

Questions 13–26

Bird Migration

The phenomenon of seasonal bird migration has been known about for thousands of years, but it is still not fully understood by scientists. Not all birds migrate, but generally speaking the more northerly the breeding ground, the more likely is it that a species will migrate south for the winter. The main reason for this annual shifting of residence is that during the northern winters food becomes scarce and the cold temperatures make survival difficult. Some species are well adapted to these harsh conditions, but for those that aren't, moving south to warmer conditions is advantageous.

Changes in the weather can trigger the start of the journey south, although birds in the Northern Hemisphere seem to know when it is time to migrate south before the winter. In some species at least, the changes in the length of the day cause glands in the birds' bodies to secrete hormones that produce other changes, which ready the birds for the long flight south. At this time fat starts to accumulate under the skin, and this provides a store of energy for the long flight when they will be expending more calories flying than they can obtain during their brief rest stops.

In fact, bird-migration patterns are more complex than the simple pattern implied above. Birds that breed in the Southern Hemisphere migrate north to wintering grounds. Other birds travel on an approximately east-west path since milder climates can often be found in coastal areas of continental regions. Some birds find conditions more suitable at lower altitudes in a mountainous region and so migrate to lower levels in winter.

Perhaps the most mysterious and as yet not totally understood aspect of bird migration is how birds can navigate such long distances and arrive so precisely at their destination. Various possibilities exist. The most obvious explanation is that they learn the topographic* features of their route. However, it is not feasible that this method could be used for crossing larger stretches of water or very long trips across whole continents. Another possible explanation is that some birds may use magnetic fields. Scientists have actually detected tiny crystals of magnetite in the olfactory* tract of some species, and homing pigeons have been shown to follow magnetic field lines of the Earth.

A further possibility is that birds can detect the polarization patterns in sunlight. Some light waves from the sun are absorbed in the atmosphere, and some pass through. The resulting pattern of light waves forms a large bowtie-shaped image in the sky. The image has fuzzy ends and is sometimes known as Haidinger's brush after the discoverer of the effect. The image is oriented in a north and south direction and is visible at sunset. Although birds may not see this shape, they can discern gradations of polarization, which give them a kind of compass for determining directions.

Scientists believe that some birds navigate by use of star positions; this has been established with at least one species. In a series of studies, caged birds were subjected to the projection of the nighttime Northern Hemisphere inside a planetarium. All stars rotate around Polaris, the pole star, and this movement seemed to give the birds the information they needed to orientate themselves in the correct direction. However, some recent research contradicts this. Perhaps it is not the lack of movement of the pole star but rather the constellation patterns that guide them. It has also been found that when fewer stars were visible on the planetarium ceiling, the birds' sense of direction became poorer. And this, too, implies that the general star pattern does have some bearing on orientation.

The current state of research suggests that all of the above-mentioned methods probably have an influence on bird migration. Different species use one, some, or even all methods at different times and in various situations.

*topographic: relating to the natural features of land

*olfactory: connected with the sense of smell

13. In paragraph 1, it is understood that some birds don't migrate south in the winter because they

(A) already live in warmer conditions
 (B) live in areas that have an abundant food supply
 (C) have difficulty surviving the frigid temperatures
 (D) are suited to the difficult conditions

Paragraph 1 is marked with an arrow [➡].

➡ The phenomenon of seasonal bird migration has been known about for thousands of years, but it is still not fully understood by scientists. Not all birds migrate, but generally speaking the more northerly the breeding ground, the more likely is it that a species will migrate south for the winter. The main reason for this annual shifting of residence is that during the northern winters food becomes scarce and the cold temperatures make survival difficult. Some species are well adapted to these harsh conditions, but for those that aren't, moving south to warmer conditions is advantageous.

14. The word "those" in the passage refers to

(A) northern winters
 (B) cold temperatures
 (C) harsh conditions
 (D) some bird species

The phenomenon of seasonal bird migration has been known about for thousands of years, but it is still not fully understood by scientists. Not all birds migrate, but generally speaking the more northerly the breeding ground, the more likely is it that a species will migrate south for the winter. The main reason for this annual shifting of residence is that during the northern winters food becomes scarce and the cold temperatures make survival difficult. Some species are well adapted to these harsh conditions, but for those that aren't, moving south to warmer conditions is advantageous.

15. According to paragraph 2, what are the results of changes in the weather?

(A) The change in the length of the day
 (B) The secretion of hormones by the birds
 (C) The expenditure of calories
 (D) The onset of migration

Paragraph 2 is marked with an arrow [➡].

➡ Changes in the weather can trigger the start of the journey south, although birds in the Northern Hemisphere seem to know when it is time to migrate south before the winter. In some species at least, the changes in the length of the day cause glands in the birds' bodies to secrete hormones that produce other changes, which ready the birds for the long flight south. At this time fat starts to accumulate under the skin, and this provides a store of energy for the long flight when they will be expending more calories flying than they can obtain during their brief rest stops.

16. The word "accumulate" in the passage is closest in meaning to

(A) build up
 (B) fill in
 (C) break up
 (D) cut back

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17. All of the bird migration patterns are mentioned in the passage EXCEPT

- (A) the migration north from the Southern Hemisphere
- (B) the migration east or west toward milder climates
- (C) the migration from mountainous regions to lower altitudes
- (D) the migration from east to west towards hotter climates.

[Refer to the full passage.]

18. The word "precisely" in the passage is closest in meaning to

- (A) finally
- (B) exactly
- (C) entirely
- (D) decisively

Perhaps the most mysterious and as yet not totally understood aspect of bird migration is how birds can navigate such long distances and arrive so precisely at their destination. Various possibilities exist. The most obvious explanation is that they learn the topographic features of their route. However, it is not feasible that this method could be used for crossing larger stretches of water or very long trips across whole continents. Another possible explanation is that some birds may use magnetic fields. Scientists have actually detected tiny crystals of magnetite in the olfactory tract of some species, and homing pigeons have been shown to follow magnetic field lines of the Earth.

19. It can be inferred that polarization patterns

- (A) absorb sunlight
- (B) are tied in the center
- (C) are invisible at night
- (D) cause a magnetic force

[Refer to the full passage.]

20. Why does the author mention Haidinger's brush?

- (A) To understand the phenomenon
- (B) To describe the pattern
- (C) To explain what birds see
- (D) To define the fuzzy ends

[Refer to the full passage.]

21. The word "subjected" in the passage is closest in meaning to

(A) exposed
(B) subjugated
(C) constrained
(D) invited

Scientists believe that some birds navigate by use of star positions; this has been established with at least one species. In a series of studies, caged birds were subjected to the projection of the nighttime Northern Hemisphere inside a planetarium. All stars rotate around Polaris, the pole star, and this movement seemed to give the birds the information they needed to orientate themselves in the correct direction. However, some recent research contradicts this. Perhaps it is not the lack of movement of the pole star but rather the constellation patterns that guide them. It has also been found that when fewer stars were visible on the planetarium ceiling, the birds' sense of direction became poorer. And this, too, implies that the general star pattern does have some bearing on orientation.

22. According to paragraph 6, how do some birds navigate during the night?

(A) By using a projection of the star positions
(B) By circling around the pole star
(C) By orientating themselves using the constellations
(D) By getting their bearings from a few visible stars

Paragraph 6 is marked with an arrow [➡].

➡ Scientists believe that some birds navigate by use of star positions; this has been established with at least one species. In a series of studies, caged birds were subjected to the projection of the nighttime Northern Hemisphere inside a planetarium. All stars rotate around Polaris, the pole star, and this movement seemed to give the birds the information they needed to orientate themselves in the correct direction. However, some recent research contradicts this. Perhaps it is not the lack of movement of the pole star but rather the constellation patterns that guide them. It has also been found that when fewer stars were visible on the planetarium ceiling, the birds' sense of direction became poorer. And this, too, implies that the general star pattern does have some bearing on orientation.

23. Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.

- (A) Birds needing to orientate themselves in the right direction seemed to use the information they get from the stars that rotate around Polaris.
- (B) The pole star seemed to be used by birds to get the information they needed because they were able to orientate themselves using the star's rotation in the correct direction.
- (C) Birds needing to correct the Polaris direction in which to orientate themselves seemed to use the fact that all stars rotate.
- (D) The stars rotating in the correct direction around the pole star is what seemed to give the birds the information they needed for orientating themselves to Polaris.

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24. The word "this" in the passage refers to

- (A) The number of stars that were visible
- (B) The relative loss of the birds' sense of direction
- (C) The constellation patterns that guide birds
- (D) The pole star's stationary position

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

Over short distances the birds could recognize particular landscapes such as river valleys and shapes of hills.

Where would the sentence best fit?

Choose the letter of the square that shows where the sentence should be added.

Perhaps the most mysterious and as yet not totally understood aspect of bird migration is how birds can navigate such long distances and arrive so precisely at their destination. Various possibilities exist. **A** The most obvious explanation is that they learn the topographic features of their route. **B** However, it is not feasible that this method could be used for crossing larger stretches of water or very long trips across whole continents. **C** Another possible explanation is that some birds may use magnetic fields. **D** Scientists have actually detected tiny crystals of magnetite in the olfactory tract of some species, and homing pigeons have been shown to follow magnetic field lines of the Earth.

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 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.

Write the letters of the answer choices in the spaces where they belong.

Refer to the full passage.

Scientists have proposed several methods that birds use for orientating themselves during their seasonal migrations.

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Answer Choices

- | | |
|---|---|
| <p>(A) Birds not only migrate north or south depending on which hemisphere they live in, but they also migrate along coastal regions or in and out of mountainous areas.</p> <p>(B) Birds' ability to detect gradations of polarization patterns in sunlight could give them a way for determining directions.</p> <p>(C) Changes in both the weather and the length of day can cause the birds' bodies to make physical changes to prepare them for the long flights.</p> | <p>(D) The principal reason for birds to migrate is that most bird species are not adapted to the harsh winter conditions and the scarcity of food during that season.</p> <p>(E) The star patterns and the way the stars rotate around the fixed position of the pole star could give birds the direction in which to navigate.</p> <p>(F) Birds may use their knowledge of the features of the landscape, although this seems unlikely given the distances that birds migrate.</p> |
|---|---|

OVERVIEW

The TOEFL® iBT test directly measures your skills in reading, listening, speaking, and writing. Some supporting skills are tested indirectly. Others are not tested but will support your chances of doing well. Listed below are five categories of supporting skills you will need to develop in order to succeed on the test.

Learner strategies

You can enhance your learning by developing learner strategies. When you begin studying for the TOEFL test, it will be valuable to identify your strengths and weaknesses, analyze what motivates you, recognize your most effective learning strategies, set goals, plan a study schedule, and think about how to evaluate your progress. None of these strategies will be tested, but they will help you focus your study and do better on the test.

Note taking, paraphrasing, and summarizing

You are allowed to take notes throughout the TOEFL iBT test. Note taking is not required, but it is an important skill that will help you to focus your attention on the listening passages, remember the important points, and organize your thoughts in the integrated speaking and writing tasks. Paraphrasing and summarizing are also important skills that will help you succeed on the test.

Vocabulary

Your knowledge of vocabulary is tested in the Reading section. In addition, your ability to choose appropriate words to describe the main points and express your ideas will affect your score in the Speaking and Writing sections.

Pronunciation

The Speaking section is scored not only on how well you develop your responses but also on the clarity of your speech. Although you are not expected to have perfect native-speaker pronunciation, your ability to match English speech patterns closely will affect your score.

Grammar

There is no grammar section on the TOEFL iBT test, but how correctly and naturally you use a combination of basic and complex grammatical structures in the speaking and writing tasks will affect your score. A strong command of English grammar will also help you comprehend the material in the Reading and Listening sections.

LEARNER STRATEGIES

When you begin to study for the TOEFL test, it is worthwhile to plan your approach to preparing for the test and stick to that plan. You may want to consider the following activities.

Analyze your strengths Reflect on skills you are good at, what strengths you used to master those skills, and how you can use those strengths to reach your goals for the TOEFL test.

Identify your learning style Think about how you learn best. Use this knowledge to plan study sessions that fit your style of learning. Think of other learning styles and how they could fit into your approach to enhance your learning.

Motivate yourself Motivation refers to your desire to do something. Your motivation could be driven by external goals. For example, you may want to receive a score that will help you get into a prestigious university. Motivation can also be driven by internal goals. For example, you may want to study because you love foreign languages and want to improve your English. Think about what your motivations are for studying for the TOEFL test, and make a list. Refer to it often.

Set goals Goal-setting is an important process. You should set goals that are specific, challenging, and attainable. Set long-term goals, then come up with a list of smaller steps that lead toward attaining them. Use these steps to build a "goal map" of short-term goals that lead to your final goal.

Plan your study schedule Find time in your schedule that can be set aside for longer periods of concentrated study. Also, identify activities in your daily routine that can be combined with learning. For example, you can give 45-second speeches to yourself when you take a shower or practice thinking to yourself in English while you are commuting.

Check your progress Keep track of your progress and modify your study plans accordingly. Periodically review your goals and see if they need to be more challenging or more accessible.

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Exercises LS1–LS13 Use Exercises LS1–LS13 to reflect on and develop your learning strategies.

EXERCISE LS1 *Identifying your strengths*

Think of a skill you are good at. Write it below.

I am good at _____

How do you know that you are good at the skill? Check (✓) all the reasons that apply.

I know this because

- ☐ I have won awards or prizes.
- ☐ I got a good grade in school.
- ☐ I have been praised for it.
- ☐ I was told that I was good at it by someone whose opinion I trust.
- ☐ I recognize my own ability.
- ☐ Other reasons: _____

EXERCISE LS2 *Analyzing your strengths*

Think about the skill you named in Exercise LS1. Write down specific activities that helped you master this skill. Write down what you did on your own and what someone else did to help you.

What I did on my own	What someone else did to help me

EXERCISE LS3 *Analyzing yourself as a teacher*

Think about a skill you learned by yourself. Write down what motivated you to learn how to do it, and the specific details of how you taught yourself. Then evaluate yourself.

1. I taught myself to _____
2. My motivation was _____
3. I taught myself in the following way(s):

4. How would I evaluate my ability in the skill that I taught myself?
☐ excellent
☐ good
☐ average
☐ poor
5. What do I base this evaluation on?

EXERCISE LS4 *Building a picture of your learning process*

Review Exercises LS1–LS2, which analyze skills you have successfully learned, and Exercise LS3, which analyzes skills you taught yourself. Then answer the questions.

1. Do I see a pattern in the way I have succeeded in mastering skills?

2. What differences are there in the ways I approach the learning process?

3. What affects my motivation?

EXERCISE LS5 *Recognizing your learning style*

For each of the four learning styles listed below, check (✓) all of the characteristics that describe you well. Then count the total number of checks for each one. Which style describes you best? Read the analysis of your learning style in the chart on the next page.

The problem solver

- ☐ I examine all parts of a task.
- ☐ I like to understand things first.
- ☐ I plan how to approach a task.
- ☐ I enjoy the challenge of difficult tasks.
- ☐ I like my work to be perfect.

_____ Total

The explorer

- ☐ I find everything interesting.
- ☐ I collect unrelated bits of information.
- ☐ I like details even though I seldom remember them.
- ☐ I have difficulty deciding what is relevant.
- ☐ I concentrate on the whole picture instead of the details.

_____ Total

The go-getter

- ☐ I tend to start in on the activity without reading instructions.
- ☐ I solve problems through trial and error.
- ☐ I like to see someone else do it first and then have the opportunity to do it myself.
- ☐ I need lots of breaks while studying because I think better when I can move around.
- ☐ I like to get on to the next activity quickly.

_____ Total

The daydreamer

- ☐ I add lots of pictures and arrows in my notes.
- ☐ I remember better if I write information down.
- ☐ I picture things in my mind.
- ☐ I work best in a quiet place.
- ☐ I think a lot about the topics.

_____ Total

Analyses of the four learning styles

	Learning strengths	Skills to be developed
The problem solver	• analytical thinking • critical thinking • organizational skills • solution-oriented	• creative thinking • stress management • working with others • risk taking
The explorer	• extensive knowledge • seeing connections • highly motivated • inventive	• time planning • priority setting • analytical thinking • sorting essential/ nonessential items
The go-getter	• quick starter • completes tasks quickly • motivator • problem solver	• time planning • creative thinking • considering alternatives • increasing concentration
The daydreamer	• reflective • gets to essence of things • successful visualizing • creative thinking	• time planning • scheduling • priority setting • distraction avoidance

EXERCISE LS6 *Reflecting on your approach to learning*

Answer the questions.

1. What tactics do I use to remember something important?

2. How do I demonstrate to myself that I have learned something?

3. How do I motivate myself?

4. What am I going to do to develop the skills I need?

5. How can I incorporate all approaches to improving the following English skills?

Reading

Listening

Speaking

Writing

EXERCISE LS7 *Managing motivation*

Answer the questions.

1. What can I do to make an activity interesting for myself?

2. How can I build up my enthusiasm?

3. How can I avoid getting discouraged when my progress seems slow?

4. What kinds of goals can I set?

EXERCISE LS8 *Creating a learning environment*

Answer the questions.

1. At what times of the day do I feel most mentally alert (e.g., early morning, late at night)?

2. How do I deal with distractions (e.g., block them out, leave the area)?

3. What environment is most helpful for my learning (e.g., music playing in the background, total silence)?

4. What can I do to create that learning environment?

5. How can I incorporate study time into my daily schedule (e.g., set aside specific time, review things while waiting in a line)?



EXERCISE LS9 *Assessing your skills*

The charts below and on the pages that follow list the skills you need to succeed on each section of the TOEFL test. For each skill, rate yourself on a scale from 1 to 5. Check (✓) the box.

1 = poor 2 = weak 3 = average 4 = good 5 = excellent

Reading section

Think about the reading passages you completed in the Diagnostic Test as you rate yourself on each of the reading skills below.

	1	2	3	4	5
I understand the general topic of a passage.					
I understand the overall meaning of a passage.					
I understand inferences.					
I can draw conclusions.					
I understand the main ideas.					
I understand the details.					
I understand most words in context.					
I know the words that are given as choices to the vocabulary items.					
I understand the pronoun references and other phrases that refer to other parts of the passage.					
I understand long and complicated sentences.					
I am good at picking out the important parts of a passage.					
I understand how the grammar of a sentence conveys meaning.					
I can summarize a passage in my own words.					
I can complete tables based on the information in the passage.					
I understand how connecting words join the ideas between sentences.					
I can recognize restatements of the information in a passage.					
I understand the connection of ideas for inserting information.					
I recognize when information has not been included in a passage.					

Listening section

Think about the passages you heard in the Diagnostic Test as you rate yourself on each of the listening skills below.

	1	2	3	4	5
I understand the general topic of a passage.					
I understand the overall meaning of a passage.					
I understand inferences.					
I can draw conclusions.					
I understand the main ideas.					
I understand the details.					
I understand most words in context.					
I understand the pronoun references and other phrases that refer to other parts of the passage.					
I am good at picking out the important parts of a passage.					
I understand how the grammar of a sentence conveys meaning.					
I understand when the speakers use filler words like "um" and "ah."					
I understand when the speakers make mistakes that they correct.					
I understand when the speakers interrupt themselves.					
I understand when the speakers hesitate.					
I understand incomplete phrases.					
I can relate ideas throughout a passage.					

Speaking section

Think about the speaking tasks you completed in the Diagnostic Test as you rate yourself on each of the speaking skills below and on the next page.

	1	2	3	4	5
I can pronounce English consonants.					
I can pronounce combinations of consonants.					
I can pronounce English vowels.					
I can pronounce combinations of vowels.					
I can reproduce English stress patterns.					
I can reproduce English rhythms.					
I can reproduce English intonation patterns.					
I speak clearly.					
I speak at a natural speed – not too fast, not too slow.					
I organize my ideas logically.					

Speaking section (continued)

	1	2	3	4	5
I connect my ideas correctly.					
I use correct structures.					
I choose precise words.					
I focus on the important points.					
I show the relationships between ideas.					
I choose relevant information.					
I include appropriate details.					
I put given information into my own words.					
I answer the requirements of the tasks.					
I budget my time well.					

Writing section

Think about the writing tasks you completed in the Diagnostic Test as you rate yourself on each of the writing skills below.

	1	2	3	4	5
I organize my ideas logically.					
I connect my ideas correctly.					
I choose precise words.					
I use correct structures.					
I make my sentences concise.					
I introduce the topic.					
I focus on the important points.					
I show the relationships between ideas.					
I choose relevant information to support my ideas.					
I include appropriate details for my supporting ideas.					
I select the relevant information from the reading and listening passages.					
I put given information into my own words.					
I present the information from the passages accurately.					
I include all the important points from the passages.					
I make connections between the reading and listening passages.					
I write a concise conclusion.					
I make corrections.					
I budget my time well.					

EXERCISE LS10 *Setting goals*

Think about your English language skills, your learning style and approach to learning, the way you motivate yourself, and your ideal learning environment. Write your answers to the following questions about your goals:

1. What have I achieved so far?
2. What do I need to achieve?
3. How can I state my goals in a specific way? ("Increase my vocabulary" is not a specific goal. "Add five new words to my vocabulary every day" is a specific goal.)
4. What goals should I give priority to?
5. How can I break my long-term goals into short-term ones?
6. How am I going to break my short-term goals into small, achievable steps?
7. What time limits am I going to set on each step?
8. How will I know that I have met my short-term goals?

EXERCISE LS11 *Reviewing your goals*

Read the questions below and review the goals you wrote in Exercise LS10. Adjust your goals accordingly.

1. Have I focused on important skills to learn?
2. Have I set my goals too low? In other words, are they too easy and not challenging enough?
3. Have I set my goals too high? Are they so high that I will fail and get discouraged?
4. Are my goals accessible? (For example, you have control over a goal such as "I will practice speaking English for one hour every day," but you might not have control over a goal such as "I will practice speaking English to a native English speaker every day.")

EXERCISE LS12 *Planning your study schedule*

1. List the times during the week that you are available to study for the TOEFL test. Look at the example below.

Times during the week I can study for the TOEFL test.

<i>Monday</i> 8 AM – 9:30 AM 7 PM – 10 PM	<i>Friday</i> 10 AM – 11:30 AM
<i>Tuesday</i> 8 AM – 9:30 AM 4 PM – 6 PM	<i>Saturday</i> 10 AM – 12 PM <i>Sunday</i> 8 PM – 10 PM
<i>Wednesday</i> 8 AM – 10 AM	
<i>Thursday</i> 4 PM – 10 PM	

2. Make a chart like the one below for each week remaining before the TOEFL test.
Look at your goals and think about what you want to accomplish. Then fill in your chart for the first week.

Week of: January 8-14							
	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.
8 AM - 10 AM	Work on Listening section in my TOEFL book.	1. Give oral summary of documentary while making breakfast. 2. Review vocabulary while on the bus.	Work on Listening section in my TOEFL book.				
10 AM - 12 PM					Meet English conversation partner at cafeteria. Give oral summary of last night's lecture.		
12 PM - 3 PM							
3 PM - 6 PM		Work on Reading section in my TOEFL book.		Attend lecture at Lyceum Hall. Take notes.			
6 PM - 10 PM	Watch documentary on English channel. Take notes. Look up unfamiliar words.			Go over notes from lecture. Look up unfamiliar words.			View English-language movie.

EXERCISE LS13 *Tracking your progress*

Look at the chart below. Make a similar chart to suit your individual needs. Use the chart to keep track of your progress.

Goal
Date work was begun
Amount of time spent on the goal
Evaluation
What I did that was successful in reaching or trying to reach this goal
What I learned that will help me in the next goal

NOTE TAKING, PARAPHRASING, AND SUMMARIZING

In addition to the four major skill areas assessed on the TOEFL test (reading, listening, speaking, and writing), there are several supplementary skills that will help you succeed on the test as well as in your academic studies. These skills – note taking, paraphrasing, and summarizing – are not directly tested on the TOEFL test, but mastering them will help you improve your score. Strategies for developing these skills are presented below.

Note taking

Note taking is an important skill for any student to develop. The average student in an American university spends 12–16 hours a week in classroom lectures and discussions. Taking notes is the most effective way to organize and remember what you hear in class, as well as what you read outside of class. Here are some reasons you will want to take notes on the TOEFL test:

- Taking notes will help you focus your attention on the content of the reading and listening passages.
- Organized notes will help you to develop a well-organized speech or essay in the time allotted.
- Writing down information will help you to remember main ideas and details.
- If you forget any details, you can refer back to your notes.

To be a good note taker, you need to develop two skills: writing notes quickly and understanding what is important in a passage. To write notes quickly, you can learn to use abbreviations and symbols, use a format, and organize ideas to show

EXERCISE G2 Diagnosing grammar difficulties

Use the following grammar quiz as a diagnostic tool. Some of the sentences contain an error. Other sentences are correct. Correct any errors that you find.

Alpine meadows are a tranquil sight.

~~Elderly~~ sometimes need special care.

The elderly

The first sentence is correct. For the second sentence, you should write *The* before the word *elderly* because *the* is needed when an adjective is used as a noun. You could also correct this sentence by writing *Elderly people*.

1. A laser cane, which the blind find useful, sends out beams that detecting obstacles.

2. In 1918, Charles Strite invented the timer that turns off the toaster when the bread is toasted.

3. The most convincing evidence that female chimpanzees in Tanzania use the aspilia plant for medicinal purposes.

4. When adults come to night classes eager to learn has been the experience of most adult-education teachers.

5. A vending machine is a kind of robot that automatically give out candy or other items when money is inserted.

6. Apprentices sometimes fear that they must not be able to master the intricacies of their chosen craft.

7. The importance of the Chaco Canyon archaeological site is that they reveals insights into a whole civilization.

8. Arched roofs were built for a first time 2,500 years ago.

9. Because of financial restrictions, some schools cannot contemplate to stay abreast of advances in modern technology.

10. Birds that breed on high cliffs have pear-shaped eggs that roll in a tight circle. However, that makes them somewhat less likely to roll off the cliff.

11. Botulism spores, which bees carry from certain kinds of plants, have been found in jars of honey.



12. Butterfly wings have iridescent scales consist of thin, interlaced layers.

13. China's first emperor was buried surrounded by 7,000 life-sized clay figures of soldiers standing in battle formation along by life-sized ceramic chariots.

14. Christopher Columbus persuaded the Spanish monarchs Isabel and Fernando financing his expeditions to the Caribbean.

15. East Coker is where the Anglo-American poet T. S. Eliot buried in 1965.

16. Even though the team of scientists encounter snow and strong winds, they continued their excavation.

17. Every four years the International Olympic Committee selects that city will hold the next games.

18. Filming a wild animal in its habitat requires meticulous preparation, unending patience, and, at times, one must be courageous.

19. George Gershwin gathered motifs for his folk opera *Porgy and Bess* while lived in Charleston.

20. Having first domesticated for milk production, sheep were then used for wool.

21. John Wesley Hyatt discovered plastics by accident while cooking up a recipe for making the billiard ball.

22. Lucid dreamers are those people who recognize when they are dreaming and thus controlling the plot of their dreams.

23. Many traditional attitudes and value seem to be disappearing under the pressure of global media.

24. Marine excavation is a race against time, the sea, and the looters who want history's treasures for themselves.

25. Mice aren't really more attracted to cheese as they are to grains.

26. Monteverdi, whose works were mainly written on commission for the private theaters of wealthy Italian nobility, wrote his final opera in 1642.
-
27. Most pioneers walked across the continent than rode in wagons or on horses.
-
28. When immersed in liquid oxygen, a magnet's pulling power is intensified.
-
29. Mount Rainier towers nearly three miles above sea level.
-
30. NASA does not quarantine space crews since returning astronauts have carried no harmful agents or living organisms.
-
31. Postwar women had more opportunities to find the work than they had had in the prewar days.
-
32. Natural oils taken from the rose and the jasmine flower are valuable ingredients of perfume.
-
33. New Orleans is a city in which older traditions can still be seen.
-
34. Not until the early nineteenth century was the modern notion of the atom formulated.
-
35. Of all salmon species, the king salmon is the rare.
-
36. Only if packages are labeled properly will sufferers be able to avoid severe allergic reactions.
-
37. Political researchers have explained why female candidates have a difficult time raising campaign money.
-
38. Putrefy is caused by bacteria and not by a chemical process.
-
39. The diary of Samuel Pepys contains eyewitness descriptive of the Great Plague and the Great Fire of London.
-
40. When a hive becomes overcrowded, a swarm of bees will search for a new home.
-



41. Scientists must be willing to change their position when confronted with new and conflicting data as is this openness to change that allows scientific progress to be made.
-
42. Scissors, a Bronze Age invention remained basically unchanged to this day, consist of two blades linked by a C-shaped spring.
-
43. Since the discovery of the double-helix structure of DNA, geneticists have made great advances in the knowledge of life at a molecular level.
-
44. When telephones were first invented, many business owners refused to have them installed in their offices because were messenger services that they believed to be more efficient.
-
45. Sixteenth-century mariners called Bermuda the "Isle of Devils" partly because breeding seabirds are making horrid sounds in the night.
-
46. Small animals can survival the desert heat by finding shade during the daytime.
-
47. So incredible explorer John Colter's descriptions were of the Yellowstone area that people didn't believe in its existence.
-
48. Public lands in many parts of the West may be overgrazed as cattle, sheep, and wildlives compete for forage.
-
49. Studies into the effects of music suggest that it can serve as a type of drug which regulates behavior.
-
50. Swimmers should avoid to enter ocean areas contaminated by red tide organisms.
-
51. That Thomas Hardy used real locations in his novels is disguised by his having altered place names.
-
52. The great stone city Angkor flourished for six centuries so that it fell in 1431 and lay prey to the jungle for four long centuries.
-
53. The largest known gathering of bald eagles anywhere is on the Chilkat River.
-
54. When llamas were first brought into the Colorado wilderness, no one could have predicted how popularly the animal would become.
-

55. The more technical today's world becomes, the most compatible with both humans and machines language needs to be.
-
56. Though capable of walking upright, apelike Australopithecus did so only for short periods of time.
-
57. Today, *carpet* refers to floor coverings that reach from wall to wall, and therefore, *rug* refers to a piece of material that covers only one section of the floor.
-
58. What we will already learn about tornadoes has contributed to reducing the casualty rates.
-
59. Silk has been woven into luxurious tapestries, rugs, clothes, and accessories for some 4,000 years.
-
60. While large numbers of eagles have long nested in national parks, only recently the birds generating outside curiosity.
-

EXERCISE G3 *Evaluating your knowledge of grammar*

Use the Answer Keys in the back of the book to check your answers to Exercise G2. Have a fresh copy of the Grammar Structures Checklist ready. For each answer that you got wrong – whether you corrected the wrong part of a sentence, corrected a sentence that had no errors, or did not correct a sentence that had an error – identify the grammar structure involved and check it off on your checklist as something that you need to work on. Make a check for every error. It is okay to check the same grammar structure more than once.

Alpine meadows are a tranquil sight.

Alpine meadows are tranquil sight.

Your answer is incorrect. The sentence is correct as is. You should check *Articles* on your Grammar Structures Checklist.

Elderly sometimes need special care.

special cares

Your answer is incorrect. The correct answer is *The elderly*. You should check *Articles* and *Nouns* on your Grammar Structures Checklist.

EXERCISE G4 *Analyzing problem areas*

Compare your self-assessment checklist from Exercise G1 with your diagnostic checklist from Exercise G3. Answer the questions on the following page.

1. Are there any areas that I checked as problem areas on my self-assessment but that I did correctly on the diagnostic quiz?

2. Are there any areas that I checked as problem areas on my self-assessment and that the diagnostic quiz also showed to be problem areas?

3. Are there any areas that I considered myself knowledgeable in on my self-assessment but that the diagnostic quiz showed to be problem areas?

4. How often did I identify a correct sentence as being wrong?

5. How often did I recognize that a sentence was incorrect but not know why it was incorrect?

6. What patterns of difficulty in my understanding of English grammar structures do I see in my analysis?

EXERCISE G5 *Determining your resources*

Read the list of resources you can use to help you develop your use and comprehension of basic and complex English structures. Check (✓) all of the resources that are available to you.

