자이기도 했다. 다게르는 또 다른 프랑스 발명가 니세포르 니엘스와 수년 간의 공동 작업을 한 끝에, 1839년 은과 백묵의 혼합물을 빛에 노출시키면 흑화 현상이 일어난다는 것을 발견했다.

은판사진법 과정은 할로겐화은을 입마한 은 조각 위에 뿌린 다음 렌즈를 통해 은판에 이미지의 초점을 맞춘다. 은판을 가열한 수은 컵 위에 두면 영상이 포착된다. 이로 인해 수은 증기가 생겨 판에서 빛에 가장 많이 노출된 부분에 응결된다. 수은이 은판에 붙으면 사진이 현상된다. 은판사진법의 마지막 단계는 증조라고 하는 용액에 사진을 적셔 판에 영상을 정착시키는 것이다. 염화금으로 판을 처리하는 것도 영상을 강화하는 데 도움이 된다. 그러나 영상이 섬세하고 사진을 다시 얻을 수가 없기 때문에 다게르와 그 뒤의 사람들은 잊지 않고 유리 조각으로 영상을 맞았다.

은판사진법은 전 세계로 순식간에 보급되었다. 은판사진이 그렇게 인기 있었던 이유는 초기의 사진술에 비해 이 방법이 훨씬 빨랐기 때문이다. 19

세기 중반에는 은판사진법을 이용해 사진을 찍는 사진사들이 이 마을 저 마을을 돌며 사람들의 초상사진을 찍어주었다. 이로 인해 사람들은 최초로 화가의 눈을 통하지 않고 자신의 모습과 정확하게 똑같은 영상을 소유할 수 있었다.

하지만 인타깝지도, 시간이 흐르면서 보다 새로운 사진술이 발명되었고 은판사진은 사진사에게는 너무 힘들고 일반인들에게는 너무 고가의 과정이었기 때문에 점점 인기를 잃어갔다. 또한 은판사진의 영상은 복제가 불가능했기 때문에 음화가 가능한 새로운 형태의 사진이 훨씬 더 인기가 있었다. 음화가 가능했던 후기 형태의 사진은 은염을 사용한 유리에 영상을 정착시켰다.

- [D] 1. (B) 2. (A) 3. (A), (E), (F)
1 the wind / 2 crescent shape /
3 many smaller dunes / 4 desertification

모래언덕

모래언덕은 풍성 과정이라고 하는 풍식작용 때문에 생기는, 단순히 모래로 된 돌멩이를 가리키는 지질학적 특성이 아니다. 모래언덕의 모양과 크기는 전적으로 바람에 따라 결정되며 인근의 모래언덕과도 모양이 다를 수 있다. 다르긴 해도 모든 형태의 모래언덕을 묘사하는 데 사용하는 몇 가지 표준 용어가 있다. 슬락은 붙어 있는 두 모래언덕 사이의 골짜기를 말하며, 모래 벌판은 모래로 가득 찬 지형을 말한다. 모래 벌판이 폭히 큰 때는 에브라라고 한다. 모래언덕의 옆면을 슬립페이스라고 한다.

모래언덕이 가장 흔히 발견되는 곳은 해안 지역이나 사막과 같이 대체적으로 건조한 내륙지방이다. 해안을 따라서 생긴 모래언덕은 폭풍이 이는 바다와 계속되는 침식으로부터 육지를 보호해준다. 조건이 상당히 열악해 보이지만 많은 해초들과 바닷새들에게 해안의 사구는 이상적인 서식지가 되고 사막의 사구는 여러 종류의 선인장, 뱀, 거미들에게 이상적인 보금자리가 된다.

모래언덕은 여러 종류가 있으며 각각은 부분적으로는 바람의 세기와 방향 그리고 주변의 지형에 의해 생긴다. 가장 흔한 모래언덕은 초승달 모양의 사구이다. 이 형태의 사구는 일반적으로 길이에 비해 폭이 넓으며 바람이 한 방향으로 지속적으로 불 때 생긴다. 별 모양의 모래 언덕은 매우 대칭적으로 높은 정상 부분으로부터 세 개 이상의 가지가 방사형으로 뻗어나간다. 이 종류의 언덕은 바람이 여러 방향으로 불어서 생기는데, 사하리의 그랑데르코오리앙탈사막에서와 같이, 사막에서 잘 나타난다. 이 사구는 측면과 반대 방향인 위쪽으로 커진다. 역전사구는 풍향이 주기적으로 바뀌기 때문에, 크기와 모양이 다양하다.

사구가 어떤 모양을 하고 있건 간에 각 형태마다 단순형, 혼합형, 복합형의 세 가지 종류가 있다. 단순형 사구는 기하학적 모양을 이루는 최소의 사면 즉 슬립페이스가 있는 사구이다. 혼합형 사구는 동일한 모양의 보다 작은 여러 개의 사구를 가진 약간 더 큰 사구를 말하며, 복합형 사구는 두 가지 이상의 형태가 결합된 사구이다.

모래언덕은 특히 해안 지역과 같은 특정 서식지에서는 필수적인 부분으로 해안 지역의 사구는 해안 지역의 토양 침식을 막고 어떤 종류의 야생생물들의 보금자리가 된다. 그런가 하면 모래언덕은 사막화라고 하는 문제를 일으킬 수도 있다. 사막화는 기후 변화로 인해 토양이 침식될 때 생긴다. 모래언덕을 만드는 것과 동일한 바람이 때로는 진흙이나 농작물에 큰 피해를 입히는 모래폭풍이나 모래사대의 형태로 인간의 서식지를 침식하기도 한다. 해마다 아프리카나 중동 같은 곳에서는 기후 지역으로 모래가 넘어오지 않도록 모래 방벽을 세운다.

- [E] 1. (B) 2. (C) 3. (A), (C), (F)

1 radio waves / 2 Grote Reber / 3 Big Ear / 4 unmanned

고급 전파망원경의 발달

전파망원경은 전파를 "발" 수 있는 라디오 수신기이다. 빛을 보는 보통 망원경과는 달리 전파망원경은 천체에서 발하는 전파를 감지할 수 있기 때문에 천문학 분야에서 주로 사용된다. 라디오 망원경이라고 부르기도 하는 우주 속의 물체는 여러 가지 원자와 분자가 내는 고온의 기체, 전자, 파장과 같은 것일 수 있다.

최초로 전파망원경이 발명된 것은 1937년 그로테 리버에 의해서이다. 그는 미국인으로 공학 분야의 학위를 땀다. 그는 아마추어 라디오 기사로 일을 했는데, 자기집 뒷마당에 자신이 직접 전파망원경을 만들기로 결심했다. 처음 만든 두 개의 라디오 수신기는 우주 공간으로부터 아무런 신호도 받지 못했지만 1938년 세 번째 전파망원경으로 우주에서 온 신호를 잡는데 성공했다.

전파망원경은 포물선 모양의 하나 또는 두 개의 대형 접시형 안테나로 되어 있다. 포물선 모양은 들어오는 전파를 초점으로 모아 신호가 가능한 한 강하게 수신되도록 하기 위해 필요하다. 접시 크기가 클수록 보다 많은 신호를 수신하고 초점에 모을 수 있다는 것을 의미한다.

이후에 보다 큰 전파망원경이 제작되긴 했지만 1950년대 말과 1960년대 초에 당시로서는 가장 큰 76미터짜리 전파망원경이 발명되었다. 현재 세상에서 가장 큰 전파망원경은 러시아에 있는 RATAN-600으로 직경이 576미터이다. 이 전파망원경 덕분에 태양 전파와 대기의 소중함 피드백을 얻을 수 있었다. 유럽에서 가장 큰 전파망원경은 독일에 있는 직경 100미터짜리이며, 미국에 있는 가장 큰 전파망원경은 오키오 주에 있는 빅 이이다. 가장 규모가 큰 전파망원경 시설은 인도에 있는 지이언트 미터웨이브 전파망원경이다.

전파망원경 덕분에 과학자들은 우주에 관한 소중한 정보를 얻을 수 있게 되었다. 전파망원경의 가장 중요한 기능 가운데 하나는 과학자들로 하여금 우주로 발사한 무인 우주 계획의 여러 가지 우주탐사선을 추적할 수 있게 하는 것이다. 전파망원경 때문에 화성 표면처럼 인간이 탐사하기에는 너무나 위험한 곳에도 우주 탐사선을 보낼 수 있다. 전파와 기습이 없다면 과학자들은 우주에 살고 있는 많은 생명체들에 대해서 알 수도 없고 볼 수도 없을 것이다. 전파파는 우주에서 우리의 눈이 되고 귀가 된다.

- [F] 1. (C) 2. (C) 3. (B), (C), (F)

1 protons and electrons / 2 Niels Bohr /
3 molecules / 4 Tunnel Ionization

원자 이온화

이온화 과정은 원자의 양성자 수와 전자 수의 차이가 바뀌어 원자가 하전된 이온이 되는 것을 말한다. 원자는 한 개 이상의 전자를 빼앗겼느냐 얻었느냐에 따라 양의 전하량을 갖거나 음의 전하량을 가진다. 만약 전자를 빼앗기면 여분의 양성자가 존재하게 되어 원자는 양이온이 된다. 자유 전자를 얻으면 원자는 음이온이 된다. 원자가 양이온 또는 음이온의 어떤 상태가 되느냐에 따라 이온화 과정은 약간 다르다.

1913년 덴마크의 물리학자인 닐스 보어는 이온화 과정 동안 원자가 다른 원자와 결합하거나 분리되기 위해 필요한 에너지를 장벽을 깨는 데 필요한 전위 에너지를 결코 초과할 수 없다고 가정했다. 예를 들어, 보어의 이론에 따르면 어떤 사람이 2피트의 바를 넘으려고 하면 그 사람은 공중에

서 적어도 2피트를 뿔 수 있어야 한다. 이 이론에 따르면 전자가 원자와 결합하거나 원자에서 분리될 때 원자가 필요로 하는 에너지는 결코 장벽의 에너지 전위보다 낮을 수 없다.

물은 이온화 과정을 보여주는 좋은 예다. 물은 +1의 양전하를 가진 두 개의 수소 이온과 -2의 음전하를 가진 한 개의 산소 이온으로 이루어져 있다. 두 개의 수소 원자와 한 개의 산소 원자가 대단히 가까워지면 원자는 가장 균형 있는 상태를 유지하려고 하기 때문에 (두 개의 전자 손실로 인해 생긴) 수소의 양전하가 산소 원자에 있는 두 개의 여분의 전자에 붙게 된다. 그래서 H_2O 는 단단히 결합되어 에너지 전위가 보다 큰 다른 입자와 만날 때에만 이온화가 일어난다.

실용적인 면에서 말하자면 이온화 과정 때문에 과학자들은 플라스틱이나 회공 약품 같은 새로운 재품을 만들기도 하고 이를 조작하기도 한다. 또한 환경과 관련하여 이온화는 공기정화기 제조회사에 많은 도움을 주는데 공기정화기는 사실 이온화 장치에 불과하다. 정화기는 공기 중의 자유 라디칼 이온을 끌어당겨 전자로 다시 전하량의 균형을 맞춘다.

위에서 설명한 님스 보어의 모델에 기초한 이온화 과정은 고전적 이온화로 알려져 있다. 이 외에도 터널 이온화나 비연속 이온화와 같은 보다 복잡한 이온화 과정이 있다. 하지만 이러한 이온화 방법들은 덜 보편적이며 종종 실험실에서 행해진다.

Building Summary Skills

1. How to Measure Geological Time

Nicholas Steno devised 1the Geologic Time Scale in the late 17th century. The time scale calibrates the history of Earth according to 2major geological events. The scale is divided into 3eons, eras, and periods. These smaller increments allow scientists to categorize and reference 4historic artifacts and fossils within certain time frames and to piece together a map of Earth's history. Since its inception, many scientists have contributed to 5the time scale.