People

- ☐ an English teacher
☐ a native English speaker
☐ a friend with good English language skills

Written materials

- ☐ English newspapers
☐ English magazines
☐ books

Textbooks

- ☐ the grammar review in this book
☐ a grammar textbook
☐ a grammar handbook

Listening and viewing resources

- ☐ CDs
- ☐ videotapes
- ☐ CD-ROMs
- ☐ DVDs
- ☐ radio programs
- ☐ TV programs
- ☐ movies

Interactive resources

- ☐ online interactive grammar sites
- ☐ Web pages
- ☐ Computer-Assisted Language Learning (CALL) programs

EXERCISE G6 *Planning a study strategy*

Plan a strategy for improving your grammar skills.

1. People who can help me analyze my use of English grammar structures in speaking and writing using the checklist:

2. The structures I can use confidently are:

3. The structures I need to work on are:

4. What I am going to do to improve and how I am going to do it:

5. How I am going to evaluate my progress:

GRAMMAR REVIEW: WORD FORMS

A word may have one or more related forms. Notice, for example, how the word *decide* changes form:

<i>Noun</i>	The decision was made months ago.
<i>Verb</i>	We decided to move to a larger house.
<i>Adjective</i>	His decisive action brought order to the meeting.
<i>Adverb</i>	She acted very decisively .

EXERCISES G15–G17 Use Exercises G15–G17 to practice your skills in using verbs and verbals.

EXERCISE G15 *Checking verb tenses*

If the underlined verb is incorrect, write the correct verb form in the blank.

1. Aerial photography will recently and unexpectedly revealed many historical sites.

2. Electricity using superconductivity can travel farther with greater efficiency.

3. In the future, we may have been measuring movements on the Earth's crust that are undetectable today.

4. It was not until the invention of the camera that artists correctly painted galloping horses.

5. Mice with disorders similar to human diseases have been grown from genetically engineered mouse cells.

6. Navigational errors have now been almost a thing of the past.

7. Once a crocodile has seized an animal, it is dragging the prey beneath the surface of the water.

8. Suburbs harbor an extraordinary variety of birds, insects, plants, and animals since urban sprawl began.



EXERCISE G16 *Checking subject-verb agreement*

Write *C* (correct) if the subject and verb agree. Write *I* (incorrect) if the subject and verb do not agree.

1. ____ The difference between the living conditions in the countryside and in towns has been eliminated.
2. ____ A reorganization of brain cells occurs during adolescence.
3. ____ The radiation levels from a computer display terminal is well below presently accepted standards of exposure.
4. ____ Pollution, together with water erosion, is taking its toll on the buildings.
5. ____ The exquisite decoration and the effective use of space, light, and water contributes to the Alhambra's unique beauty.

EXERCISE G17 Choosing verb forms

Choose the letter of the word or phrase that correctly completes the sentence.

Remote sensing from orbiting instruments aided explorers ____ the lost city of Ubar.

- (A) to find
- (B) in finding

You should choose *B* because the verb *aid* is used with the word *in* followed by a gerund.

1. The English Heritage members attempt ____ castles and other ancient buildings in England.
 - (A) to maintain
 - (B) maintaining
2. In 1970, the Canadian scientist George Kell ____ that warm water freezes more quickly than cold water.
 - (A) proved
 - (B) proving
3. A great deal of thought has ____ into the designing of a concert hall.
 - (A) to go
 - (B) been gone
4. Only through diplomatic means can a formal agreement be _____.
 - (A) reaching
 - (B) reached
5. The vessel that sank ____ the gold and jewels from the dowry of Catherine of Aragon.
 - (A) may have been carrying
 - (B) will have been carrying
6. Hollywood film producers have been regularly ____ tens of millions of dollars for a single movie.
 - (A) budgeted
 - (B) budgeting
7. Attempts ____ the face cards from playing cards have proved unsuccessful.
 - (A) abolishing
 - (B) to abolish
8. One out of every eight balloons in the world ____ at Albuquerque, New Mexico.
 - (A) is launched
 - (B) launched
9. For noncriminal purposes, U.S. currency ____ only if the copy is one-sided and significantly different in size.
 - (A) must be copied
 - (B) may be copied
10. Even though many governments disapprove of their citizens' ____ the opium poppy, the practice thrives.
 - (A) cultivating
 - (B) to cultivate

8. contrasts

Sometimes the meaning of a word can be understood because it is in contrast to another word in the sentence. Some words that indicate a contrast are:

but	in contrast	or
despite	in spite of	unlike
however	instead	whereas

The brief scenes in the movie focus on the boy's point of view, whereas the longer scenes depict the father's side.

Brief scenes are understood to be short scenes because they are in contrast to the *longer* scenes.

9. other words in the sentence

Other words in a sentence can sometimes give a general meaning of a word but not always a specific definition.

In order to sip the nectar with its long tongue, the bee must dive into the flower and in so doing becomes dusted with the fine pollen grains from the anthers.

We can guess that *nectar* is the substance that bees collect from a flower because the bee must "sip . . . with its long tongue" and "dive into the flower." We can guess that *anther* is a part of the flower because the bee gets "dusted with the fine pollen grains from the anthers" when it dives into the flower.

Improving your ability to understand words in context and increasing your vocabulary in general will help you succeed in the Reading section of the TOEFL test.

Exercises R1–R3 Use Reading Exercises R1–R3 to practice understanding meaning from context.

EXERCISE R1 *Understanding words in context*

This exercise consists of two types of questions. Examples of these two types, including directions, are shown in the boxes below.

Read the sentence and write the definition of the underlined word.

A cutlass is a short, curved sword.

a short, curved sword

You should write *a short, curved sword* as the meaning of *cutlass* because the definition is included in the sentence. The definition follows the verb *be*.

Read the paragraph, and choose the letter of the word or phrase that completes the sentence that follows it.

In law, a nuisance is an act that has no legal justification and that interferes with the safety or comfort of other people. Public nuisances, those that are injurious to the community, may be prosecuted as crimes.

A public nuisance is

- (A) a protective law
- (B) an injurious act
- (C) a legal justification
- (D) a safety precaution

You should choose *B* because a *public nuisance* is an act that interferes with the safety of others; that is, an injurious act.

Using *be* to understand meanings

1. Hypoxia is an illness caused by a deficiency of oxygen in the tissues of the body.

2. A porcupine is a large climbing rodent that is covered with sharp spines for defense.

3. The atom is the smallest part of a chemical element that can exist and still have the properties of the element.

4. The Celtic religion centered on the worship of a pantheon of nature deities. Their religious ceremonies included animal sacrifices and various forms of magic. Druids were the priests who led the people in this highly ritualistic worship.
Druids are
 - (A) deities
 - (B) ceremonies
 - (C) sacrifices
 - (D) priests
5. Waste that has been made useful is said to have been recycled. Empty bottles can be returned and used again. Other things that can be recycled are paper, plastic, and metals. Besides the aesthetic value of recycling, there are many environmental reasons to do so.
Recycled material is
 - (A) strewn garbage
 - (B) common waste materials
 - (C) paper, glass, and coffee
 - (D) reused waste
6. Both the Rocky Mountains in North America and the Swiss Alps in Europe have high peaks that challenge the most skilled of mountain climbers. As these climbers ascend the steep, rocky crevices, they may come across edelweiss.



Although edelweiss is the Swiss national flower, it is also found in the Rocky Mountains. It grows wild near areas with year-round snow and can be recognized by its small, white, star-shaped blossoms.

Edelweiss is a

- (A) crevice
- (B) flower
- (C) star
- (D) peak

Using appositives to understand meanings

7. Pacemakers, small electrical devices that stimulate the heart muscle, have saved many lives.

8. Many residents of Hawaii used to believe that a volcano's flarings were tirades of their goddess, Pele.

9. Studying supernovas, the catastrophic explosions of dying stars, may give answers to questions of modern cosmology.

10. Seventeenth-century attempts to preserve anatomical specimens brought about modern techniques of embalming, the preservation of the body tissue after death by artificial chemical means. The most common agent used today is formaldehyde, which is infused to replace body fluids.

Embalming is

- (A) death by a chemical means
- (B) the preservation of body tissue
- (C) a common agent related to formaldehyde
- (D) the replacement of body fluids

11. The grasslands of the world are inhabited by the magnificent and impressive ungulates, the long-legged hoofed mammals, such as bison. The greatest varieties of ungulates are found on the African savanna, where the herds of gazelles and wildebeests in mass movement are a spectacular sight.

Ungulates are

- (A) grasslands
- (B) herds
- (C) African animals
- (D) hoofed mammals

12. Samuel Morse spent twelve years perfecting his own version of André Ampère's idea for an electric telegraph. However, this inventor is best known for the Morse code, a system of telegraphic signals composed of dots and dashes. The dot represents a very brief depression of the telegraph key. The dash represents a depression three times as long as the dot. Different combinations of dots and dashes are used to code the alphabet, numerals, and some punctuation.

Morse code is a system of telegraphic

- (A) signals
- (B) keys
- (C) dots
- (D) depression

Using punctuation to understand meanings

13. Long barrows – Stone Age burial mounds made of earth or rubble – are widely distributed throughout northern Europe.
-
14. If you are ectomorphic, "the slender type," you are likely to be good at such sports as track, tennis, and basketball.
-
15. The occlusal (biting) surfaces of the back teeth tend to be the most frequent sites for dental cavities.
-
16. At the age of 19, Galileo discovered isochronism – the principle in which each oscillation of a pendulum takes the same time despite changes in amplitude.

Isochronism is

- (A) a principle
 (B) an oscillation
 (C) a pendulum
 (D) an amplitude
17. A composer indicates to a musician how a musical passage is to be played through the use of dynamic markings. The symbol for soft is *p*, whereas the one for loud is *f*. The intensity – loudness or softness – depends on the extent or amplitude of the vibrations made by the particular instrument being played.

Intensity is

- (A) dynamic markings
 (B) the symbol for soft and loud
 (C) the extent of the vibrations
 (D) loudness or softness
18. Oral history, the use of the tape recorder to capture memories of the past in private interviews, has become increasingly popular among professional historians. Studs Terkel is the best known of America's historians to use this method for recording historical events. He has interviewed people about their experiences during important events such as the Great Depression and World War II.

Oral history is

- (A) private interviews
 (B) the recording of people's memories
 (C) experiences during important events
 (D) the history of tape recording

Using *or* to understand meanings

19. Altitude, or the height above sea level, is a factor that determines climate.
-
20. Osteoblasts, or cells responsible for the formation of new bone, tend to be concentrated on bone surfaces.
-



21. In seagoing vessels, bulkheads, or internal walls, form watertight compartments and strengthen the overall structure.
-

22. According to many psychologists, phobias, or irrational fears, represent or are symbolic of repressed anxiety. They are usually persistent, illogical, and intense. The most useful treatment has been behavior-modification therapy.

A phobia is a

- ☐ (A) psychologist
☐ (B) fear
☐ (C) symbol
☐ (D) treatment
23. Honeybees live in colonies of many thousand members. A typical colony has a queen that lays eggs; fertile males, or drones; and sexually undeveloped females called workers. The workers care for the queen and larvae, gather nectar, make and store honey, and protect the hive.

A drone is

- ☐ (A) an egg
☐ (B) a male bee
☐ (C) an undeveloped female
☐ (D) a worker
24. The nervous system of an insect is not a simple electrical circuit. When a signal gets to one end of a nerve cell, the cell sprays various molecules out for the next cell to pick up. The central nervous system of grasshoppers, fruit flies, and other insects includes both the brain and a chain of simpler segmental ganglia, or groups of nerve cells.

Ganglia are

- ☐ (A) nervous systems
☐ (B) electrical circuits
☐ (C) groups of nerve cells
☐ (D) the molecules the cells send out

Using examples to understand meanings

25. Large fish such as groupers and moray eels recognize the wrasse as a friend that will help them.
-

26. Creatures such as the camel and the penguin are so highly specialized that they can only live in certain areas of the world.
-

27. The sand absorbs enough moisture to support drought-resistant plants such as mesquite, as well as several species of grasses.
-

28. Much can be done to halt the process of desertification. For example, an asphalt-like petroleum can be sprayed onto sand dunes, and seeds of trees and shrubs can then be planted. The oil stabilizes the sand and retains moisture, allowing vegetation to become established where the desert had previously taken over.

Desertification is the

- (A) spraying of oil onto sand dunes
- (B) planting of trees and shrubs
- (C) vegetation becoming established
- (D) desert taking over a fertile area

29. Of all the electronic devices that engineers have produced, the computer has had the greatest impact on society. At the heart of every computer, there are microchips. Microchips consist of large collections of tiny devices like the diode and transistor, connected on a single piece ("chip") of silicon.

Diodes and transistors are

- (A) collections of computers
- (B) microelectronic devices
- (C) silicon pieces
- (D) computer engineers

30. How complicated the preparations for a camping trip are depends on the duration of the trip as well as the isolation of the area in which the camper intends to be. If a camper intends to stay at one of the many commercial campsites, most needs are provided for. However, for outdoor enthusiasts who want to get far from civilization, choosing camping paraphernalia such as tents, sleeping bags, cooking implements, and other supplies should be done with care.

Paraphernalia is

- (A) equipment
- (B) food supplies
- (C) sleeping bags
- (D) campsites

Using adjective clauses to understand meanings

31. Recent tests show that silver sulfadiazine, which is a compound used in the treatment of burns, can cure the most serious types of African sleeping sickness.

32. Melody, which is the succession of sounds, takes on new interest when fit into a rhythmic pattern.

33. The O at the beginning of many Irish names comes from the Gaelic word ua, which means "descended from."

34. The Pueblo Indians are those who dwell in pueblos, a name derived from the Spanish word for *village*. The pueblo is usually built against the face of a cliff and generally consists of connected houses rising in a series of receding terraces. The roof of one house is the yard or patio of the next house. The kiva, where Pueblo Indians hold their secret ceremonies, is entered by an opening in the roof.

A kiva is a

- (A) patio
- (B) ceremonial room
- (C) series of terraces
- (D) Pueblo Indian village



35. The coyote resembles a medium-sized dog with a pointed face, thick fur, and a black-tipped, bushy tail. Although its main diet consists of rabbits and other rodents, it is considered dangerous to livestock. Consequently, thousands of coyotes are killed yearly. In recent years, nonlethal techniques, those that do not kill coyotes, have been developed to protect sheep and other livestock while allowing the coyote to remain in the wild.

Nonlethal techniques are those that

- (A) are dangerous to livestock
- (B) injure thousands of coyotes yearly
- (C) allow livestock to live in the wild
- (D) are not deadly to wild animals

36. The phenomenon of a mirage, which is an atmospheric optical illusion in which an observer sees a nonexistent body of water, can be explained by two facts. First, light rays are bent in passing between media of differing densities. Second, the boundary between two such media acts as a mirror for rays of light coming in at certain angles.

A mirage is

- (A) an illusion
- (B) a body of water
- (C) a medium acting as a mirror
- (D) the boundary between two media

Using referents to understand meanings

37. An agricultural concern is the growing number of boll weevils. An infestation of these insects is capable of destroying a cotton crop overnight.

-
38. The analysis of carbon and nitrogen isotopes can be used to identify the skeletal remains of carnivores. Because they are higher up the food chain, these meat-eating animals have larger proportions of heavy isotopes in their bone remains.

-
39. The perfection of the chronometer by John Harrison was a lifesaving development for sailors. This marine timekeeping device allowed accurate computation of longitude during long sea voyages.

-
40. Important officials visiting President Theodore Roosevelt were surprised by his menagerie of pets. No previous president had filled the White House with such a variety of animals.

A menagerie is a varied group of

- (A) officials
- (B) presidents
- (C) animals
- (D) staff members

41. At least 50 different weed species fight off competitors by emitting toxins from their roots, leaves, or seeds. These poisons do their work in a variety of ways, such as inhibiting germination of seeds and destroying photosynthesis abilities.

Toxins are

- (A) roots
- (B) leaves
- (C) seeds
- (D) poisons

42. The English longbowmen did not draw their bows but bent them by leaning on them with one arm and the upper part of their body. This method utilized the strength of the body instead of just the arm and gave the archers endurance to use the longbow for extended periods.

A longbowman is

- (A) an archer
- (B) a bowing technique
- (C) a method for utilizing the strength of the body
- (D) a way to increase endurance for longer use of the longbow

Using contrasts to understand meanings

43. The bite of a garter snake, unlike that of the deadly cobra, is benign.
-

44. The bluebonnet, the Texas state flower, thrives in dry, poor soil but struggles in overly wet conditions.
-

45. In contrast to some fluids like water, which has relatively low resistance to motion, honey is highly viscous.
-

46. A unified field theory is one in which two forces, seemingly very different from each other, are shown to be basically identical. According to such a theory, unification will take place at various stages as the energy and temperature increase.

Identical is

- (A) different
- (B) unified
- (C) equal
- (D) level

47. The campanile is chiefly a medieval form of Italian architecture. Built in connection with a church or town hall, it served as a belfry, watchtower, and sometimes a civil monument. Unlike other bell towers that are attached to buildings, the campanile generally stands as a detached unit.

A campanile is a

- (A) church
- (B) town hall
- (C) tower
- (D) unit

48. While the methods used at other learning institutions are based on the theory that children need a teacher, the Montessori method is based on the theory that a child will learn naturally if placed in an environment rich in learning materials. These



materials are suited to children's abilities and interests, and learning takes place as the child plays. Children following this method are autodidactic, and only when a child needs help does the teacher step in.

Autodidactic is

- (A) playful
- (B) self-taught
- (C) able to learn
- (D) dependent on teachers

Using other words in the sentence to understand meanings

49. The bright purple gentian grows wild in Colorado and blooms in late summer.

50. While blowing air into the leather bag, a bagpipe player produces melodies by fingering the chanter.

51. Unfortunately, the modified potato plant's hairs kill useful insects, but this problem can be alleviated by controlling the amount of hair.

52. The much larger hull of the multidecked round ship allowed it to carry more supplies, more men, more guns, and more sails, all of which were necessary for long voyages of commerce and discovery.

A hull is a

- (A) storage place
- (B) deck
- (C) kind of sail
- (D) type of commerce

53. In the third century BCE, Ctesibius, the Greek engineer and theorist, first exercised his inventive talents by making an adjustable mirror and then creating ingenious toys that could move under their own power.

Inventive is

- (A) regional
- (B) creative
- (C) flexible
- (D) effective

54. Vitamin D is called the sunshine vitamin because it is absorbed through bare skin. The body uses it to form strong bones, and therefore, it is essential for growing children. People who are not exposed to the sun can become deficient in vitamin D and may develop the bone disease rickets.

Deficient is

- (A) overexposed
- (B) infected
- (C) lacking
- (D) improved

EXERCISE R2 *Choosing the best synonym*

Read each passage. Choose the letter of the word or phrase that best completes each of the sentences that follow it.

The horse has played a little-known but very important role in the field of medicine. Horses were injected with toxins of diseases until their blood built up immunities. Then a serum was made from their blood. Serums to fight both diphtheria and tetanus were developed in this way.

The word "serum" is closest in meaning to

- (A) ointment
- (B) antitoxin
- (C) blood
- (D) acid

According to the passage, horses were given toxins to which they became immune. The blood was made into serums, which acted as antitoxins against the toxins of diseases. Therefore, you should choose B.



Questions 1–6

The fork, which did not become a standardized item in Europe until the eighteenth century, was almost unheard of in America. With the absence of forks, it can be assumed that colonists used a spoon instead. The knife was probably held in the right hand, generally the preferred hand for manipulating utensils. The spoon would have been held in the left hand with the concave part of the bowl facing downward. In this position, the diner would be more adept at securing a piece of meat against a plate while the cutting took place. Once the meat was cut, the down-turned spoon would not have been suitable for picking up the morsel. Probably the diner would have put the knife down and shifted the spoon to the right hand. This action would bring the spoon into the correct position for scooping up the bite of food.

This practice of shifting utensils back and forth between hands continued when the fork made its way to America and replaced the spoon as the tool to secure the food being cut. The fork kept the food against the plate more adequately, and its curving tines served the same function as the bowl of the spoon. The custom of shifting the fork from the left hand to the right was no longer necessary, but people continued to use the style that they were used to. This American style of handling eating utensils persists to this day.

1. The word "utensils" is closest in meaning to

- (A) gadgets
- (B) cutlery
- (C) hammers
- (D) weapons

2. The word "adept" is closest in meaning to

- (A) cultivated
- (B) agreeable
- (C) cumbersome
- (D) proficient

3. The word "morsel" is closest in meaning to
 - (A) piece
 - (B) meat
 - (C) food
 - (D) spoon
4. The phrase "scooping up" is closest in meaning to
 - (A) packing up
 - (B) hoisting up
 - (C) messing up
 - (D) picking up
5. The word "tines" is closest in meaning to
 - (A) handles
 - (B) blades
 - (C) prongs
 - (D) bowls
6. The word "persists" is closest in meaning to
 - (A) continues
 - (B) operates
 - (C) traces
 - (D) impresses

Questions 7–12

When Jessye Norman's parents were knocking on the wall of their young daughter's room as a signal for her to stop singing and to go to sleep, little did they dream that this small child who seemed to have been born singing would grow up to be an internationally renowned opera singer.

It is not surprising that Jessye loved to sing. Music was an integral part of her family's lifestyle. Although Jessye remembers her mother singing spirituals, it was her grandmother who was always singing. Every hour of her day and every mood was highlighted with a song that fit the occasion. As Jessye was growing up, her piano-playing mother and trumpet- and trombone-playing brothers accompanied her when the family was called upon to provide special music for church services, parent-teacher meetings, and ribbon-cutting ceremonies.

During her childhood, Jessye knew only three operatic songs: one that she learned from a recording and two others – the only opera scores she could find at the local music store. Although singing was in her blood, it was not until she attended Howard University that Jessye Norman took her first voice lesson with Carolyn Grant, who recognized her talent and knew how to channel it. It was almost immediately after leaving the university in 1968, on her first visit to Europe, that Jessye won the singing prize in the International Music Competition of German Radio. The following year, she was invited to go to Berlin to perform at the Deutsche Opera. Since that time, Jessye Norman has become a world superstar whose singular voice reaches audiences all over the world.

7. The word "renowned" is closest in meaning to
 - (A) infamous
 - (B) celebrated
 - (C) notorious
 - (D) precocious

8. The word "integral" is closest in meaning to
- (A) demanding
 - (B) persistent
 - (C) essential
 - (D) intuitive
9. The word "highlighted" is closest in meaning to
- (A) emphasized
 - (B) contradicted
 - (C) conveyed
 - (D) belittled
10. The word "scores" is closest in meaning to
- (A) points
 - (B) experts
 - (C) voice lessons
 - (D) sheet music
11. The word "channel" is closest in meaning to
- (A) station
 - (B) irrigate
 - (C) exploit
 - (D) direct
12. The word "singular" is closest in meaning to
- (A) flattering
 - (B) exceptional
 - (C) fluctuating
 - (D) different

Questions 13–18

Many laws that were passed in the various states of the United States over the years are now out of date or seem ludicrous. For example, the laws in one state make it illegal for women to expose their ankles and for men to go without their guns. Obviously, these laws are broken daily. With current trends in fashion, every woman who walks down the street or goes to a beach or public swimming pool is committing a crime. While it was once considered of utmost importance that a man be armed and ready for action on the frontier, it is hardly necessary for a man to tote guns to work today. However, a man without a gun is also technically breaking the law.

On the other hand, other laws aren't ever likely to be broken. For example, another law makes it illegal to tether one's horse to the fence surrounding the capitol building. It is hard to imagine anyone riding a horse into the city and leaving it tied outside of the capitol building today. One would have to go to great lengths in order to break this law.

These outdated laws remain on the record because the time needed for state legislatures to debate the issues and make changes in the existing laws would keep the members from attending to more important current and relevant issues. It would be hard to calculate the cost to the taxpayers for these laws to be purged or updated. Consequently, it is likely that these laws will remain on the books.

13. The word "ludicrous" is closest in meaning to
- (A) insipid
 - (B) demeaning
 - (C) ridiculous
 - (D) incomprehensible
14. The word "expose" is closest in meaning to
- (A) sprain
 - (B) conceal
 - (C) decorate
 - (D) display
15. The word "tether" is closest in meaning to
- (A) gallop
 - (B) fasten
 - (C) saddle
 - (D) conduct
16. The word "debate" is closest in meaning to
- (A) challenge
 - (B) contemplate
 - (C) discuss
 - (D) overturn
17. The word "relevant" is closest in meaning to
- (A) pertinent
 - (B) fashionable
 - (C) extraneous
 - (D) inadequate
18. The word "purged" is closest in meaning to
- (A) eliminated
 - (B) restored
 - (C) remedied
 - (D) amended

EXERCISE R3 *Understanding the author's meaning*

Read each passage. Choose the letter of the word or phrase that best completes the sentence that follows it.

Although originally formed to prevent illegal trade in whiskey, the Royal Canadian Mounted Police, or "Mounties" as they are informally called, now enforce all federal laws throughout Canada. Their diverse duties also include participating in peacekeeping efforts and supplying expertise in areas like forensics to Canadian and international police forces. About 1,000 members of the force are assigned exclusively to the task of controlling the spread of illicit drugs.

In stating that "1,000 members of the force are assigned exclusively to the task of controlling the spread of illicit drugs," the author means that these members

- (A) deal only with work involving drug control
- (B) are excluded from the task force assigned to drug control
- (C) work with those who are assigned to the task of drug control
- (D) are assigned all law enforcement tasks excluding that of drug control

You would choose A because the word *exclusively* means *without exception*. The members' only task is that of controlling the spread of illicit drugs.

1. Astronomers have recently gained new knowledge of the behavior of galaxies. It has been discovered that spiral galaxies sometimes collide with each other. The huge forces created in such a cosmic event can tug long trails of stars and create new ones from compressed gases. After repeated collisions, galaxies may eventually merge, forming a single elliptical shape. Our own galaxy, the Milky Way, is on a collision course with the nearby Andromeda Galaxy. Hundreds of millions of years from now, these two star systems may combine to form one giant configuration.

In stating that "the Milky Way is on a collision course," the author means that

- (A) the Milky Way is going to crash into our own galaxy
- (B) the Milky Way is heading toward the Andromeda Galaxy
- (C) the Milky Way is the result of an impact that created one giant configuration
- (D) the Milky Way will crash into two star systems in hundreds of millions of years

2. As long ago as the thirteenth century, Roger Bacon, the celebrated philosopher and Franciscan friar, postulated that humankind could fly with the aid of a large ball constructed of thin copper filled with air. Throughout the centuries, other scientific dreamers hypothesized the construction of a variety of flying devices. Leonardo da Vinci, in particular, studied aspects of flight and made sketches for flying machines. It was not until 1783 that the first people, Pilâtre de Rozier and the Marquis d'Arlandes, successfully took off from the ground, in a balloon designed by the Montgolfier brothers.

In stating that "Roger Bacon . . . postulated that humankind could fly," the author means that Roger Bacon

- (A) witnessed human flight
- (B) wanted to show how humans could fly
- (C) knew why it was important that humans fly
- (D) thought that human flight was possible

3. Christmas Island, discovered by Captain James Cook on Christmas Eve in 1777, was once populated by a wide variety of bird species. In recent years, at least 18 species of birds – a total of 17 million birds – have been observed to leave or to perish on the island. It is suspected that the cause of the disappearance may be related to a cyclical weather phenomenon in the Pacific that alters winds, salinity, and ocean currents. These variously repeating conditions have resulted in higher water temperatures, which may have caused the fish and squid that the birds live on to die.

In stating that "the cause of the disappearance may be related to a cyclical weather phenomenon," the author means that the cause is related to

- (A) hurricanes and cyclones
 - (B) recurring climatic conditions
 - (C) a succession of environmental patterns
 - (D) a combination of wind, salt, and ocean currents
4. The historic centers of the American sister cities Savannah, Georgia, and Charleston, South Carolina, have fortunately been saved from demolition or neglect and now attract tourists eager to view the gracious old houses. Of particular interest for the visitor is the exquisite decorative ironwork found throughout the older parts of both cities, especially on porch and stair railings and banisters. Both wrought and cast iron became popular there in the early 1800s, since fire was a constant threat and iron would not burn. Pig iron, which was used as ballast in ships coming from Europe to pick up cargoes of cotton, was bought cheaply, and a local industry producing beautiful ironwork developed.

In stating that "the historic centers of the American sister cities . . . have fortunately been saved from demolition," the author means that the city centers have

- (A) been kept intact
- (B) remained neglected
- (C) been elegantly restored
- (D) saved the tourist industry

Reading Mini-test 1

Check your progress in understanding meaning from context (Exercises R1–R3) by completing the following Mini-test. This Mini-test uses question types used in the Reading section of the TOEFL iBT test.

Select the correct answer.

Questions 1–4

The incorporation of broken-down scrap tires into asphalt to produce a blend suitable for the construction of road surfaces is becoming widespread. The resulting material, asphalt-rubber, has several advantages over customary road-building materials. It can be applied in a reduced thickness, and this means that less material has to be mined and transported to the road site. Furthermore, roads constructed with this material require less maintenance than more conventional roads. Another benefit is the abatement of traffic noise, a serious issue in urban areas. Perhaps most important, the reduction and possible eventual elimination of waste tires with all their attendant environmental problems may one day become a reality.

1. The word "scrap" is closest in meaning to
 - (A) waste
 - (B) outdated
 - (C) rough
 - (D) broken
2. The word "customary" is closest in meaning to
 - (A) special
 - (B) unusual
 - (C) regular
 - (D) suitable
3. In stating "Another benefit is the abatement of traffic noise," the author means that the traffic noise has
 - (A) subsided
 - (B) become beneficial
 - (C) become a serious issue
 - (D) benefited from the construction
4. The word "elimination" is closest in meaning to
 - (A) revision
 - (B) fulfillment
 - (C) reduction
 - (D) eradication

Questions 5-8

Emily Dickinson published only a handful of poems during her lifetime, and she was so secretive about her writing that even her own family was not aware of her literary activities. Emily never married, and after the age of 30 she became increasingly reclusive, rarely venturing out of her family home in Amherst, Massachusetts. She did, however, take a keen interest in contemporary culture and science and was a lively and prolific correspondent.

Her poetry was also abundant, and it was much concerned with the themes of religious conflict, nature, love, and death. Technically her poems show innovative use of rhyme and rhythm and exhibit intense emotion clearly and concisely expressed. After her death in 1886, her sister, Lavinia, discovered her entire unpublished output, over 1,700 poems in all, concealed in drawers. Four years after Emily's death, a selection of these was published, and since then her reputation has grown immensely. Her poetry is now acclaimed throughout the world.

5. The word "reclusive" is closest in meaning to
 - (A) solitary
 - (B) distinct
 - (C) hostile
 - (D) lonely

6. In stating that Emily Dickinson was a "prolific correspondent," the author means that
 - (A) her letters were profound
 - (B) her letters were entertaining
 - (C) she held many serious discussions
 - (D) she communicated a lot through letters
7. The word "intense" is closest in meaning to
 - (A) focused
 - (B) inhibited
 - (C) weird
 - (D) strong
8. The word "concisely" is closest in meaning to
 - (A) accurately
 - (B) cryptically
 - (C) movingly
 - (D) succinctly

Questions 9–12

In the last couple of decades, marine researchers have observed that epidemic diseases are attacking a variety of sea creatures. Some of them are affecting rare species that are already at risk of extinction. For example, in the 1980s a mysterious epidemic struck a species of sea urchin in the Caribbean, wiping out over 90 percent of the population. Later in the same decade, harbor seals in the Baltic and North Seas succumbed to an unidentified affliction. The green sea turtle has expired in large numbers as a result of developing tumors, known as fibropapillomas, which eventually cover the creature and prevent it from seeing or eating.

Coral reefs and the species that inhabit them have also witnessed an explosion of new diseases. Most of these reported diseases are infections that have appeared recently or are increasing in incidence or geographic range. Some scientists infer that human activity is responsible for spreading these afflictions. Perhaps industrial pollution is weakening the immune systems of marine populations and making them more susceptible to pathogens.