2. The Pleiades

The Pleiades makes up 1the constellation Taurus. It is formed of the hottest and brightest stars in the galaxy as well as 2reflection nebulae that further enhance its overall shine. Estimated to be 3about 440 light years away from Earth and spanning 12 light years in diameter, scientists predict that it will burn itself out before 4gravitational forces can pull it apart. Meanwhile, its intense power and brilliance have won it a prominent role in the mythologies and 5advancements of many cultures.

3. The Daguerreotype

The daguerreotype was invented by French chemist 1Louis Daguerre in 1839 when he discovered that a mixture of silver and chalk would darken an image exposed to light. This discovery made it possible to create 2exact images of people. Furthermore, although early methods of photography had been attempted, the daguerreotype

process was 3less cumbersome than its predecessors and meant that early photographers could travel from town to town to 4take portraits of their subjects. Unfortunately, the daguerreotype lacked the means to produce copies, and with 5the introduction of the negative, the daguerreotype soon lost favor.

4. Sand Dunes

A sand dune is a mound of sand formed from 1wind erosion. Generally, dunes are created along 2coastal areas or in desert regions. The ferocity and direction of the wind determines 3the type of sand dune that is formed. Although sand dunes provide 4ideal habitats for various plants and animals as well as prevent subsequent erosion, they also encroach on human habitats through a process called desertification. In desertification, sand storms and sand avalanches cause major damage to 5buildings and crops.

5. The Development of Advanced Radio Telescopes

Radio telescopes are important to scientists because they are able to see and track 1information from space. First developed by American 2Grote Reber in 1937, radio telescopes are designed with 3a parabolic shape that concentrates signals into a strong focal point that can more easily be detected. A larger dish size determines a greater degree of 4concentration. Since then, the early 1960s saw the invention of a radio telescope with a 76-meter diameter, but today the largest radio telescopes exceed 100 meters in diameter with the largest having a diameter of 5576 meters. Furthermore, radio telescopes can be found around the world.

6. The Ionization of an Atom

Ionization is the process of 1changing the charge of an atom. It allows scientists to manipulate atoms into new products. Possibly because it is 2environmentally friendly, the process of ionization has become particularly profitable for companies that market air purifiers. Ionization enables the purifiers to 3attract free radical ions and rebalance their charges with electrons. This type of ionization is called 4Classical Ionization and was first theorized by 5Neils Bohr in 1931. Although other types of ionization processes have been developed, they are less commonly used.

TOEFL iBT Practice Test

- | | | | | |
|---------|-------------------|------------------|---------|---------|
| 1. (A) | 2. (C) | 3. (D) | 4. (B) | 5. (A) |
| 6. (B) | 7. (A) | 8. (A), (C), (F) | 9. (C) | |
| 10. (A) | 11. (B) | 12. (A) | 13. (B) | 14. (D) |
| 15. (C) | 16. (B), (D), (F) | | | |

금성의 대기

저녁별과 새벽별로 불리는 금성은 태양에서 두 번째로 가까운 행성이며 밤 하늘에 보이는 별 가운데 가장 밝다. 지구일로 224일마다 태양 주위를 한 바퀴 도는 이 행성은 지구와 크기가 비슷하기 때문에 지구의 자매 행성이라고도 불린다. 하지만 금성의 대기는 지구의 대기와 비슷하지 않다.

금성의 대기는 지구보다 훨씬 무거우며 비중도 높다. 레이더 지도 제작을 이용하지 않고는 거의 관찰이 불가능한 두꺼운 구름층이 금성 표면을 덮고 있지만 금성의 대기는 지구의 대기보다 훨씬 높이까지 팽창한다.

금성의 상층부 대기의 압력과 온도는 지구와 비슷하지만 하층부 대기의 압력과 열은 용광로와 다를 바가 없다. 주로 이산화탄소 그리고 소량의 질소로 이루어졌기 때문에 금성의 대기층은 매우 짙다. 만약 인간이 금성 표면의 극심한 열(400°C)을 견뎌낼 수 있다고 하더라도 지구 기압의 90배 이상인 표면압과 싸워야만 한다. 금성이 이렇게 고온 상태를 유지하는 것은 모두 엄청난 양의 이산화탄소로 인한 온실효과 때문이다. 온실효과란 태양의 적외선이 대기에 의해 보다 쉽게 흡수되는 과정을 말한다. 연중 식물을 키우기 위해 사용하는 실제 온실과 마찬가지로 다량의 이산화탄소가 복사열을 가두어 금성의 대기를 데운다. 금성은 수성에 비해 태양으로부터의 거리가 두 배나 더 먼데도 이 현상 때문에 금성은 수성보다 기온이 높다.

하지만 과학자들은 금성의 대기가 항상 고온 상태이지는 않았다고 주장한다. 연구에 따르면 한 때는 금성 표면에 많은 물이 있었지만 물이 전부 증발하면서 오늘날 금성을 조절하는 일방적 온실효과가 나타나게 되었다. [원인은 다르지만 결과는 마찬가지다.] 그래서 인류가 온실효과의 초기 단계에서 고군분투하고 있는 상황에서 금성은 오늘날 과학자들에게 중요한 연구대상이 되었다. 우리의 문제는 수원의 증발에서 일어나지는 않았지만 기,액체나 지동차에서 배출되는 배기 가스로 인한 이산화탄소와 다른 온실 배기가스의 증식 때문이다.

금성의 대기에서 주목할 만한 또 한 가지 흥미로운 점은 낮기온과 밤기온이 그다지 차이가 나지 않는다는 것이다. 이것은 기온 변화에도 불구하고 열을 가두는 물질의 능력인 열관성 때문이다. 금성 표면은 지구에 비해 바깥이 찬찬히 움직이지만 금성의 대기는 밀도가 너무 높기 때문에 서서히 움직이는 바람이 대향 장에 물들을 움직이고 행성 표면에 있는 돌을 불수제비 뜨듯 날리기까지 한다.

인류는 1966년에 최초로 금성 대기에 기록 장치를 보내는 시도를 했다. 베네라 3호는 금성 표면에 닿긴 했지만 착륙시 생긴 갑작스런 충격으로 통신 시스템이 고장 나 피드백을 보내올 수가 없었다. 1967년에 베네라 4호는 금성 대기에 진입하는 데 성공해 많은 기록들을 보내왔는데, 그 중에는 금성 대기의 90~95%가 이산화탄소라는 기록도 있었다. 후속 베네라 탐사선들이 금성 대기로 보내졌지만 대부분이 금성의 높은 기압 벽을 뚫지 못했다.

대수층

대수층은 물을 통과시키고 우물을 이용해 지하수를 퍼 올릴 수 있는 지하 암석층이나 용융되지 않은 다른 물질 층을 말한다. 대수층은 비피압대수층이거나 피압대수층이다. 비피압대수층은 대수층과 지하수면 사이에 제한층이 없다. 피압대수층은 상부 경계로 반대수층이 있으며 종종 그 위에 또 다른 비피압대수층이 있다. 반대수층은 한 대수층에서 다른 대수층으로의 지하수 흐름을 제한하는 지역을 말한다. 대수층이 완전히 관통할 수 없는 경우에는 난대수층 또는 비대수층이라고 한다. 반대수층은 점토 또는 불기성이 없는 암석과 같이 투수계수가 낮은 낮은 물질로 되어 있다.

지구의 얇은 표면 아래 거의 어느 곳에서나 지하수를 찾을 수 있다. 지각은 포화대와 불포화대의 두 지역으로 나누어진다. 포화대에서는 있을 수

있는 모든 공간들이 물로 채워져 있다. 대수층은 여기에 존재한다. 불포화대에서는 지하수가 도달하지 못한 일부 공간을 공기가 채우고 있다. 포화대에서 대수층의 압력은 대기압보다 크다. 지하수면에서는 물에 가해지는 압력이 대기압과 동일하다. 한편 불포화대에서는 물이 용압을 받아 위로 빨리 움직이고 그 위에 있는 것의 상부 경계에 붙게 된다.

산이 없는 곳에서는 대수층이 전형적으로 강이나 다른 유수에 의해 포화된 퇴적물인 충적토로 이루어진다. 충적토는 일반적으로 침나나 전토와 같은 작은 입자와 모래나 자갈 같은 보다 큰 입자들로 이루어진다. 강은 끊임없이 미세한 입자를 운반하고 퇴적시킨다. 침착할 수 있는 것처럼 강에 있는 큰 입자들은 운반하는 데 많은 에너지가 필요하기 때문에 더 큰 암석이나 자갈은 수원에 더 가까이에 있고 수원으로부터 멀리 떨어져 있는 대수층은 일반적으로 더 미세한 입자들로 이루어져 있다.

대수층은 사람들의 거주지에 상관없이 땅에서 물을 파올릴 수 있게 해주기 때문에 살아가는 데 없어서는 안 된다. 당연히, 크고 평활한 수원에 더 가까이 있을수록 땅을 더 얇게 파도 생존에 적합한 대수층을 발견할 수 있다. 보다 건조한 곳이나 고도가 높은 곳에 사는 사람들은 대수층을 발견하기까지 땅을 더 깊게 파야 한다. 어떤 대수층은 다른 대수층보다 크기가 더 크기도 하다. [대수층을 파려는 계획을 세울 때는 얼마나 많은 물이 필요한지를 결정해야 한다.] 만약 파려는 우물이 순전히 한 가족이 먹을 식수 공급을 위해서만 필요하다면 작아도 된다. 하지만 관개나 채굴에 사용할 계획이라면 더 큰 대수층이 필요하다. 대수층도 대부분의 자연자원과 마찬가지로 한정되어 있기 때문에 대수층을 지나치게 개발해서는 안 된다. 쉽게 마실 수 있는 물은 유한정하기 때문에 담수 대수층은 특히나 과용해서는 안 된다. 하지만 일부 대수층은 조만간에 고갈될 위험이 거의 없기도 하다. 예를 들어, 호주에 있는 그레이트 아터큰 베이슨은 세계에서 가장 큰 대수층이다. 이 대수층은 호주의 가장 오지에까지도 물을 공급하고 있으며 호주 대륙의 23%나 되는 부분의 아래에 존재한다.

Vocabulary Review

- A** 1. (D) 2. (A) 3. (C) 4. (C) 5. (A)
6. (D) 7. (B) 8. (C) 9. (A) 10. (B)
- B** 1. g 2. a 3. i 4. c 5. j
6. h 7. d 8. e 9. b 10. f

Unit 10 Fill in a Table

Skill & Drill

1. Life Stages (A), (C), (E)
Habitat (D), (F)

과일나무야마리나비

과일나무야마리나비(*Archips argyrospilus*)는 캘리포니아 전역에 있는 수목에 피해를 입히는 해충이다. 이 해충은 낙엽수나 떡갈나무와 같은 관

상용 식물의 잎을 시들게 만든다. 또한 무엇보다도 벼, 사과, 살구, 자두 나무의 열매에 피해를 입힌다. 이 해충은 땅에까지 내려와서 나무 아래에 있는 잔디나 식물의 잎도 시들게 만든다. 이 곤충은 네 가지 발달 단계를 거친다. 첫 번째 단계가 알인데 나무 잔가지나 가지에 붙어있는 많은 것 중의 하나가 이 해충의 알이다. 단단한 땅에서 나와 새로 부화한 유충은 숙주 나무를 갉아먹으며 자라서 완전히 다 자란 모충이 된다. 충분히 먹이 든 성충의 뒤에는 유충은 번데기라고 하는 명주실로 감싼 나뭇잎 안에 몸을 맡아 놓는다. 8일에서 11일이 지나면 번데기에서 성충이 나온다. 그러면 성충은 새로운 곳으로 가서 짝짓기를 해서 다음 세대를 위한 알을 낳는다.