9. The word "affliction" is closest in meaning to
 - (A) situation
 - (B) toxin
 - (C) disease
 - (D) seizure
10. In stating "The green sea turtle has expired in large numbers," the author means that the sea turtles have
 - (A) died from an illness
 - (B) declined in numbers
 - (C) quit coming to the Caribbean
 - (D) become extinct in the Baltic and North Seas

11. The word "incidence" is closest in meaning to

- (A) rate of occurrence
- (B) degree of circumstance
- (C) degree of severity
- (D) rate of exposure

12. The word "susceptible" is closest in meaning to

- (A) attractive
- (B) heedful
- (C) perilous
- (D) vulnerable

Questions 13–16

Psychologists have found that privately made resolutions are rarely followed, whereas a public commitment to achieve some goal, such as losing weight or giving up smoking, is likely to be much more effective. This is because the approval of others for reaching one's target is valued. In contrast, disapproval for failure can lead to feelings of shame.

Advertising agencies have designed studies bearing out the truth of this observation. In their research, a group of strangers was bombarded with information about the qualities of a particular product. They were then asked to either announce out loud or write down privately whether they intended to buy the product. It was later discovered that those who publicly declared their intention to buy were considerably more likely to do so than those who affirmed their intentions in private.

In another study, an experimenter claiming to represent a local utility company interviewed homeowners, telling them he was investigating ways in which energy consumption could be reduced. Half the subjects, randomly selected, were told that if they agreed to conserve energy, their names would be mentioned in an article published in the local newspaper; the remaining half were told their names would not be used. All those interviewed agreed to cooperate and signed a form either giving consent for their names to be used or stating that their names would not be used. Later in the year, the amount of gas consumed in each house was recorded. The owners who had agreed to their names being published had used significantly less gas than those who remained anonymous.

13. The word "resolutions" is closest in meaning to

- (A) declarations
- (B) explanations
- (C) speculations
- (D) persuasions

14. The word "bombarded" is closest in meaning to

- (A) bombed
- (B) attacked
- (C) saturated
- (D) hampered

15. In stating "an experimenter claiming to represent a local utility company interviewed homeowners," the author means that the experimenter who interviewed the homeowners was
- (A) committing fraud
 - (B) working for a state utility company
 - (C) hiding his identity from the people in the study
 - (D) representing a claimant in a law case against the utility company
16. The word "consent" is closest in meaning to
- (A) permission
 - (B) submission
 - (C) justification
 - (D) consideration

PRACTICE WITH UNDERSTANDING THE CONNECTION OF IDEAS

Recognizing and understanding how sentences and ideas are linked throughout a passage will help your comprehension of the passage. Your ability to follow the flow and organization of a passage depends upon your ability to understand how the major points, facts, and details are arranged in support of the main idea. The skills you will need in order to make these connections are outlined below.

Understanding referents

Instead of repeating the same words over and over, writers use pronouns and short phrases to refer to these words. These pronouns and short phrases are called *referents*. They may refer back to a previously used word, phrase, or idea. They can also be used to anticipate a word, phrase, or idea that follows. Read the following example:

Instead of picking the children up on his way to the supermarket, Tom waited until he was on his way home to get them.

In this sentence, *them* refers to *the children* and *he* refers to *Tom*. *Them* and *he* are referents.

Improving your understanding of referents will help you to follow the flow of ideas in reading passages, to answer specific referent questions, and to answer many other questions on the TOEFL test.

(For more information on and practice with referents, see Grammar Review: Referents, p. 113; Practice with Understanding Connections, p. 257; Practice with Cohesion, p. 317; and Practice with Cohesion, p. 379.)

Understanding transitional expressions

Recognizing and understanding transitional expressions will help you follow the flow and organization of ideas in the reading passages on the test. (For more

Exercises R4–R8 Use Exercises R4–R8 to build your skills in understanding the connection of ideas in reading passages.

EXERCISE R4 *Locating referents within sentences*

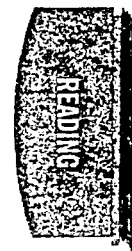
Read the sentence. Find the referent for each underlined word or words, and write it in the space.

Under the ice, bubbles gather against the ice roof until they overflow and escape through the tide cracks.

they bubbles

You should write *bubbles* because *they* (plural) agrees with *bubbles*, and bubbles can overflow and escape.

- Arctic people must not only defend themselves from the environment and wild animals, but they must also protect these natural resources.
 themselves _____
 they _____
 these natural resources _____
- Amnesty International consists of over 900 groups of individuals who work for the release of political prisoners incarcerated for their beliefs.
 who _____
 their _____
- In 1863, when a Hungarian count recognized the potential of Californian soil and sun for growing wine grapes, he planted the first European variety there near the town of Sonoma.
 when _____
 he _____
 the first European variety _____
 there _____
- The first complete American dictionary of the English language was compiled in 1828 by the lawyer and lexicographer Noah Webster, who was particularly eager to show at this time that the English spoken in America was distinct from that spoken in Britain.
 the lawyer and lexicographer _____
 who _____
 at this time _____
 that _____



EXERCISE R5 *Locating referents within a passage*

Read the passage. Choose the letter of the word or phrase that best completes the sentence that follows it.

Differences in the way men and women process language is of special interest to brain researchers. It has been known that aphasia – a kind of speech disorder – is more common in men than in women when the left side of the brain is damaged in an accident or after a stroke. However, women are more likely than men to suffer aphasia when the front part of the brain is damaged. This clearly indicates that the brains of men and women are organized differently in the way they process speech.

The word "they" in the passage refers to

- (A) men
- (B) women
- (C) brains
- (D) researchers

You should choose C because *they* (plural) agrees with *brains*, and brains can process speech.

1. One of the most potentially explosive international problems is that of mass tourism. Of the more than six billion people in the world, an increasing number of them are determined to travel. Annually a vast number of travel-hungry tourists traipse around the globe, and thousands of perfect beaches, quaint villages, historic cities, and regions of exquisite natural beauty have become victims of developers' building schemes. Attempts to accommodate these people have led to the destruction of the very attractions that they have come to enjoy and have made daily living almost impossible for the local residents.

The phrase "these people" in the passage refers to

- (A) people in the world
- (B) tourists
- (C) developers
- (D) residents

2. Traditionally, America's fast-food companies have hired teenagers. While teenagers provide cheap labor, they are sometimes unreliable. Consequently, fast-food companies often use another source of cheap labor – the elderly. Older people are less likely to skip a day of work or quit without giving notice, but because they have not been brought up with computers, they view the high-tech fast-food counter with terror. Training centers have opened in order to teach "mature workers" how to operate computerized cash registers, timed deep-fat fryers, and automatic drink-dispenser software. These students are put into classrooms with their peers and, since mental arithmetic is a thing of the past, are taught how to use a calculator.

The phrase "These students" in the passage refers to

- (A) teenagers
- (B) fast-food employers
- (C) the elderly
- (D) peers

3. The Bettmann Archive is a picture library that was founded in the 1930s by German immigrant Otto Bettmann. He arrived in New York City with two suitcases of photographs and opened a picture library, which he built into the biggest commercial operation of its kind in the world. Among the millions of photographs the archive contains are some of the most memorable images of the twentieth century: Marilyn Monroe standing by a street grate ventilating her skirt, Einstein sticking out his tongue, and the Hindenburg exploding into flames. According to Bettmann, the archive's success was due to his unique filing system which he designed to suit journalistic needs. For example, the Mona Lisa was not filed under "Paintings" or "Leonardo da Vinci"; it was filed under "Smiling."

The word "some" in the passage refers to

- (A) suitcases of photographs
- (B) picture libraries
- (C) commercial operations
- (D) archive photographs



EXERCISE R6 *Locating multiple referents within a passage*

Read the passage. Then draw a line from each highlighted word to its referent.

People often assume that athletes are healthier and more attuned to their overall well-being than nonathletes. However, two researchers recently conducted a survey of college students. They reported that athletes are more likely than those who aren't into sports to engage in behaviors that put their health at risk.

1. Scientists used to believe that animals scream to startle predators into loosening their grip or to warn their kin. However, now some researchers have concluded that the piercing, far-reaching cries of animals may have another function. Recent studies indicate that these screams may have evolved to attract other predators, which will give the prey a chance to escape during the ensuing struggle between predators.
2. When cartoonists take on the task of drawing real people, they do so by making a caricature. These kinds of cartoon drawings are frequently used to satirize well-known people. Most famous people have several particular characteristics that distinguish them, such as facial features, body posture, or gestures, which are familiar to the general public. Cartoonists can cleverly exaggerate them to the point of ridiculousness.
3. Satellites routinely relay pictures of desert areas. From these pictures, it can be determined where locusts are likely to breed. With information on the locusts' breeding areas, agriculture officials can use pesticides to kill these insects before they become a menace. If not eradicated, a single swarm can devour 80,000 tons of corn a day – sustenance for half a million people for one year.

Ethnohistorians, the scholars who blend anthropology's insights with historical research to produce a cultural understanding of the past, have been making advances in understanding the Native American perspective on European colonialization.

The author mentions all of the following as sources of primary documentation EXCEPT

- (A) government reports
- (B) travel accounts
- (C) trade journals
- (D) history books

2. Although Winslow Homer (1836–1910) is best known for his realistic watercolors of powerfully dramatic seascapes, he first won acclaim in the art world as an illustrator for the reportage of the American Civil War. This led to his illustrating texts of prose and poetry. His more than 160 drawings reached print as lithographs, wood engravings, and photomechanical cuts. Despite the skill and serious intent he invested in them, Homer's book illustrations made little impact during his lifetime. Even today, most of his illustrations are not discussed in the literature covering his work, and nearly all of them have been excluded from even the most comprehensive exhibitions of Homer's art.

The author mentions all of the following as types of work Winslow Homer did EXCEPT

- (A) photography
- (B) lithographs
- (C) watercolors
- (D) illustrations

3. Almost all sports and outdoor leisure activities carry real risks. Swimmers drown, mountaineers fall, skiers are swept away by avalanches, and boxers are killed by blows to the head. A person's skill or experience is no guarantee against disaster. In fact, the better an athlete is, the greater the temptation to break records or succeed in doing something that has never been done before. Danger, which tests nerves, courage, and skill, is an essential element that adds thrill and enjoyment to a sport. Although those who organize sports formulate their rules in a way to minimize the risk of injury and to ensure that medical assistance is readily available, no amount of caution can alter basic facts: even the best-trained horse may panic; motorcycles give little protection in a crash; and a hard-driven golf ball can go astray.

According to the passage, all of the following are risks in sports EXCEPT

- (A) falls
- (B) storms
- (C) accidents
- (D) avalanches

4. Perhaps one of the most hazardous ways of making a living from the sea was diving for pearls. Only the most daring would risk their lives in this profession. The technique of pearl diving was simple. Divers attached themselves to ropes that were used to keep them in contact with an assistant on board the ship. Attached to a different rope were large weights that helped to speed the divers' descent and, hence, conserve their breath for searching the seabed. Also needed were nose clips, heavy gloves that provided protection for their hands against the sharp edges of the oyster shells, and a net in which they collected the oysters. These nets were slung around

the divers' necks so as not to impede the movement of their hands. When the divers signaled their intention to surface, the assistant hauled them and their load of oysters up. The oysters were then opened, and any pearls found were sifted through sieves and graded according to size and quality. Once a widely practiced profession, pearl diving has largely disappeared with the development of the cultured pearl.

The author mentions all of the following as the pearl divers' underwater activities EXCEPT

- (A) the contact with an assistant on board
- (B) the attachment of a heavy weight to make them descend faster
- (C) the collection of oysters
- (D) the opening of the oyster

5. Margaret Mitchell wrote only one novel, *Gone with the Wind*. It was published in 1936 and proved to be such a huge success that Mitchell's life was irrevocably altered. She lost all her privacy and lamented this fact constantly until her death in 1949. The novel, which has been translated into 28 languages and has sold more copies than any other book except for the Bible, won the Pulitzer Prize in 1937. Two years later, the movie produced by David O. Selznick had its premiere in Atlanta. This movie holds the record of having been viewed more times than any other movie produced. Throughout her life, Mitchell denied that her main characters, Scarlett and Rhett, or any of her other characters, were biographical in any way. She did have access to family correspondence dating from the 1850s to the 1880s, the time of the American Civil War. It seems natural that a woman with Margaret Mitchell's vivid imagination and historical awareness, and in possession of a collection of family correspondence that documents such a volatile era as that of a civil war, could weave a story that still enthralls.

The author of the passage gives all the relevant dates about Mitchell EXCEPT the date of

- (A) the family letters
- (B) her birth
- (C) the first showing of the movie
- (D) the first printing of the novel

EXERCISE R11 *Determining whether statements are the same or different*

Write *S* in the space if the two sentences have the same meaning. Write *D* if they have different meanings.

 D A collection of fascinating tales called *The Arabian Nights* was introduced to Europe by the French scholar Antoine Galland.

The French scholar Antoine Galland introduced to Europe a collection of fascinating tales that he named *The Arabian Nights*.

You should write *D* because the sentences do not mean the same thing. The first sentence means that the scholar introduced the tales, whereas the second sentence means that the scholar both introduced and named the tales.

1. ____ Scree, which abounds in the Rocky Mountains, has its origins in the ice ages.
The Rocky Mountains have a lot of scree, the formation of which dates back to the ice ages.

2. ____ Many reef organisms avoid dead-end caves, which lack the steady currents necessary for bringing a continuous food supply.
Dead-end caves don't have currents that bring in food supplies, so many reef organisms don't go there.
3. ____ Two theaters in Stratford-upon-Avon and two in London are the ones regularly used by the Royal Shakespeare Company.
The Royal Shakespeare Company regularly uses four theaters – two in Stratford-upon-Avon and two in London.
4. ____ Police reconstruct scenes because people seem to recall things best when they are in the same physical situation.
When people are in the same physical situation, they seem to remember better scenes than the ones police have reconstructed.
5. ____ Despite the cold Alaskan temperatures, which freeze perspiration and breath in men's beards, cabin fever forces inhabitants to challenge the elements.
Alaskan inhabitants suffer from cabin fever, which causes perspiration and breath to freeze in men's beards.
6. ____ Leather, when improperly handled and exposed to changeable temperatures, cracks easily.
Leather cracks easily when it is handled incorrectly and is exposed to variable temperatures.
7. ____ Despite the increasing pollution of their shorelines over the past decade, oceans have become cleaner in the vast open-sea areas.
During the last ten years, pollution has been increasing along the coasts of the oceans and spreading to the once clean open-sea areas.
8. ____ The Hitler diaries, the greatest known publishing fraud in history, were written by a man who copied material from Hitler's speeches and medical reports.
By copying material from Hitler's speeches and medical reports, a man wrote the Hitler diaries, known as the greatest publishing fraud in history.

EXERCISE R12 *Locating restated information*

Read each passage and the restatement that follows it. Underline the words or phrases in the passage that give the information that is restated.

The damp British climate may be infuriating to humans, but it is ideal for plants. The Gulf Stream flows across the Atlantic to warm the west coast of these islands, which occupy the same latitudes as Newfoundland. Moisture-laden Atlantic winds bring almost constant rain and mist.

The perfect weather conditions for plants to flourish are found in the wet British Isles.

You should underline *British climate* (weather conditions in the British Isles), *ideal for plants* (perfect for plants), and *constant rain and mist* (wet) because these are ideas from the passage that are restated.

1. Europa, one of Jupiter's moons, is the only place in the solar system – outside of Earth – where enormous quantities of water are known to exist. Although this water is in ice form, there is a possibility that there is only a crust of ice with a liquid ocean underneath. Because of powerful thermal pulses caused by the tidal forces of Jupiter and the other moons, Europa may be the best place in the solar system for finding life forms.

Europa's vast oceans are unequalled in the solar system, with one exception.

2. Using sophisticated instrumentation, lightning experts have learned that lightning travels at one-third the speed of light. A lightning bolt is five times hotter than the surface of the sun and can have ten times more power than the output of a large power company. A single discharge can actually contain twenty or more successive strokes, occurring too fast for the eye to separate. Some seem to stretch for 500 miles when observed from outer space.

It is possible that a lightning bolt, which seems very large, is really a series of bolts.

3. Once porpoises reach speeds of 12 miles per hour, they frequently leap out of the water to escape the pull of surface drag. At that point, leaping out of the water actually requires less energy than swimming. These leaps are most efficient at speeds of 40 miles per hour and greater.

Porpoises conserve energy by traveling through the air, which creates less drag than water.

4. In the earliest stages of a star's formation – a process that takes some 10,000 years – the star is surrounded by an extremely dense layer of gas and dust. This matter eventually condenses and heats up to 1 million degrees and hotter, triggering a thermonuclear explosion. During the flare-up, strong winds blowing off the surface of the star disperse the surrounding dust and expose the newborn star to observers on Earth.

People can see the birth of a star because of the strong winds that scatter the dust particles.

5. Perhaps the greatest navigators in history were the Vikings. Without compasses or other modern instruments, they explored Iceland, Greenland, and even crossed the Atlantic Ocean to the shores of North America. To find their way, they stayed close to shorelines or used the position of the sun to plot the latitude.

The Vikings were expert sailors.

6. Since the first dolphin was trained by the United States Navy in 1965 to help divers in their underwater home, *Sealab II*, many other dolphins have been drafted into the Navy. Originally, dolphins were used as messengers or to answer calls for help. Today, dolphins do such dangerous and necessary work as locating explosives hidden in the sea and helping ships navigate safely in war zones.

An important task for a dolphin is to find mines.



7. Saint Bernard dogs are large, shaggy animals. They were bred by Augustinian monks, who trained them to search for travelers lost in snowstorms or avalanches in the Alps. For hundreds of years, Saint Bernards served this purpose. But nowadays journeys across the Alps are on well-maintained road and tunnel systems, and the dogs are no longer needed.

Saint Bernards aided travelers for centuries.

8. Every year in Japan, the competitions for the longest human-powered flights are held. Out on Lake Biwa, participants attempt to break records by flying their own inventions over the water without propeller or jet assistance. The would-be human birds glide until their craft meets its inevitable crash landing. A flotilla of small boats lines the flight path waiting to rescue the pilot. In the first Japanese event, a world record of 88.53 meters was established. Since then, new records have been set almost every year. These days, flights of several kilometers are regularly achieved. Participants fly in craft they have designed themselves.

EXERCISE R13 *Choosing the restatement of highlighted sentences*

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

The bulk of Kafka's writings was not published until after his early death from tuberculosis.

- (A) It was not until after Kafka's early death from tuberculosis that the bulk of his writings was published.
- (B) After the bulk of his writings was published, Kafka died an early death from tuberculosis.
- (C) After Kafka had written the bulk of his published writings, he met with an early death from tuberculosis.
- (D) An early death from tuberculosis kept Kafka from publishing the bulk of his writings.

You should choose A because this is the only sentence that contains the same information as the first sentence: First Kafka died, and then most of his writings were published.

1. Fainting is caused by a sudden drop in the normal blood supply to the brain.

- (A) The brain reacts to a drop in the normal blood supply by fainting.
- (B) Fainting occurs when the brain suddenly loses its normal blood supply.
- (C) Fainting happens when the brain drops its normal blood supply.
- (D) The brain faints when the normal blood supply drops.

2. Gorillas, which are vegetarians, have been observed to demonstrate gentle behavior toward small creatures in the wild.
- (A) Vegetarians have been observed to demonstrate gentle behavior toward gorillas and small creatures in the wild.
 - (B) Only vegetarian gorillas have been observed as demonstrating gentle behavior toward small creatures in the wild.
 - (C) Small creatures in the wild have been observed as behaving gently and demonstratively when near gorillas.
 - (D) It has been observed in the wild that gorillas, by nature vegetarians, treat small animals gently.
3. In fighting forest fires, the initial attack crews dig a fire line, which varies in width depending on the strength and nature of the fire.
- (A) Initial attack crews dig a forest fire to vary the fire line's width.
 - (B) Initial attack crews depend on the strength and nature of the fire to vary the fire line.
 - (C) The width of the fire line, which the initial attack crews dig, varies according to the strength and nature of the fire.
 - (D) In digging a fire line, the initial attack crews depend on fighting forest fires.
4. Medical quackery, which promises cures for all existing and even nonexistent diseases, has a powerful appeal even to the well educated.
- (A) Well-educated people in medicine promise to find powerful cures for diseases.
 - (B) Even well-educated people are attracted to fake cures for diseases that may or may not exist.
 - (C) Medical quackery promises the well educated a cure for diseases.
 - (D) The medical profession has appealed to the well educated for funding to find cures for diseases.
5. A silver compound has been found to kill the parasitic protozoa that are carried by the dreaded tsetse fly and that cause sleeping sickness.
- (A) The dreaded tsetse fly causes sleeping sickness and kills the parasitic protozoa used for finding silver compounds.
 - (B) It has been found that the silver compound that is carried by the dreaded tsetse fly and causes sleeping sickness kills the parasitic protozoa.
 - (C) Sleeping sickness, which is caused by the dreaded tsetse fly, has been found to kill the parasitic protozoa in silver compounds.
 - (D) Parasitic protozoa that cause sleeping sickness and are carried by the dreaded tsetse fly can be killed with a silver compound.
6. While working as a postmaster at the University of Mississippi, William Faulkner submitted thirty-seven stories to magazines, six of which were accepted.
- (A) Of the thirty-seven stories that Faulkner submitted while working at the University of Mississippi as a postmaster, six were published in magazines.
 - (B) Faulkner wrote six out of thirty-seven stories after accepting a job as postmaster at the University of Mississippi.
 - (C) Faulkner published thirty-seven stories in magazines, six of which were accepted by the University of Mississippi.
 - (D) The six accepted stories by Faulkner were about his job as a postmaster at the University of Mississippi.

7. The continental drift theory proposes that the Earth's crustal plates are driven by a global system of convection currents in the hot magma below that behave like giant conveyor belts.
 - (A) Theoretically, the Earth's crustal plates behave like giant conveyor belts, driving the convection currents across the hot magma, which causes the continents to drift.
 - (B) A global system of convection currents in the underlying hot magma acts as giant conveyor belts to drive the Earth's crustal plates.
 - (C) The continental drift theory suggests that global plates cover hot magma, which acts as a giant conveyor belt for convection currents.
 - (D) The continental drift theory is proposed by the Earth's crustal plates, which drive a global system of convection currents in the hot magma below, behaving like giant conveyor belts.

8. Medical authorities have been reluctant to support the findings of some nutritionists that vitamin C given in large doses can prevent the common cold.
 - (A) Medical authorities support nutritionists' views about the value of vitamin C in preventing the common cold.
 - (B) Nutritionists have found that medical authorities are not in favor of using vitamin C to prevent the common cold.
 - (C) Some nutritionists have found that large doses of vitamin C can prevent the common cold, but this has not been completely accepted by medical authorities.
 - (D) According to nutritionists and some medical authorities, the common cold can be prevented by giving large doses of vitamin C.

9. Female cowbirds, which cannot sing, are nonetheless able to teach songs to their young by responding to specific chirps and ignoring others.
 - (A) Even though female cowbirds cannot sing, they teach their chicks to do so by responding to specific chirps and ignoring others.
 - (B) Female cowbirds can neither sing nor teach songs to their babies by responding to certain chirps more than to others.
 - (C) Female cowbirds, which cannot sing, have other birds teach their young to sing.
 - (D) Female cowbirds, which cannot sing, unsuccessfully attempt to teach their young to sing by responding to other bird songs.

10. The conflict between those who wish to conserve a large area of unaltered and unimproved spaces and those who want the abolition of the last remnants of wilderness in the interest of industrial profit will not be resolved in the near future.
 - (A) The people who desire to conserve a large area of untouched natural land and those who want to use all land for industrialization are in a conflict that will not have an immediate resolution.
 - (B) The conflict over whether a large area of unaltered and unimproved space should be given over for industrial development and profit is of interest to those resolved to abolish the last remnants of wilderness.
 - (C) Lawyers are profiting from the unresolved conflict between the people who wish to save the last remnants of wilderness and those who want to alter and improve the space for industry.
 - (D) There is an unresolved conflict caused by people who wish to abolish industry and turn the spaces back into a natural wilderness state.

EXERCISE R14 *Choosing the restatement of highlighted sentences in paragraphs*

Read each passage. Then choose the letter of the sentence that best expresses the essential information in the highlighted sentence. Incorrect choices change the meaning in important ways or leave out essential information.

Between the late 1920s and 1950s, the Osborne Calendar Company produced a series of calendars featuring trains of the Pennsylvania Railroad. Up to 300,000 of these, featuring large, colorful scenes of trains at work, were published each year to hang in depots and shippers' offices along the lines of the famous railroad company. The scenes, mostly painted by one artist, Grif Teller, are now valuable collectibles.

- (A) The scenes of trains, for the most part painted by Grif Teller, are collectibles.
- (B) The Osborne Calendar series of train scenes are collector's items.
- (C) Grif Teller has a valuable collection of the Osborne Calendar scenes of trains at work.
- (D) Grif Teller's paintings of depots and shippers' offices are valued by collectors.

You should choose A because the scenes of trains are the valuable collectibles.

1. Tree rings have long been used to determine the ages of trees and to gauge past climatic conditions. New evidence adds considerable weight to the theory that tree rings also record earthquakes. The rings reflect the effects of earthquakes, such as tilting, the disruption of root systems, and breakage, as well as shifts in environments. Older trees and petrified trees may give information about earthquakes that took place hundreds and even thousands of years ago.
 - (A) The effects of earthquakes on trees can be seen in tree rings.
 - (B) Earthquakes cause a lot of damage to trees in the environment.
 - (C) The effects of earthquakes are tilting, disruption of root systems, breakage, and shifts in environments.
 - (D) Tilting, disruption of root systems, breakage, and shifts in environments are examples of how an earthquake affects trees.
2. Yuzen dyeing is a Japanese art that produces a lavish, multicolored type of kimono design that dates from the seventeenth century. First, a pattern is sketched on a kimono of plain, undyed silk. The garment is then taken apart and the design carefully painted onto the fabric with a paste that prevents the fabric from absorbing dye. Next, dyes are brushed over the silk, their colors penetrating only the untreated areas. After the paste is rinsed out, the strips of silk are again sewed into the kimono. Elaborate embroidery often completes the decoration.
 - (A) The paste keeps the unstitched garment together while the fabric is absorbing the colors.
 - (B) The dye is prevented from being absorbed into the fabric pieces by the paste that covers the design.
 - (C) The design is painted onto the pieces of garment with a paste that keeps the dye from destroying the design.
 - (D) The design is painted onto the fabric in places where the paste does not prevent the paint being absorbed by the garment.



3. The beaver's comical-looking flat tail, which is three-quarters of an inch thick, six or seven inches wide, and perhaps a foot long, is unique in the animal world. In the water, it serves as a rudder for swimming, and on land it props the beaver upright while the animal is cutting trees. It also serves as a radiator through which the heavily insulated beaver passes off excess body heat. The beaver uses its broad tail for an early warning system by slapping it against the water's surface, making a resounding whack that can be heard half a mile away.
- (A) The beaver's tail is like a big fan that disperses heat.
 - (B) The beaver gets rid of extra body heat through its tail.
 - (C) The beaver's body heat radiates through its heavily insulated body.
 - (D) The beaver has a heavy coat and, therefore, needs a radiator to reduce its body heat.
4. If pearls are protected properly, they can last for centuries. One reason a pearl loses its luster or cracks is that the mineral constituent of the pearl can be dissolved by weak acids. There are several kinds of acids that pearls may come in contact with. Human perspiration contains one such acid. Much of the cotton that pearls are wrapped in when not in use is treated with an acid. Another kind of acid that damages pearls is found in many modern cosmetics. The chemicals in commercial brands of makeup seep into the string canal and may penetrate into the layers of a pearl and cause deterioration. The best protection to give pearls to ensure their long life is having them cleaned and restrung at prescribed intervals.
- (A) The penetration through the pearl of the string canal causes damage to the layers.
 - (B) The deterioration of the pearl is usually caused by string canal seepage and penetration.
 - (C) The infiltration of cosmetics into the pearl may cause it to disintegrate.
 - (D) A pearl's deterioration can be prevented through cosmetic usage.

Reading Mini-test 3

Check your progress in understanding details and recognizing restatements (Exercises R9–R14) by completing the following Mini-test. This Mini-test uses question types used in the Reading section of the TOEFL iBT test.

Select the correct answer.

Questions 1–5

Every year about two million people visit Mount Rushmore, where the faces of four U.S. presidents were carved in granite by the sculptor Gutzon Borglum and his son. The creation of the Mount Rushmore monument took 14 years – from 1927 to 1941 – and nearly a million dollars. These were times when money was difficult to come by, and many people were jobless. To help him with this sculpture, Borglum hired laid-off workers from the closed-down mines in the Black Hills area of South Dakota. He taught these men to dynamite, drill, carve, and finish the granite as they were hanging in midair in his specially devised chairs, which had many safety features.

Borglum used dynamite to remove 90 percent of the 450,000 tons of rock from the mountain quickly and relatively inexpensively. His workmen became so skilled that without causing damage, they could blast to within four inches of the finished surface and grade the contours of the facial features. Borglum was proud of the fact that no workers were killed or seriously injured during the years of blasting and carving the granite. Considering the workers regularly used dynamite and heavy equipment, this was a remarkable feat.

During the carving, many changes in the original design had to be made to keep the carved heads free of large fissures that were uncovered. However, not all the cracks could be avoided, so Borglum concocted a mixture of granite dust, white lead, and linseed oil to fill them.

Every winter, water from melting snow gets into the fissures and expands as it freezes, making the fissures bigger. Consequently, every autumn maintenance work is done to refill the cracks. To preserve this national monument for future generations, the repairers swing out in space over a 500-foot drop and fix the monument with the same mixture that Borglum used.

1. The author of the passage indicates that the men Borglum hired were
 - (A) trained sculptors
 - (B) laid-off stone carvers
 - (C) Black Hills volunteers
 - (D) unemployed miners
2. According to the passage, what achievement did Borglum pride himself on?
 - (A) The four presidential faces in granite that he had sculpted
 - (B) The removal of 90 percent of the 450,000 tons of rock quickly and at a relatively low cost
 - (C) His safety record of no deaths or serious injuries during the years of work with heavy equipment and dynamite
 - (D) His skillful training of the labor force that enabled blasts of dynamite to be within inches of the contour lines of the faces

3. Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.
 - (A) Since cracks could not be avoided, Borglum tried various materials to cover them.
 - (B) In order to fill the unavoidable cracks, Borglum invented a mixture for filling them.
 - (C) A mixture was uncovered by Borglum during the changes in design needed to avoid cracks.
 - (D) Because cracks could not be avoided, Borglum bought a mixture of granite dust, white lead, and linseed oil.
4. According to the passage, today Mount Rushmore needs to be
 - (A) protected from air pollution
 - (B) polished for tourists
 - (C) restored during the winter
 - (D) repaired periodically
5. The passage discusses all of the following aspects of the creation of the Mount Rushmore carvings EXCEPT
 - (A) where the people who worked on Mount Rushmore came from
 - (B) why Borglum carved the heads of four U.S. presidents
 - (C) how Borglum dealt with fissures that could not be avoided
 - (D) when repairs to this national monument are made

Questions 6–10

Teotihuacán is the largest and most impressive urban archaeological site of ancient America, covering an area of roughly 20 square kilometers. The city was at one time thought to be the religious center of the Toltecs but is now believed to be a creation of an earlier civilization about whose origins little is known. The earliest artifacts from Teotihuacán date from over 2,000 years ago, but the period of greatest expansion dates from 200 CE to 500 CE. At its peak the city is estimated to have had a population of up to 200,000 inhabitants, with residential areas extending throughout the built-up area. Judging by regionally dispersed finds of the image of the rain god Tlaloc, of "thin orange wear" pottery, and of the characteristic architectural forms, the influence of Teotihuacán was widespread. It is not clear what caused the city's decline and eventual abandonment, but the evidence points to overpopulation, a depletion of resources, and the possible sacking by adversaries.

The primary axis of the city was the Avenue of the Dead, which extends for 2.5 kilometers through the center of the urban area, starting in the north at the Moon Plaza and continuing beyond the Great Compound complexes to the south. The avenue divided Teotihuacán into two sections with apartment compounds arranged on either side, often symmetrically, suggesting a highly planned layout from the earliest phases of construction.

The vast Pyramid of the Sun, located in the middle of the central zone, is the tallest and most dominant structure of Teotihuacán, with a height of 65 meters and a base covering approximately 10 acres. At one time the edifice was surmounted by a temple. A cave located underneath the pyramid and possibly used for ritual activities hints at its religious importance. The Pyramids of the Moon and Feathered Serpent are other notable ceremonial sites nearby.