2. Neolithic Humans (B), (D), (E)
Pre-Neolithic Humans (A), (F)

신석기 문화

신석기 시대는 구석기 시대와 청동기 시대 사이에 시작되었다. 신석기 시대는 발생한 시간에 의해 규정되는 대신 그 시대에 동반되는 행동적, 문화적 특성에 의해 규정된다. 그러한 특징의 하나가 야생 작물과 농경 작물의 경작이다. 이 농업 문화는 그들이 일생 동안 살고 일한 곳에 농업 기반을 마련했기 때문에 초기 인류의 유목 생활에 종말을 고하게 되었다. 또 다른 특징으로는 동물의 사육을 들 수 있다. 축산업의 도래는 과학에서부터 심리학에 이르기까지 인간 발달의 여러 면에서 진보를 가져왔다. 화석 증거를 통해 신석기 시대로 확인된 최초의 문화 가운데 하나는 서남아시아와 중동 지역이다. 기원전 10,000년 직후에 아나톨리아 남동쪽과 메소포타미아 북쪽에서 문명이 발달하면서 동쪽과 서쪽으로 확산되었다.

3. Characteristics (A), (D)
Benefits (C), (E), (G)

맹그로브 숲

맹그로브 숲은 수목과 관목이 자랄 수 있는 해수 지역이다. 전 세계적으로 맹그로브 숲에는 약 110여 종의 수목과 관목이 자란다. 이 숲지는 맹그로브 뿌리가 자라기 좋은 미세한 퇴적물이 많은 해안 지역이나 강에 분포한다. 맹그로브는 또한 영양분이 되는 유기물 성분이 많은 지역에서 잘 자란다. 그리고 이 지역은 강한 파도의 작용으로부터 어느 정도 보호가 되어야 한다. 이 숲에 있는 식물들은 무산소성, 염분 그리고 조수에 의한 잦은 침수 등의 몇 가지 문제에도 잘 적응해야 한다. 맹그로브의 수중 뿌리는 물이나 해변 동물, 심지어 개와 같은 해양 생물들의 은신처가 된다. 이러한 동물들에게 은신처를 제공해 주는 것 외에도 맹그로브는 해안 지역을 강타할 수 있는 폭풍이나 그 밖의 자연력에 대한 방벽 역할을 하는 중요한 존재이다. 이 숲은 또한 침식을 막고 비정상적으로 큰 파도를 막는 자연 방벽의 역할도 한다.

4. Positive Effects (B), (G)
Negative Effects (A), (C), (D)

텔레비전이 미국의 가정에 미치는 영향

텔레비전이 가족 구성원에게 미치는 영향이 미국에서 면밀히 연구되었다. 일부 학자들은 텔레비전 프로그램은 날마다 보는 것이 가족 내 의사소통 형태에 엄청난 영향을 미친다고 생각한다. 다른 학자들은 어린이의 사고력이 증진된다고 믿는다. 텔레비전이 가족에게 미치는 영향을 다룬 한 연구는 양자(兩者)관계라고 하는 부모-어린이 집단을 대상으로 비교 설문지를 작성하게 했다. 연구는 자녀들이 텔레비전을 보도록 허용한 부모들이 자녀를 더 효과적으로 통제할 수 있지만 의사소통을 하는 데는 덜 효과적임을

보여주었다. 서로 다른 텔레비전 쇼에 노출되면 시각 차이 때문에 부모와 자녀가 의사소통하기가 더 힘들어질 수 있다. 텔레비전에 나오는 폭력은 사고방식의 발달을 저해하고 그로 인해 아이의 마음에 도덕적 사유가 덜 발달하게 되는데, 부모가 그러한 폭력물에 현실성이 있음을 설명하지 않을 때 특히 그렇다.

TOEFL Reading Practice

- [A] 1. (A) 2. (D)
3. The Law of the Sea Treaty (A), (F), (G)
The Traffic Light Color Convention (B), (C)
110% / 215 years / 3 Traffic Light Color Convention /
4 Gene splicing

어류 남획의 해결책

남획은 상업적인 어업 활동으로 어류의 양이 현 수준을 유지할 수 없을 정도로, 충분히 많은 수나 빠른 속도로 자연적 번식을 할 수 없는 지점까지 이른 것을 말한다. 인류가 먹을 수 있는 어류로 바다를 채울 수 있는 생활 주기, 평형은 이익을 챙기려는 어부들의 욕망 때문에 지속 불가능한 상태가 되어 버렸다.

어류의 저장고가 붕괴된다고 할 때는 이전에 관찰된 최대량의 10% 미만까지 감소될 때를 말한다. <사이언스>지에 발표된 국제 과학 연구에서는 전 세계에 분포하는 모든 어류 자원량의 3분의 1이 붕괴되었으며, 만약 이런 추세가 계속된다면 전 세계의 모든 어류 자원량이 향후 50년 내에 붕괴될 것이라고 한다.

남획의 역사는 1970년대에서 살펴볼 수 있는데, 이때 페루 해안의 멸치 자원량이 고갈되었다. 동시에 과학자들은 페루 해안의 자연 멸치 자원량이 엘니뇨 효과로 줄어들었다고 주장했다. 1971년과 1972년 사이 페루의 어부들은 이전 해보다도 60% 적은 멸치 어획고를 올렸다. 이러한 붕괴는 페루 경제에 심각한 타격을 의미했다.

이 문제에 대해 고민하던 과학자들은 새로 발생한 문제를 해결하기 위한 예방 조치로 일련의 남획 원칙을 내놓았다. 그들은 전 세계 어업계에 수확 규제, 관리 원칙을 소개했다.

남획, 고갈, 어류 자원량의 붕괴 등을 막기 위한 규칙 제정을 위해 신호등 협약이라고 하는 시스템이 도입되었다. 이것은 자유로운 어업을 할 수 있는 어업 지역은 파란색으로, 자원량에 주의한 해야 하는 규제도가 높은 어업 지역은 노란색으로, 어류 자원량이 안전하고 지속 가능한 수준으로 회복될 때까지 어업 활동을 해서는 안 되는 지역은 빨간색으로 구분하는 간단한 협약이었다.

신호등협약 외에 유엔해양법협약에도 남획 문제와 관련된 몇 가지 조항이 있다. 이 문제를 언급한 첫 번째 조항은 61조로, 여기에는 모든 해안 국가들이 남획으로 어종들이 멸종 위기에 처하지 않도록 어업 지역의 생물 자원을 보존해야 한다고 명시되어 있다. 이 조항은 또한 심각한 위협을 받고 있는 종의 보존과 회복을 요구하고 있다. 이 문제와 관련한 다음 조항은 62조로, 여기에는 모든 해안 국가들이 그들의 경제 구역 내에 있는 상업적 생물 자원을 최대한 잘 활용하도록 해야 한다고 적고 있다. 마지막으로 65 조에는 상업적 이익을 위해 해양 포유류의 수확 규제할 수 있는 해안 국가의 일반적 권리를 명시하고 있다.

남획 문제를 해결할 수 있는 또 다른 해결책은 '물고기'의 번식속도 및 번고 가속화시킬 수 있는 유전자 집합 기술이다. 이 방법은 뉴런드렌트에 있

는 아쿠아 바운티 뱀스키에 의해 발명되었다. 일단 기술이 좀 더 발전되면 이 프로그램으로 인해 자연적 자원량은 그대로 두어 번식을 할 수 있도록 하면서 어부들은 돌리막은 탱크 시설을 이용해 전 세계적 어류 수요량을 충족시킬 수 있다.

- [B] 1. (D) 2. (B)
3. Dance Language Theory (B), (D), (F)
Odor Plume Theory (A), (C)
1food sources / 2by colors /
3waggle dance / 4Odor plume theory

꿀벌의 의사소통과 학습

꿀벌은 학습과 의사소통을 할 수 있고 그것을 먹이의 위치를 찾아내는 데 사용하는 고도로 발달된 동물이다. 또한 꿀벌은 이러한 기술을 사용해 먹이를 수확하기 위해 일벌을 배치하기도 한다.

꿀벌은 각 벌집에 맞는 효율적이고 성공적인 채집 시스템을 만들기 때문에 꿀벌에게 학습 과정은 중요하다. 먹이 사냥을 하는 벌은 아침에 벌집을 나서 꽃가루나 꿀이 있는 식물이나 꽃을 찾는다. 만약 식물이나 꽃에 원하는 꿀이나 꽃가루가 많이 있는 경우에는 반복해서 찾아오지 않도록 재빨리 익힌다. 풍부한 먹이가 있는 경우에는 다시 찾아오도록 기억해야 한다. 이러한 형태의 학습을 연상학습이라고 하는데, 보통 척추동물의 경우에만 있다.

과학자들은 간단한 Y자 모양의 미로를 사용한 실험에서 꿀벌의 학습 능력을 조사했다. 먹이 사냥을 하는 벌은 일정한 색깔 표시를 한 미로 속에 들어갈수록 훈련을 시킨다. 그런 다음 한 쪽은 입구의 색깔과 같은 표시가 되어 있고 다른 쪽은 다른 색깔로 표시가 되어 있는 곳에서 길을 선택해야 한다. 벌은 같은 색깔로 된 방향에 포상이 기다리고 있다는 것을 재빨리 배운다.

이 실험을 한 과학자들은 또한 벌이 새로운 조건을 재학습 할 수 있는지 보기 위해 색깔을 바꾸고 미로의 길이를 늘렸는데 벌은 이 조건도 재학습했다. 올바른 색깔 표시를 보기 위해 날아야 하는 거리를 늘임으로써 과학자들은 벌이 최고 5초까지 색깔 표시 정보를 기억할 수 있다는 사실을 증명해 보았다. 이것은 벌이 많은 조류의 기억과 비슷한 단기 기억력을 가졌다는 것을 보여준다.

가장 포상이 많은 식물과 꽃의 위치를 파악하면 먹이 사냥 벌은 벌집으로 돌아가 일벌에게 발견한 사실을 알린다. 이것을 하는 이유는 동일한 지역에서 꽃가루와 꿀을 딸 일벌을 모으기 위해서이다. 먹이 사냥 벌이 어떻게 일벌을 모으는지에 관해서는 두 가지 상충되는 이론이 있다. 이 두 가지 이론들은 춤 언어 이론과 향기 발산 이론이다.

아리스토텔레스 이후로 꿀벌은 꽃가루와 꿀을 따는 데 성공해 벌집으로 돌아온 후 춤을 추는 것으로 알려져 왔다. 이 두 가지 춤은 원무와 꼬리춤이다. 원무는 벌이 작은 원을 그리며 추는 춤이고 꼬리춤은 지그재그 모양으로 추는 춤이다. 이 춤들은 먹이가 있는 식물이나 꽃의 존재와 위치를 알리기 위한 것이다. 춤 이론에 따르면 이 행동은 새 꿀벌들에게 꿀이 많은 위치를 알려주는 역할을 한다고 한다.

향기 발산 이론에 따르면 춤 언어는 단지 관심을 끌기 위한 것이고 꽃가루와 꿀을 따기 위한 일벌을 모으는 것은 꿀이 내는 향기 발산 때문이라고 한다. 이것을 입증해 보이기 위해서 과학자들은 실험을 했는데, 이 실험에서 그들은 꿀벌에게 향기가 없는 당원을 주었더니 일벌들이 다른 꿀벌들을 먹이가 있는 곳으로 데려가지 못했다.

- [C] 1. (A) 2. (B)
3. Direct (D), (G) / Forced (B), (E) / Indirect (F)
1ideas, behavior, and material objects /
2located nearby / 3forced diffusion / 4globalization

문화 전파

문화 전파란 문화간에 사고, 행동, 물체가 전파되는 것을 가리키는 말이다. 이 용어는 인구 이동이나 대규모 이주 없이 이 움직임이 일어날 때 특히 자주 사용된다.

문화 전파 개념을 포함하는 이론은 인류학계에 논쟁을 일으킨다. 이것은 대량 이주에 관한 이론들과 상충되기 때문이다. 문화 전파와 대량 이주 사이의 대립은 북아메리카, 유럽, 아시아 대륙 북극권 주변의 동굴곰 두개골이 있는 유사한 인류 매장지와 관련한 이론에서 찾을 수 있다. 그럼에도 불구하고 많은 인류학자들은 일반적인 설명을 할 때 문화 전파 즉 문화간의 특성 작용에 기초한 이론을 더 즐겨 사용한다.

인류의 역사와 선사시대를 통틀어 어떤 문화가 계속 보존되거나 다른 문화들과 완전히 고립되어 있었던 적은 결코 없다. 문헌시대 일본의 고립주의 문화에서조차도 설마를 하고 다니면 스님에 의해 시작된 불교의 종교 철학이 인도와 중국으로부터 전해졌다. 이것은 어떻게 문화 전파가 대규모로 일어나는지를 보여주는 예이다. 문화 전파는 직접, 강제, 간접 전파의 세 가지 유형이 있다.

직접 전파는 서로 지리적으로 가까이 위치한 두 문화 사이에 일어난다. 이 결과 양 국민들 사이에 결혼이 생기고 경제 무역과 물리적 충돌도 일어난다. 직접 전파의 예는 멕시코인과 미국인처럼 국경을 접하고 있는 나라의 두 사람이 결혼을 하거나 하키나 야구처럼 같은 운동을 하는 미국과 캐나다와 같이 국경을 접하고 있는 나라의 회원들이 결혼을 하는 경우이다.

강제 전파는 보다 강한 문화가 약한 문화를 정복하거나 노예국으로 만들어 자국의 문화를 정복한 국민들에게 강요할 때 일어난다. 이것의 예로는 아프리카 노예들을 미국으로 대량과 기독교를 믿도록 강요한 것을 들 수 있다. 또 다른 좋은 예는 영국이 한때 인도를 식민지로 만들어 많은 인도인들에게 영어를 배우도록 한 것을 들 수 있다.

간접 전파는 요즘 들어 가장 흔히 일어나는 문화 전파의 유형이다. 이 유형의 전파는 보내거나 받는 문화가 직접적으로 접촉하지 않은 채 매개인 즉 중재인을 통해 문화 사이에 문화적 특성이 전해질 때 발생한다. 유럽인이 미국을 방문해 미국인들이 스시라고 하는 일본 음식을 즐기는 것을 볼 때 간접 전파가 일어난다. 또 다른 예로 한 아프리카 사람이 디즈니랜드에는 한 번도 가본 적이 없지만 관광객에게서 미키 마우스 티셔츠를 받아 입는 것을 들 수 있다.

이런 형태들의 문화 전파는 역사를 통틀어 빈번하기도 했고 그렇지 않기도 했다. 고대에는 사람들이 인접 지역에 거주했기 때문에 직접 전파가 일반적이었다. 하지만 오늘날에는 매스미디어와 인터넷의 발명으로 간접 전파가 가장 흔한 형태가 되었다.

- [D] 1. (D) 2. (C)
3. Squirrel (A), (E) / Mouse (B), (D) /
Prairie Dog (F)
12,000 to 3,000 / 2semi-aquatic /
3two to four / 4above ground

설치류의 보금자리 습성

설치류는 약 2~3,000종이 포함되는 포유류의 목으로 포유류 전체의 40% 이상을 차지한다. 설치류는 코가 작고 빈식 주기가 짧으며 다양한 종류의 먹이를 먹고 생존할 수 있는 전체적 능력 때문에 번성했다.

대부분의 설치류는 비교적 작지만 무게와 신체적 특징은 대단히 다양하다. 이러한 다양성을 확실히 보여주는 예가 약 7그램 정도 나가는 아프리카피그미쥐와 오늘날에도 현존하는 최고 45킬로그램까지 나가는 캐피바라이다.

설치류 중 간의 이러한 일반적인 차이는 여러 종류의 설치류들이 만드는 보금자리의 형태에도 잘 나타난다. 예를 들어, 아메리카비버는 나무를 갇아서 쓰러뜨려 보금자리를 만든다. 비버는 다양한 가지뿐만 아니라 이러한 나무를 이용해 강을 가로지르는 댐을 만든다. 이 댐은 결국 인공 인물이 된다. 이 댐 안에서 비버는 소굴이라고 하는 반수생 보금자리를 만든다.

비버의 보금자리와 많은 차이를 보이는 설치 동물의 보금자리는 다람쥐의 보금자리다. 다람쥐는 나무 가지 사이에 다람쥐굴이라고 하는 보금자리를 만든다. 또한 다람쥐는 겨울철에 영양분을 공급해 줄 도토리나 다른 열매를 저장해 놓을 수 있는 저장고인 보금자리 안이나 주변에 만든다. 과학자들은 다람쥐는 기억력이 지극히 단기적이기 때문에, 저장 장소를 기억나게 해 줄 안표가 있는 곳에 열매를 저장한다는 것을 발견했다. 예를 들어, 다람쥐는 먹이를 저장한 장소가 기억나도록 나무의 북쪽 면에 열매를 보관하기도 한다.

보금자리 만드는 방식이 아주 다른 또 다른 설치류로는 프레리도그가 있다. 프레리도그는 큰 무리의 프레리도그 가족이 사는 잘 조직화된 군락을 만드는 것으로 유명하다. 가족은 보통 한 마리의 수컷과 두 마리에서 네 마리의 암컷으로 구성된다. 이 군락은 실제로 프레리도그가 지하에 판 거대한 굴이다. 이 굴은 신선한 공기의 통풍을 극대화하고 빛을 효를 조절할 수 있도록 만들어진다. 여기에는 잠자고 먹고 새끼를 키우는 방이 따로 따로 있다. 또한 이 굴에는 포식자의 침입이 있을 경우 탈출할 수 있는 몇 개의 통로도 있다.

또 다른 설치류 동물인 쥐는 지상에 보금자리를 만든다. 대부분의 쥐는 진드, 섬유, 조각난 물건 등으로 좁은 지역에 보금자리를 만든다. 여기에서 쥐들은 잠을 자고 짹짹하고 새끼를 키운다. 대부분의 쥐들은 아늑하고 작고 보호가 되는 지상에 보금자리를 만들지만 몇몇 쥐들은 얇은 굴을 파기도 하는 것으로 관찰되었다. 그런가 하면 오래된 집의 벽이나 나무의 그루터기, 심지어 폐차의 배기관 속에 보금자리를 만들기도 하는 것이 관찰되었다.

- [E] 1. [A], [D] 2. [C]
3. Food Acquisition Skills [B], [E]
Service Skills [D], [F], [G]
1 omnivores / 2 mosquito repellent /
3 self-aware / 4 paraplegics or injured

꼬리잡기원숭이의 지능

꼬리잡기원숭이는 신세계 원숭이 중 가운데 가장 독특한 것으로 알려져 있다. 이들은 중앙아메리카와 남아메리카에 분포한다. 숲에서 살면서 하루의 대부분을 먹이를 찾으며 보낸다. 밤이 되면 나무 가지 사이에 몸을 맡아 놓은 채 나무에서 잠을 잔다. 덩치가 큰 메나 벨, 고양이와 같은 천적을 피하기 위해 밤 동안 나무 위에서 지낸다.

꼬리잡기원숭이는 곤충이나 기미, 새알, 작은 설치류뿐만 아니라 열매, 견과류, 씨앗, 싹 등을 먹는 잡식성 동물이다. 또한 들앵이를 이용해 계의

껍질을 갈라서 먹는 것이 관찰되기도 했다.

꼬리잡기원숭이는 특히 독특한 것으로 알려져 있으며 장기간에 걸쳐 도구 사용하는 것이 관찰되었다. 이것은 영장류 외의 포유동물 가운데 도구 사용하는 몇 안 되는 예 중의 하나이다. 이 꼬리잡기원숭이는 또한 야자 열매를 먹을 때 마코앵무새가 열매를 쪼개는 행동을 모방하는 것이 관찰되기도 했다.

꼬리잡기원숭이는 가장 잘 익은 열매를 골라 껍을 물어 뜯은 다음 씹은 마신다. 그런 다음 열매를 옆으로 던져버려 마치 버리는 듯 보인다. 하지만 일단 이 버린 열매들이 단단해지면 그것들을 모아 크고 평평한 바위 위에 놓는데, 그것은 이전에 모아둔 강 돌로 열매를 쪼개 안에 든 견과류를 꺼내 먹기 위해 받침대로 사용했던 돌이다. 꼬리잡기원숭이는 열매를 쪼개는 데 사용했던 동일한 돌을 사용하기 때문에, 수집해서 사용했던 강 돌은 장기적인 도구라고 할 수 있다. 새끼들은 나이가 많은 원숭이들이 하는 행동을 보고 마침내 그들로부터 배우게 된다.

꼬리잡기원숭이의 지능과 도구 사용을 보여주는 또 다른 예는 모기철 동안에 한 수 있다. 이 시기쯤 나이 든 꼬리잡기원숭이들은 노래기를 모아 밭아서 찌그러뜨린다. 그런 다음 서로의 등에 찌그러진 노래기 액을 문지른다. 이 노래기 액은 자연적인 모기 구충제의 역할을 한다.

꼬리잡기원숭이에 관한 한 연구에서는 이 동물의 자기 인식 능력을 조사해 보기 위해 거울을 사용했다. 꼬리잡기원숭이는 거울 속에 나타난 모습을 보고 거울을 다른 원숭이로 보는 것과 이미지 그 자체로 인식하는 것의 중간쯤 되는 방식으로 반응하는 것이 관찰되었다. 이 실험 결과 꼬리잡기원숭이들이 다른 많은 종의 영장류보다도 훨씬 더 자기 인식 능력이 뛰어나다는 것이 밝혀졌다.

수백 년 동안 이 원숭이는 지능을 이용해 인간에게 도움을 주었다. 그들은 과거의 음악가들과 함께 여행하던 풍금 연주 원숭이로 잘 알려져 있다. 또한 이동 서키스단이나 카니발에서 흥을 돋우는 역할을 하기도 했다. 요즘에 와서 꼬리잡기원숭이는 치주 장애가 있는 사람이나 대마비 환자를 돕는 역할을 한다. 이러한 부상을 당한 사람들의 집에서 꼬리잡기원숭이들은 음식을 전자레인지에 돌리고 환자의 얼굴을 씻겨 주고 병 뚜껑을 따 주는 것과 같은 단순한 활동을 해 도움을 준다.

- [F] 1. [B] 2. [B]
3. Academic Theories [A], [D], [G]
Current Puebloan People's Theories [B], [F]
1 southwestern U.S. / 2 Puebloans /
3 pit house designs / 4 hostility

푸에블로 문화

아나사지 문화의 사람들은 기원전 약 1200년부터 수세기째 같이 자취를 감춘 기원후 1300년까지 미국의 남서부 지역에 살았다. 지금은 사라진 이 문명이 남긴 가장 큰 건축 유적은 유타, 애리조나, 뉴멕시코, 콜로라도의 일부를 포함하는 포코너스에 있다.

아나사지족의 현대 후손들은 자신들을 푸에블로인이라고 부르고 자신들의 문화를 푸에블로 문화라고 부르기를 더 좋아한 것이다. 이는 아나사지라는 말이 다른 언어를 사용하는 또 다른 종족인 나바호족에서 나왔기 때문이다. 그들의 언어로 아나사지는 "죽의 조상"이다. 옛날부터 이 언어는 이 지역에 유적은 남긴 사라진 문화를 묘사하는 데 사용되었기 때문에 오늘날에도 사용된다. 하지만 많은 사람들은 이 용어를 사용하지 않기를 바란다.

고대 푸에블로 문화는 하갈, 어도비, 사암과 같은 다양한 돌과 점토를 이용해 절벽의 옆면에 거주지를 지은 것으로 잘 알려져 있다. 이 고대 절벽 주거지 유적의 상당 부분이 차코 문화역사공원, 메사 베르드 국립공원, 맨들러 국립유적지 등과 같은 국립 역사공원 내에 위치한다. 이 거주지 가운데 일부는 로프나 압벽 등반을 해야만 다가가 수 있다.