A particular feature of the architecture of many of the pyramidal platforms at this site is the series of sloping apron walls, known as *taluds*, interspersed with vertical panels – *tableros* – producing a step-like appearance. Originally all such structures would have been covered with a layer of stucco and then painted, often with pictures of animals and mythological creatures.

6. According to the passage, the dispersed finds from Teotihuacán indicate that
- (A) the city is over 2,000 years old
 - (B) the city had an estimated population of as many as 200,000 inhabitants
 - (C) the residential areas extended throughout the urbanized area
 - (D) the city greatly influenced the surrounding areas
7. According to the passage, which of the following statements about the decline of Teotihuacán is known to be true?
- (A) The people migrated to another city.
 - (B) The population of the city starved.
 - (C) The city was invaded by neighbors.
 - (D) The cause of the decline is uncertain.
8. According to the passage, the symmetrical layout around the Avenue of the Dead
- (A) divided the city into two sections, one of which had apartment compounds for the living
 - (B) started at the Moon Plaza, continued past the Great Compound complexes, and extended as far as the center of the urban area
 - (C) included a primary axis of the city
 - (D) indicated that the city layout was planned before building began
9. Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.
- (A) A feature of the pyramidal architecture is the many platforms that make up the steps.
 - (B) The sloping walls of the pyramid have occasional vertical panels, which gives the appearance of steps.
 - (C) The architectural features known as *taluds* and *tableros* are a particular feature of the many pyramidal platforms.
 - (D) A series of sloping walls combined with vertical panels produces the appearance of steps that form the pyramidal platforms.
10. All of the following are mentioned as having been found in the Teotihuacán area EXCEPT
- (A) market streets
 - (B) religious artifacts
 - (C) ceremonial structures
 - (D) residential districts

Questions 11–15

In the eleventh century, people noticed that if a small hole were put in one wall of a darkened room, then light coming through the aperture would make a picture of the scene outside on the opposite wall of the room. A room like this was called a camera obscura. Artists later used a box to create a camera obscura, with a lens in its opening to make the picture clearer. But it was not possible to preserve the image that was produced in the box.

In 1727, Johann Heinrich Schulze mixed chalk, silver, and nitric acid in a bottle. He found that when the mixture was subjected to light, it became darker. In 1826, Joseph Nicéphore Niépce put some paper dipped in a light-sensitive chemical into his camera obscura, which he left exposed in a window. The result was probably the first permanent photographic image. The image Niépce made was a negative, a picture in which all the white parts are black and all the black parts are white. Later, Louis Daguerre found a way to reverse the black and white parts to make positive prints. But when he looked at the pictures in the light, the chemicals continued to react and the pictures went dark. In 1837, he found a way to fix the image. These images are known as daguerreotypes.

Many developments of photographic equipment were made in the nineteenth century. Glass plates coated with light-sensitive chemicals were used to produce clear, sharp, positive prints on paper. In the 1870s, George Eastman proposed using rolls of paper film, coated with chemicals, to replace glass plates. Then, in 1888, Eastman began manufacturing the Kodak® camera, the first "modern" lightweight camera that people could carry and use.

During the twentieth century, many technological improvements were made. One of the most important was color film. Color film is made from layers of chemicals that are sensitive to red, green, and blue light, from which all other colors can be made. Despite the fact that the space age has witnessed the creation of an array of technological marvels, until recently even the ability to take photographs of distant galaxies from above the Earth's atmosphere via orbiting satellites was grounded in the basic principles of photography that Niépce used when he took his first fuzzy negative pictures.

11. The first camera obscura can be described as nothing more than
 - (A) a darkened room in which an image was projected onto a wall
 - (B) a preserved image of a darkened room projected in a box
 - (C) a box with a lens, which projected an image onto a wall in a dark room
 - (D) a hole in a wall into which a lens could be inserted to project an image
12. According to the passage, what problem did Daguerre encounter?
 - (A) His pictures were all negative images.
 - (B) He could not find a way to make positive images.
 - (C) His positive images would darken.
 - (D) He could not reverse the fixed image.
13. According to the passage, George Eastman built a camera that
 - (A) used chemically coated glass plates
 - (B) produced light-sensitive prints
 - (C) used chemicals to produce clear, sharp, and positive prints
 - (D) was portable

14. Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.
- (A) The layers of chemicals that make up color film are sensitive to all colors that can be made.
 - (B) Color film uses chemicals that are sensitive to red, green, and blue light.
 - (C) Red, green, and blue light are the essential colors from which all colors can be chemically made.
 - (D) The layers of chemicals on color film are sensitive to red, green, and blue light that, combined, can make all colors.
15. All of the following people are mentioned as working with photographic images EXCEPT
- (A) Johann Heinrich Schulze
 - (B) Joseph Nicéphore Niépce
 - (C) Louis Daguerre
 - (D) George Eastman

Questions 16–20

Generations of American schoolchildren have been taught the story of how the Great Fire of Chicago in October 1871 was started by Daisy, a cow belonging to one Mrs. O'Leary. The cow, stabled in a barn behind Mrs. O'Leary's house, supposedly kicked over a kerosene lamp, which set fire to hay and other combustible materials stored there. The blaze quickly spread, and fanned by a strong southwest wind and aided by intensely dry conditions, the conflagration engulfed and entirely destroyed more than three square miles of built-up area. Almost 100,000 people were left homeless, and about 300 lost their lives. Property damage was estimated at 200 million dollars, an immense sum in those days.

Soon after the fire, the O'Leary-cow story became an almost unchallenged truth and, over the years, took on the status of a modern-day myth – a staple ingredient in the fabric of American folklore. However, there are good reasons to believe that neither Mrs. O'Leary nor Daisy was culpable. First, a police reporter later claimed to have invented the whole story. Of course, this is not a conclusive refutation, but his reasoning was valid and his alternative suggestions credible. Furthermore, the testimony of one of the main witnesses, a neighbor called "Peg Leg" Sullivan, is now thought to be questionable. Some claim he invented the story to avoid censure, since he himself was not above suspicion and there were inconsistencies in his account. Other accusers have focused the blame on a variety of targets – some local boys smoking in the barn, a different neighbor, an unnamed terrorist organization, spontaneous combustion, and, most recently, an asteroid. The asteroid theory gains credence from the fact that on the same night as the Chicago fire, neighboring states suffered more than a dozen major fires. One fire destroyed the entire town of Peshtigo, Wisconsin, with the loss of more than 1,200 lives.

Whatever the real origin of the fire, the truth is that it was inevitable, given the near-drought conditions of the time and the fact that much of the city consisted of densely packed wooden shacks served by an undermanned fire department. It seems that Mrs. O'Leary and her cow were perhaps no more than convenient and vulnerable scapegoats on which a devastated populace could center its frustrations.

16. What myth has been told to generations of American schoolchildren?
- (A) That many people lost their lives and many were left homeless
 - (B) That the Great Fire of Chicago was started by a cow kicking over a lamp
 - (C) How much the property damage caused by the Great Fire of Chicago cost
 - (D) How fast the Great Fire of Chicago spread and how much of the Chicago area was destroyed
17. What did "Peg Leg" Sullivan do?
- (A) He set the barn on fire while smoking.
 - (B) He accused some local boys.
 - (C) He gave a suspicious account.
 - (D) He came up with some believable alternatives.
18. Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.
- (A) The number of fires in the surrounding states on the same night as the Chicago fire supports the asteroid theory.
 - (B) There were a number of fires throughout the city of Chicago, and this supports the asteroid theory.
 - (C) The numerous fires on the same night as the Chicago fire means that asteroids were to blame.
 - (D) Asteroids may have caused the unusually high number of fires in Chicago on the same night.
19. All of the following are mentioned as possible reasons that the fire was so devastating EXCEPT
- (A) the lack of rain
 - (B) fire-prone building materials
 - (C) too few firefighters
 - (D) a riotous populace
20. According to the passage, Mrs. O'Leary's cow
- (A) is a myth
 - (B) is folklore
 - (C) was a scapegoat
 - (D) did not exist

You should draw the conclusion or understand that the study was probably about some aspect of children in multiracial school environments because it can be inferred from the phrases "multiracial schools in Miami" and "multiracial schools in other cities" that a multiracial environment was an important factor in choosing children from those particular schools.

Exercises R15–R21 Use Exercises R15–R21 to build your skills in making inferences and drawing conclusions in reading passages.

EXERCISE R15 *Identifying inferences*

Choose the letter of those inferences that can be made from the information given in the statement. More than one inference may be possible.

The lesser North American poets are more popular with children than major poets because they are direct and clear.

- (A) Children may have difficulty understanding major poets.
- (B) Minor poets write poetry for children.
- (C) There are fewer poets writing for children than writing for adults.
- (D) Indirect and hidden meanings are used in the poetry of major poets.

You should choose *A* because it can be inferred that the poetry of major poets is difficult for children because, unlike that of lesser poets, it is not direct and clear. You should not choose *B* because it cannot be inferred that either minor or major poets write for children or *C* because *lesser* means *minor poets*, not *fewer poets*. You should also choose *D* because it can be inferred that if children like the lesser poets because they write more directly and clearly, the major poets use indirect ways of expressing ideas.

1. Three of the published reports came from official investigations, but the other two came from private individuals.
 - (A) Private individuals cannot submit reports for publication.
 - (B) Only the three official reports were considered for publication.
 - (C) Five reports were published.
 - (D) Official investigations were made on private individuals.
2. The Institute of Anthropology plans to computerize archaeological data to help restore the Native American villages in Chaco Canyon.
 - (A) The Chaco Canyon Native American villages were destroyed by European people.
 - (B) The Institute of Anthropology collects information about Native American villages that are in ruins.
 - (C) The Native Americans in Chaco Canyon have computers to help them store data.
 - (D) Computers can be helpful in restoring archaeological plans.

3. Some scientists believe that the African bees that have devastated the Latin American beekeeping industry will become gentler as they interbreed with the previously introduced European varieties.
- (A) European bees will not be advantageous to the Latin American beekeeping industry.
 - (B) African bees are ferocious and destructive.
 - (C) The Latin American beekeeping industry will become gentler as African bees and European bees interbreed.
 - (D) African bees, as well as European bees, live in Latin America.
4. No partner helps the male pheasant-tailed jacana protect and nurture his chicks in their floating nest.
- (A) The female pheasant-tailed jacana does not take care of her babies.
 - (B) The pheasant-tailed jacana is an aquatic bird.
 - (C) The male pheasant-tailed jacana doesn't help to protect and nurture its partner.
 - (D) The male pheasant-tailed jacana does not mate.
5. Elephants are slowly becoming trapped in isolated forest enclaves completely surrounded by land cleared for agriculture.
- (A) Hunters are trapping elephants in isolated forest enclaves to get their ivory tusks.
 - (B) People are destroying the elephants' habitat to make farms.
 - (C) Elephants would have to cross over farmland to migrate to different forest areas.
 - (D) People are trapping elephants to use them for clearing land for agriculture.
6. To safeguard sunken ships from adventurers or thieves, ship salvagers keep the wrecks under constant surveillance by electronic and other means.
- (A) Thieves sink ships to steal the cargo.
 - (B) Sunken ships contain things that are valuable.
 - (C) Ship salvagers are usually caught before they steal anything because of safeguards.
 - (D) There are various ways to guard sunken ships from pilferers.
7. A species of weed known as the gopher plant has earned a new name – the gasoline plant – because it yields a milky latex containing hydrocarbons that can be refined into substitutes for crude oil and gasoline.
- (A) Some weeds have been renamed "gasoline plants" because their latex can be made into a gasoline substitute.
 - (B) Gasoline refined from the gasoline plant will soon replace the need for gasoline from other sources.
 - (C) Substitutes for crude oil and gasoline can come from hydrocarbons.
 - (D) Milk contains hydrocarbons necessary for crude oil and gasoline substitutes.
8. Not yet profitably synthesized, morphine, a drug unsurpassed for controlling pain, is still being scraped from opium poppy heads as it was at least 5,000 years ago.
- (A) Morphine, a drug from the poppy plant, is no longer profitable to cultivate.
 - (B) Cocaine is not as effective as morphine for stopping pain.
 - (C) Morphine has been used for pain control for at least 5,000 years.
 - (D) It is possible to make artificial morphine economically.

EXERCISE R16 *Locating sources for inferred information*

Read the passage and the statement about inferences that follows it. Underline the part or parts of the passage from which the inference can be made.

Is it true that crime doesn't pay? Although it is impossible to report every dollar that was generated in the U.S. economy by Watergate, figures pointed at what could be termed a first-class growth industry. Fees, royalties, fines, bills, and other miscellaneous payments added up into the millions of dollars moving around in the U.S. economy.

It can be inferred from this passage that Watergate is the name for a crime that took place in the United States.

You should underline *crime* and *dollar that was generated in the U.S. economy by Watergate* because it can be inferred that Watergate was a crime or else it wouldn't have been cited in the discussion of whether or not crime pays. The passage goes on to discuss how crime has paid by generating money in the U.S. economy.

1. Unlike other toads, the male golden toad is nearly voiceless. It attracts its mate through its unmistakable orange color. When the clouds are thick in the rain forest, usually in April and May, the male toads appear like flashing neon signals, which is as effective as croaking in luring females during the mating season.

It can be inferred from this passage that most toads attract their mates by making sounds.

2. The great temple of Borobudur is a stepped pyramid of unmortared andesite and basalt volcanic stone, with a perimeter of 403 feet and standing 105 feet high. This holy place lay abandoned and forgotten for more than 800 years after a devastating earthquake and an eruption of one of the four surrounding volcanoes caused its population to flee in 1006. Besides earthquakes and volcanoes, torrential rains, encroaching tropical vegetation, and time have all taken their toll.

It can be inferred from this passage that the temple of Borobudur is in ruins.

3. Some multiple sclerosis victims are experimenting with deadly snake venom to ease the pain and tiredness caused by their disease. First, the poison is milked from cobra, krait, and viper snakes. One part of it is then mixed to 4,000 parts of a saline solution. Although medical authorities are skeptical of the treatment, those using it claim that the venom has startling healing qualities.

It can be inferred from this passage that snake venom for the treatment of multiple sclerosis has not yet been approved by doctors.

4. The cassowary, one of the world's largest and least known birds, grows to a height of 6 feet and a weight of 120 pounds. Its powerful legs, which it uses for defense, are fearful weapons because the inner toe of each foot is equipped with a sharp claw, four inches long. The cassowary has glossy black plumage, which hangs coarse and brushlike because it lacks the barbules that are needed to lock feathers into a flat vane. The naked neck is of iridescent blue on the sides and pink on the back. Its head is crowned by a leathery helmet that protects it when it is charging through the jungle.

It can be inferred from this passage that the cassowary probably doesn't fly.

5. Prior to 1870, little stone decoration was done on New York buildings, except for churches and public buildings. With the arrival of artisans among the groups of European immigrants, architectural carving began to flourish. Architects would buy sculptures already done or show sketches of what they wanted carved. Away from the master carver, who had dictated what was to be carved, the artisans created eclectic and uninhibited sculptures, which became integrated into a purely American style.

It can be inferred from this passage that in Europe, artisans did not carve what they wanted to carve.

6. The Society for Creative Anachronism is a nonprofit club that joins together people who enjoy reenacting life as it was lived before the 1700s. Members of both sexes not only learn the art of sword fighting in mock combat but learn a wide range of authentic medieval skills as well. These include such skills as armor making, equestrian arts, games, jewelry making, astrology, and magic. Since the first tournament held in 1966, in which a dozen fighters took part, the society has increased by thousands of members.

It can be inferred from this passage that female members of the Society for Creative Anachronism fight in battles.

7. Computer-driven cameras, lights, and servomotors, as well as lasers and tiny lens assemblies, are just a few of the complex instruments that have brought to today's television viewers effective scientific informational films. Two crucial problems in such films are finding arresting visuals and creating special effects to illustrate complex scientific concepts. Computer-generated motion pictures allow the viewer to see the meaning of data and complex relationships instantly and are a new aid to human understanding of almost limitless power.

It can be inferred from this passage that computers used in the film industry have enabled people to understand science better.

8. Fish rubbings and nature printing have been developing as art forms in North America over the past several decades, although the techniques may date as far back as the time of early cave dwellers. To make a fish print, one should choose a very fresh fish with large rough scales and a flat body. Other needed materials are several brushes, including a fine brush for painting the eyes on the print, a thick waterbased ink, newspaper, modeling clay for supporting the fins, straight pins, and cloth or absorbent paper such as newsprint. Handmade paper is best, but it is more expensive and not recommended for beginners. The fish should be washed, dried, and laid out on the newspaper. A thin layer of ink should be brushed on in both directions. The paper is then placed over the fish and pressed carefully with the fingers, avoiding wrinkles or movement of the paper.

It can be inferred from this passage that it takes practice to become proficient in using this technique.

9. Characteristics of tropical rain forests are high and steady levels of heat and moisture, as well as a wide variety of organisms. It is believed that two-thirds of all species live in the tropics, and half of those live in the tropical rain forests. Nowhere else, except perhaps in tropical coral reefs, is nature so great in its diversity of organisms and complex in its biological interaction.

It can be inferred from this passage that tropical coral reefs contain a wide variety of organisms.



10. Even though historians think that ice-skating has been a sport for the last 2,000 years, it is within the last five decades that skating has gained recognition as a form of art. Champion athletes combine new heights of athleticism with the elegance of dance in what is now called figure skating. Ice-skaters performing daring jumps in flamboyant costumes have brought ballet to the ice rink. Ice-skating is now seen as an exciting and innovative sport that has won millions of new admirers.

It can be inferred from this passage that ice-skaters are both athletes and artists.

EXERCISE R17 *Checking if an inference is correct*

Read each sentence and answer *Yes* or *No* to the question that follows.

Volunteers for organizations such as Save the Children make an extremely important personal contribution toward improving the daily lives of millions of children throughout the world.

Can it be inferred that Save the Children volunteers contribute a lot of money to aid children?

No

You should write *No* in the space because a "personal contribution" does not necessarily mean a monetary contribution. Volunteers may contribute time or a special personal skill that they have in order to aid children.

1. Each day, more and more communities discover that they have been living near dumps or on top of ground that has been contaminated by toxic chemicals.
Can it be inferred that communities aren't always told when and where toxic wastes are being disposed?

2. E. B. White's death, at 86, was cause for sadness in millions of homes.
Can it be inferred that E. B. White was famous?

3. There is evidence that a global firestorm raged about the time the dinosaurs disappeared.
Can it be inferred that dinosaurs became extinct because of a global firestorm?

4. Of the twelve sulfite-associated deaths, one was caused by wine, one by beer, and one by hashed brown potatoes; the rest were linked to fresh fruits or vegetables.
Can it be inferred that nine people died from sulfite-contaminated fresh foods?

5. Quinolone, a recently discovered antibiotic, inhibits an enzyme that controls the way bacterial DNA unravels and rewinds when microbes reproduce.
Can it be inferred that quinolone will eventually replace all other antibiotics?

6. For people whose nerves have been damaged by illness or injuries, actions such as walking or grasping an object may be impossible.
Can it be inferred that the nervous system is important for muscle control?

EXERCISE R18 *Identifying inferences in paragraphs*

Read the passage and the statements that follow it. Write *I* in the space if the statement is an inference. Write *R* if the statement is a restatement. Leave the space blank if the statement is neither an inference nor a restatement.

Francis Gary Powers survived when his high-flying reconnaissance aircraft was shot down over the Soviet Union in 1960. He was convicted of espionage after a trial in Moscow. Later, Powers was returned to the United States in exchange for Soviet spy Rudolf Abel. Powers was killed in a helicopter crash in California in 1977.

- A. R Powers was found guilty of spying in the Soviet Union.
 B. I Rudolf Abel was imprisoned by the United States for spying.
 C. _____ Powers was killed during a reconnaissance mission.

You should write *R* for A because to be "convicted of espionage" means the same as to be "found guilty of spying." You should write *I* for B because Rudolf Abel must have been imprisoned by the United States if the Americans exchanged him for Powers. You should leave C blank because no information is given on why Powers was flying in the helicopter. It might have been for work or for pleasure.

1. The MacArthur Prizes, or "genius awards," are large grants of money given to individuals who show outstanding talents in their fields. According to a foundation spokesperson, this money frees these people from financial worries and allows them the time to devote themselves to creative thinking. The recipients of MacArthur Prizes are people who have already achieved considerable success. It may be asked whether they attained success despite the fact that they had to worry about money or because of it.
 - A. _____ Someone who is not already known in his or her field will probably not be a recipient of a MacArthur Prize.
 - B. _____ Some people may become successful because they are worried about money.
 - C. _____ Some individuals receive large sums of money to think.
2. The CDC (Centers for Disease Control) is responsible for the research done in solving or attempting to solve medical mysteries. Teams of epidemiologists crisscross the country investigating outbreaks of disease. They ask questions, look for clues, and track down pieces of puzzles in a relentless pursuit to find answers that will bring about breakthroughs in the prevention or cure of serious diseases. The CDC rushes in to study epidemics because it is possible to quickly determine patterns and common links among the victims.
 - A. _____ The CDC is not always successful in its research of diseases.
 - B. _____ Epidemiologists travel across the nation to do their research.
 - C. _____ Because there are more victims when an epidemic strikes, more data can be collected to find answers to medical questions.



3. Astronomers have long believed that frozen gases and water account for up to 80 percent of a comet's mass. While observing Comet Bowell, astronomers were able to measure the amount of light this comet absorbed and reflected. On the basis of these observations, they determined that comets do indeed contain frozen water.
 - A. _____ Astronomers have proved the theory that comets contain frozen water.
 - B. _____ The ice content of other comets can be ascertained by measuring how much light they absorb and reflect.
 - C. _____ The name of the observed comet is Bowell.
4. Although most honeybees die in the field while gathering pollen, some bees die in the hives and must be removed in order to prevent the spread of disease and to keep the nest from filling up with corpses. These corpses emit a chemical that signals death. While some bees ignore the corpses, others poke at them, lick them, or inspect them. Usually within an hour, the bees that are in charge of removing dead bees grasp the corpses in their mandibles, pull them through the hive toward the entrance, then fly away and drop them as far as 400 feet from the hive.
 - A. _____ Dead bees cannot be left in the hive because they may make the other bees sick.
 - B. _____ The honeybees know there is a dead bee in the hive because of the death chemical that is emitted.
 - C. _____ In less than one hour, the dead bees have usually been removed from the hive.
5. The northern elephant seal, a 2,000-pound mammal, is making a dramatic comeback after being hunted to near extinction in the late nineteenth century. The seals that once thrived off the coast of California now receive protection from both the Mexican and United States governments. A contributing factor to their survival is the reduced demand for seal oil due to the ready availability of petroleum products.
 - A. _____ Products that were once made from seal oil are now made from petroleum.
 - B. _____ Petroleum is easier to obtain now than seal oil is.
 - C. _____ Northern elephant seals are now numerous.
6. Diverse in culture and language, the tenacious men and women who inhabit the world's harshest environment, the land above the Arctic Circle, probably descended from hunting societies pushed north from Central Asia by population pressure about 10,000 years ago. "Scarcity" is the word that best describes the Arctic ecosystem, where life-giving solar energy is in short supply. In the winter, the sun disappears for weeks or months depending on the latitude. Even during the months of prolonged sunlight, the slanted rays cannot thaw the frozen subsurface soil. But more than the severe cold, the lack of resources for food, clothing, and shelter defines the lifestyles that the Arctic peoples lead.
 - A. _____ Scarcity of food, clothing, and shelter influences Arctic living conditions more than the harsh climate does.
 - B. _____ Anthropologists are not completely certain about the ancestry of the Arctic peoples.
 - C. _____ The further north one is, the less sunshine there is.

7. Half of all the astronauts on space flights are afflicted with debilitating space sickness, an ailment akin to car sickness and marked by nausea and vomiting. It is believed that zero gravity and its effect on the inner ear and the flow of body fluids are the cause. Scientists are attempting to find a way to predict who is susceptible to the illness because it interferes with the important work that must be done efficiently during space missions.
- A. ☐ Scientists cannot tell whether an astronaut who suffers from car sickness will suffer from space sickness.
 - B. ☐ Space sickness makes it difficult for afflicted astronauts to do their work.
 - C. ☐ Space sickness and car sickness are related illnesses.
8. The white shark, which has acquired a reputation for mindless ferocity unequalled among terrestrial or aquatic predators, belongs to the family known as the mackerel shark. Nothing about this terrifying fish is predictable: not its behavior, range, or diet. Despite this fearsome reputation, evidence from the remains of victims of shark attacks suggests that the white shark does not eat people.
- A. ☐ A white shark is a kind of mackerel shark.
 - B. ☐ The white shark has gained a terrifying reputation because it attacks people.
 - C. ☐ The white shark attacks its victims for reasons other than hunger.
9. Because they seem to be taking a measure with each looping stride, some caterpillars are called geometrids, or earth measurers. From this comes their common name, inchworms. This caterpillar grasps a twig with its back legs, extends itself forward, then draws its back end up to its front legs and repeats the sequence.
- A. ☐ The geometrid moves by stretching forward, then moving its back to its front, then repeating this process.
 - B. ☐ Not all caterpillars are inchworms.
 - C. ☐ All inchworms are earth measurers.
10. The Merlin is propelled by six compact engines, each encased in a separate duct. With no exposed blades, the craft is much safer to maneuver on the ground than either a helicopter or small plane. The Merlin takes off and hovers by blasting a column of air straight down and moves forward by directing some of that air backward with movable vanes behind each engine.
- A. ☐ The Merlin is a kind of aircraft.
 - B. ☐ Exposed blades make some aircraft unsafe.
 - C. ☐ Production of the Merlin has not yet begun.

EXERCISE R19 *Making inferences*

Read the passage and the question that follows it. Then choose the letter of the best answer based on the information given.

In the third and fourth centuries, the Germanic tribes of central Europe joined forces and plundered the crumbling Roman Empire. But they in turn became the victims of the Norse invasions of the eighth century. The Norsemen raided villages in every region. They killed the men, abducted the women and children, and then departed in their fast-sailing ships, leaving nothing but a few smoldering ruins.

What does the author mean by the statement "they in turn became the victims"?

- (A) The Germanic tribes turned on the Norse invaders in the eighth century.
- (B) The Germanic tribes and the Norse invaders took turns in attacking the Roman Empire.
- (C) The Germanic tribes received the same treatment from the Norsemen that they had given the Roman Empire.
- (D) The Roman Empire was first plundered by the Germanic tribes in the third and fourth centuries and then by the Norsemen in the eighth century.

You should choose C because the author is pointing out how the invaders later became the victims of another group of invaders.

1. Erosion of America's farmland by wind and water has been a problem since settlers first put the prairies and grasslands under the plow in the nineteenth century. By the 1930s, more than 282 million acres of farmland were damaged by erosion. After decades of conservation efforts, soil erosion has accelerated due to new demands placed on the land by heavy crop production. In the years ahead, soil erosion and the pollution problems it causes are likely to replace petroleum scarcity as the nation's most critical natural resource problem.

Why does the author mention "petroleum scarcity"?

- (A) To show that petroleum scarcity will become the most critical natural resource problem
- (B) To prove that petroleum is causing heavy soil erosion and pollution problems
- (C) To indicate that soil erosion has caused humans to place new demands on heavy crop production
- (D) To emphasize the fact that soil erosion will become the most critical problem the nation faces

2. Contamination of the sea caused by oil spills is a critical problem as wind and wave action can carry oil spills a great distance across the sea. However, there are ways in which oil spills in the sea can be dealt with. For example, straw, which can absorb up to four times its weight in oil, can be thrown on the spill and then be burned. Oil can be broken up and sunk by sand, talcum powder, or chalk. Under experimentation, some chemicals have been shown to disperse the spill into droplets, which microbes can then destroy.

Why does the author mention that straw "can absorb up to four times its weight in oil"?

- (A) To emphasize the versatility of straw
- (B) To show why straw is useful in cleaning oil spills
- (C) To compare the weight of straw to that of oil spills
- (D) To give background on the properties of straw

3. The quality of the graphics output on a computer printer is measured in dpi (dots per inch). Simply by changing the density of dots that make up each part of an image, the printer can produce graphics that look almost photographic. To understand how this works, consider how a black-and-white photograph shows the shades that, in real life, are colors. Each color is a different shade of gray. For graphics to be produced on the computer printer, a piece of software called a printer driver decides upon a dot pattern that will represent each color shade. These different patterns or textures each create an individual effect that your eye translates into gray shades. The closer you look at the image, however, the less lifelike it looks.

Why does the author mention "a black-and-white photograph"?

- (A) To explain how a printer makes graphics
 - (B) To compare the clarity of computer graphics to photographs
 - (C) To emphasize the difference between colored graphics and black-and-white graphics
 - (D) To convince the reader that dpi is preferable to photography
4. Endesha Ida Mae Holland became a playwright by a mere twist of fate. While studying at the University of Minnesota, Ms. Holland was consumed by activities other than academics. She helped start student groups dedicated to racial progress and black unity. Off campus, she formed an organization to get former prisoners back on their feet. So diverted, it took her nearly 15 years to earn her bachelor's degree. When she found herself four credit hours short of a degree, she enrolled in an acting course, which she thought would be easy because of her experience on speaking tours. But by transposing two numbers, Ms. Holland accidentally signed up for an advanced playwriting seminar. An author was born.

What does the author mean by stating "Endesha Ida Mae Holland became a playwright by a mere twist of fate"?

- (A) It took nearly 15 years to complete her bachelor's degree.
- (B) An author was born.
- (C) She didn't intend to take the playwriting seminar.
- (D) She had experience because of her speaking tours.

EXERCISE R20 *Drawing conclusions*

Read the statement and the question that follows it. Then choose the letter of the best answer based on the information given.

Few school curriculums include a unit on how to deal with bereavement and grief, and yet all people at some point in their lives suffer from loss through death and parting.

What topic would probably NOT be included in a unit on bereavement?

- (A) How to write a letter of condolence
- (B) What emotional stages are passed through in the healing process
- (C) How to give support to a grieving friend
- (D) What the leading causes of death are

Bereavement is the state of experiencing the death of a relative or friend. Since the leading causes of death are not relevant to the particular death that a person may have to deal with, you should choose D.

1. Studies show that bike races in Mexico City, where the air is 20 percent less dense than at sea level, tend to be 3 to 5 percent faster than at lower altitudes.

In which area would a bike race probably be the slowest?

- (A) Along the coast
- (B) On an indoor track
- (C) On a high plateau
- (D) Near the snow line of a volcano

2. Owners of famous and valuable paintings have recently been commissioning talented artists to paint copies of these art treasures to exhibit in their homes.

What is the most likely reason an owner of a valuable painting might want to exhibit a copy instead of the original?

- (A) Because they need to trick the experts
- (B) Because they hope to foil would-be thieves
- (C) Because they want to encourage talented artists
- (D) Because they enjoy buying fake paintings

3. The Academy of Dog Training supplies law enforcement agencies with German shepherds that are trained to recognize the smell of marijuana and other drugs.

In which of the following places would these German shepherds most likely be used?

- (A) At scenes of violent crimes
- (B) Where burglaries have taken place
- (C) At public swimming pools
- (D) At customs checks between borders

4. Schools based upon the philosophy of Rudolph Steiner are all coeducational, practice mixed-ability teaching, and discourage competition among children.

Which of the following activities would probably NOT be seen in a Steiner school?

- (A) A class period devoted to the teaching of mathematics
- (B) A game involving both boys and girls
- (C) A poetry-writing contest
- (D) A classroom of children reading at different levels

5. The microbiologist exposed bacteria to increasingly higher levels of cyanide until he had a type of bacteria that could destroy the cyanide that had been dumped into rivers by chemical plants.

In what way could these bacteria be useful?

- (A) For saving the water life from toxic wastes
- (B) For poisoning undesirable fish
- (C) For cleaning swimming pools
- (D) For increasing the cyanide in the chemical plants

EXERCISE R21 *Reviewing inferences*

Read each passage and the items that follow it. Then choose the letter of the best answer for each.