그러나 최초의 푸에블로 주거지는 절벽 옆면에 위치하지 않았다. 바스켓 메이커 문화라고 불렸던 많은 고대 문화에서 일반적으로 나타나는 것처럼 구덩이를 판 형태였다. 이 초기의 거주지는 작은 마을을 이루고 있었다. 간단한 건축법을 사용했으며 L자형, 반원형, 직사각형 등으로 만들어졌다. 그것은 시간이 흐르면서 점점 더 정교해지고 견고해졌다. 푸에블로 문화가 꽃피었던 1150년경에는 이 거주지가 절벽 옆면에 지어진 정도로 건축 기술이 발달했다. 이 고대 푸에블로인들은 또한 암석 조각이나 그림 문자의 형태로 그린 많은 예술 작품뿐만 아니라 대단히 독특한 양식의 도기로도 유명하다.

고고학자들과 인류학자들은 푸에블로인들이 12세기와 13세기에 절벽 거주지를 만든 이유를 밝혀내지 못했다. 장기간에 걸친 가뭄, 표토의 침식, 환경의 파괴, 종교 또는 문화적 변화, 심지어 새로 온 종족으로부터의 적대감 등 여러 요소가 그 이유일 것이라는 설이 있었다.

고대 푸에블로인이 수수께끼처럼 사라져 버린 데 대한 현재의 과학적 추론은 농업에 치명적인 기후 변화와 이들을 몰아낸 새로운 종족의 도착이 복합적으로 작용한 결과라는 것이다.

이 의견에 대해 많은 현대의 푸에블로인들이 이의를 제기하는데, 그들은 고대 조상이 사라진 것이 아니라고 한다. 대신에 그들은 보다 강우량이 풍부하고 나은 시내가 있는 남서쪽으로 이동했다고 믿는다. 그들은 또한 고대 푸에블로인들이 멕시코 원주민이나 남서부 부족과 같은 다른 종족들과 혼합되었다고 주장한다.

Building Summary Skills

1. Possible Solutions to Overfishing

The problem of overfishing has led to ¹the decline and collapse of fish stocks. Several steps are needed to combat the problem. Fishing rules have been implemented to ²regulate fishing in depleted areas until their fish stocks return to ³safe and sustainable levels. The United Nations Convention on the Law of the Sea Treaty issued several articles that address related ⁴issues of exploitation, and methods of ⁵accelerating fish reproduction have been introduced.

2. The Communication and Learning of Honeybees

Scientists are interested in how bees learn and communicate. They have investigated ¹the memory capacity of honeybees and determined that honeybees have ²a short-term memory similar to that of birds. Scientists have also studied the ways and purposes that bees communicate through dances, particularly ³the round dance and the waggle dance. The study has led to debate on ⁴the odor plume theory because, while some scientists argue that dance is merely used to attract the attention of

worker bees, which are cued to the existence of rewarding plants through their aromas, other scientists argue that the dance itself communicates ⁵the whereabouts of the desired plants.

3. Cultural Diffusion

Although anthropologists do not agree on all aspects of cultural diffusion, they have identified three main forms: ¹direct, indirect, and forced. Direct diffusion occurs when populations are ²geographically close enough to allow for interaction through activities that include trade or marriage. Indirect diffusion can occur from ³exposure brought through a middleman such as a traveling merchant who carries wares and stories from one culture to another. ⁴Forced diffusion is the imposition of one culture's values and customs on another through subjugation. Today, with the widespread use of mass media and the Internet, ⁵indirect diffusion is the most prevalent form.

4. The Nesting Habits of Rodents

Rodents are a varied and hardy kind of mammal that make up more than ¹40% of all mammal species. Included among ²the 2,000 to 3,000 rodent species are beavers, squirrels, prairie dogs, and mice. Although each is distinguished by ³the type of nest that it builds, rodents are usually characterized as relatively small animals that have ⁴short breeding cycles and the ability to eat many kinds of food for survival. Their high survival rate is owed to nests that are built in safety ⁵away from predators. Beavers build nests by felling trees, squirrels build them between tree branches, mice construct nests above ground, and prairie dogs dig tunnels.

5. The Intelligence of Capuchin Monkeys

Scientists have taken an interest in the capuchin monkeys because they are ¹sociable and demonstrate ²a high level of intelligence. For example, they sleep together at night, and during the day, they look for and process food with ³river stones. They have even learned to ⁴make a salve from millipedes to protect themselves from insect bites. In the past, capuchin monkeys were well-known for their adeptness at entertaining, but today scientists are more interested in training the monkeys to perform ⁵household and personal tasks for paraplegics and victims of spinal cord injuries.

6. The Puebloan Culture

Known for their strong homes and exquisite artistry, ¹the Anasazi cliff dwelling people of southwestern North America mysteriously disappeared ²about 1300 A.D. Anthropologists and archaeologists, as well as the

descendants of that culture, who prefer to be called Puebloans, speculate about the disappearance. Some of their explanations involve environmental changes that would have devastated an agricultural lifestyle while others suggest that the Anasazi people merged with other cultures. Still another explanation is that the emergence of a hostile tribe drove them from their territory.

TOEFL iBT Practice Test

1. (A) 2. (B) 3. (C) 4. (B) 5. (D)
6. (C) 7. (B) 8. Causes (B), (C), (F) /
Methods (E), (G) 9. (C) 10. (B) 11. (B)
12. (A) 13. (C) 14. (A) 15. (D)
16. Phototropism (C), (D) / Heliotropism (A), (B) /
Hydrotropism (F)

사막화

사막화는 아름, 건조, 반건조 지역에서 한때 비옥했던 땅이 불모의 사막이 되는 과정을 말한다. 이러한 변화는 기후 변화와 인간의 활동 때문에 일어난다. 많은 근대의 사막화는 점점 더 많은 사람들이 농작물을 경작하거나 소가 풀을 뜯을 수 있는 땅을 잃기 필요로 한 결과 발생한다.

사막화의 가장 큰 문제는 생물다양성과 생산 능력이 감소된다는 것이다. 이러한 영향은 미국의 남서부에서 볼 수 있는데, 이곳에서는 한때 주황을 이루었던 번치그래스가 멸종되고 1900년대 초반 이후로 크레오소트가 자라는 관목지대로 대체되었다.

이러한 변화가 뚜렷한 또 다른 장소는 마다가스카르의 중앙 고원으로, 전 국토의 10%가 사막화 과정을 겪었다. 이러한 초목과 농지의 급격한 소실은 토착민들이 사용한 화전농법 때문이다.

현대에 와서 사막화가 일어나는 주요 원인 가운데 하나는 일정한 땅에서 지속 가능한 한계를 넘어서 가축들을 방목하기 때문이다. 이 소와 양들이 반쯤으로 땅 위를 쿵쿵거리며 뛰어다녀서 하층토가 단단해지면서 수분을 흡수할 수 있는 능력이 감소하게 된다. 가축의 무게와 지속적인 발구름 때문에 토양은 또한 더욱 미세한 입자로 부수진다. 이 모든 활동으로 인해 토양은 바람이나 물의 침식 작용에 더 쉽게 피해를 입게 된다. 땅갈음 장작을 모으는 것뿐만 아니라 가축을 방목하는 행위도 토양을 고정시키는 식물을 감소시키고 없애는 역할을 한다.

사막화의 또 다른 원인은 토양의 과도 경작이다. 비옥한 토지에 작물을 심으면 작물을 수확하고 토지는 재이용하게 된다. 결국 토지는 광물질과 수분을 빼앗기게 된다. 농부가 새로운 작물을 심기 위해 토지를 갈면 토지는 침식의 영향에 노출된다. 이러한 나쁜 농업 관행이 1930년대 미국 중서부 지역의 사막화를 초래했다. 엄청난 인구가 생산력이 없는 토지를 버리고 집을 떠나게 만들었던 이 경제적인 재앙은 황진지대라고 이름 붙여졌다.

사막화는 중국의 광대한 지역에서 급속도로 일어나고 있다. 20세기 중반 이후 농촌 지역의 인구가 증가하고 벼이름 많이 먹는 가축 종이 도입되면서 사막화는 증가 추세에 있다.

사막화는 생물다양성에 큰 위협으로 인식되기 때문에 일부 국가들은 이러한 악영향을 역전시키기 위해 생물다양성 실행 계획을 내놓았다. 이 계획은 위해 요소를 제한하고 멸종 위기에 처한 동식물을 보호하기 위해 고

안되었다.

현재 사막화를 막기 위해 쓰고 있는 한 가지 방법은 콩과 식물을 심는 것이다. 이 식물은 공기 중에서 질소를 뽑아 토양 속으로 뽑아 넣는다. 이 과정이 사막화가 시작된 토양에서 생산력을 회복시키는 것으로 밝혀졌다. 또 다른 방법은 나무 밑동 둘레에 돌을 쌓아서 아침 이슬이 계속 모여 토지가 수분을 머금을 수 있게 더 넓은 표면적을 만드는 것이다.

또 다른 방법은 지하에 인공 도랑을 파고 그것이 빗물을 머금고 바람에 날린 씨앗을 포획할 수 있도록 해서 토지를 회복시키는 것이다. 이 도랑은 토지가 사막화되지 않게 보호한다. 이 방법을 사용하면 간단한 노력으로도 토지를 보호할 수 있다.

이러한 환경론자들은 작물을 심은 반건조 지역에 석유를 분사하는 새로운 방법을 시도했다. 이 과정은 묘목에서 수분이 증발하지 않도록 막을 입히고 바람이 묘목을 날려 버리는 것을 막아준다.

사막화를 막는 몇 가지 아주 간단하지만 성공적인 방법은 모래가 해당 지역으로 들어오지 않도록 모래 방벽을 설치하고 바람이 토양을 침식하지 못하도록 바람막이를 설치하는 것이다. 사막화와 싸우는 또 다른 중요한 제한 조치는 토양에 피해를 입히는 오프로드 자동차의 운행 지역을 제한하는 것이다.

굴성의 종류

과학자들은 굴성을 생물이 환경의 자극에 반응하여 몸을 움직이거나 자라는 생물학적 변화 현상이라고 본다. 생물이 몸을 옮기거나 자라는 방향은 자극의 방향에 따라 결정된다. 굴성의 반대 현상이 경성 운동인데, 여기서는 자극에 대한 반응의 방향이 일정하지 않다. 굴성은 그것을 일으키는 자극에 따라 이름이 다르다. 굴성을 뜻하는 영어 단어 "tropism"은 "돌리다" 또는 "빈하다"를 뜻하는 그리스어 trope에서 나왔다. 굴성의 종류로는 굴화성, 굴지성, 굴수성, 향일성, 굴광성, 굴촉성 등이 있다.

굴성은 대개 식물이나 다른 고차 생물과 관련이 있다. 만약 어떤 생물이 자신의 위치나 자동력으로 물리적으로 움직일 수 있다면 자극에 대한 반응으로 나타나는 이 생물의 활동이나 움직임은 굴성으로 간주되지 않고 지향적 반응인 추성 또는 무지향적 반응인 무정위 운동성으로 간주된다.

굴화성은 보통 식물이나 박테리아에서 화학적 자극의 결과로 나타난다. 이러한 운동의 좋은 예는 화분편의 성장에서 잘 관찰할 수 있다. 암술머리의 표면에 지방질이 있는 경우에 화분편의 성장이 가속화되는 것을 볼 수 있다. 이 관은 또한 꽃의 암술머리에 한 개 이상의 꽃가루가 있을 경우 자극을 받아 훨씬 더 빠른 속도로 성장한다.

찰스 다윈은 굴지성 또는 향지성의 존재를 처음으로 입증했다. 굴지성은 식물이나 굴류 식물이 지구 중력에 대한 반응으로 방향을 옮기거나 성장하는 것을 말한다. 이것은 식물의 뿌리가 아래로 자라거나 정글의 덩굴 식물이 나무 꼭대기에서부터 아래쪽으로 자라는 것을 보면 알 수 있다. 또한 바위의 지의류나 이끼의 성장 방향을 봐도 알 수 있다.

굴수성은 물 자극에 반응해 그 방향으로 성장하거나 움직이는 것을 말한다. 굴수성이 존재할지라도 그것을 식물의 뿌리에서 관찰하기는 매우 어렵는데, 이는 토양 속에서 물이 지속적으로 움직이고 이를 관찰하려면 실험 대상인 식물에게 피해를 입혀야 하는 탓에 물의 움직임을 볼 수 없기 때문이다. 하지만 수분이 부족한 식물의 뿌리는 수분을 얻기에 가장 좋은 방향으로 자라기 때문에 이 과정을 상상하기는 어렵지 않다.

또한 향일성은 식물의 주행성 움직임을 이른다. 이 용어는 하늘을 가로지르는 태양의 운동에 직접 반응하는 식물의 움직임을 말한다. 꽃들은 밤이 되면 아무 방향이나 향하겠지만 동쪽에서 해가 뜨면 하늘을 가로지르는 데

양을 향하고 서쪽으로 해가 질 때까지 따라간다. 이 동작은 꽃의 바로 아래쪽에 있는 줄기의 유연한 부분 안에 있는 운동 세포가 담당한다. 운동 세포는 조직에 칼륨 이온을 끌어 넣고 이것이 압력의 변화를 일으켜서 운동이 일어나게 된다.

굴광성은 단지 빛의 자극뿐만 아니라 빛의 자극에 반응을 보이는 식물의 움직임을 나타낸다는 점에서 항알성과는 다르다. 광원 쪽으로 식물의 성장이 일어나는 것을 양성 굴광성이라고 하고 빛의 반대 방향으로 성장이 일어나는 것을 음성 굴광성이라고 한다. 대부분의 식물들은 양성 굴광성을 보이지만 뿌리는 토양 깊숙이 뿌리를 내리면서 음성 굴광성 경향을 보인다. 많은 이끼와 지의류는 굴광성을 띠며 바위에서 태양에 노출된 부분에 서식하는 반면 사삼균이나 곰팡이는 햇빛이 전혀 비치지 않는 곳에서 자란다.

명굴식물과 같은 일부 기어오르는 식물들은 접촉 자극에 반응하는 굴촉성을 보인다. 이런 반응을 보이는 식물에는 옥신을 만드는 세포가 있는데, 옥신 때문에 식물은 벽이나 항아리, 막대와 같은 표면을 따라 자라게 된다.

Vocabulary Review

- [A] 1. (A) 2. (C) 3. (D) 4. (B) 5. (C)
6. (A) 7. (D) 8. (A) 9. (C) 10. (B)
- [B] 1. c 2. g 3. ! 4. a 5. h
6. b 7. i 8. f 9. d 10. e

Actual Test 01

1. (B) 2. (B) 3. (A) 4. (D) 5. (C)
6. (C), (E) 7. (B) 8. (C) 9. (C) 10. (C)
11. (A) 12. (A) 13. (A), (E), (F) 14. (C)
15. (D) 16. (A) 17. (B) 18. (D) 19. (D)
20. (C) 21. (B) 22. (A) 23. (C) 24. (B)
25. (D) 26. Right-handedness (A), (C), (E) /
Left-handedness (B), (F) 27. (A) 28. (A)
29. (D) 30. (B) 31. (C) 32. (B) 33. (B)
34. (C), (E) 35. (B) 36. (C) 37. (A) 38. (C)
39. (A), (D), (F)

지구형 행성과 목성형 행성

우리 태양계에 있는 행성들은 태양 주위로 대략 동심의 타원 궤도를 그리며 동일한 평면에 위치해 있다. 하지만 태양에서 가장 가까운 행성들은 바깥쪽 행성들과는 아주 다른 특징들을 가지고 있다. 전자를 지구형 행성이라고 하는데, 태양에서부터 순서대로 수성, 금성, 지구, 화성이 여기에 해당된다. 후자는 목성형 행성이라고 하며, 목성, 토성, 천왕성, 해왕성이 해당된다. 지구형 행성에 비해 목성형 행성은 크기가 더 크고 자전 속도도 더 빠르며 자기장도 더 강하다. 게다가 목성형 행성은 모두 고리가 있고 궤도

를 그리며 도는 여러 개의 위성을 거느리고 있다.

목성형(Jovian)이라는 말은 로마신 주피터 또는 라틴어 Jovis에서 나왔다. 일반적으로 아홉 번째 행성이자 제일 바깥쪽 행성이라고 여겨지는 명왕성은 두 범주 중 어느 쪽에도 해당되지 않으며 양쪽의 특징을 조금씩 나타낸다. 2006년에는 과학자들이 명왕성을 행성 목록에서 제외했다.

두 범주에 속하는 행성 간의 주된 구분점은 조성이다. 지구형 행성은 주로 암석으로 이루어지며 핵은 금속철로, 표면은 규산염으로 되어 있다. 지구가 그러한 성분으로 되어 있기 때문에 이와 비슷한 구성을 지닌 네 개의 행성을 지구물 뜻하는 라틴어 term를 따서 지구형(terrestrial) 행성이라고 한다. 지구형 행성은 표면이 암석으로 되어 있기 때문에 산과 협곡, 분화구, 화산 등이 많다. 핵이 고체라서 지구형 행성은 판 이동의 영향을 받는데, 그 때문에 지구의 대륙 이동처럼 오랜 시간에 걸쳐 표면이 움직이게 된다.

이와는 대조적으로 목성형 행성은 주로 수소와 헬륨으로 구성되어 있고 소량의 메탄과 물, 암모니아를 함유하기 때문에 거대 가스 행성이라고 한다. 거대 가스 행성의 핵은 액체 상태의 암석이나 금속으로 되어 있다. 하지만 핵은 단단한 덩어리가 아니라 철과 규소 같은 무거운 원소들이 농축되어 있는 것이 더 가깝다. 그리고 내핵은 목성형 행성의 질량 대부분을 차지하는 가스 혼합물로 위축되어 있다. 가스는 엄청난 압력을 받기 때문에 행성의 핵과 대기 사이에는 뚜렷한 경계가 없다. 그래서 목성형 행성에는 우주선이 착륙할 수가 없다.

목성형 행성 가운데 처음 두 개에 해당하는 목성과 토성은 전형적인 거대 가스 행성이며 천왕성과 해왕성은 주로 얼음으로 구성되어 있고 소량의 물과 메탄, 암모니아를 갖고 때문에 거대 얼음 행성이라고 하는 하위그룹에 속한다. 목성형 행성에 얼음이 많은 것은 태양으로부터 더 멀리 떨어져 있기 때문이다.

목성형 행성들은 지구형 행성보다 훨씬 크기 때문에 자기장도 훨씬 더 강해서 대기의 밀도가 더 높다. 지구와 비슷한 행성들은 방원경과 우주탐사기로 관찰이 가능한 반면 목성형 행성의 핵은 가스로 된 두터운 대기층에 가려져 있다.

지구형 행성은 내부 온도가 훨씬 낮다. 지구의 표면 온도는 인간이 살수 있는 유일한 온도이다. 다른 지구형 행성들은 표면 온도가 수성의 510℃에서부터 화성의 36℃까지 다양하다. 목성형 행성은 태양으로부터 훨씬 멀리 떨어져 있어서 온도가 더 낮는데, 목성은 영하 148℃, 해왕성은 영하 214℃에 이른다.

목성형 행성은 자전 속도가 빠르기 때문에 바깥 가스층 주위로 떠나 줄 모양의 바람 무늬가 생긴다. 이 때는 고기압과 저기압 지역인데, 고기압과 저기압 지역이 극지적으로 나타나는 지구와 달리 행성의 고속 자전으로 인해 행성 전체를 감싸고 있다. 게다가 네 개의 행성 모두 고리와 위성이 있는데, 지구에서는 토성의 고리가 가장 잘 보인다. 고리는 얼음 결정 입자로 되어 있다. 고리의 기원은 잘 알려져 있지 않다. 가장 그럴 듯한 설명은 토성의 위성들이 토성에 대단히 가까워졌을 때 고리가 생겼다는 것이다. 토성의 조력 때문에 위성이 작은 조각들로 쪼개졌을 것이다. 이러한 조각들이 현재의 고리를 이루고 있다. 지구형 행성 가운데는 고리가 있는 행성이 없으며 위성은 딱 세 개(지구에 한 개, 화성에 두 개)가 있다. 목성은 혼자서 63개의 위성을 거느리고 있으며 토성은 33개, 천왕성은 27개, 해왕성은 13개의 위성이 있다.

오른손잡이 우성

인간은 발군형할 정도로 오른손잡이가 많다. 어느 손이 우성인지를 결정할

이렇다 할 기준이 없기 때문에 왼손잡이 대 오른손잡이의 정확한 비율에 대해 과학자들은 의견 일치된 보지 못하고 있다. 예를 들어, 오른손으로 글을 쓰고 물건을 던지는 사람 중에는 왼손으로 다른 일을 하거나 왼발로 공을 차는 사람도 있다. 객관적인 기준이 없기 때문에 이 추정치의 범위는 넓다. 오른손잡이가 전체의 85%에서 95%, 왼손잡이가 5%에서 15% 나머지 아주 작은 비율은 (오른손과 왼손을 동일하게 사용하는) 양손잡이라서 양손을 똑같이 능숙하게 쓸 수 있다.

오른손잡이 우성에 관한 가장 이상한 점은 그 원인을 거의 모른다는 사실이다. 몇몇 이론이 나오기는 했다. 일부 증거를 볼 때 이 현상은 유전적이지만 유전학자들은 유전에 의해 오른손잡이나 왼손잡이가 되는 과정은 밝혀내지 못했다. 교사나 부모가 선천적으로 왼손잡이인 아동들에게 오른손을 사용하도록 강요하기 때문에 사회적 또는 문화적 요인으로 어느 손잡이가 될지를 결정하는 요인이 된다. 그리고 인류학자들은 보다 제한적인 사회에서는 왼손잡이가 덜 흔한 반면 보다 허용적인 사회에서는 더 흔하다는 사실을 관찰했다. 하지만 왜 그런 일이 생기는지에 관해서는 의견 일치를 보지 못했다.

가장 그럴 법한 설명은 뇌 내부의 기능에 관한 것이다. 뇌의 두 반구는 신체의 반대쪽을 제어하는 것으로 밝혀졌다. 뇌 신경은 목 부분에서 교차되어 몸의 반대쪽으로 가기 때문에 뇌의 오른쪽 부분은 몸의 왼쪽 부분을, 뇌의 왼쪽 부분은 몸의 오른쪽 부분을 제어하게 된다고 한다. 과학자들은 뇌의 왼쪽 부분이 오른쪽을 지배할 정도로 진화했다고 믿는다. 그 결과 몸의 오른쪽 부분은 보다 우세한 좌뇌에 의해 제어가 되며 오른쪽이 신체적 활동을 보다 잘 하게 된다. 하지만 어떤 사람의 우뇌가 더 우세할 경우에는 왼손잡이가 된다. 일부 연구자들은 왼손잡이의 경우 출생 시 생긴 뇌 손상에 의한 병리적적 요인이 있을지도 모른다고 주장한다.

진화에 기초한 한 가지 이론은 "전사와 방패 이론"이라는 이론이다. 이 이론은 오른손잡이의 경우 왼손에 방패를 들고 심장을 가린 채로 오른손으로 무기질 잡을 수 있기 때문에 오랜 세월에 걸쳐 오른손잡이가 우성으로 진화했다고 설명한다. 이와는 대조적으로 왼손잡이의 경우 왼손으로 무기를 잡고 오른손으로 방패를 잡아 심장이 노출되게 된다. 그래서 오른손잡이 전사들은 적의 공격에 대해 심장을 보호할 수 있었기 때문에 생존한 확률이 더 컸다. 이 자연선택의 과정에 의해 오른손잡이가 왼손잡이에 비해 선호되었다.

또 다른 이론은 자연적으로 비대칭적(불균형적)인 인체의 배치에 초점을 맞춘다. 그러한 비대칭성은 얼굴의 오른쪽 부분이 왼쪽과 약간 다르다는 것, 한쪽 다리가 다른 쪽 다리에 비해 좀 더 세거나 길다는 것, 한쪽 발이 다른 쪽 발보다 더 크다는 것 등을 보면 알 수 있다. 이 이론에 따르면 오른손잡이는 이러한 자연적 비대칭성의 한 예일 뿐이라는 것이다.