Questions 1–4

The Malabar Pied-Hornbill usually nests in the fruit trees that bear its food. First, the female enters a hole in the tree and sheds her feathers. Then, she and her mate seal the hollow with mud and dung, leaving a crack through which he feeds her. When the chicks hatch and her plumage returns, she breaks out, resealing the nest to guard the young, which emerge later.

1. The Malabar Pied-Hornbill is probably a

- (A) chicken
- (B) seal
- (C) bird
- (D) bear

2. What can be said about the Malabar Pied-Hornbill's nest?

- (A) It is padded with feathers.
- (B) It is so warm that the female Malabar Pied-Hornbill loses its plumage.
- (C) The female Malabar Pied-Hornbill breaks it up after losing her plumage.
- (D) Its cracks are covered by the feathers which the female Malabar Pied-Hornbill plucks off herself.

3. Which of the following statements can be inferred?

- (A) The male is afraid of other males and, therefore, forces his mate into the nest and seals it.
- (B) The female is so involved in building her nest that she doesn't realize she's locked herself inside it.
- (C) The female purposely imprisons herself to lay her eggs.
- (D) The female has to keep the male from hurting the babies, so she encloses herself in the nest.

4. The male Malabar Pied-Hornbill probably

- (A) feeds the eggs through a crack in the nest
- (B) doesn't help the female until she has enclosed herself in the nest
- (C) uses his plumage to guard the recently hatched chicks
- (D) doesn't hatch the eggs by keeping them warm with his own body

Questions 5–7

The Mississippi River and its tributaries form the world's fourth-longest river system. Two Canadian provinces and all or parts of 31 states in the United States have rivers that drain into the Mississippi. As the Mississippi River flows down to join the sea, it deposits sand, silt, and clay, building the delta seaward across Louisiana's shallow continental shelf. The delta marsh and its bays, lakes, and sounds provide shelter and nutrients for North America's most fertile marine nursery.

5. It can be inferred from the passage that
 - (A) Canada has only two drainage areas in its provinces
 - (B) there are 31 states in the United States
 - (C) the 31 states mentioned have no other river systems to carry silt, sand, and clay
 - (D) some of the silt deposited in the Louisiana delta is from Canada
6. It is probably true that
 - (A) the delta system formed by the Mississippi River is very important for marine life
 - (B) nurseries have been set up in the delta so that children can take part in aquatic sports in the bays, lakes, and sounds
 - (C) the delta marshland is an excellent area for medical people to study diseases caused by mosquitoes and other insects
 - (D) the United States government has established nurseries to provide shelter and food for migrating birds
7. It can be inferred from the passage that
 - (A) the delta is being destroyed by the Mississippi River depositing sand, silt, and clay
 - (B) the geographic features of the delta are always changing
 - (C) the sea movement is building a delta on the continental shelf at the mouth of the Mississippi
 - (D) the river, delta, and sea all play an important role in building Louisiana's continental shelf

Questions 8–10

An ultralight airplane is very different from a conventional airplane. It looks like a lawn chair with wings, weighs no more than 254 pounds, flies up to 60 miles an hour, and carries about 5 gallons of fuel. Most ultralights are sold as kits and take about 40 hours to assemble. Flying an ultralight is so easy that a pilot with no experience can fly one. Accidents are rarely fatal or even serious because the ultralight lands so slowly and gently and carries so little fuel. Some models now have parachutes attached, while others have parachute packs which pilots can wear.

8. Ultralights are powered by
 - (A) an engine
 - (B) human energy
 - (C) remote control
 - (D) solar energy
9. It is probably true that
 - (A) an ultralight can be purchased at the airport
 - (B) people can put their own ultralights together
 - (C) people who fly ultralights have no experience
 - (D) ultralight builders need to have training in aviation

10. It can be inferred from the passage that

- (A) accident statistics are inaccurate because ultralights are not registered at airports
- (B) fatal accidents are frequent because of the lack of experienced pilots
- (C) ultralight pilots can walk away from most of the accidents they are in
- (D) because of the frequency of fatal accidents, laws requiring parachutes have been enacted

Reading Mini-test 4

Check your progress with making inferences and drawing conclusions (Exercises R15–R21) by completing the following Mini-test. This Mini-test uses question types used in the Reading section of the TOEFL iBT test.

Select the correct answer.

Questions 1–4

Jacob Epstein's sculptures were the focus of much controversy during the sculptor's lifetime. Epstein was born in the United States of Russian-Jewish immigrants in 1880. He moved to Paris in his youth and later to England, where he eventually settled and obtained British citizenship in 1907. His first major public commission, on a building in London, offended public taste because of the expressive distortion and nudity of the figures. In 1937, the Rhodesian government, which at that time owned the building, actually mutilated the sculptures to make them conform to public notions of decency. Many other of Epstein's monumental carvings received equally adverse criticism.

While the general public denounced his work, many artists and critics praised it. They admired in particular the diversity of his work and noted the influence on it of primitive and ancient sculptural motifs from Africa and the Pacific. Today, Epstein's work has received the recognition it deserves, and Epstein is considered one of the major sculptors of the twentieth century.

1. The author's attitude toward Epstein's work is
 - (A) critical
 - (B) derisive
 - (C) amusing
 - (D) admiring
2. Which of the following was most probably an important influence on Epstein's work?
 - (A) public tastes
 - (B) African carvings
 - (C) Russian painting
 - (D) the Rhodesian government
3. Today, a newly erected Epstein sculpture would probably
 - (A) be mutilated
 - (B) conform to public opinions
 - (C) be well received
 - (D) be expressive

4. What does the author mean by the statement "Many other of Epstein's monumental carvings received equally adverse criticism"?
- (A) Many of Epstein's monuments were defaced.
 - (B) People have taken equal offense to other critical works of art.
 - (C) Epstein's monuments were usually denounced for their nudity.
 - (D) Other sculptures of Epstein's elicited negative comments.

Questions 5–9

History books record that the first moving picture with sound was *The Jazz Singer* in 1927. But sound films, or "talkies," did not suddenly appear after years of silent screenings. From the earliest public performances in 1896, films were accompanied by music and sound effects. These were produced by a single pianist, a small band, or a full-scale orchestra; larger movie theaters could buy sound-effects machines.

Research into sound that was reproduced at exactly the same time as the pictures – called "synchronized sound" – began soon after the very first movies were shown. With synchronized sound, characters on the movie screen could sing and speak. As early as 1896, the newly invented gramophone, which played a large disc carrying music and dialogue, was used as a sound system. The biggest disadvantage was that the sound and pictures could become unsynchronized if, for example, the gramophone needle jumped or if the speed of the projector changed. This system was only effective for a single song or dialogue sequence.

A later development was the "sound-on-film" system. Here, sounds were recorded as a series of marks on celluloid read by optical sensors. These signals would be placed on the film alongside the images, guaranteeing synchronization. Short feature films were produced in this way as early as 1922. This system eventually brought us "talking pictures."

5. Why does the author mention "a single pianist, a small band, or a full-scale orchestra"?
- (A) To show how badly paid musicians were
 - (B) To explain how sound that accompanied early films was made
 - (C) To emphasize the role sound effects played in *The Jazz Singer*
 - (D) To refute history books that claim the first movie with sound was made in 1927
6. It can be inferred that
- (A) most movie theaters had a pianist
 - (B) sound-effects machines were common
 - (C) orchestras couldn't synchronize sound with the pictures
 - (D) gramophones were developed about the same time as moving pictures
7. Why could gramophones be considered ineffective?
- (A) They were subject to variations in speed.
 - (B) They were too large for most movie theaters.
 - (C) They couldn't always match the speed of the projector.
 - (D) They were newly invented.

8. It can be understood that the synchronization system
- (A) could be placed alongside the images
 - (B) developed at the same time as sound for movies
 - (C) was an important development for talking pictures
 - (D) was a guarantee that short feature films could be produced
9. It can be inferred that short feature films produced as early as 1922
- (A) preceded talking pictures
 - (B) put musicians out of work
 - (C) were recorded by optical sensors
 - (D) were only effective for dialogue sequences

Questions 10–13

Experiments have shown that in selecting personnel for a job, interviewing is at best a hindrance and may even cause harm. These studies have disclosed that the judgments of interviewers differ markedly and bear little or no relationship to the adequacy of job applicants. Of the many reasons why this should be the case, three in particular stand out. The first reason is related to an error of judgment known as the halo effect. If a person has one noticeable good trait, their other characteristics will be judged as better than they really are. Thus, an individual who dresses smartly and shows self-confidence is likely to be judged capable of doing a job well regardless of his or her real ability. The horns effect is essentially the same error, but focuses on one particular bad trait. Here the individual will be judged as incapable of doing a good job.

Interviewers are also prejudiced by an effect called the primacy effect. This error occurs when interpretation of later information is distorted by earlier connected information. Hence, in an interview situation, the interviewer spends most of the interview trying to confirm the impression given by the candidate in the first few moments. Studies have repeatedly demonstrated that such an impression is unrelated to the aptitude of the applicant.

The phenomenon known as the contrast effect also skews the judgment of interviewers. A suitable candidate may be underestimated because he or she contrasts with a previous one who appears exceptionally intelligent. Likewise, an average candidate who is preceded by one who gives a weak showing may be judged as more suitable than he or she really is.

Since interviews as a form of personnel selection have been shown to be inadequate, other selection procedures have been devised that more accurately predict candidate suitability. Of the various tests devised, the predictor that appears to do this most successfully is cognitive ability as measured by a variety of verbal and spatial tests.

10. What does the author mean by the phrase "essentially the same error"?
- (A) The effect of the error is the same.
 - (B) The error is based on the same kind of misjudgment.
 - (C) The effect focuses only on negative traits.
 - (D) The individual is considered less capable of the job.
11. Which of the following applicants would probably be hired for the job based on an interview in which the typical interview errors are made?
- (A) A well-dressed, confident person following someone who appears very intelligent
 - (B) An unconfident, well-dressed person following someone who is well-dressed and confident
 - (C) A well-dressed, confident person following someone who has apparent flaws
 - (D) A confident person following a well-dressed, confident person

12. Which of the following statements would the author most likely agree with concerning the actions of an interviewer looking for the best applicant for a job?
- (A) The interviewer should spend time trying to confirm a first impression.
 - (B) The interviewer should be confident and well-dressed.
 - (C) The interviewer should be aware that this process is a hindrance to finding the right person.
 - (D) The interviewer should look for other ways to choose the best applicant.
13. The paragraphs following the passage most likely discuss which of the following?
- (A) Other reasons for misjudgments about applicants
 - (B) More information on the kinds of judgmental effects
 - (C) More information on tests measuring cognitive ability
 - (D) Other selection procedures included in interviewing

PRACTICE WITH SUMMARIES AND CHARTS

Your ability to understand how a reading passage is organized and to grasp the relationships between details and main ideas will be tested in the Reading section of the TOEFL test. In the last item for each reading passage, you will be required to extract information from the entire passage and arrange the given text options into a summary or a category chart. Your ability to recognize and understand compare-and-contrast, cause-and-effect, and agree-and-disagree relationships, as well as steps in a process, will help you to succeed on these questions.

Summary questions

These questions require you to understand the main ideas that together form a summary of the passage. You will be given the first sentence in a summary and a list of other sentences. You will then be asked to choose which of the other sentences complete the summary by clicking on your choices and dragging them into a box. It is not necessary for you to put them in the correct order. The number of choices will be apparent by the number of spaces in the box.

Incorrect answer choices can be sentences that are details from the passage but are not critical to the understanding of the passage or to the formation of a summary. Incorrect choices can also be sentences that contain ideas that were not explicitly stated or information that is not mentioned within the passage.

Category chart questions

These questions require you to organize important material from the passage into a chart. You will be given a two-column chart with answer choices on the left and category headings on the right. You will then be asked to sort the answer choices under the appropriate headings by clicking on the choices and dragging them from the left column to the right. You will not always use all of the answer choices.

Incorrect answer choices may include information that is not mentioned in the text. Incorrect choices can also be incorrect generalizations or conclusions.

Exercises R22–R24 Use Exercises R22–R24 to build your skills in recognizing the relationships between details and main ideas in reading passages.

EXERCISE R22 *Understanding summaries*

Read each passage and the statements that follow it. Write *S* in the blank if the sentence summarizes the passage. Write *D* if the sentence expresses a detail in the passage. If the sentence expresses ideas not found in the passage, write *N*.

The Pre-Raphaelite brotherhood was a school of artists formed in about 1848. The Pre-Raphaelites' ideal was absolute fidelity to nature. For a time, this school of painting greatly influenced art developments throughout Europe. However, within a decade, the movement had disbanded.

- A. N The Pre-Raphaelite movement formed in 1848 broke up within ten years due to European influences on the brotherhood.
- B. S The Pre-Raphaelite movement, which advocated a faithful portrayal of nature, influenced European art developments in the mid-nineteenth century.
- C. D The Pre-Raphaelites brought their ideals of a true portrayal of nature to their painting.

For *A* you should write *N* because there is no information in the passage concerning the reason the brotherhood disbanded. For *B* you should write *S* because this sentence summarizes the passage. For *C* you should write *D* because this is a restatement of a detail in the passage.

1. Because winning or losing a race in skiing can be a matter of a tiny fraction of a second, skiing equipment has undergone many changes. Even clothing has changed as skiers search for ways to increase speed. Now they wear one-piece suits that cling to their bodies in order to reduce wind resistance. Nothing is worn under these tight-fitting suits as anything extra may mean the loss of an important millisecond.
 - A. ____ Skiers are always searching for ways to change their appearance for an important race.
 - B. ____ Skiing equipment and clothing have been developed specifically to increase racing speeds.
 - C. ____ Clothes that cling to a skier's body cause less wind resistance.
2. Rice is the only major grain crop that is grown almost exclusively as human food. Some remarkable genetic advances have made it possible to cultivate high-yield varieties that are resistant to disease and insect pests. Because rice constitutes an essential part of the diet for much of the world's population, these advances have averted disasters that otherwise would have left millions of people severely underfed.
 - A. ____ Rice has been genetically modified for use as animal feed.
 - B. ____ New rice varieties have prevented many people from going hungry.
 - C. ____ Genetic advances have led to high-yield rice varieties.



3. Addiction to cigarette smoking is basically an addiction to nicotine. Those who are attempting to overcome their addiction have found the most common cures ineffective. Switching to low-nicotine cigarettes simply causes problem smokers to smoke more. Cigarettes without any of this chemical substance are usually rejected because they don't satisfy smokers' needs. One aid, which some quitters have found effective, is a chewing gum containing nicotine, which allows them to stop without the unpleasant withdrawal symptoms. A similar kind of treatment provides a measured nicotine dose through an inhaler.
- A. ____ Smokers have tried to overcome their addiction to cigarettes using various methods.
 - B. ____ Nicotine is the chemical substance that all cigarettes contain.
 - C. ____ Methods that provide those trying to quit smoking with a way to get nicotine without smoking a cigarette have been effective in some cases.
4. Two-thirds of China's vast territory is either mountainous or covered by desert. Every spring, windstorms come raging out of the mountains and cross the great deserts, gathering dust. A dense cloud of dust forms that is hundreds of miles wide. It is blown thousands of miles, traveling from the North Pacific to the Gulf of Alaska and from there moving south and then east. As the prevailing winds lose their velocity, dust particles fall from the cloud. It is believed that as much as 10 percent of the soil in Hawaii comprises dust particles collected from China's deserts and dispersed in the journey across the Pacific.
- A. ____ As the winds abate, dust particles drop from the clouds.
 - B. ____ The raging windstorms are increasing the great deserts in China.
 - C. ____ The winds coming out of China scatter dust particles across the Pacific.

EXERCISE R23 *Identifying summary ideas*

Each of the passages below is followed by an introductory sentence that begins a brief summary of the passage. Choose the letters of the three statements that express the most important ideas in the passage. Incorrect choices express minor details or are not presented in the passage.

In 1836, crews building a canal from Washington, D.C., to the Ohio River found a major obstacle in their path: a long, steep crest of mountains known as Paw Paw Ridge. Various options for surmounting this hurdle were proposed. One idea, to build directly over the sheer cliffs, proved impractical. Another option was to create a series of aqueducts to skirt around the difficult terrain. This idea was rejected because of the anticipated time and expense.

The company's project engineer, Lee Montgomery, finally decided to tunnel through the ridge, a distance of about one kilometer. This was expected to take only two years. Perhaps this was optimistic on his part, given that power drills and dynamite had not yet been invented. Montgomery had invested much of his own money in the project and was keen to see the deadlines met. However, the construction crews found that the ridge was composed of soft shale, which frequently caved in and hampered progress. Other problems followed. Cholera, aided by the unsanitary living conditions, swept through the shantytowns, claiming many lives. At one point the laborers could not be paid.

The major obstacle for the completion of the Paw Paw Canal was the Paw Paw Ridge.

- (A) The Paw Paw Canal is named after the mountain ridge that had to be traversed.
- (B) Several ideas for overcoming the Paw Paw Ridge Canal were considered.
- (C) It was decided that a one-kilometer tunnel was the best way to overcome the barrier.
- (D) Power drills and dynamite were not available during the time that the canal was being built.
- (E) The project was beset with financial setbacks, disease, and unexpected terrain characteristics.
- (F) Unpaid laborers held protests that led to the loss of lives.

You should choose *B* because the first paragraph states and discusses ideas that were considered for overcoming the obstacle, *C* because it concerns the decision on how the ridge was to be dealt with, and *E* because these were obstacles encountered during the tunneling. *A* might be inferred but is not stated as fact. *D* is a detail. The laborers were unpaid at one point, but there is no mention of their possible response as stated in *F*.

1. A recent survey found that nine out of ten drivers admit to having felt intense anger toward other drivers at some time. "Road rage" seems to be on the rise, and several explanations for this have been presented. First, there are more cars today competing for road space. People also are far more subject to time constraints. A person who must meet a time deadline, but is caught in a tangle of traffic, may feel increasingly frustrated. Soon this stress may result in an outburst of road rage ranging anywhere from pounding on the car horn to getting out of the car and attacking another driver.

Of the three major responses to stress which have evolved – fight, flight, or freeze – only one is available to the driver who is suddenly caught behind a dawdler in the fast lane. The car itself prohibits the driver from fleeing the situation or freezing in one place. The only stress response left is fight.

Another explanation may be that people are not as courteous as they used to be. A person who is worried about getting to work on time, having a report ready for the afternoon mail, and running into the boss while coming into the office late may forget how to be polite. Other drivers become the enemy and the car, a weapon.

Road rage has become a serious problem that is on the rise.

- (A) These days the roads are very congested.
- (B) Stress caused by the frustration of dealing with the traffic is a major reason for people to succumb to road rage.
- (C) The major responses to stress are fight, flight, or freeze.
- (D) The fight response is the only recourse for the driver who cannot flee nor freeze because of the situation the car puts him or her in.
- (E) The car is now a weapon and all other drivers are the enemy.
- (F) The stresses of modern-day living may cause people to forget courtesy and give in to road rage.

2. For a fossil to be found, a complicated series of steps must occur in sequence. The first is that the animal (or plant) must be buried quickly. Animals that die on the plains or in the mountains are soon found by scavengers, such as hyenas or ceratosaurs, and rapidly reduced to bone chips. Most animals that are fossilized are caught in a flash flood, or die in or near a river and are buried in a sand bar, or are caught in a sandstorm. If the current in the river is fairly strong, even those few animals that die in the water are soon torn apart and their bones scattered over acres of river bottom. It is estimated that perhaps one animal in a thousand is fossilized, likely a generous estimate.

The second condition necessary for an animal to be fossilized is that it must be buried in a depositional area: that is, more and more layers of mud or gravel must be laid down over it. If the area is subject to erosion – and nearly all land surfaces are – the fossil will soon be washed out and destroyed.

The third step is that this depositional area must at some time become an erosional area, so that wind and water wear it down and uncover the buried remains.

The fourth step necessary for the recovery of a fossil is that when the fossil is uncovered, someone knowledgeable has to walk along that ridge, or study the face of that cliff, and locate the fossil and recover it. The time frame for this recovery varies, but it is necessarily short. The fossil is protected, but also invisible, until it is exposed. As soon as it is exposed, wind and water attack it, and they can destroy it quickly. The best fossils are found when someone spots an exposed bone that turns out to be part of a buried skeleton and is therefore still well preserved. But many fine fossils have been washed away because no one happened to see them when they were first exposed, or the people who saw them didn't realize what they were seeing.

The conditions that have to be met in order for a fossil to be found are relatively rare.

- (A) Animals that die are quickly eaten by scavengers and reduced to bone chips within a short period of time.
 - (B) For an animal or a plant to become fossilized, it must be buried before other animals or the elements destroy the body.
 - (C) A fossilized animal must first be covered by layers of soil for a length of time and then be uncovered by erosional forces.
 - (D) A fossil must be protected from the elements for as long as it is buried.
 - (E) The best fossils are those that have not been washed away and scattered before they are found.
 - (F) An exposed fossil needs to be found and recognized by someone for what it is before it is destroyed by the elements.
3. One of the major hazards for deep-sea divers is decompression sickness (DCS), more commonly known as "the bends." This sometimes fatal condition is caused by gas bubbles forming in the bloodstream if the diver ascends too rapidly. These bubbles travel in the blood and may become lodged anywhere in the body. Most commonly, they get trapped in joints, particularly the spine. The resulting pain causes the diver to bend over, hence the name of the condition.
- The reason gas bubbles form has to do with the saturation and desaturation of body tissues with various gases. At increasingly great depths, the diver breathes air at higher pressures. This results in an increased quantity of air being dissolved in the bloodstream. Different body tissues are saturated with different gases from the air at different rates. When the diver rises to the surface, oxygen is used by the body tissues, carbon dioxide is released quickly, and nitrogen remains. The nitrogen needs to be released gradually from the bloodstream and body tissues. If nitrogen is

subjected to a too rapid pressure reduction, it forms bubbles. Not only do these bubbles collect in joints, but they also become trapped in capillaries. This prevents blood and oxygen from supplying necessary nutrients to body tissues, which consequently begin to die.

Saturation and desaturation are affected by various factors such as the depth, length of time, and amount of exertion under water. There are other factors that must be taken into account when determining a safe ascent rate. These include the diver's sex and body build, the number of dives undertaken within the previous 12 hours, the time spent at the dive location before the dive, and the composition of the respiration gas.

Diving tables set guidelines based on statistical probabilities of getting the bends. However, someone who stays within the suggested limits can still get DCS. Since even a mild case can leave a diver permanently disabled, it is imperative that divers recognize the symptoms. Unfortunately, such symptoms can be similar to those of the flu or a strained muscle, something that occurs frequently when divers are handling heavy equipment, using improperly fitted gear, or engaging in unaccustomed activity. Because even professionals can have difficulty diagnosing DCS, the most reliable test is to recompress the patient and see whether the symptoms abate.

Decompression sickness (DCS) is a sometimes fatal condition that affects deep-sea divers.

- (A) DCS is the formation of gas bubbles in the bloodstream caused by the different saturation and desaturation rates of gases under pressure.
 - (B) Most people are more familiar with the term "the bends," referring to the way a diver bends over in pain.
 - (C) Body tissues die when nitrogen prevents blood and oxygen from bringing important nutrients.
 - (D) Saturation and desaturation rates of gases are affected by factors that divers need to take into consideration.
 - (E) DCS can be misdiagnosed as the flu.
 - (F) The best way to diagnose DCS is to put the patient through recompression.
4. One of the most basic laws of economics is that nothing of value is free. Sometimes this is dubbed "tansaaf." The word *tansaaf* is formed from the initials of the statement: "There ain't no such thing as a free lunch." What this means is that everything that has value must be paid for in currency, labor, or by some other means.

Not only do people have to pay for everything that has value, but governments do as well. Governments have a lot of expenditures – public buildings, roads, military, etc. – and to get the necessary money, they tax their citizens. Nobody likes to pay taxes, and history has shown that when taxes get too high, people eventually revolt and overthrow the offending government. To avoid raising taxes, a government must find another way to deal with the problem of getting money to meet its expenses.

A case in point is the government of the Roman Empire. The Roman government taxed its citizens in order to pay for the expenses of running such a vast empire. It became apparent that if it raised taxes further, it risked provoking unrest. So it came up with the idea of clipping the denarius, a coin made of 94 percent silver. When the tax collectors brought in people's taxes paid in silver coins, the Roman treasury clipped, or shaved the edges off, the coins. The clippings were minted into new coins. For a time, this gave the government the money necessary for its budget.



But it did not take the Roman people long to realize that some of their coins were missing silver. Therefore, they either refused to accept the clipped coins or charged more coins for their goods or services.

In later centuries a system called reeding came into practice. A reeded coin has grooves along its edge making it easy to see whether or not clipping has taken place. But since the Roman government still needed money and clipping no longer served its purpose, the Roman treasury started melting down coins and reminting them with a mixture of base metal, such as copper. However, each time a coin was melted down and reminted with a base-metal mixture, the content of precious metal became less and that of base metal, more. When the Roman people realized that their money was being debased, they responded by hoarding coins. Whenever they got a good coin, one with a high percentage of silver in it, they kept it. They spent only bad coins, those with a low percentage of silver. This behavior is explained by Gresham's Law, which states: Bad money drives good money out of circulation. When debasement happens, money loses its value and prices inevitably rise.

The Roman government tried various ways of dealing with the economic problem of running their Empire.

- (A) The Roman officials understood the concept of *tanstaafl* – that nothing of value is free.
- (B) Like Roman people, the Roman government had expenses, which in the case of the Empire included building cities, maintaining roads, and keeping an army.
- (C) The Roman Treasury met expenditures by taxing citizens until further tax increases would have caused discontent.
- (D) The Roman currency was the denarius, which was composed of 94 percent silver.
- (E) By clipping silver from an old coin, the Treasury was able to mint new coins until the people became wise and the coins had to be reeded.
- (F) A further need for money caused the Roman Treasury to start the practice of minting coins that were debased.

EXERCISE R24 Organizing information into charts

In the following exercise, each passage is followed by a list of answer choices and two categories. Follow the specific instructions underneath each passage about how to match the answer choices to the correct categories. Not all of the answer choices will be used.

Early Greek columns were built in two main styles, or orders – the Doric and the Ionic – named after Greek dialects. Of these two orders, the Ionic is the more slender – but is most notably different in the decoration of the capital, the part that rests on top of the column. While the capital of the Doric column is plain and unadorned, that of the Ionic is characterized by two pairs of prominent spiral scrolls, one pair on each side of the capital, which may have been inspired by curling leaves of foliage. Between the scrolls other ornamentation, such as an egg and dart pattern, were often carved for added embellishment.

Questions 1–13

Cellular Slime Molds

Cellular slime molds are extraordinary life forms that exhibit features of both fungi and protozoa, although often classed for convenience with fungi. At one time they were regarded as organisms of ambiguous taxonomic status, but more recent analysis of DNA sequences has shown that slime molds should be regarded as inhabiting their own separate kingdom. Their uniqueness lies in their unusual life cycle, which alternates between a feeding stage in which the organism is essentially unicellular and a reproductive stage in which the organism adopts a multicellular structure. At the first stage they are free-living, separate amoebae, usually inhabiting the forest floor and ingesting bacteria found in rotting wood, dung, or damp soil. But their food supplies are relatively easily exhausted since the cells' movements are restricted and their food requirements rather large.

When the cells become starved of nutrition, the organism initiates a new genetic program that permits the cells to eventually find a new, food-rich environment. At this point, the single-celled amoebae combine together to form what will eventually become a multicellular creature. The mechanism by which the individual members become a single entity is essentially chemical in nature. At first, a few of the amoebae start to produce periodic chemical pulses that are detected, amplified, and relayed to the surrounding members, which then move toward the pulse origin. In time, these cells form many streams of cells, which then come together to form a single hemispherical mass. This mass sticks together through the secretion of adhesion molecules.

The mass now develops a tip, which elongates into a finger-like structure of about 1 or 2 millimeters in length. This structure eventually falls over to form a miniature slug, moving as a single entity orienting itself toward light. During this period the cells within the mass differentiate into two distinct kinds of cell. Some become prestalk cells, which later form into a vertical stalk, and others form prespore cells, which become the spore head.

As the organism migrates, it leaves behind a track of slime rather like a garden slug. Once a favorable location has been found with a fresh source of bacteria to feed on, the migration stops and the colony metamorphoses into a fungus-like organism in a process known as "culmination." The front cells turn into a stalk, and the back cells climb up the stalk and form a spherical-shaped head, known as the sorocarp. This final fruiting body is about 2 millimeters in height. The head develops into spores, which are dispersed into the environment and form the next generation of amoebae cells. Then the life cycle is repeated. Usually the stalk disappears once the spores have been released.

The process by which the originally identical cells of the slime mold become transformed into multicellular structures composed of two different cell types – spore and stalk – is of great interest to developmental biologists since it is analogous* to an important process found in higher organisms in which organs with highly specialized functions are formed from unspecialized stem cells. Early experiments showed which parts of the slime mold organism contributed to the eventual stalk and which parts to the head. Scientists stained the front part of a slug with a red dye and attached it to the back part of a different slug. The hybrid creature developed as normal. The experimenters then noted that the stalk of the fruiting body was stained red and that the spore head was unstained. Clearly, the anterior part of the organism culminated in the stalk and the posterior part in the spore head. Nowadays, experiments using DNA technology and fluorescent proteins or enzymes to label the prespore and prestalk cells have been undertaken. This more molecular approach gives more precise results than using staining dyes but has essentially backed up the results of the earlier dye studies.

*analogous: similar

1. According to paragraph 1, how the slime mold should be classified used to be

(A) unknown
(B) uncertain
(C) controversial
(D) unfamiliar

Paragraph 1 is marked with an arrow [➡].

➡ Cellular slime molds are extraordinary life forms that exhibit features of both fungi and protozoa, although often classed for convenience with fungi. At one time they were regarded as organisms of ambiguous taxonomic status, but more recent analysis of DNA sequences has shown that slime molds should be regarded as inhabiting their own separate kingdom. Their uniqueness lies in their unusual life cycle, which alternates between a feeding stage in which the organism is essentially unicellular and a reproductive stage in which the organism adopts a multicellular structure. At the first stage they are free-living, separate amoebae, usually inhabiting the forest floor and ingesting bacteria found in rotting wood, dung, or damp soil. But their food supplies are relatively easily exhausted since the cells' movements are restricted and their food requirements rather large.

2. The word "ingesting" in the passage is closest in meaning to

(A) chewing
(B) catching
(C) absorbing
(D) consuming

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3. According to the passage, what is unusual about the slime molds' life cycle?

(A) They inhabit their own kingdom.
(B) They are organisms whose classification is ambiguous.
(C) They alternate between unicellular and multicellular structures.
(D) They are free-living organisms.

[Refer to the full passage.]

4. According to the passage, what is the primary reason the cells need to combine into a single larger creature?
- (A) To move to find a new food source
 - (B) To slow the rate of ingesting food
 - (C) To become separate creatures
 - (D) To create their own kingdom

[Refer to the full passage.]

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

Starvation is reached when the population of cells is high in relation to the abundance of the food source.

Where would the sentence best fit?

Choose the letter of the square that shows where the sentence should be added.

6. The word "entity" in the passage is closest in meaning to
- (A) division
 - (B) species
 - (C) piece
 - (D) unit

7. The word "others" in the passage refers to
- (A) cells
 - (B) stalks
 - (C) spores
 - (D) kinds

When the cells become starved of nutrition, the organism initiates a new genetic program that permits the cells to eventually find a new, food-rich environment. **A** At this point, the single-celled amoebae combine together to form what will eventually become a multicellular creature. **B** The mechanism by which the individual members become a single entity is essentially chemical in nature. **C** At first, a few of the amoebae start to produce periodic chemical pulses that are detected, amplified, and relayed to the surrounding members, which then move toward the pulse origin. **D** In time, these cells form many streams of cells, which then come together to form a single hemispherical mass. This mass sticks together through the secretion of adhesion molecules.

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The mass now develops a tip, which elongates into a finger-like structure of about 1 or 2 millimeters in length. This structure eventually falls over to form a miniature slug, moving as a single entity orienting itself toward light. During this period the cells within the mass differentiate into two distinct kinds of cell. Some become prestalk cells, which later form into a vertical stalk, and others form prespore cells, which become the spore head.

8. All of the following are mentioned in paragraph 4 as being parts of the multicellular slug EXCEPT

(A) the head
(B) the stalk
(C) legs
(D) spores

Paragraph 4 is marked with an arrow [➡].