오른손잡이 우성의 결과 대부분의 소비재가 오른손잡이용으로 만들어지고 있어 왼손잡이들은 자신들을 염두에 두지 않고 만들어진 디자인물에 적응하기 위해 분투해야 한다. 이러한 제품으로는 가위, 손잡이, 자물쇠, 스크루드라이버, 자동차 장착물, 냉장고, 캔 따개, 옷 단추와 잠금 장치, 악기 등이 있다. [왼손잡이들은 종종 이러한 제품을 따로 주문하기도 한다.] 이러한 디자인 상의 편견은 단순히 불편한 야기하는 것이 아니다. 왼손잡이 군인 가운데는 오른손잡이용으로 제작된 소총을 사용하다가 튀어나온 탄피 때문에 눈과 머리 부상을 입은 군인들이 계속 생기고 있다.

손의 우성은 인간 외의 종에서는 일어나지 않는 것으로 보인다. 일부 동물들이 한쪽 손을 다른 손에 비해 더 많이 사용하는 것이 관찰되었지만 인간의 경우처럼 종 전체에 이러한 우성이 있다는 증거는 나오지 않고 있다. 일부 과학자들은 동물에도 이러한 우성이 있다고 주장하지만 동물원이

나 연구소처럼 제한된 공간에서나, 야생 상태에서 양손을 어떻게 사용하는지를 반영해주지 않는 신체적 행동을 할 때만 그렇다.

석회동물

동물은 지구의 빈 공간인데, 세 가지 방법으로 만들어진다. 해식동물은 물, 바람, 모래가 해안에 있는 바위에 작용해 생긴다. 용암동물은 화산 분출로 용암이 굳으면서 생긴다. 가장 흔한 동물인 석회동물은 빗물 또는 녹은 눈이 석회암을 용해시켜 만들어진다. 전 세계 곳곳에서 만들어지는 석회동물은 이제까지 발견된 가장 깊고 큰 동굴이기도 하다. 가장 긴 동굴은 켄터키에 있는 매카드-프린트 리지 동굴로 길이가 306킬로미터가 넘는다. 그러한 동굴이 형성되는 데는 수 백만 년이 넘는 시간이 걸린다.

석회암은 얇은 바다에 산호와 같은 죽은 해양 동물이 서서히 쌓여 만들어진다. 해저에 쌓인 퇴적물은 수 백만 년이 흐르면 크고 단단한 석회암이 되며 이 석회암이 마침내 수면 위로 올라오게 된다. 빗물이나 녹은 눈이 상층부의 토양에 난 틈 사이사이로 스며들면서 유기물질이 부패하며 생긴 이산화탄소를 흡수한다. 물과 이산화탄소가 섞여 탄산이 생기는데 이것이 석회암의 용매가 된다. 이 탄산수는 봄이나 구멍 같이 석회암에 있는 약한 부분으로 새어나와 이 약해진 부분의 석회암을 서서히 용해시킨다. 그 결과 탄산칼슘이 생긴다. 이것을 광물로는 방해석이라고 하는데, 방해석은 석회암 속에 있는 광물이다.

그런 다음 탄산칼슘은 지하수면으로 흘러 내려가는데, 지하수면이란 지구가 물로 흠뻑 젖은 상한선을 말한다. 수천 년에 걸쳐 탄산칼슘이 이 과정을 반복하면 주위의 석회암을 침식시켜 결국 수로가 만들어진다. 이 용해 과정에서 카르스트라고 하는 특징적 지형이 생긴다. 동굴에서부터 지면까지는 두 가지 방법으로 연결부가 만들어진다. 동굴 위의 암석이 무너져 지하라고 하는 수직 통로가 만들어지기도 한다. 또는 시내가 동굴의 옆면을 갈라 수평의 입구가 생기기도 한다.

수로가 점점 넓어지고 길어지면서 보다 많은 물을 수용할 수 있게 되는데 그렇게 되면 보다 많은 석회암을 용해시키게 된다. 그 결과 수로는 점점 커져서 동굴 크기가 되거나 인간이 들어갈 수 있을 정도의 크기가 된다. [그런 다음 새로 만들어진 동굴은 건조 과정을 거친다.] 동굴은 두 가지 방법으로 건조된다. 지하수면이 떨어져 동굴이 공기 중에 노출되거나 지진 또는 다른 지판 이동에 의해 동굴이 용기된다. 어느 쪽이 일어나도 수분이 증발하고 배수가 되어 동굴 안이 공기로 채워지면서 건조가 된다. 지표류가 동굴을 관통할 경우 동굴은 계속 커져 보다 많은 석회암을 용해시킨다. 탄산칼슘은 계속해 동굴 천정으로부터 떨어져 동굴암석이라고 하는 탄산칼슘 퇴적물이 생긴다. 가장 잘 알려진 동굴암석으로는 종유석과 석순이 있다. 종유석은 동굴의 천장에 매달린 고드름 같은 형성물을 말한다. 석순은 바닥에서부터 올라가는 기둥을 말한다.

자연광이 동굴 내부로 들어오지는 않지만 동굴 탐험자들은 많은 동굴 내에 인공 조명을 설치해 때로 환상적인 동굴암석 지형을 보여주기도 한다. 종유석과 석순 외에도 드레이퍼리(천정에 붙어 있는 얇은 판 모양의 암석), 유석(동굴 벽과 바닥을 덮고 있는 건조된 얇은 광천수 층), 유석 석고석회(다공질 암석으로부터 뿜어 나온 나선형 결정), 곡석(암석에서 자라나온 비틀린 원주) 등이 있다. 가장 정교하게 장식이 된 동굴들은 몽베르, 난간, 전기 조명 등을 설치해 인기 있는 관광지로 만들어졌다. 가장 흥미로운 동굴 두 개는 멕시코에 있는 캄스배드 동굴과 버지니아에 있는 루레이 동굴이다.

동굴은 인간과 동물들의 보금자리와 피난처를 제공해 주었다. 네안데르탈인이야 크로마뇽인과 같은 선사시대 사람들은 동굴에서 살았다. 지금까지 알려진 가장 오래된 예술작품은 동굴벽화이다. 오늘날에는 동굴이 조류,

박쥐, 귀뚜라미, 도마뱀, 쥐 등 많은 종들에게 보금자리가 된다. 박쥐는 낮 동안 동굴에서 잠을 자고 밤이 되면 밖으로 나와 곤충을 사냥한다. 조분석이라고 하는 박쥐의 분비물은 동굴 안에 서식하는 수많은 곤충들의 먹이가 된다.

Actual Test 02

1. (A) 2. (B) 3. (C) 4. (D) 5. (A)
6. (B) 7. (C) 8. (C) 9. (A) 10. (D)
11. (B) 12. (A) 13. Pigeons (A), (F) / Robins (B), (C), (G)
14. (C) 15. (B) 16. (B) 17. (C)
18. (C) 19. (A) 20. (B) 21. (B) 22. (A)
23. (D) 24. (B) 25. (C) 26. (B), (C), (E)
27. (A) 28. (D) 29. (B) 30. (D) 31. (A)
32. (C) 33. (B) 34. (A) 35. (D) 36. (C)
37. (B) 38. (D) 39. (A), (D), (E)

철새는 이동 중 어떻게 길을 찾는가?

철새의 이동은 자연 현상 가운데 가장 흥미로우면서도 가장 불가해한 현상에 속한다. 매년 가을이면 북쪽 지방의 새들을 떼를 지어 더 따뜻한 남쪽 지방으로 날아갔다가 봄이 되면 다시 북쪽으로 돌아온다. 과학자들은 철새 이동의 주요인이 먹이를 찾아서 그리고 열악한 기후 조건을 피해서라는 데 동의한다. 예를 들어, 곤충들은 날씨가 추워지면 모습을 감추는데, 그렇게 되면 곤충을 잡아먹던 새들은 곤충이 번식을 하는 따뜻한 남쪽 지방으로 이동한다. 하지만 철새가 어떻게 비행할 하는지에 관해서는 이와 비슷한 의견 일치가 없다. 최근 들어 많은 실험들이 있었음에도 불구하고 조류 전문가들은 아직까지 철새들이 어떻게 해서 매년 같은 목적지를 찾아가고 봄이 되면 다시 보금자리로 돌아오는지 알지 못한다.

일부 학자들은 철새들이 강이나 산줄기와 같은 이정표들을 이용해 길을 찾는다고 주장한다. 몇몇 실험들을 통해 일부 조류 종들은 실제로 그런 지형학적 특징을 이용하는 것으로 확인되었다. 하지만 그러한 방법은 어떻게 새들이 야간에 비행을 할 수 있는지를 설명해주지는 못한다. 또 다른 연구들에서 어떤 야행성 조류들은 별을 보고 비행을 한다는 사실이 밝혀졌다. 하지만 이것 역시 주간 비행이나 하늘에 구름이 짙을 때 새들이 어떻게 비행을 하는지를 설명해주지는 못한다.

현재로서 가장 신빙성 있는 설명은 철새들이 지구의 지극에 의해 길을 찾는다는 것이다. 정확한 기전은 아직까지 밝혀지지 않았다. 한 이론에 따르면 일부 조류의 뇌에는 산화철로 된 자연발생적 자성 물체인 자철광이 있다고 한다. 자철광은 조류를 비롯한 많은 동물들에게서 발견되었다. 철새들은 뇌 속에 자철광이 있어 남극과 북극의 자기장을 감지할 수 있을 것이다.

전서구(傳書鳥)를 이용해 최근에 시행한 실험에서 자철광이 철새의 이동에 결정적인 역할을 하는 것으로 밝혀졌다. 전서구는 수백 미일 떨어진 곳으로 데려가도 다시 보금자리를 찾아 돌아오는 능력을 가진 것으로 알려져 있다. 연구자들은 전서구가 자기장의 변화를 인식하도록 훈련시킬 수 있다

는 사실을 알았다. 주변의 자기장이 정상적인 경우 새들은 새장의 한쪽 끝에 모여 있었다. 하지만 자기장의 극성을 바꾸자 새들은 반대쪽 끝으로 옮겨 앉았는데, 이는 새들이 자기장의 변화를 감지하고 기기에 반응을 한다는 사실을 보여준다.

또 다른 이론은 자극에 대한 이러한 민감성을 설명해준다. 이 이론은 양자 역학에 기초하는데, 그것은 원자 내의 입자들이 어떻게 움직이는지를 다루는 학문이다. 이 이론에 따르면 전자들은 쌍을 이루어 원자의 핵 주위를 돈다. 두 전자는 서로 반대 방향으로 회전하기 때문에 두 자석의 자성이 상쇄되게 된다. 하지만 입자들이 쪼개져 다른 입자와 반응해 회합물을 만들게 될 때는 전자쌍은 더 이상 반대 방향으로 돌지 않는다. 대신에 전자들은 자석의 N극끼리 밀어낼 때와 마찬가지로 서로 밀어내기도 한다. 전자들은 두 개의 전자가 다시 서로 상쇄되어 아무런 자기장을 발생시키지 않는 안정된 상태가 되기 위해 방향을 바꾸려고 한다.

이 이론에 따르면 새들이 빛의 변화에 노출되게 되면 이런 전자쌍 교환이 일어나게 된다. 새들은 남극과 북극의 인력에 생긴 미세한 변화 때문에 전자들이 안정 상태에 도달하려고 하는 것을 감지하게 된다. 새들은 이런 식으로 비행 중에 남극과 북극의 방향을 알아낼 수 있다.

이 효과를 확인하기 위한 한 실험에서 한 무리의 유럽붉은가슴올새들은 인공조명으로 인해 봄 이동을 할 때라고 믿게 되었다. 새들은 북쪽으로 비행을 하려고 안달이었다. 빛의 변화로 인해 위에서 언급한 전자쌍-회합이 생기면서 올새들은 전자쌍에 일어나는 자기장의 변화를 느끼게 된 것이다. 새들은 방향감각을 잃고 이리저리로 날기 시작했다. 실험에 사용된 모의 자기장은 새들의 자연 자철광으로 감지하기에는 너무 미약해서 자철광이 아니라 전자쌍이 새들의 비행 혼란을 가져왔다고 밝혀졌다.

따라서 현재로서는 빛이 철새의 이동을 안내하는 데 중요한 역할을 한다는 전제가 지배적이다. 이런 이유에서 새들은 비행을 시작하기 전에 좌우로 머리를 돌리는 것으로 보인다. 주위의 빛을 감지해 현재의 자기장을 처리, 분석해 올바른 방향을 찾을 수 있도록 하는 것이다.

사막의 물

사막이란 연강수량이 25센티미터 미만의 곳이다. 사막은 일반적으로 뜨거운 곳으로 알려져 있지만 남극과 같은 한대지방에도 사막이 존재한다.

사막은 강우량에 따라 분류한다. 가장 건조한 사막은 과건조사막이라고 하는데, 적어도 12개월 이상 계속해서 비가 오지 않는 곳이다. 건조사막은 약간의 비가 내리기는 하지만 연강수량이 250밀리미터 미만의 곳이다. 마지막으로 반건조사막은 연강수량이 250~500밀리미터인 곳이다.

사막은 장기적으로는 강우량이 부족하지만 때로 엄청난 폭우가 퍼붓기도 한다. 이러한 폭우 동안에는 우곡이라고 하는 말라버린 강바닥이 재빨리 채워지고 넘치나 때로는 위험한 분류성 홍수가 발생하기도 한다. 물이 신크 사이클 빠른 속도로 흘러내리면서 땅을 침식시켜 자갈이며 암석 모래를 운반해 우곡의 밑바닥에 선상지(扇狀地)라고 하는 부채꼴 모양의 지형이 만들어지기도 한다.

사막 외부에서 온 물고 만들어진 외래하천이라고 하는 연구적인 강이 사막을 가로지르는 경우도 있다. 잘 알려진 외래하천으로는 이집트의 니일강, 중국의 황하강, 애리조나의 콜로라도강 등이 있다. 다른 수원으로는 지하샘이나 지수지를 들 수 있는데, 이 수원들은 사막의 초목에 수분을 공급해 생명을 유지시키는 역할을 한다. 사막에는 주근을 땅 속 깊이까지 내려 아래쪽 물을 흡수함으로써 건조한 환경에 적응한 많은 식물 종들이 분포한다.

강우량이 충분한 경우에는 일시적인 호수가 만들어지기도 한다. 이런 호수는 줄기가 없는 분지에 생긴다. 호수 바닥이 마르면 플라야라고 하는 소

금으로 덮인 평지가 생긴다. 북아메리카의 사막에는 유타주의 그레이트 솔트 호수를 비롯해 100여 개의 플라이가 있다.

강우량이 적다고 해서 항상 사막이 생기는 것은 아니다. 잠재증발산량이, 라고 하는 강수량 대비 증발량이 높아야만 한다. 이 수치는 정상적인 증발과 식물에서 생기는 증발을 통한 총 수분 손실을 말한다. 잠재증발산량이라는 것은 어느 지역에서든 증발할 수 있는 물의 양을 말한다. 이 수치가 실제 강수량을 초과하게 되면 사막과 같은 조건이 생기게 된다.

그렇기 때문에 잠재증발산량이 강수량보다 크기만 하다면 사막은 매우 마을 수도 있고 우울 수도 있다. 남극과 같은 얼음 사막은 강수가 연의 형태로 내리기 때문에 토양 속으로 흘러 들어가지 않는다. 그리고 사하라 사막과 같은 열대 사막은 비가 거의 내리지 않아 강우량이 잠재증발량보다 적다.

사막 표면 아래에 퇴적되는 광상(礦床)의 농도는 수분과 관련이 있다. 강우는 광물층을 통과해 광물층을 지하 수면 근처에 다시 퇴적시키는데, 여기에서는 채광 작업을 통해 쉽게 광물을 캐낼 수 있다. 광상은 또한 플라야 내의 수분 증발에 의해서 농축되기도 하는데, 이로 인해 석고와 같은 광물이나 질산나트륨이나 염화나트륨과 같은 염화합물이 만들어지기도 한다. 그러한 증발의 예를 볼 수 있는 곳으로 미국의 그레이트 베이슨 사막을 들 수 있다. 이 곳에는 봉소가 함유되어 있는데, 봉소는 약이나 연수기, 유리, 농사에 쓰는 여러 가지 화학약품의 제조에 꼭 필요한 성분이다.

사막의 형성에서 수분이 어떤 역할을 하는지를 잘 알 수 있는 곳은 남아메리카 칠레 북부에 있는 아타카마사막이다. 이 사막은 서쪽으로는 페평양에서부터 동쪽으로 안데스산맥에까지 걸쳐져 있다. 안데스산맥 위의 고기압으로 인해 한랭건조한 공기가 지상으로 내려온다. 이 공기는 수증기가 없어 태양에 의해 쉽게 대위적 지표면의 온도를 올리고 습도를 내리는 역할을 해 사막이 형성된 완벽한 조건이 된다.

아타카마사막에서는 비그늘이라는 현상 때문에 비가 잘 내리지 않는다. 아마존 열대우림에서 온 온난습윤한 공기가 안데스산맥에 막혀 아타카마 사막에 도달하지 못한다. 공기는 산의 한랭한 공기에 의해 차가워져 산맥 지방에서 응결되어 비나 눈이 된다. 공기가 산맥의 서쪽을 따라 내려오면서 데워지고 수분을 보유해 땅으로 떨어지지 못하게 된다. 따라서 안데스 산맥은 아마존강 분지에는 극심한 수분이 생기면서 동시에 산맥의 반대쪽에는 극심한 건조가 일어나는 특이한 현상이 발생한다. 흥미롭게도, 지구 상에서 가장 건조한 지역과 가장 습윤한 지역이 서로 거의 인접해 있다.

도시열섬

일반적으로 도시는 주위의 교외나 시골 지역보다 화씨 10도 또는 섭씨 6도 정도 더 따뜻하다. 과학자들은 이것이 도시열섬 효과 때문이라고 보는데, 이는 도시 지역의 여러 가지 특징들이 결합해 주위의 온도를 인위적으로 올리는 효과를 말한다.

도시열섬의 주요 원인은 건물이다. 도심에 있는 고층건물들은 햇빛을 반사하고 흡수하는 많은 면들을 노출시킨다. 반사된 빛은 다른 건물에 부딪쳐 주위의 대기 속으로 들어가지 못한다. 대부분 건물 외관을 덮고 있는 어두운 물집에 의해 흡수된 빛은 건물을 데우게 된다. 콘크리트나 아스팔트와 같은 이런 물질들은 시골이나 교외 건물에 사용되는 자재에 비해 열전도성이나 반사능력이 더 크다. 건물 사이사이나 건물 근처에 열을 가두는 이러한 성질을 헤파 효과라고 한다. 고층 건물의 또 다른 효과는 뜨거운 공기를 불어내고 남아 있는 공기를 식히는 역할을 하는 바람을 차단한다는 것이다.

또한 지면과 식물의 위에서 일어나는 증발로 인한 수분 손실인 증발산량

의 부재도 이러한 열 보유의 원인이 된다. 이 현상은 도시 지역에서 둔화되는데, 이는 고여있는 물과 조목의 부족 때문이다. 이 두 가지 모두 냉각 효과가 있다.

사람들 역시 도시열섬 효과를 내는 데 한몫을 한다. 도시의 인구밀도는 자동차나 버스, 기차, 에어컨, 공장 설비와 같은 보다 많은 인간적 열생성 과정이나 기구를 의미하게 된다. 이러한 모든 활동들은 대기오염을 유발하고 이로 인해 온실효과가 생긴다. 온실효과란 대기 중의 오염 입자들로 인해 지면의 뜨거운 공기가 대기 중으로 빠져나가지 못하는 현상을 말한다.

열섬 효과의 영향은 야간에 더 심한 듯 하다. 야간에는 위쪽 대기로의 복사과정에 의해 지면과 다른 면들이 열을 잃게 된다. 하지만 도시에서는 이러한 상방 복사가 고층 건물에 의해 차단되기 때문에 사람들이 거주하고 온도를 측정하는 높이에 열을 가두게 된다.

세계 인구의 거의 절반 정도가 도시에 거주하고 있기 때문에 도시열섬 효과는 30억 이상의 인구에게 영향을 미칠 수 있다. 그러기 때문에, 인구통계 학자나 기상학자들은 이에 대해 자세한 연구를 한다. 해마다 수천 명이 혹서로 사망하며 도시열섬은 그러한 혹서의 강도와 지속기간을 증가시킨다. 도시열섬에서는 야간이 되어도 도시 외부 지역에서 일어나는 동일한 냉각 효과가 일어나지 않기 때문에 야간 시간대라고 해도 아무런 도움이 되지 않는다.

도시열섬의 또 다른 부작용으로는 에어컨이나 냉장고를 가동하기 위해 보다 많은 에너지가 필요하다는 것이다. 한 연구에 따르면 로스앤젤레스는 열섬효과로 인한 에너지 소비 증가로 연간 1억 달러의 비용을 지출하는 것으로 밝혀졌다. 해당 지역의 기후 조건도 바람의 패턴 변화, 구름과 안개의 증가, 오염 증가, 번개 증가, 강수량 증가 등에 의해 영향을 받는다.

열섬효과를 완화시키는 한 가지 방법은 주택이나 도로, 고속도로 등에 햇빛을 흡수하는 대신 반사시키는 자재들을 사용하는 것이다. 또 다른 방법으로는 많은 도시 거주자들이 자신들의 아파트 건물이나 사무실 지붕에 하는 것처럼 보다 많은 조록을 심는 것이다.

열섬효과가 지구온난화에 영향을 미치는지에 관해서는 약간의 논쟁이 있다. 한 학파는 도시 지역이나 비도시 지역에서 거의 비슷한 수준으로 장기적인 온도 상승이 있기 때문에 이 효과가 해당 지역을 넘어서지 않는다고 주장한다. 이 견해는 바람이 없는 잔잔한 야간과 바람이 부는 야간의 도시 기온을 비교한 2004년의 연구에 의해 입증되었다. 도시열섬 이론에 의하면 바람이 도시에서 뜨거운 공기를 끌어내기 때문에 바람이 부는 야간이 더 시원해야 함에도 불구하고 두 기온 간에는 차이가 없었다. 바람이 없는 잔잔한 야간만큼이나 바람이 부는 야간에도 지구 평균 온도가 올랐는데, 이는 전체적인 지구 온난화가 도시 개발 때문에 발생한 게 아님을 보여준다고 이 연구는 결론지었다. 이와 견해를 달리 하는 사람들은 지구온난화의 분절에 대해 의문을 가진다. 그들은 도시열섬이 지상에 설치한 기구들에 의해 기록된 온난화의 거의 대부분의 원인이 된다고 주장한다. 하지만 이 소수 견해를 뒷받침해줄 어떠한 과학적인 연구도 진행되지 않았다.

The first of these is the fact that the system is not a simple one. It is a complex system, and the behavior of the system is not predictable. The second is that the system is not a simple one. It is a complex system, and the behavior of the system is not predictable. The third is that the system is not a simple one. It is a complex system, and the behavior of the system is not predictable. The fourth is that the system is not a simple one. It is a complex system, and the behavior of the system is not predictable. The fifth is that the system is not a simple one. It is a complex system, and the behavior of the system is not predictable. The sixth is that the system is not a simple one. It is a complex system, and the behavior of the system is not predictable. The seventh is that the system is not a simple one. It is a complex system, and the behavior of the system is not predictable. The eighth is that the system is not a simple one. It is a complex system, and the behavior of the system is not predictable. The ninth is that the system is not a simple one. It is a complex system, and the behavior of the system is not predictable. The tenth is that the system is not a simple one. It is a complex system, and the behavior of the system is not predictable.

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