➡ As the organism migrates, it leaves behind a track of slime rather like a garden slug. Once a favorable location has been found with a fresh source of bacteria to feed on, the migration stops and the colony metamorphoses into a fungus-like organism in a process known as "culmination." The front cells turn into a stalk, and the back cells climb up the stalk and form a spherical-shaped head, known as the sorocarp. This final fruiting body is about 2 millimeters in height. The head develops into spores, which are dispersed into the environment and form the next generation of amoebae cells. Then the life cycle is repeated. Usually the stalk disappears once the spores have been released.

9. In paragraph 4, why does the author refer to the fungus-like organism as a fruiting body?

(A) Because it has become one entity
(B) Because it is 2 millimeters in height
(C) Because it now has a stalk and head
(D) Because it has reached its reproductive stage

Paragraph 4 is marked with an arrow [➡].

➡ As the organism migrates, it leaves behind a track of slime rather like a garden slug. Once a favorable location has been found with a fresh source of bacteria to feed on, the migration stops and the colony metamorphoses into a fungus-like organism in a process known as "culmination." The front cells turn into a stalk, and the back cells climb up the stalk and form a spherical-shaped head, known as the sorocarp. This final fruiting body is about 2 millimeters in height. The head develops into spores, which are dispersed into the environment and form the next generation of amoebae cells. Then the life cycle is repeated. Usually the stalk disappears once the spores have been released.

10. Which of the sentences below best expresses the essential information in the highlighted sentence? Incorrect choices change the meaning in important ways or leave out essential information.

(A) The next generation of amoebae cells disperses into the environment by attaching themselves to spores on the head.
(B) After the spores that form the head are scattered around the area, they develop into a new generation of amoebae cells.
(C) The spores develop into amoebae cells and then become spread around the head of the slug.
(D) The spores spread throughout an area and develop into a new generation of amoebae cells.

As the organism migrates, it leaves behind a track of slime rather like a garden slug. Once a favorable location has been found with a fresh source of bacteria to feed on, the migration stops and the colony metamorphoses into a fungus-like organism in a process known as "culmination." The front cells turn into a stalk, and the back cells climb up the stalk and form a spherical-shaped head, known as the sorocarp. This final fruiting body is about 2 millimeters in height. The head develops into spores, which are dispersed into the environment and form the next generation of amoebae cells. Then the life cycle is repeated. Usually the stalk disappears once the spores have been released.

11. It can be inferred that developmental biologists are especially interested in the slime mold because

- (A) the change in degree of specialization in its cells helps them to understand cell development in more complex organisms
- (B) it is convenient to perform experiments on a creature that is composed of two different cell types
- (C) scientists could form hybrid organisms in their experiments using the same process that slime mold uses to transform itself
- (D) it is easy to find specimens on which to perform experiments

[Refer to the full passage.]

12. According to the passage, the recent DNA studies

- (A) give similar results to the dye studies
- (B) contradict the dye studies
- (C) are less exact than the dye studies
- (D) have introduced confusion about the dye study results

[Refer to the full passage.]

13. **Directions:** Select the appropriate phrases from the answer choices and match them to the stage of slime mold life cycle to which they relate. TWO of the answer choices will NOT be used. This question is worth 4 points.

Write the letters of the answer choices in the spaces where they belong.
Refer to the full passage.

Answer Choices

- (A) Alteration between feeding and reproduction
- (B) Bacteria-consuming amoebae inhabiting the forest floor
- (C) Culmination of dyed cells in stalk and head
- (D) Development of sorocarp
- (E) Dispersal of spores
- (F) Mass formed through the secretion of adhesion molecules
- (G) Migration oriented to fresh source of food
- (H) Production of chemical pulses causing members to merge
- (I) Transformation of cells into stalk and head

Unspecialized Cells

Specialized Cells

Questions 14–26

The Coriolis Force

In the early part of the twentieth century, the Norwegian scientist and polar explorer Fridtjof Nansen noted that icebergs did not follow the path of the wind as common sense had assumed. Instead they tended to move to the right side of the direction in which the wind blew. A student of Nansen's, V. W. Ekman, showed that the rotation of the Earth leading to an inertial force known as the Coriolis force was responsible for this phenomenon. He further demonstrated that in the Northern Hemisphere the deflection was toward the right of the prevailing wind, and in the Southern Hemisphere the deflection was toward the left. The icebergs observed by Nansen were moved by ocean currents that also moved at an angle to the prevailing wind.

The Coriolis force itself is caused by the fact that the Earth rotates on its axis once per day, and hence all points on the planet have the same rotational velocity; that is, they take one whole day to complete a rotational circle. However, since a complete rotation around the Earth is shorter the further one is away from the equator, different points on the Earth travel at different speeds depending on degree of latitude. For example, a point on the equator travels the whole distance around the sphere (about 40,000 kilometers), whereas a point near the poles will travel a much shorter distance. Therefore, we can say that the linear speed of a point depends on its latitude above or below the equator. Thus the actual linear speed of a point on the surface is faster the nearer that point is to the equator.

Now if an untethered object (or current) is moving northward away from the equator in the Northern Hemisphere, it will also maintain the initial speed imparted to it by the eastward rotation of the Earth. That eastward deflection is faster at the equator than at more northerly (or southerly) latitudes, and thus, when the object reaches a more northerly point, it will be traveling faster in an eastward direction than the surrounding ground or water. The moving object will appear to be forced away from its path by some mysterious phenomenon. In reality the ground is simply moving at a different speed from the original speed at the object's (or current's) home position. The resulting direction of movement will therefore be at an angle of about 45 degrees to the original direction, so an object traveling north will move to the right in the Northern Hemisphere and to the left in the Southern Hemisphere with respect to the rotating Earth. An object traveling south will be deflected to the left in the Northern Hemisphere and to the right in the Southern Hemisphere.

As the surface water in the ocean is moved by the wind, it tends to veer* off at an angle of 45 degrees to the right or left. This movement exerts a drag on the water immediately below it, and the Coriolis force causes this layer to move and also to deflect to the right or left. This layer in turn drags the layer below, which in turn is deflected. At successively deeper layers, the water is deflected in relation to the layer above until at a depth of around 150 meters, the water is moving in a direction opposite to the surface water. At successively greater depths, the frictional forces between layers reduce the energy of the flow, causing water to move more slowly the deeper the layer. The resulting deflections produce a spiral pattern known as the Ekman spiral. The net movement of water is roughly at 90 degrees from the wind direction and is known as Ekman transport.

This phenomenon is an important factor in the movement of water in the oceans. Among other things, it creates zones of upwelling by forcing surface waters apart and other zones of downwelling by forcing surface waters together. For example, wind blowing parallel to the shore may create a net movement of water at 90 degrees away from the shore. Nutrient-rich deeper ocean water will upwell to take the place of the displaced water and thus profoundly influence the marine ecosystem.

*veer: to suddenly change direction

14. The phrase "path of the wind" in the passage is closest in meaning to

(A) wind strength
(B) wind variation
(C) wind direction
(D) wind phenomenon

In the early part of the twentieth century, the Norwegian scientist and polar explorer Fridtjof Nansen noted that icebergs did not follow the path of the wind as common sense had assumed. Instead they tended to move to the right side of the direction in which the wind blew. A student of Nansen's, V. W. Ekman, showed that the rotation of the Earth leading to an inertial force known as the Coriolis force was responsible for this phenomenon. He further demonstrated that in the Northern Hemisphere the deflection was toward the right of the prevailing wind, and in the Southern Hemisphere the deflection was toward the left. The icebergs observed by Nansen were moved by ocean currents that also moved at an angle to the prevailing wind.

15. The phrase "this phenomenon" in the passage refers to

(A) the movement of icebergs
(B) the rotation of the Earth
(C) the direction of the wind
(D) the inertial Coriolis force

In the early part of the twentieth century, the Norwegian scientist and polar explorer Fridtjof Nansen noted that icebergs did not follow the path of the wind as common sense had assumed. Instead they tended to move to the right side of the direction in which the wind blew. A student of Nansen's, V. W. Ekman, showed that the rotation of the Earth leading to an inertial force known as the Coriolis force was responsible for this phenomenon. He further demonstrated that in the Northern Hemisphere the deflection was toward the right of the prevailing wind, and in the Southern Hemisphere the deflection was toward the left. The icebergs observed by Nansen were moved by ocean currents that also moved at an angle to the prevailing wind.

16. The word "rotates" in the passage is closest in meaning to

(A) spins
(B) travels
(C) twirls
(D) swivels

The Coriolis force itself is caused by the fact that the Earth rotates on its axis once per day, and hence all points on the planet have the same rotational velocity; that is, they take one whole day to complete a rotational circle. However, since a complete rotation around the Earth is shorter the further one is away from the equator, different points on the Earth travel at different speeds depending on degree of latitude. For example, a point on the equator travels the whole distance around the sphere (about 40,000 kilometers), whereas a point near the poles will travel a much shorter distance. Therefore, we can say that the linear speed of a point depends on its latitude above or below the equator. Thus the actual linear speed of a point on the surface is faster the nearer that point is to the equator.

17. We can infer that rotational velocity is

(A) the same as speed in kph
(B) different at different latitudes
(C) the same at different latitudes
(D) dependent on latitude

[Refer to the full passage.]

18. In paragraph 2, the author explains the differences in linear speed by

- (A) arguing that an object moving north moves faster
- (B) describing the linear velocity of the Earth
- (C) identifying the eastward deflection of a current
- (D) relating speed to the distance of a point from the equator

Paragraph 2 is marked with an arrow [➡].

➡ The Coriolis force itself is caused by the fact that the Earth rotates on its axis once per day, and hence all points on the planet have the same rotational velocity; that is, they take one whole day to complete a rotational circle. However, since a complete rotation around the Earth is shorter the further one is away from the equator, different points on the Earth travel at different speeds depending on degree of latitude. For example, a point on the equator travels the whole distance around the sphere (about 40,000 kilometers), whereas a point near the poles will travel a much shorter distance. Therefore, we can say that the linear speed of a point depends on its latitude above or below the equator. Thus the actual linear speed of a point on the surface is faster the nearer that point is to the equator.

19. According to the passage, a point near the equator in the Northern Hemisphere travels

- (A) at the same speed as any other point
- (B) faster than a point at a higher latitude
- (C) slower than a point in the Southern Hemisphere
- (D) at different speeds in different seasons

[Refer to the full passage.]

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

And conversely, if the object is traveling southward toward the equator, it will be moving more slowly than the surrounding land or water.

Where would the sentence best fit?

Choose the letter of the square that shows where the sentence should be added.

Now if an untethered object (or current) is moving northward away from the equator in the Northern Hemisphere, it will also maintain the initial speed imparted to it by the eastward rotation of the Earth. **A** That eastward deflection is faster at the equator than at more northerly (or southerly) latitudes, and thus, when the object reaches a more northerly point, it will be traveling faster in an eastward direction than the surrounding ground or water. **B** The moving object will appear to be forced away from its path by some mysterious phenomenon. In reality the ground is simply moving at a different speed from the original speed at the object's (or current's) home position. **C** The resulting direction of movement will therefore be at an angle of about 45 degrees to the original direction, so an object traveling north will move to the right in the Northern Hemisphere and to the left in the Southern Hemisphere with respect to the rotating Earth. **D** An object traveling south will be deflected to the left in the Northern Hemisphere and to the right in the Southern Hemisphere.

2. According to the passage, making walls hollow and filling this wall space with materials that absorb noise results in

(A) filtered air
 (B) a lack of sound
 (C) an adverse reaction to noise
 (D) a reduction in undesirable noise

3. The following sentence can be added to the passage:

A silent home can cause feelings of anxiety and isolation.

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

Where would the sentence best fit? Choose the letter of the square [■] that shows where the sentence should be added.

Questions 4–6

The gambrel roof design has an enduring appeal to many builders and homeowners. Originally a feature of Dutch colonial architectural style, the gambrel is a straight double-sloped roof joined at a central ridge. **A** The main distinguishing feature is that each roof side is broken into two planes, with the lower slope inclined at a steeper pitch than the upper. Sometimes the angle of the gambrel roof becomes shallower again at the eaves and projects over the wall of the house, giving a bell-shaped appearance in cross section. **B** The main advantage of the gambrel roof is that it creates a spacious interior on the upper floor of the house. **C** This makes it a perfect choice for a growing family. **D**

4. The phrase "a feature" in the passage refers to

(A) the gambrel roof design
 (B) the straight sloping roof
 (C) the roof design in Holland
 (D) the roof joined at a central ridge

5. The gambrel roof design of the Dutch colonial architectural style is appealing to homeowners because

(A) it has a bell-shaped appearance
 (B) it creates a spacious upper floor
 (C) the shape is traditional
 (D) the angle becomes shallower at the eaves

6. The following sentence can be added to the passage:

This spaciousness also makes the gambrel roof highly suitable for barn construction, since the upper floor can be used as a hayloft.

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

Where would the sentence best fit? Choose the letter of the square [■] that shows where the sentence should be added.

Questions 7–9

Diamond value is based on four characteristics: carat, color, clarity, and cut. The size of a diamond is measured by carat weight. There are 100 points in a carat and 142 carats in an ounce. Each point above 1 carat is more valuable than each one below 1 carat. In other words, a stone that weighs more than 1 carat is more valuable per point than a stone that is smaller than 1 carat.

The scale used for rating color begins with D, which means the gem is absolutely colorless and, therefore, the most valuable. E and F are almost colorless. All three are good for investment purposes. A stone rated between G and J is good for jewelry. Beyond J the stones take on a slightly yellowish color, which gets deeper as the grade declines.

The clarity of a stone is determined by its lack of carbon spots, inner flaws, and surface blemishes. While most of these are invisible to the unaided eye, they do affect the diamond's brilliance. For jewelry, a diamond rated VVS1 (very, very slight imperfections) is as close to flawless as one will find. After that the scale goes to VVS2, VS1, VS2, SI1, SI2, I1, I2, and so on.

➡ The final characteristic is cut. **A** When shaped – whether round, oval, emerald, marquise, pear, or heart – the diamond should be faceted so that light is directed into the depths of the prism and then reflected outward again. **B** A well-cut diamond will separate the light into different colors when the light is reflected. **C** Only stones of similar shape should have their reflective qualities compared, as some shapes are more reflective than others. The round shape is the most reflective. **D**

7. The word "one" in the passage refers to

- (A) a diamond
- (B) an ounce
- (C) each point
- (D) 1 carat

8. Even though they affect a diamond's brilliance, slight carbon spots, inner flaws, and surface blemishes

- (A) lack imperfections
- (B) are rated VVS1
- (C) cannot be seen with the naked eye
- (D) can make a diamond more valuable

9. The following sentence can be added to paragraph 4:

In contrast, a nearly flawless diamond that is not professionally cut will not acquire its full reflective potential, and thus, its value may be diminished.

Paragraph 4 is marked with an arrow [➡]. Look at the four squares [■] that indicate where the sentence could be added. Where would the sentence best fit?

Choose the letter of the square [■] that shows where the sentence should be added.



Questions 10–12

People who suffer from excessive drowsiness during the daytime may be victims of a condition known as "narcolepsy." Although most people may feel sleepy while watching TV or after eating a meal, narcoleptics may fall asleep at unusual or embarrassing times. They may doze while eating, talking, taking a shower, or even driving a car.

Victims can be affected in one of two ways. Most narcoleptics have several sleeping periods during each day with alert periods in between, but a minority feel drowsy almost all the time and are alert for only brief intervals. Many people with this condition also suffer from cataplexy – a form of muscular paralysis that can range from a mild weakness at the knees to complete immobility affecting the entire body. This condition lasts from a few seconds to several minutes and is often set off by intense emotions.

➡ No reliable data exist showing how many people have narcolepsy. **A** Unfortunately, there is also little knowledge about the causes of this illness. **B** Researchers suggest that the problem may stem from the immune system's reacting abnormally to the brain's chemical processes. **C** Further studies have shown a link between narcolepsy and a number of genes, although it is quite possible for an individual to have these genes and not develop the disease. **D** There are also cases of twins where one member has narcolepsy but the other does not. Thus, an explanation based on genetics alone is not adequate.

There is currently no cure for narcolepsy, so sufferers of this condition can only have their symptoms treated through a combination of counseling and drugs. The available drugs can help control the worst of the symptoms, but their administration has unwanted side effects such as increased blood pressure and heart rate and, sometimes, even increased sleepiness. It is clear that improved medications need to be developed.

10. Unlike most people who may feel drowsy after a meal or while watching TV, narcoleptics

(A) doze off at odd times
(B) sleep most of the time
(C) suffer in one of two ways
(D) have no trouble falling asleep

11. The word "their" in the passage refers to

(A) sufferers
(B) symptoms
(C) drugs
(D) side effects

12. The following sentence can be added to paragraph 3:

Some estimates put the number as high as 300,000 in the United States alone.

Paragraph 3 is marked with an arrow [➡]. Look at the four squares [■] that indicate where the sentence could be added. Where would the sentence best fit? Choose the letter of the square [■] that shows where the sentence should be added.

Questions 13–15

On December 4, 1872, the brigantine *Mary Celeste*, carrying 1,700 barrels of crude alcohol en route from New York to Genoa, was found abandoned and drifting in the Atlantic Ocean between the Azores and Portugal. The crew of the *Dei Gratia*, the cargo ship that found the *Mary Celeste*, inspected her carefully and then sailed her to Gibraltar to collect the large salvage reward. Their report given at the inquiry suggests that the captain, his wife, his young daughter, and the seven-man crew had deserted the ship in a great hurry. The captain's bed was unmade, something unheard of in a well-run ship, which the *Mary Celeste* was known to be. The oilskin boots and pipes belonging to the crew had also been left, although the chronometer, sextant, and lifeboat were missing. The cargo was intact, although some barrels had leaked and two of the hatches were not in place.

Several theories have been propounded to explain why those aboard left a perfectly seaworthy vessel to risk their lives on an open boat. It has been suggested that they were the victims of alien abduction or sea-monster attacks. Such outlandish notions are hardly credible. The idea that the ship was a victim of piracy can also be discounted, since the cargo and other valuables were untouched. Likewise, mutiny does not seem plausible, since the captain and first officer were known to be fair and experienced, the voyage was relatively short, and mutineers would probably have taken over the ship, not forsaken it.

➡ A possible explanation is that some event made the captain fear for the safety of the ship. **A** In fact, recently studied seismic records indicate that a violent earthquake, whose epicenter was on the seafloor in the region where the *Mary Celeste* was sailing, occurred some days before the ship's discovery. **B** If the ship had been subjected to intense shocks caused by the quake, all aboard may have hastily abandoned ship to avoid what they imagined might be its imminent destruction from an explosion of the combustible cargo.

C A severed rope found dangling from the side of the *Mary Celeste* suggests that the evacuees trailed behind in the lifeboat, attached to the ship, waiting for the crisis to pass.

D Great waves may then have snapped the rope and capsized the smaller boat, whose occupants would have disappeared without a trace.

13. The word "Their" in the passage refers to

- (A) the captain's family
- (B) the crew of the *Dei Gratia*
- (C) the crew of the *Mary Celeste*
- (D) all those aboard the ships sailing between the Azores and Portugal

14. The phrase "Such outlandish notions" in the passage refers to

- (A) risking their lives in an open boat
- (B) alien abduction or sea-monster attacks
- (C) piracy
- (D) mutiny

15. The following sentence can be added to paragraph 3:

The need to circulate air to prevent such a blast could explain why the crew left two hatches open.

Paragraph 3 is marked with an arrow [➡]. Look at the four squares [■] that indicate where the sentence could be added. Where would the sentence best fit? Choose the letter of the square [■] that shows where the sentence should be added.

PRACTICE WITH UNDERSTANDING DETAILS AND RECOGNIZING PARAPHRASES

Understanding details

Some of the questions in the Reading section of the TOEFL test will require you to understand details within a reading passage. Several details may be mentioned within a passage. To answer these questions successfully, you must be able to recognize them.

Detail questions are frequently introduced in the following ways:

According to the passage, . . .

The author states that . . .

The remaining part of the question will tell you what to look for, as shown in the example below:

According to the astronomers, the blue arcs are

- (A) a visual phenomenon
- (B) actually imaginary
- (C) invisible to the human eye
- (D) bending massive galaxies

The details in the answer choices may use words and phrases that are different from (but have similar meaning to) those in the reading passage. Here is the part of the passage that contains the answer to the example:

The discoverers of these arcs think they are actually optical illusions created by light that has been bent by the immense gravitational pull of a massive galaxy.

In order to answer the question, you will have to recognize that the discoverers of the arcs must be astronomers, and the pronoun *they* refers to *these arcs*. The word *optical* is related to *visual* and an illusion could be a phenomenon. Therefore, you should choose A.

Recognizing paraphrases

Improving your ability to recognize details from a passage that are stated in a different way in the questions and answer choices will help you succeed on the TOEFL test.

Identifying restated information from a passage

Some test questions will require you to choose a sentence that has the same meaning as a highlighted sentence in the reading passage. The answer choices use words similar to those in the highlighted statement, but the incorrect choices do not have the same meaning. Incorrect choices can also leave out pertinent details in the highlighted sentence. Read the excerpt below. An example of this type of multiple-choice question follows.

The discoverers of these arcs think they are actually optical illusions created by light that has been bent by the immense gravitational pull of a massive galaxy. The arcs are probably formed when the light from a distant galaxy is bent by the gravitational pull of another, less distant, intervening

galaxy. Even though such light-bending galaxies contain billions of stars, they do not contain enough visible ones that alone could exert the pull needed to create a blue arc. It has been theorized that there must be huge amounts of invisible or "dark" matter within these galaxies.

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

- (A) Billions of stars are contained in the galaxies, which alone could exert the pull needed to create a blue arc.
- (B) Those galaxies that cause light to bend into a blue arc do not have enough visible stars to exert such a pull.
- (C) The light-bending galaxies contain billions of visible and invisible stars that exert enough pull to cause a blue arc.
- (D) Since the light-bending galaxies don't contain enough visible stars to exert the pull needed to create a blue arc, dark matter is considered a possibility.

In choice A, the information is contrary to that in the highlighted statement. The visible stars are not enough to exert the pull that creates a blue arc. In choice C, the information has introduced "invisible stars." Choice D has introduced "dark matter." The passage may contain information about invisible stars and dark matter. However, this information is not mentioned in the highlighted sentence and is therefore incorrect as a restatement. Therefore, you should choose B as the correct restatement of the highlighted sentence.

Identifying information not stated in a passage

Some questions will ask you to identify information that has *not* been stated explicitly in the reading passage. These multiple-choice questions are frequently introduced in the following ways:

All of the following are mentioned in the passage . . . EXCEPT

All of the following are mentioned in paragraph . . . EXCEPT

The remaining part of the question will tell you what to look for. To answer these questions successfully, you will need to read all of the answer choices and determine whether the details described in each one can be found in the passage.

The details in the answer choices may use words and phrases that are different from (but have similar meaning to) those in the reading passage. Read the excerpt about arcs again. An example of this type of question follows on the next page.

The discoverers of these arcs think they are actually optical illusions created by light that has been bent by the immense gravitational pull of a massive galaxy. The arcs are probably formed when the light from a distant galaxy is bent by the gravitational pull of another, less distant, intervening galaxy. Even though such light-bending galaxies contain billions of stars, they do not contain enough visible ones that alone could exert the pull needed to create a blue arc. It has been theorized that there must be huge amounts of invisible or "dark" matter within these galaxies.

All of the following are mentioned in the paragraph as factors in the blue arc phenomenon EXCEPT

- (A) the light being bent by the gravitational pull of galaxies
- (B) the light coming from a distant galaxy and bent by a closer one
- (C) the amount of gravity needed being explained by dark matter theory
- (D) the light-bending dark matter existing in such distant intervening galaxies

Choice A is found in the passage in the phrase "light that has been bent by the immense gravitational pull of a massive galaxy." Choice B is found in the words "the light from a distant galaxy is bent by the gravitational pull of another, less distant, intervening galaxy." Choice C is found in the phrase "theorized that there must be huge amounts of invisible or 'dark' matter within these galaxies," which refers to the fact that there are not enough visible stars to exert the needed pull. There is no information in the passage concerning the galaxies where dark matter exists. Therefore, you should choose D.

Exercises R9–R14 Use Exercises R9–R14 to build your skills in understanding details and recognizing paraphrases in reading passages.

• EXERCISE R9 *Finding facts*

Read each passage and the statements that follow. Write *T* in the space if the statement is true according to the information in the passage. Write *F* in the space if the statement is false or if the information is not given in the passage.

Micromyale diblemma is a spider that inhabits the coastal, forested regions of Panama. It has only two eyes whereas most spiders have six or eight. Unlike most spiders, it does not have lungs but instead absorbs oxygen through its skin. Just three one-hundredths of an inch long, the size of the head of a pin, *M. diblemma* is one of the world's smallest spiders.

- A. T The coastal, forested regions of Panama are where one of the world's smallest spiders lives.
- B. F While most spiders have six or eight eyes and absorb oxygen through the skin, *Micromyale diblemma* has only two eyes and lungs.
- C. F The world's smallest spider is the size of the head of a pin.

Statement A is true. According to the passage, the spider that inhabits the coastal, forested regions of Panama is one of the world's smallest spiders. Statement B is false. Most spiders have six or eight eyes and have lungs. *Micromyale diblemma* has two eyes, but does not have lungs. It takes in oxygen through its skin. Statement C is false because there is no information about the world's smallest spider. We only know that one of the world's smallest spiders is about the size of the head of a pin.

1. The plan to join Britain to the European continent by boring a tunnel under the English Channel between Dover, England, and Calais, France, was originally proposed in the second half of the nineteenth century. The bill authorizing the work was rejected in 1883. The plan was again proposed in 1930 by many enthusiastic supporters. The tunnel was to be the longest ever made and an engineering wonder. However, the estimated cost, the military risks, and the doubt as to the feasibility of construction led to the rejection of the proposal in June 1930. Finally, in the 1980s, the proposal was accepted and tunneling began. The great engineering feat was completed in 1994, and for the first time passengers could travel underwater between England and the European mainland.

- A. ____ The plan to unite Britain with the European continent was proposed three times.
- B. ____ The plan to unite Britain with the continent was rejected three times.
- C. ____ It was believed by some that the tunnel posed a security threat.
- D. ____ Some people did not believe that the tunnel was a viable idea in the 1930s.
- E. ____ The plan was rejected in 1883 because the people were bored.
- F. ____ The construction of the tunnel led to the rejection of the proposal in 1930.
- G. ____ The tunnel made in 1930 was the longest ever constructed.
- H. ____ The predicted expense of the proposed tunnel was prohibitive in 1930.

2. The 50-million-year-old fossils of an ancient whale found in the Himalayan foothills of Pakistan give strong evidence that modern whales are descended from a four-legged, land-dwelling animal. The fossils consist of part of the skull, some teeth, and the well-preserved middle ear of an animal that was 6 to 8 feet long, weighed about 350 pounds, had a wolf-like snout, and had two foot-long jaws with sharp, triangular teeth. It is the middle ear that suggests that the ancient whale lived on land. Analysis indicated that the animal had eardrums, which would not have worked in water and which modern whales have only in vestigial form. Furthermore, the right and left ear bones were not isolated from each other. The separation of these bones in marine whales enables them to detect the direction of underwater sounds.

- A. ____ The 50-million-year-old fossils found in Pakistan are most likely from a four-legged, land-dwelling animal.
- B. ____ The fossils are 6 to 8 feet long and about 350 pounds in weight.
- C. ____ The whale's skull, teeth, and middle ear are evidence that the Himalayan foothills were once under water.
- D. ____ Because eardrums do not function under water, the ancient whale probably lived on land.
- E. ____ Whales with eardrums would not be able to hear well in the water.
- F. ____ A marine whale can recognize the source of a sound because the middle ear is in a vestigial form.
- G. ____ When the right and left ear bones are isolated from each other, a whale can detect the direction of underwater sounds.
- H. ____ Whales with isolated right and left ear bones live in the sea.

3. The potato, which is nutritious and popular, is an important food source for millions of people. It is so important that destruction of the potato crop by pests has resulted in famines. Plant researchers, studying the hundreds of varieties of potatoes, have uncovered a wild hairy variety of potato from Bolivia that emits a strong glue from the end of its hairs. This glue traps and kills insects. A new hairy potato was developed when researchers successfully crossed the common potato with the hairy potato. This new hybrid potato not only reduces aphid populations by 40 to 60 percent, but also emits a substance that checks the population of the Colorado potato beetle, one of the most destructive potato pests. Unfortunately, the hairs also trap beneficial insects. Plant researchers are currently trying to alleviate this problem by limiting the density of hairs.
- A. ____ The potato, an important food for millions of people, is nutritious and popular.
 - B. ____ There are hundreds of varieties of potatoes that are hairy.
 - C. ____ Plant researchers are studying a potato from Bolivia that gives off a scent from the end of its hairs.
 - D. ____ Insects get trapped in the sticky hairs and die.
 - E. ____ The hairy potato was crossed with the common potato to develop a new hairy potato.
 - F. ____ All insect populations have been reduced by 40 to 60 percent by the wild hairy potato.
 - G. ____ The Colorado potato beetle is one of the pests affected by the substance the hairy potato emits.
 - H. ____ The hybrid potato harms insects that help potatoes.
4. A Stradivarius violin is unmatched in tonal quality and responds more quickly and easily to the touch than any other violin. Unfortunately, the secrets for making such a superb instrument were lost in 1737 with the death of Antonio Stradivari, the master craftsman who built them. Many attempts have been made to reproduce an instrument of such quality, but all have failed. It is believed that the secret lies in the wood that was used and the distinctive varnish, which ranges from orange to a deep reddish-brown color. Only around 650 Stradivarius violins are believed to be in existence today, and the average price for such a rare instrument is well into the hundreds of thousands of dollars. Even a "cheap" Stradivarius costs around a quarter of a million dollars. It is not surprising that Stradivarius violins are sought after by great violinists and musical-instrument collectors alike.
- A. ____ A Stradivarius violin cannot match the tonal quality of any other violin.
 - B. ____ The main qualities of the Stradivarius are tone and response.
 - C. ____ Antonio Stradivari was the man who crafted the violins.
 - D. ____ Stradivari's notes on making such a superb instrument were preserved.
 - E. ____ People believe that the quality comes from the type of wood and the color of the varnish that was used.
 - F. ____ The varnish color ranges between an orange and a deep reddish-brown.
 - G. ____ The 650 Stradivarius violins in existence cost a quarter of a million dollars in total.
 - H. ____ Both musicians and instrument collectors would like to own a Stradivarius.

5. The most traditional American food may well be cornmeal. Cornmeal, as we know it today, began as a Native American staple. The Native Americans grew corn of six different varieties: black, red, white, yellow, blue, and multicolored. They ground the corn kernels into cornmeal and mixed it with salt and water. Then they baked it. This recipe was introduced to the early colonists, who experimented with it and developed their own uses for cornmeal. Succotash (a meat stew with cornmeal added) and mush (leftover cornmeal porridge cooled, cut, and fried) are two meals invented by early colonists. Today, visitors can travel to the South and enjoy spoon bread, a smooth puddinglike dish, or to New England for johnnycakes, a kind of flat pancake. But probably the most common recipes using cornmeal nationwide are cornbread, cornmeal muffins, and the "hush puppy" – a round ball of cornmeal batter that is fried in oil.
- A. ____ The multicolored corn was made up of six different colors.
 - B. ____ Cornmeal was ground into kernels that were baked.
 - C. ____ The Native Americans shared their recipe of baked cornmeal with the early settlers.
 - D. ____ The colonists did not like the meal of the Native Americans and thus developed their own meals.
 - E. ____ Succotash and mush are two meals the colonists shared with the Native Americans.
 - F. ____ Succotash is a meal that is made from meat and cornmeal.
 - G. ____ Mush is fried leftovers from a cornmeal dish.
 - H. ____ Common forms of cornmeal are restricted to certain regions in America.

EXERCISE R10 *Understanding exceptions*

Read each passage. Choose the letter of the word or phrase that best completes the sentence that follows it.

Today's readers look for knowledge and information from more than just an encyclopedia. Knowledge, information, data, and images race around the world with ever-increasing speed and availability. With a quick press of a key on the computer keyboard, data from some of the great libraries in the world can be called onto a screen for immediate perusal.

The author mentions all of the following means of accessing information EXCEPT

- (A) encyclopedias
- (B) television
- (C) computers
- (D) libraries

The author's mention of a screen is in reference to a computer screen and not to a television screen. The only means of accessing information not mentioned is television. Therefore, you should choose B.

1. Whereas the scene of colonial North America was one of complex cultural negotiations and explosive interactions among Native Americans, Africans, and Europeans, history books have portrayed the settlement of North America as a unilateral push of Europeans into a virgin land. Although primary documentation – government reports, travel accounts, trade journals, all written from a European perspective – is filled with observations concerning Native American customs and beliefs, history books are more interested in outlining important battles.

Ethnohistorians, the scholars who blend anthropology's insights with historical research to produce a cultural understanding of the past, have been making advances in understanding the Native American perspective on European colonialization.

The author mentions all of the following as sources of primary documentation EXCEPT

- (A) government reports
- (B) travel accounts
- (C) trade journals
- (D) history books

2. Although Winslow Homer (1836–1910) is best known for his realistic watercolors of powerfully dramatic seascapes, he first won acclaim in the art world as an illustrator for the reportage of the American Civil War. This led to his illustrating texts of prose and poetry. His more than 160 drawings reached print as lithographs, wood engravings, and photomechanical cuts. Despite the skill and serious intent he invested in them, Homer's book illustrations made little impact during his lifetime. Even today, most of his illustrations are not discussed in the literature covering his work, and nearly all of them have been excluded from even the most comprehensive exhibitions of Homer's art.

The author mentions all of the following as types of work Winslow Homer did EXCEPT

- (A) photography
- (B) lithographs
- (C) watercolors
- (D) illustrations

3. Almost all sports and outdoor leisure activities carry real risks. Swimmers drown, mountaineers fall, skiers are swept away by avalanches, and boxers are killed by blows to the head. A person's skill or experience is no guarantee against disaster. In fact, the better an athlete is, the greater the temptation to break records or succeed in doing something that has never been done before. Danger, which tests nerves, courage, and skill, is an essential element that adds thrill and enjoyment to a sport. Although those who organize sports formulate their rules in a way to minimize the risk of injury and to ensure that medical assistance is readily available, no amount of caution can alter basic facts: even the best-trained horse may panic; motorcycles give little protection in a crash; and a hard-driven golf ball can go astray.

According to the passage, all of the following are risks in sports EXCEPT

- (A) falls
- (B) storms
- (C) accidents
- (D) avalanches

4. Perhaps one of the most hazardous ways of making a living from the sea was diving for pearls. Only the most daring would risk their lives in this profession. The technique of pearl diving was simple. Divers attached themselves to ropes that were used to keep them in contact with an assistant on board the ship. Attached to a different rope were large weights that helped to speed the divers' descent and, hence, conserve their breath for searching the seabed. Also needed were nose clips, heavy gloves that provided protection for their hands against the sharp edges of the oyster shells, and a net in which they collected the oysters. These nets were slung around

the divers' necks so as not to impede the movement of their hands. When the divers signaled their intention to surface, the assistant hauled them and their load of oysters up. The oysters were then opened, and any pearls found were sifted through sieves and graded according to size and quality. Once a widely practiced profession, pearl diving has largely disappeared with the development of the cultured pearl.

The author mentions all of the following as the pearl divers' underwater activities EXCEPT

- (A) the contact with an assistant on board
- (B) the attachment of a heavy weight to make them descend faster
- (C) the collection of oysters
- (D) the opening of the oyster

5. Margaret Mitchell wrote only one novel, *Gone with the Wind*. It was published in 1936 and proved to be such a huge success that Mitchell's life was irrevocably altered. She lost all her privacy and lamented this fact constantly until her death in 1949. The novel, which has been translated into 28 languages and has sold more copies than any other book except for the Bible, won the Pulitzer Prize in 1937. Two years later, the movie produced by David O. Selznick had its premiere in Atlanta. This movie holds the record of having been viewed more times than any other movie produced. Throughout her life, Mitchell denied that her main characters, Scarlett and Rhett, or any of her other characters, were biographical in any way. She did have access to family correspondence dating from the 1850s to the 1880s, the time of the American Civil War. It seems natural that a woman with Margaret Mitchell's vivid imagination and historical awareness, and in possession of a collection of family correspondence that documents such a volatile era as that of a civil war, could weave a story that still entralls.

The author of the passage gives all the relevant dates about Mitchell EXCEPT the date of

- (A) the family letters
- (B) her birth
- (C) the first showing of the movie
- (D) the first printing of the novel

EXERCISE R11 *Determining whether statements are the same or different*

Write *S* in the space if the two sentences have the same meaning. Write *D* if they have different meanings.

D A collection of fascinating tales called *The Arabian Nights* was introduced to Europe by the French scholar Antoine Galland.

The French scholar Antoine Galland introduced to Europe a collection of fascinating tales that he named *The Arabian Nights*.

You should write *D* because the sentences do not mean the same thing. The first sentence means that the scholar introduced the tales, whereas the second sentence means that the scholar both introduced and named the tales.

1. ____ Scree, which abounds in the Rocky Mountains, has its origins in the ice ages. The Rocky Mountains have a lot of scree, the formation of which dates back to the ice ages.

2. ____ Many reef organisms avoid dead-end caves, which lack the steady currents necessary for bringing a continuous food supply.
Dead-end caves don't have currents that bring in food supplies, so many reef organisms don't go there.
3. ____ Two theaters in Stratford-upon-Avon and two in London are the ones regularly used by the Royal Shakespeare Company.
The Royal Shakespeare Company regularly uses four theaters – two in Stratford-upon-Avon and two in London.
4. ____ Police reconstruct scenes because people seem to recall things best when they are in the same physical situation.
When people are in the same physical situation, they seem to remember better scenes than the ones police have reconstructed.
5. ____ Despite the cold Alaskan temperatures, which freeze perspiration and breath in men's beards, cabin fever forces inhabitants to challenge the elements.
Alaskan inhabitants suffer from cabin fever, which causes perspiration and breath to freeze in men's beards.
6. ____ Leather, when improperly handled and exposed to changeable temperatures, cracks easily.
Leather cracks easily when it is handled incorrectly and is exposed to variable temperatures.
7. ____ Despite the increasing pollution of their shorelines over the past decade, oceans have become cleaner in the vast open-sea areas.
During the last ten years, pollution has been increasing along the coasts of the oceans and spreading to the once clean open-sea areas.
8. ____ The Hitler diaries, the greatest known publishing fraud in history, were written by a man who copied material from Hitler's speeches and medical reports.
By copying material from Hitler's speeches and medical reports, a man wrote the Hitler diaries, known as the greatest publishing fraud in history.

EXERCISE R12 *Locating restated information*

Read each passage and the restatement that follows it. Underline the words or phrases in the passage that give the information that is restated.

The damp British climate may be infuriating to humans, but it is ideal for plants. The Gulf Stream flows across the Atlantic to warm the west coast of these islands, which occupy the same latitudes as Newfoundland. Moisture-laden Atlantic winds bring almost constant rain and mist.

The perfect weather conditions for plants to flourish are found in the wet British Isles.

You should underline *British climate* (weather conditions in the British Isles), *ideal for plants* (perfect for plants), and *constant rain and mist* (wet) because these are ideas from the passage that are restated.

1. Europa, one of Jupiter's moons, is the only place in the solar system – outside of Earth – where enormous quantities of water are known to exist. Although this water is in ice form, there is a possibility that there is only a crust of ice with a liquid ocean underneath. Because of powerful thermal pulses caused by the tidal forces of Jupiter and the other moons, Europa may be the best place in the solar system for finding life forms.

Europa's vast oceans are unequaled in the solar system, with one exception.

2. Using sophisticated instrumentation, lightning experts have learned that lightning travels at one-third the speed of light. A lightning bolt is five times hotter than the surface of the sun and can have ten times more power than the output of a large power company. A single discharge can actually contain twenty or more successive strokes, occurring too fast for the eye to separate. Some seem to stretch for 500 miles when observed from outer space.

It is possible that a lightning bolt, which seems very large, is really a series of bolts.

3. Once porpoises reach speeds of 12 miles per hour, they frequently leap out of the water to escape the pull of surface drag. At that point, leaping out of the water actually requires less energy than swimming. These leaps are most efficient at speeds of 40 miles per hour and greater.

Porpoises conserve energy by traveling through the air, which creates less drag than water.

4. In the earliest stages of a star's formation – a process that takes some 10,000 years – the star is surrounded by an extremely dense layer of gas and dust. This matter eventually condenses and heats up to 1 million degrees and hotter, triggering a thermonuclear explosion. During the flare-up, strong winds blowing off the surface of the star disperse the surrounding dust and expose the newborn star to observers on Earth.

People can see the birth of a star because of the strong winds that scatter the dust particles.

5. Perhaps the greatest navigators in history were the Vikings. Without compasses or other modern instruments, they explored Iceland, Greenland, and even crossed the Atlantic Ocean to the shores of North America. To find their way, they stayed close to shorelines or used the position of the sun to plot the latitude.

The Vikings were expert sailors.

6. Since the first dolphin was trained by the United States Navy in 1965 to help divers in their underwater home, *Sealab II*, many other dolphins have been drafted into the Navy. Originally, dolphins were used as messengers or to answer calls for help. Today, dolphins do such dangerous and necessary work as locating explosives hidden in the sea and helping ships navigate safely in war zones.

An important task for a dolphin is to find mines.



7. Saint Bernard dogs are large, shaggy animals. They were bred by Augustinian monks, who trained them to search for travelers lost in snowstorms or avalanches in the Alps. For hundreds of years, Saint Bernards served this purpose. But nowadays journeys across the Alps are on well-maintained road and tunnel systems, and the dogs are no longer needed.

Saint Bernards aided travelers for centuries.

8. Every year in Japan, the competitions for the longest human-powered flights are held. Out on Lake Biwa, participants attempt to break records by flying their own inventions over the water without propeller or jet assistance. The would-be human birds glide until their craft meets its inevitable crash landing. A flotilla of small boats lines the flight path waiting to rescue the pilot. In the first Japanese event, a world record of 88.53 meters was established. Since then, new records have been set almost every year. These days, flights of several kilometers are regularly achieved. Participants fly in craft they have designed themselves.

EXERCISE R13 *Choosing the restatement of highlighted sentences*

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

The bulk of Kafka's writings was not published until after his early death from tuberculosis.

- (A) It was not until after Kafka's early death from tuberculosis that the bulk of his writings was published.
- (B) After the bulk of his writings was published, Kafka died an early death from tuberculosis.
- (C) After Kafka had written the bulk of his published writings, he met with an early death from tuberculosis.
- (D) An early death from tuberculosis kept Kafka from publishing the bulk of his writings.

You should choose A because this is the only sentence that contains the same information as the first sentence: First Kafka died, and then most of his writings were published.

1. Fainting is caused by a sudden drop in the normal blood supply to the brain.

- (A) The brain reacts to a drop in the normal blood supply by fainting.
- (B) Fainting occurs when the brain suddenly loses its normal blood supply.
- (C) Fainting happens when the brain drops its normal blood supply.
- (D) The brain faints when the normal blood supply drops.

2. Gorillas, which are vegetarians, have been observed to demonstrate gentle behavior toward small creatures in the wild.
- (A) Vegetarians have been observed to demonstrate gentle behavior toward gorillas and small creatures in the wild.
 - (B) Only vegetarian gorillas have been observed as demonstrating gentle behavior toward small creatures in the wild.
 - (C) Small creatures in the wild have been observed as behaving gently and demonstratively when near gorillas.
 - (D) It has been observed in the wild that gorillas, by nature vegetarians, treat small animals gently.
3. In fighting forest fires, the initial attack crews dig a fire line, which varies in width depending on the strength and nature of the fire.
- (A) Initial attack crews dig a forest fire to vary the fire line's width.
 - (B) Initial attack crews depend on the strength and nature of the fire to vary the fire line.
 - (C) The width of the fire line, which the initial attack crews dig, varies according to the strength and nature of the fire.
 - (D) In digging a fire line, the initial attack crews depend on fighting forest fires.
4. Medical quackery, which promises cures for all existing and even nonexistent diseases, has a powerful appeal even to the well educated.
- (A) Well-educated people in medicine promise to find powerful cures for diseases.
 - (B) Even well-educated people are attracted to fake cures for diseases that may or may not exist.
 - (C) Medical quackery promises the well educated a cure for diseases.
 - (D) The medical profession has appealed to the well educated for funding to find cures for diseases.
5. A silver compound has been found to kill the parasitic protozoa that are carried by the dreaded tsetse fly and that cause sleeping sickness.
- (A) The dreaded tsetse fly causes sleeping sickness and kills the parasitic protozoa used for finding silver compounds.
 - (B) It has been found that the silver compound that is carried by the dreaded tsetse fly and causes sleeping sickness kills the parasitic protozoa.
 - (C) Sleeping sickness, which is caused by the dreaded tsetse fly, has been found to kill the parasitic protozoa in silver compounds.
 - (D) Parasitic protozoa that cause sleeping sickness and are carried by the dreaded tsetse fly can be killed with a silver compound.
6. While working as a postmaster at the University of Mississippi, William Faulkner submitted thirty-seven stories to magazines, six of which were accepted.
- (A) Of the thirty-seven stories that Faulkner submitted while working at the University of Mississippi as a postmaster, six were published in magazines.
 - (B) Faulkner wrote six out of thirty-seven stories after accepting a job as postmaster at the University of Mississippi.
 - (C) Faulkner published thirty-seven stories in magazines, six of which were accepted by the University of Mississippi.
 - (D) The six accepted stories by Faulkner were about his job as a postmaster at the University of Mississippi.

7. The continental drift theory proposes that the Earth's crustal plates are driven by a global system of convection currents in the hot magma below that behave like giant conveyor belts.
 - (A) Theoretically, the Earth's crustal plates behave like giant conveyor belts, driving the convection currents across the hot magma, which causes the continents to drift.
 - (B) A global system of convection currents in the underlying hot magma acts as giant conveyor belts to drive the Earth's crustal plates.
 - (C) The continental drift theory suggests that global plates cover hot magma, which acts as a giant conveyor belt for convection currents.
 - (D) The continental drift theory is proposed by the Earth's crustal plates, which drive a global system of convection currents in the hot magma below, behaving like giant conveyor belts.
8. Medical authorities have been reluctant to support the findings of some nutritionists that vitamin C given in large doses can prevent the common cold.
 - (A) Medical authorities support nutritionists' views about the value of vitamin C in preventing the common cold.
 - (B) Nutritionists have found that medical authorities are not in favor of using vitamin C to prevent the common cold.
 - (C) Some nutritionists have found that large doses of vitamin C can prevent the common cold, but this has not been completely accepted by medical authorities.
 - (D) According to nutritionists and some medical authorities, the common cold can be prevented by giving large doses of vitamin C.
9. Female cowbirds, which cannot sing, are nonetheless able to teach songs to their young by responding to specific chirps and ignoring others.
 - (A) Even though female cowbirds cannot sing, they teach their chicks to do so by responding to specific chirps and ignoring others.
 - (B) Female cowbirds can neither sing nor teach songs to their babies by responding to certain chirps more than to others.
 - (C) Female cowbirds, which cannot sing, have other birds teach their young to sing.
 - (D) Female cowbirds, which cannot sing, unsuccessfully attempt to teach their young to sing by responding to other bird songs.
10. The conflict between those who wish to conserve a large area of unaltered and unimproved spaces and those who want the abolition of the last remnants of wilderness in the interest of industrial profit will not be resolved in the near future.
 - (A) The people who desire to conserve a large area of untouched natural land and those who want to use all land for industrialization are in a conflict that will not have an immediate resolution.
 - (B) The conflict over whether a large area of unaltered and unimproved space should be given over for industrial development and profit is of interest to those resolved to abolish the last remnants of wilderness.
 - (C) Lawyers are profiting from the unresolved conflict between the people who wish to save the last remnants of wilderness and those who want to alter and improve the space for industry.
 - (D) There is an unresolved conflict caused by people who wish to abolish industry and turn the spaces back into a natural wilderness state.

EXERCISE R14 *Choosing the restatement of highlighted sentences in paragraphs*

Read each passage. Then choose the letter of the sentence that best expresses the essential information in the highlighted sentence. Incorrect choices change the meaning in important ways or leave out essential information.

Between the late 1920s and 1950s, the Osborne Calendar Company produced a series of calendars featuring trains of the Pennsylvania Railroad. Up to 300,000 of these, featuring large, colorful scenes of trains at work, were published each year to hang in depots and shippers' offices along the lines of the famous railroad company. The scenes, mostly painted by one artist, Grif Teller, are now valuable collectibles.

- (A) The scenes of trains, for the most part painted by Grif Teller, are collectibles.
- (B) The Osborne Calendar series of train scenes are collector's items.
- (C) Grif Teller has a valuable collection of the Osborne Calendar scenes of trains at work.
- (D) Grif Teller's paintings of depots and shippers' offices are valued by collectors.

You should choose A because the scenes of trains are the valuable collectibles.

1. Tree rings have long been used to determine the ages of trees and to gauge past climatic conditions. New evidence adds considerable weight to the theory that tree rings also record earthquakes. The rings reflect the effects of earthquakes, such as tilting, the disruption of root systems, and breakage, as well as shifts in environments. Older trees and petrified trees may give information about earthquakes that took place hundreds and even thousands of years ago.
 - (A) The effects of earthquakes on trees can be seen in tree rings.
 - (B) Earthquakes cause a lot of damage to trees in the environment.
 - (C) The effects of earthquakes are tilting, disruption of root systems, breakage, and shifts in environments.
 - (D) Tilting, disruption of root systems, breakage, and shifts in environments are examples of how an earthquake affects trees.
2. Yuzen dyeing is a Japanese art that produces a lavish, multicolored type of kimono design that dates from the seventeenth century. First, a pattern is sketched on a kimono of plain, undyed silk. The garment is then taken apart and the design carefully painted onto the fabric with a paste that prevents the fabric from absorbing dye. Next, dyes are brushed over the silk, their colors penetrating only the untreated areas. After the paste is rinsed out, the strips of silk are again sewed into the kimono. Elaborate embroidery often completes the decoration.
 - (A) The paste keeps the unstitched garment together while the fabric is absorbing the colors.
 - (B) The dye is prevented from being absorbed into the fabric pieces by the paste that covers the design.
 - (C) The design is painted onto the pieces of garment with a paste that keeps the dye from destroying the design.
 - (D) The design is painted onto the fabric in places where the paste does not prevent the paint being absorbed by the garment.

3. The beaver's comical-looking flat tail, which is three-quarters of an inch thick, six or seven inches wide, and perhaps a foot long, is unique in the animal world. In the water, it serves as a rudder for swimming, and on land it props the beaver upright while the animal is cutting trees. It also serves as a radiator through which the heavily insulated beaver passes off excess body heat. The beaver uses its broad tail for an early warning system by slapping it against the water's surface, making a resounding whack that can be heard half a mile away.

- (A) The beaver's tail is like a big fan that disperses heat.
- (B) The beaver gets rid of extra body heat through its tail.
- (C) The beaver's body heat radiates through its heavily insulated body.
- (D) The beaver has a heavy coat and, therefore, needs a radiator to reduce its body heat.

4. If pearls are protected properly, they can last for centuries. One reason a pearl loses its luster or cracks is that the mineral constituent of the pearl can be dissolved by weak acids. There are several kinds of acids that pearls may come in contact with. Human perspiration contains one such acid. Much of the cotton that pearls are wrapped in when not in use is treated with an acid. Another kind of acid that damages pearls is found in many modern cosmetics. The chemicals in commercial brands of makeup seep into the string canal and may penetrate into the layers of a pearl and cause deterioration. The best protection to give pearls to ensure their long life is having them cleaned and restrung at prescribed intervals.

- (A) The penetration through the pearl of the string canal causes damage to the layers.
- (B) The deterioration of the pearl is usually caused by string canal seepage and penetration.
- (C) The infiltration of cosmetics into the pearl may cause it to disintegrate.
- (D) A pearl's deterioration can be prevented through cosmetic usage.

Reading Mini-test 3

Check your progress in understanding details and recognizing restatements (Exercises R9–R14) by completing the following Mini-test. This Mini-test uses question types used in the Reading section of the TOEFL iBT test.

Select the correct answer.

Questions 1–5

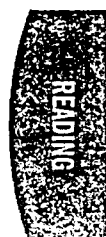
Every year about two million people visit Mount Rushmore, where the faces of four U.S. presidents were carved in granite by the sculptor Gutzon Borglum and his son. The creation of the Mount Rushmore monument took 14 years – from 1927 to 1941 – and nearly a million dollars. These were times when money was difficult to come by, and many people were jobless. To help him with this sculpture, Borglum hired laid-off workers from the closed-down mines in the Black Hills area of South Dakota. He taught these men to dynamite, drill, carve, and finish the granite as they were hanging in midair in his specially devised chairs, which had many safety features.

Borglum used dynamite to remove 90 percent of the 450,000 tons of rock from the mountain quickly and relatively inexpensively. His workmen became so skilled that without causing damage, they could blast to within four inches of the finished surface and grade the contours of the facial features. Borglum was proud of the fact that no workers were killed or seriously injured during the years of blasting and carving the granite. Considering the workers regularly used dynamite and heavy equipment, this was a remarkable feat.

During the carving, many changes in the original design had to be made to keep the carved heads free of large fissures that were uncovered. However, not all the cracks could be avoided, so Borglum concocted a mixture of granite dust, white lead, and linseed oil to fill them.

Every winter, water from melting snow gets into the fissures and expands as it freezes, making the fissures bigger. Consequently, every autumn maintenance work is done to refill the cracks. To preserve this national monument for future generations, the repairers swing out in space over a 500-foot drop and fix the monument with the same mixture that Borglum used.

- The author of the passage indicates that the men Borglum hired were
 - trained sculptors
 - laid-off stone carvers
 - Black Hills volunteers
 - unemployed miners
- According to the passage, what achievement did Borglum pride himself on?
 - The four presidential faces in granite that he had sculpted
 - The removal of 90 percent of the 450,000 tons of rock quickly and at a relatively low cost
 - His safety record of no deaths or serious injuries during the years of work with heavy equipment and dynamite
 - His skillful training of the labor force that enabled blasts of dynamite to be within inches of the contour lines of the faces



3. Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.
- (A) Since cracks could not be avoided, Borglum tried various materials to cover them.
 - (B) In order to fill the unavoidable cracks, Borglum invented a mixture for filling them.
 - (C) A mixture was uncovered by Borglum during the changes in design needed to avoid cracks.
 - (D) Because cracks could not be avoided, Borglum bought a mixture of granite dust, white lead, and linseed oil.
4. According to the passage, today Mount Rushmore needs to be
- (A) protected from air pollution
 - (B) polished for tourists
 - (C) restored during the winter
 - (D) repaired periodically
5. The passage discusses all of the following aspects of the creation of the Mount Rushmore carvings EXCEPT
- (A) where the people who worked on Mount Rushmore came from
 - (B) why Borglum carved the heads of four U.S. presidents
 - (C) how Borglum dealt with fissures that could not be avoided
 - (D) when repairs to this national monument are made

Questions 6–10

Teotihuacán is the largest and most impressive urban archaeological site of ancient America, covering an area of roughly 20 square kilometers. The city was at one time thought to be the religious center of the Toltecs but is now believed to be a creation of an earlier civilization about whose origins little is known. The earliest artifacts from Teotihuacán date from over 2,000 years ago, but the period of greatest expansion dates from 200 CE to 500 CE. At its peak the city is estimated to have had a population of up to 200,000 inhabitants, with residential areas extending throughout the built-up area. Judging by regionally dispersed finds of the image of the rain god Tlaloc, of "thin orange wear" pottery, and of the characteristic architectural forms, the influence of Teotihuacán was widespread. It is not clear what caused the city's decline and eventual abandonment, but the evidence points to overpopulation, a depletion of resources, and the possible sacking by adversaries.

The primary axis of the city was the Avenue of the Dead, which extends for 2.5 kilometers through the center of the urban area, starting in the north at the Moon Plaza and continuing beyond the Great Compound complexes to the south. The avenue divided Teotihuacán into two sections with apartment compounds arranged on either side, often symmetrically, suggesting a highly planned layout from the earliest phases of construction.

The vast Pyramid of the Sun, located in the middle of the central zone, is the tallest and most dominant structure of Teotihuacán, with a height of 65 meters and a base covering approximately 10 acres. At one time the edifice was surmounted by a temple. A cave located underneath the pyramid and possibly used for ritual activities hints at its religious importance. The Pyramids of the Moon and Feathered Serpent are other notable ceremonial sites nearby.

A particular feature of the architecture of many of the pyramidal platforms at this site is the series of sloping apron walls, known as *taluds*, interspersed with vertical panels – *tableros* – producing a step-like appearance. Originally all such structures would have been covered with a layer of stucco and then painted, often with pictures of animals and mythological creatures.

6. According to the passage, the dispersed finds from Teotihuacán indicate that
- (A) the city is over 2,000 years old
 - (B) the city had an estimated population of as many as 200,000 inhabitants
 - (C) the residential areas extended throughout the urbanized area
 - (D) the city greatly influenced the surrounding areas
7. According to the passage, which of the following statements about the decline of Teotihuacán is known to be true?
- (A) The people migrated to another city.
 - (B) The population of the city starved.
 - (C) The city was invaded by neighbors.
 - (D) The cause of the decline is uncertain.
8. According to the passage, the symmetrical layout around the Avenue of the Dead
- (A) divided the city into two sections, one of which had apartment compounds for the living
 - (B) started at the Moon Plaza, continued past the Great Compound complexes, and extended as far as the center of the urban area
 - (C) included a primary axis of the city
 - (D) indicated that the city layout was planned before building began
9. Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.
- (A) A feature of the pyramidal architecture is the many platforms that make up the steps.
 - (B) The sloping walls of the pyramid have occasional vertical panels, which gives the appearance of steps.
 - (C) The architectural features known as *taluds* and *tableros* are a particular feature of the many pyramidal platforms.
 - (D) A series of sloping walls combined with vertical panels produces the appearance of steps that form the pyramidal platforms.
10. All of the following are mentioned as having been found in the Teotihuacán area EXCEPT
- (A) market streets
 - (B) religious artifacts
 - (C) ceremonial structures
 - (D) residential districts

Questions 11–15

In the eleventh century, people noticed that if a small hole were put in one wall of a darkened room, then light coming through the aperture would make a picture of the scene outside on the opposite wall of the room. A room like this was called a camera obscura. Artists later used a box to create a camera obscura, with a lens in its opening to make the picture clearer. But it was not possible to preserve the image that was produced in the box.

In 1727, Johann Heinrich Schulze mixed chalk, silver, and nitric acid in a bottle. He found that when the mixture was subjected to light, it became darker. In 1826, Joseph Nicéphore Niépce put some paper dipped in a light-sensitive chemical into his camera obscura, which he left exposed in a window. The result was probably the first permanent photographic image. The image Niépce made was a negative, a picture in which all the white parts are black and all the black parts are white. Later, Louis Daguerre found a way to reverse the black and white parts to make positive prints. But when he looked at the pictures in the light, the chemicals continued to react and the pictures went dark. In 1837, he found a way to fix the image. These images are known as daguerreotypes.

Many developments of photographic equipment were made in the nineteenth century. Glass plates coated with light-sensitive chemicals were used to produce clear, sharp, positive prints on paper. In the 1870s, George Eastman proposed using rolls of paper film, coated with chemicals, to replace glass plates. Then, in 1888, Eastman began manufacturing the Kodak® camera, the first "modern" lightweight camera that people could carry and use.

During the twentieth century, many technological improvements were made. One of the most important was color film. Color film is made from layers of chemicals that are sensitive to red, green, and blue light, from which all other colors can be made. Despite the fact that the space age has witnessed the creation of an array of technological marvels, until recently even the ability to take photographs of distant galaxies from above the Earth's atmosphere via orbiting satellites was grounded in the basic principles of photography that Niépce used when he took his first fuzzy negative pictures.

11. The first camera obscura can be described as nothing more than
 - (A) a darkened room in which an image was projected onto a wall
 - (B) a preserved image of a darkened room projected in a box
 - (C) a box with a lens, which projected an image onto a wall in a dark room
 - (D) a hole in a wall into which a lens could be inserted to project an image
12. According to the passage, what problem did Daguerre encounter?
 - (A) His pictures were all negative images.
 - (B) He could not find a way to make positive images.
 - (C) His positive images would darken.
 - (D) He could not reverse the fixed image.
13. According to the passage, George Eastman built a camera that
 - (A) used chemically coated glass plates
 - (B) produced light-sensitive prints
 - (C) used chemicals to produce clear, sharp, and positive prints
 - (D) was portable

14. Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.
- (A) The layers of chemicals that make up color film are sensitive to all colors that can be made.
 - (B) Color film uses chemicals that are sensitive to red, green, and blue light.
 - (C) Red, green, and blue light are the essential colors from which all colors can be chemically made.
 - (D) The layers of chemicals on color film are sensitive to red, green, and blue light that, combined, can make all colors.
15. All of the following people are mentioned as working with photographic images EXCEPT
- (A) Johann Heinrich Schulze
 - (B) Joseph Nicéphore Niépce
 - (C) Louis Daguerre
 - (D) George Eastman

Questions 16–20

Generations of American schoolchildren have been taught the story of how the Great Fire of Chicago in October 1871 was started by Daisy, a cow belonging to one Mrs. O'Leary. The cow, stabled in a barn behind Mrs. O'Leary's house, supposedly kicked over a kerosene lamp, which set fire to hay and other combustible materials stored there. The blaze quickly spread, and fanned by a strong southwest wind and aided by intensely dry conditions, the conflagration engulfed and entirely destroyed more than three square miles of built-up area. Almost 100,000 people were left homeless, and about 300 lost their lives. Property damage was estimated at 200 million dollars, an immense sum in those days.

Soon after the fire, the O'Leary-cow story became an almost unchallenged truth and, over the years, took on the status of a modern-day myth – a staple ingredient in the fabric of American folklore. However, there are good reasons to believe that neither Mrs. O'Leary nor Daisy was culpable. First, a police reporter later claimed to have invented the whole story. Of course, this is not a conclusive refutation, but his reasoning was valid and his alternative suggestions credible. Furthermore, the testimony of one of the main witnesses, a neighbor called "Peg Leg" Sullivan, is now thought to be questionable. Some claim he invented the story to avoid censure, since he himself was not above suspicion and there were inconsistencies in his account. Other accusers have focused the blame on a variety of targets – some local boys smoking in the barn, a different neighbor, an unnamed terrorist organization, spontaneous combustion, and, most recently, an asteroid. The asteroid theory gains credence from the fact that on the same night as the Chicago fire, neighboring states suffered more than a dozen major fires. One fire destroyed the entire town of Peshtigo, Wisconsin, with the loss of more than 1,200 lives.

Whatever the real origin of the fire, the truth is that it was inevitable, given the near-drought conditions of the time and the fact that much of the city consisted of densely packed wooden shacks served by an undermanned fire department. It seems that Mrs. O'Leary and her cow were perhaps no more than convenient and vulnerable scapegoats on which a devastated populace could center its frustrations.

16. What myth has been told to generations of American schoolchildren?
- (A) That many people lost their lives and many were left homeless
 - (B) That the Great Fire of Chicago was started by a cow kicking over a lamp
 - (C) How much the property damage caused by the Great Fire of Chicago cost
 - (D) How fast the Great Fire of Chicago spread and how much of the Chicago area was destroyed
17. What did "Peg Leg" Sullivan do?
- (A) He set the barn on fire while smoking.
 - (B) He accused some local boys.
 - (C) He gave a suspicious account.
 - (D) He came up with some believable alternatives.
18. Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.
- (A) The number of fires in the surrounding states on the same night as the Chicago fire supports the asteroid theory.
 - (B) There were a number of fires throughout the city of Chicago, and this supports the asteroid theory.
 - (C) The numerous fires on the same night as the Chicago fire means that asteroids were to blame.
 - (D) Asteroids may have caused the unusually high number of fires in Chicago on the same night.
19. All of the following are mentioned as possible reasons that the fire was so devastating EXCEPT
- (A) the lack of rain
 - (B) fire-prone building materials
 - (C) too few firefighters
 - (D) a riotous populace
20. According to the passage, Mrs. O'Leary's cow
- (A) is a myth
 - (B) is folklore
 - (C) was a scapegoat
 - (D) did not exist

You should draw the conclusion or understand that the study was probably about some aspect of children in multiracial school environments because it can be inferred from the phrases "multiracial schools in Miami" and "multiracial schools in other cities" that a multiracial environment was an important factor in choosing children from those particular schools.

Exercises R15–R21 Use Exercises R15–R21 to build your skills in making inferences and drawing conclusions in reading passages.

EXERCISE R15 *Identifying inferences*

Choose the letter of those inferences that can be made from the information given in the statement. More than one inference may be possible.

The lesser North American poets are more popular with children than major poets because they are direct and clear.

- (A) Children may have difficulty understanding major poets.
- (B) Minor poets write poetry for children.
- (C) There are fewer poets writing for children than writing for adults.
- (D) Indirect and hidden meanings are used in the poetry of major poets.

You should choose A because it can be inferred that the poetry of major poets is difficult for children because, unlike that of lesser poets, it is not direct and clear. You should not choose B because it cannot be inferred that either minor or major poets write for children or C because *lesser* means *minor poets*, not *fewer poets*. You should also choose D because it can be inferred that if children like the lesser poets because they write more directly and clearly, the major poets use indirect ways of expressing ideas.

1. Three of the published reports came from official investigations, but the other two came from private individuals.
 - (A) Private individuals cannot submit reports for publication.
 - (B) Only the three official reports were considered for publication.
 - (C) Five reports were published.
 - (D) Official investigations were made on private individuals.
2. The Institute of Anthropology plans to computerize archaeological data to help restore the Native American villages in Chaco Canyon.
 - (A) The Chaco Canyon Native American villages were destroyed by European people.
 - (B) The Institute of Anthropology collects information about Native American villages that are in ruins.
 - (C) The Native Americans in Chaco Canyon have computers to help them store data.
 - (D) Computers can be helpful in restoring archaeological plans.

3. Some scientists believe that the African bees that have devastated the Latin American beekeeping industry will become gentler as they interbreed with the previously introduced European varieties.
- (A) European bees will not be advantageous to the Latin American beekeeping industry.
 - (B) African bees are ferocious and destructive.
 - (C) The Latin American beekeeping industry will become gentler as African bees and European bees interbreed.
 - (D) African bees, as well as European bees, live in Latin America.
4. No partner helps the male pheasant-tailed jacana protect and nurture his chicks in their floating nest.
- (A) The female pheasant-tailed jacana does not take care of her babies.
 - (B) The pheasant-tailed jacana is an aquatic bird.
 - (C) The male pheasant-tailed jacana doesn't help to protect and nurture its partner.
 - (D) The male pheasant-tailed jacana does not mate.
5. Elephants are slowly becoming trapped in isolated forest enclaves completely surrounded by land cleared for agriculture.
- (A) Hunters are trapping elephants in isolated forest enclaves to get their ivory tusks.
 - (B) People are destroying the elephants' habitat to make farms.
 - (C) Elephants would have to cross over farmland to migrate to different forest areas.
 - (D) People are trapping elephants to use them for clearing land for agriculture.
6. To safeguard sunken ships from adventurers or thieves, ship salvagers keep the wrecks under constant surveillance by electronic and other means.
- (A) Thieves sink ships to steal the cargo.
 - (B) Sunken ships contain things that are valuable.
 - (C) Ship salvagers are usually caught before they steal anything because of safeguards.
 - (D) There are various ways to guard sunken ships from pilferers.
7. A species of weed known as the gopher plant has earned a new name – the gasoline plant – because it yields a milky latex containing hydrocarbons that can be refined into substitutes for crude oil and gasoline.
- (A) Some weeds have been renamed "gasoline plants" because their latex can be made into a gasoline substitute.
 - (B) Gasoline refined from the gasoline plant will soon replace the need for gasoline from other sources.
 - (C) Substitutes for crude oil and gasoline can come from hydrocarbons.
 - (D) Milk contains hydrocarbons necessary for crude oil and gasoline substitutes.
8. Not yet profitably synthesized, morphine, a drug unsurpassed for controlling pain, is still being scraped from opium poppy heads as it was at least 5,000 years ago.
- (A) Morphine, a drug from the poppy plant, is no longer profitable to cultivate.
 - (B) Cocaine is not as effective as morphine for stopping pain.
 - (C) Morphine has been used for pain control for at least 5,000 years.
 - (D) It is possible to make artificial morphine economically.

EXERCISE R16 *Locating sources for inferred information*

Read the passage and the statement about inferences that follows it. Underline the part or parts of the passage from which the inference can be made.

Is it true that crime doesn't pay? Although it is impossible to report every dollar that was generated in the U.S. economy by Watergate, figures pointed at what could be termed a first-class growth industry. Fees, royalties, fines, bills, and other miscellaneous payments added up into the millions of dollars moving around in the U.S. economy.

It can be inferred from this passage that Watergate is the name for a crime that took place in the United States.

You should underline *crime* and *dollar that was generated in the U.S. economy by Watergate* because it can be inferred that Watergate was a crime or else it wouldn't have been cited in the discussion of whether or not crime pays. The passage goes on to discuss how crime has paid by generating money in the U.S. economy.

1. Unlike other toads, the male golden toad is nearly voiceless. It attracts its mate through its unmistakable orange color. When the clouds are thick in the rain forest, usually in April and May, the male toads appear like flashing neon signals, which is as effective as croaking in luring females during the mating season.

It can be inferred from this passage that most toads attract their mates by making sounds.

2. The great temple of Borobudur is a stepped pyramid of unmortared andesite and basalt volcanic stone, with a perimeter of 403 feet and standing 105 feet high. This holy place lay abandoned and forgotten for more than 800 years after a devastating earthquake and an eruption of one of the four surrounding volcanoes caused its population to flee in 1006. Besides earthquakes and volcanoes, torrential rains, encroaching tropical vegetation, and time have all taken their toll.

It can be inferred from this passage that the temple of Borobudur is in ruins.

3. Some multiple sclerosis victims are experimenting with deadly snake venom to ease the pain and tiredness caused by their disease. First, the poison is milked from cobra, krait, and viper snakes. One part of it is then mixed to 4,000 parts of a saline solution. Although medical authorities are skeptical of the treatment, those using it claim that the venom has startling healing qualities.

It can be inferred from this passage that snake venom for the treatment of multiple sclerosis has not yet been approved by doctors.

4. The cassowary, one of the world's largest and least known birds, grows to a height of 6 feet and a weight of 120 pounds. Its powerful legs, which it uses for defense, are fearful weapons because the inner toe of each foot is equipped with a sharp claw, four inches long. The cassowary has glossy black plumage, which hangs coarse and brushlike because it lacks the barbules that are needed to lock feathers into a flat vane. The naked neck is of iridescent blue on the sides and pink on the back. Its head is crowned by a leathery helmet that protects it when it is charging through the jungle.

It can be inferred from this passage that the cassowary probably doesn't fly.

5. Prior to 1870, little stone decoration was done on New York buildings, except for churches and public buildings. With the arrival of artisans among the groups of European immigrants, architectural carving began to flourish. Architects would buy sculptures already done or show sketches of what they wanted carved. Away from the master carver, who had dictated what was to be carved, the artisans created eclectic and uninhibited sculptures, which became integrated into a purely American style.

It can be inferred from this passage that in Europe, artisans did not carve what they wanted to carve.

6. The Society for Creative Anachronism is a nonprofit club that joins together people who enjoy reenacting life as it was lived before the 1700s. Members of both sexes not only learn the art of sword fighting in mock combat but learn a wide range of authentic medieval skills as well. These include such skills as armor making, equestrian arts, games, jewelry making, astrology, and magic. Since the first tournament held in 1966, in which a dozen fighters took part, the society has increased by thousands of members.

It can be inferred from this passage that female members of the Society for Creative Anachronism fight in battles.

7. Computer-driven cameras, lights, and servomotors, as well as lasers and tiny lens assemblies, are just a few of the complex instruments that have brought to today's television viewers effective scientific informational films. Two crucial problems in such films are finding arresting visuals and creating special effects to illustrate complex scientific concepts. Computer-generated motion pictures allow the viewer to see the meaning of data and complex relationships instantly and are a new aid to human understanding of almost limitless power.

It can be inferred from this passage that computers used in the film industry have enabled people to understand science better.

8. Fish rubbings and nature printing have been developing as art forms in North America over the past several decades, although the techniques may date as far back as the time of early cave dwellers. To make a fish print, one should choose a very fresh fish with large rough scales and a flat body. Other needed materials are several brushes, including a fine brush for painting the eyes on the print, a thick waterbased ink, newspaper, modeling clay for supporting the fins, straight pins, and cloth or absorbent paper such as newsprint. Handmade paper is best, but it is more expensive and not recommended for beginners. The fish should be washed, dried, and laid out on the newspaper. A thin layer of ink should be brushed on in both directions. The paper is then placed over the fish and pressed carefully with the fingers, avoiding wrinkles or movement of the paper.

It can be inferred from this passage that it takes practice to become proficient in using this technique.

9. Characteristics of tropical rain forests are high and steady levels of heat and moisture, as well as a wide variety of organisms. It is believed that two-thirds of all species live in the tropics, and half of those live in the tropical rain forests. Nowhere else, except perhaps in tropical coral reefs, is nature so great in its diversity of organisms and complex in its biological interaction.

It can be inferred from this passage that tropical coral reefs contain a wide variety of organisms.



10. Even though historians think that ice-skating has been a sport for the last 2,000 years, it is within the last five decades that skating has gained recognition as a form of art. Champion athletes combine new heights of athleticism with the elegance of dance in what is now called figure skating. Ice-skaters performing daring jumps in flamboyant costumes have brought ballet to the ice rink. Ice-skating is now seen as an exciting and innovative sport that has won millions of new admirers.

It can be inferred from this passage that ice-skaters are both athletes and artists.

EXERCISE R17 *Checking if an inference is correct*

Read each sentence and answer *Yes* or *No* to the question that follows.

Volunteers for organizations such as Save the Children make an extremely important personal contribution toward improving the daily lives of millions of children throughout the world.

Can it be inferred that Save the Children volunteers contribute a lot of money to aid children?

No

You should write *No* in the space because a "personal contribution" does not necessarily mean a monetary contribution. Volunteers may contribute time or a special personal skill that they have in order to aid children.

1. Each day, more and more communities discover that they have been living near dumps or on top of ground that has been contaminated by toxic chemicals.
Can it be inferred that communities aren't always told when and where toxic wastes are being disposed?

2. E. B. White's death, at 86, was cause for sadness in millions of homes.
Can it be inferred that E. B. White was famous?

3. There is evidence that a global firestorm raged about the time the dinosaurs disappeared.
Can it be inferred that dinosaurs became extinct because of a global firestorm?

4. Of the twelve sulfite-associated deaths, one was caused by wine, one by beer, and one by hashed brown potatoes; the rest were linked to fresh fruits or vegetables.
Can it be inferred that nine people died from sulfite-contaminated fresh foods?

5. Quinolone, a recently discovered antibiotic, inhibits an enzyme that controls the way bacterial DNA unravels and rewinds when microbes reproduce.
Can it be inferred that quinolone will eventually replace all other antibiotics?

6. For people whose nerves have been damaged by illness or injuries, actions such as walking or grasping an object may be impossible.
Can it be inferred that the nervous system is important for muscle control?

EXERCISE R18 *Identifying inferences in paragraphs*

Read the passage and the statements that follow it. Write *I* in the space if the statement is an inference. Write *R* if the statement is a restatement. Leave the space blank if the statement is neither an inference nor a restatement.

Francis Gary Powers survived when his high-flying reconnaissance aircraft was shot down over the Soviet Union in 1960. He was convicted of espionage after a trial in Moscow. Later, Powers was returned to the United States in exchange for Soviet spy Rudolf Abel. Powers was killed in a helicopter crash in California in 1977.

- A. R Powers was found guilty of spying in the Soviet Union.
 B. I Rudolf Abel was imprisoned by the United States for spying.
 C. _____ Powers was killed during a reconnaissance mission.

You should write *R* for A because to be "convicted of espionage" means the same as to be "found guilty of spying." You should write *I* for B because Rudolf Abel must have been imprisoned by the United States if the Americans exchanged him for Powers. You should leave C blank because no information is given on why Powers was flying in the helicopter. It might have been for work or for pleasure.

1. The MacArthur Prizes, or "genius awards," are large grants of money given to individuals who show outstanding talents in their fields. According to a foundation spokesperson, this money frees these people from financial worries and allows them the time to devote themselves to creative thinking. The recipients of MacArthur Prizes are people who have already achieved considerable success. It may be asked whether they attained success despite the fact that they had to worry about money or because of it.
 - A. _____ Someone who is not already known in his or her field will probably not be a recipient of a MacArthur Prize.
 - B. _____ Some people may become successful because they are worried about money.
 - C. _____ Some individuals receive large sums of money to think.
2. The CDC (Centers for Disease Control) is responsible for the research done in solving or attempting to solve medical mysteries. Teams of epidemiologists crisscross the country investigating outbreaks of disease. They ask questions, look for clues, and track down pieces of puzzles in a relentless pursuit to find answers that will bring about breakthroughs in the prevention or cure of serious diseases. The CDC rushes in to study epidemics because it is possible to quickly determine patterns and common links among the victims.
 - A. _____ The CDC is not always successful in its research of diseases.
 - B. _____ Epidemiologists travel across the nation to do their research.
 - C. _____ Because there are more victims when an epidemic strikes, more data can be collected to find answers to medical questions.



3. Astronomers have long believed that frozen gases and water account for up to 80 percent of a comet's mass. While observing Comet Bowell, astronomers were able to measure the amount of light this comet absorbed and reflected. On the basis of these observations, they determined that comets do indeed contain frozen water.
 - A. ____ Astronomers have proved the theory that comets contain frozen water.
 - B. ____ The ice content of other comets can be ascertained by measuring how much light they absorb and reflect.
 - C. ____ The name of the observed comet is Bowell.
4. Although most honeybees die in the field while gathering pollen, some bees die in the hives and must be removed in order to prevent the spread of disease and to keep the nest from filling up with corpses. These corpses emit a chemical that signals death. While some bees ignore the corpses, others poke at them, lick them, or inspect them. Usually within an hour, the bees that are in charge of removing dead bees grasp the corpses in their mandibles, pull them through the hive toward the entrance, then fly away and drop them as far as 400 feet from the hive.
 - A. ____ Dead bees cannot be left in the hive because they may make the other bees sick.
 - B. ____ The honeybees know there is a dead bee in the hive because of the death chemical that is emitted.
 - C. ____ In less than one hour, the dead bees have usually been removed from the hive.
5. The northern elephant seal, a 2,000-pound mammal, is making a dramatic comeback after being hunted to near extinction in the late nineteenth century. The seals that once thrived off the coast of California now receive protection from both the Mexican and United States governments. A contributing factor to their survival is the reduced demand for seal oil due to the ready availability of petroleum products.
 - A. ____ Products that were once made from seal oil are now made from petroleum.
 - B. ____ Petroleum is easier to obtain now than seal oil is.
 - C. ____ Northern elephant seals are now numerous.
6. Diverse in culture and language, the tenacious men and women who inhabit the world's harshest environment, the land above the Arctic Circle, probably descended from hunting societies pushed north from Central Asia by population pressure about 10,000 years ago. "Scarcity" is the word that best describes the Arctic ecosystem, where life-giving solar energy is in short supply. In the winter, the sun disappears for weeks or months depending on the latitude. Even during the months of prolonged sunlight, the slanted rays cannot thaw the frozen subsurface soil. But more than the severe cold, the lack of resources for food, clothing, and shelter defines the lifestyles that the Arctic peoples lead.
 - A. ____ Scarcity of food, clothing, and shelter influences Arctic living conditions more than the harsh climate does.
 - B. ____ Anthropologists are not completely certain about the ancestry of the Arctic peoples.
 - C. ____ The further north one is, the less sunshine there is.

7. Half of all the astronauts on space flights are afflicted with debilitating space sickness, an ailment akin to car sickness and marked by nausea and vomiting. It is believed that zero gravity and its effect on the inner ear and the flow of body fluids are the cause. Scientists are attempting to find a way to predict who is susceptible to the illness because it interferes with the important work that must be done efficiently during space missions.
- A. ☐ Scientists cannot tell whether an astronaut who suffers from car sickness will suffer from space sickness.
 - B. ☐ Space sickness makes it difficult for afflicted astronauts to do their work.
 - C. ☐ Space sickness and car sickness are related illnesses.
8. The white shark, which has acquired a reputation for mindless ferocity unequalled among terrestrial or aquatic predators, belongs to the family known as the mackerel shark. Nothing about this terrifying fish is predictable: not its behavior, range, or diet. Despite this fearsome reputation, evidence from the remains of victims of shark attacks suggests that the white shark does not eat people.
- A. ☐ A white shark is a kind of mackerel shark.
 - B. ☐ The white shark has gained a terrifying reputation because it attacks people.
 - C. ☐ The white shark attacks its victims for reasons other than hunger.
9. Because they seem to be taking a measure with each looping stride, some caterpillars are called geometrids, or earth measurers. From this comes their common name, inchworms. This caterpillar grasps a twig with its back legs, extends itself forward, then draws its back end up to its front legs and repeats the sequence.
- A. ☐ The geometrid moves by stretching forward, then moving its back to its front, then repeating this process.
 - B. ☐ Not all caterpillars are inchworms.
 - C. ☐ All inchworms are earth measurers.
10. The Merlin is propelled by six compact engines, each encased in a separate duct. With no exposed blades, the craft is much safer to maneuver on the ground than either a helicopter or small plane. The Merlin takes off and hovers by blasting a column of air straight down and moves forward by directing some of that air backward with movable vanes behind each engine.
- A. ☐ The Merlin is a kind of aircraft.
 - B. ☐ Exposed blades make some aircraft unsafe.
 - C. ☐ Production of the Merlin has not yet begun.

EXERCISE R19 *Making inferences*

Read the passage and the question that follows it. Then choose the letter of the best answer based on the information given.

In the third and fourth centuries, the Germanic tribes of central Europe joined forces and plundered the crumbling Roman Empire. But they in turn became the victims of the Norse invasions of the eighth century. The Norsemen raided villages in every region. They killed the men, abducted the women and children, and then departed in their fast-sailing ships, leaving nothing but a few smoldering ruins.

What does the author mean by the statement "they in turn became the victims"?

- (A) The Germanic tribes turned on the Norse invaders in the eighth century.
- (B) The Germanic tribes and the Norse invaders took turns in attacking the Roman Empire.
- (C) The Germanic tribes received the same treatment from the Norsemen that they had given the Roman Empire.
- (D) The Roman Empire was first plundered by the Germanic tribes in the third and fourth centuries and then by the Norsemen in the eighth century.

You should choose C because the author is pointing out how the invaders later became the victims of another group of invaders.

1. Erosion of America's farmland by wind and water has been a problem since settlers first put the prairies and grasslands under the plow in the nineteenth century. By the 1930s, more than 282 million acres of farmland were damaged by erosion. After decades of conservation efforts, soil erosion has accelerated due to new demands placed on the land by heavy crop production. In the years ahead, soil erosion and the pollution problems it causes are likely to replace petroleum scarcity as the nation's most critical natural resource problem.

Why does the author mention "petroleum scarcity"?

- (A) To show that petroleum scarcity will become the most critical natural resource problem
- (B) To prove that petroleum is causing heavy soil erosion and pollution problems
- (C) To indicate that soil erosion has caused humans to place new demands on heavy crop production
- (D) To emphasize the fact that soil erosion will become the most critical problem the nation faces

2. Contamination of the sea caused by oil spills is a critical problem as wind and wave action can carry oil spills a great distance across the sea. However, there are ways in which oil spills in the sea can be dealt with. For example, straw, which can absorb up to four times its weight in oil, can be thrown on the spill and then be burned. Oil can be broken up and sunk by sand, talcum powder, or chalk. Under experimentation, some chemicals have been shown to disperse the spill into droplets, which microbes can then destroy.

Why does the author mention that straw "can absorb up to four times its weight in oil"?

- (A) To emphasize the versatility of straw
- (B) To show why straw is useful in cleaning oil spills
- (C) To compare the weight of straw to that of oil spills
- (D) To give background on the properties of straw

3. The quality of the graphics output on a computer printer is measured in dpi (dots per inch). Simply by changing the density of dots that make up each part of an image, the printer can produce graphics that look almost photographic. To understand how this works, consider how a black-and-white photograph shows the shades that, in real life, are colors. Each color is a different shade of gray. For graphics to be produced on the computer printer, a piece of software called a printer driver decides upon a dot pattern that will represent each color shade. These different patterns or textures each create an individual effect that your eye translates into gray shades. The closer you look at the image, however, the less lifelike it looks.

Why does the author mention "a black-and-white photograph"?

- (A) To explain how a printer makes graphics
 - (B) To compare the clarity of computer graphics to photographs
 - (C) To emphasize the difference between colored graphics and black-and-white graphics
 - (D) To convince the reader that dpi is preferable to photography
4. Endesha Ida Mae Holland became a playwright by a mere twist of fate. While studying at the University of Minnesota, Ms. Holland was consumed by activities other than academics. She helped start student groups dedicated to racial progress and black unity. Off campus, she formed an organization to get former prisoners back on their feet. So diverted, it took her nearly 15 years to earn her bachelor's degree. When she found herself four credit hours short of a degree, she enrolled in an acting course, which she thought would be easy because of her experience on speaking tours. But by transposing two numbers, Ms. Holland accidentally signed up for an advanced playwriting seminar. An author was born.

What does the author mean by stating "Endesha Ida Mae Holland became a playwright by a mere twist of fate"?

- (A) It took nearly 15 years to complete her bachelor's degree.
- (B) An author was born.
- (C) She didn't intend to take the playwriting seminar.
- (D) She had experience because of her speaking tours.

EXERCISE R20 *Drawing conclusions*

Read the statement and the question that follows it. Then choose the letter of the best answer based on the information given.

Few school curriculums include a unit on how to deal with bereavement and grief, and yet all people at some point in their lives suffer from loss through death and parting.

What topic would probably NOT be included in a unit on bereavement?

- (A) How to write a letter of condolence
- (B) What emotional stages are passed through in the healing process
- (C) How to give support to a grieving friend
- (D) What the leading causes of death are

Bereavement is the state of experiencing the death of a relative or friend. Since the leading causes of death are not relevant to the particular death that a person may have to deal with, you should choose D.



1. Studies show that bike races in Mexico City, where the air is 20 percent less dense than at sea level, tend to be 3 to 5 percent faster than at lower altitudes.

In which area would a bike race probably be the slowest?

- (A) Along the coast
 - (B) On an indoor track
 - (C) On a high plateau
 - (D) Near the snow line of a volcano
2. Owners of famous and valuable paintings have recently been commissioning talented artists to paint copies of these art treasures to exhibit in their homes. What is the most likely reason an owner of a valuable painting might want to exhibit a copy instead of the original?
- (A) Because they need to trick the experts
 - (B) Because they hope to foil would-be thieves
 - (C) Because they want to encourage talented artists
 - (D) Because they enjoy buying fake paintings
3. The Academy of Dog Training supplies law enforcement agencies with German shepherds that are trained to recognize the smell of marijuana and other drugs. In which of the following places would these German shepherds most likely be used?
- (A) At scenes of violent crimes
 - (B) Where burglaries have taken place
 - (C) At public swimming pools
 - (D) At customs checks between borders
4. Schools based upon the philosophy of Rudolph Steiner are all coeducational, practice mixed-ability teaching, and discourage competition among children. Which of the following activities would probably NOT be seen in a Steiner school?
- (A) A class period devoted to the teaching of mathematics
 - (B) A game involving both boys and girls
 - (C) A poetry-writing contest
 - (D) A classroom of children reading at different levels
5. The microbiologist exposed bacteria to increasingly higher levels of cyanide until he had a type of bacteria that could destroy the cyanide that had been dumped into rivers by chemical plants. In what way could these bacteria be useful?
- (A) For saving the water life from toxic wastes
 - (B) For poisoning undesirable fish
 - (C) For cleaning swimming pools
 - (D) For increasing the cyanide in the chemical plants

EXERCISE R21 *Reviewing inferences*

Read each passage and the items that follow it. Then choose the letter of the best answer for each.

Questions 1–4

The Malabar Pied-Hornbill usually nests in the fruit trees that bear its food. First, the female enters a hole in the tree and sheds her feathers. Then, she and her mate seal the hollow with mud and dung, leaving a crack through which he feeds her. When the chicks hatch and her plumage returns, she breaks out, resealing the nest to guard the young, which emerge later.

1. The Malabar Pied-Hornbill is probably a
 - (A) chicken
 - (B) seal
 - (C) bird
 - (D) bear
2. What can be said about the Malabar Pied-Hornbill's nest?
 - (A) It is padded with feathers.
 - (B) It is so warm that the female Malabar Pied-Hornbill loses its plumage.
 - (C) The female Malabar Pied-Hornbill breaks it up after losing her plumage.
 - (D) Its cracks are covered by the feathers which the female Malabar Pied-Hornbill plucks off herself.
3. Which of the following statements can be inferred?
 - (A) The male is afraid of other males and, therefore, forces his mate into the nest and seals it.
 - (B) The female is so involved in building her nest that she doesn't realize she's locked herself inside it.
 - (C) The female purposely imprisons herself to lay her eggs.
 - (D) The female has to keep the male from hurting the babies, so she encloses herself in the nest.
4. The male Malabar Pied-Hornbill probably
 - (A) feeds the eggs through a crack in the nest
 - (B) doesn't help the female until she has enclosed herself in the nest
 - (C) uses his plumage to guard the recently hatched chicks
 - (D) doesn't hatch the eggs by keeping them warm with his own body

Questions 5–7

The Mississippi River and its tributaries form the world's fourth-longest river system. Two Canadian provinces and all or parts of 31 states in the United States have rivers that drain into the Mississippi. As the Mississippi River flows down to join the sea, it deposits sand, silt, and clay, building the delta seaward across Louisiana's shallow continental shelf. The delta marsh and its bays, lakes, and sounds provide shelter and nutrients for North America's most fertile marine nursery.

5. It can be inferred from the passage that
 - (A) Canada has only two drainage areas in its provinces
 - (B) there are 31 states in the United States
 - (C) the 31 states mentioned have no other river systems to carry silt, sand, and clay
 - (D) some of the silt deposited in the Louisiana delta is from Canada
6. It is probably true that
 - (A) the delta system formed by the Mississippi River is very important for marine life
 - (B) nurseries have been set up in the delta so that children can take part in aquatic sports in the bays, lakes, and sounds
 - (C) the delta marshland is an excellent area for medical people to study diseases caused by mosquitoes and other insects
 - (D) the United States government has established nurseries to provide shelter and food for migrating birds
7. It can be inferred from the passage that
 - (A) the delta is being destroyed by the Mississippi River depositing sand, silt, and clay
 - (B) the geographic features of the delta are always changing
 - (C) the sea movement is building a delta on the continental shelf at the mouth of the Mississippi
 - (D) the river, delta, and sea all play an important role in building Louisiana's continental shelf

Questions 8–10

An ultralight airplane is very different from a conventional airplane. It looks like a lawn chair with wings, weighs no more than 254 pounds, flies up to 60 miles an hour, and carries about 5 gallons of fuel. Most ultralights are sold as kits and take about 40 hours to assemble. Flying an ultralight is so easy that a pilot with no experience can fly one. Accidents are rarely fatal or even serious because the ultralight lands so slowly and gently and carries so little fuel. Some models now have parachutes attached, while others have parachute packs which pilots can wear.

8. Ultralights are powered by
 - (A) an engine
 - (B) human energy
 - (C) remote control
 - (D) solar energy
9. It is probably true that
 - (A) an ultralight can be purchased at the airport
 - (B) people can put their own ultralights together
 - (C) people who fly ultralights have no experience
 - (D) ultralight builders need to have training in aviation

10. It can be inferred from the passage that

- (A) accident statistics are inaccurate because ultralights are not registered at airports
- (B) fatal accidents are frequent because of the lack of experienced pilots
- (C) ultralight pilots can walk away from most of the accidents they are in
- (D) because of the frequency of fatal accidents, laws requiring parachutes have been enacted

Reading Mini-test 4

Check your progress with making inferences and drawing conclusions (Exercises R15–R21) by completing the following Mini-test. This Mini-test uses question types used in the Reading section of the TOEFL iBT test.

Select the correct answer.

Questions 1–4

Jacob Epstein's sculptures were the focus of much controversy during the sculptor's lifetime. Epstein was born in the United States of Russian-Jewish immigrants in 1880. He moved to Paris in his youth and later to England, where he eventually settled and obtained British citizenship in 1907. His first major public commission, on a building in London, offended public taste because of the expressive distortion and nudity of the figures. In 1937, the Rhodesian government, which at that time owned the building, actually mutilated the sculptures to make them conform to public notions of decency. Many other of Epstein's monumental carvings received equally adverse criticism.

While the general public denounced his work, many artists and critics praised it. They admired in particular the diversity of his work and noted the influence on it of primitive and ancient sculptural motifs from Africa and the Pacific. Today, Epstein's work has received the recognition it deserves, and Epstein is considered one of the major sculptors of the twentieth century.

1. The author's attitude toward Epstein's work is

- (A) critical
- (B) derisive
- (C) amusing
- (D) admiring

2. Which of the following was most probably an important influence on Epstein's work?

- (A) public tastes
- (B) African carvings
- (C) Russian painting
- (D) the Rhodesian government

3. Today, a newly erected Epstein sculpture would probably

- (A) be mutilated
- (B) conform to public opinions
- (C) be well received
- (D) be expressive

4. What does the author mean by the statement "Many other of Epstein's monumental carvings received equally adverse criticism"?
- (A) Many of Epstein's monuments were defaced.
 - (B) People have taken equal offense to other critical works of art.
 - (C) Epstein's monuments were usually denounced for their nudity.
 - (D) Other sculptures of Epstein's elicited negative comments.

Questions 5–9

History books record that the first moving picture with sound was *The Jazz Singer* in 1927. But sound films, or "talkies," did not suddenly appear after years of silent screenings. From the earliest public performances in 1896, films were accompanied by music and sound effects. These were produced by a single pianist, a small band, or a full-scale orchestra; larger movie theaters could buy sound-effects machines.

Research into sound that was reproduced at exactly the same time as the pictures – called "synchronized sound" – began soon after the very first movies were shown. With synchronized sound, characters on the movie screen could sing and speak. As early as 1896, the newly invented gramophone, which played a large disc carrying music and dialogue, was used as a sound system. The biggest disadvantage was that the sound and pictures could become unsynchronized if, for example, the gramophone needle jumped or if the speed of the projector changed. This system was only effective for a single song or dialogue sequence.

A later development was the "sound-on-film" system. Here, sounds were recorded as a series of marks on celluloid read by optical sensors. These signals would be placed on the film alongside the images, guaranteeing synchronization. Short feature films were produced in this way as early as 1922. This system eventually brought us "talking pictures."

5. Why does the author mention "a single pianist, a small band, or a full-scale orchestra"?
- (A) To show how badly paid musicians were
 - (B) To explain how sound that accompanied early films was made
 - (C) To emphasize the role sound effects played in *The Jazz Singer*
 - (D) To refute history books that claim the first movie with sound was made in 1927
6. It can be inferred that
- (A) most movie theaters had a pianist
 - (B) sound-effects machines were common
 - (C) orchestras couldn't synchronize sound with the pictures
 - (D) gramophones were developed about the same time as moving pictures
7. Why could gramophones be considered ineffective?
- (A) They were subject to variations in speed.
 - (B) They were too large for most movie theaters.
 - (C) They couldn't always match the speed of the projector.
 - (D) They were newly invented.

8. It can be understood that the synchronization system
- (A) could be placed alongside the images
 - (B) developed at the same time as sound for movies
 - (C) was an important development for talking pictures
 - (D) was a guarantee that short feature films could be produced
9. It can be inferred that short feature films produced as early as 1922
- (A) preceded talking pictures
 - (B) put musicians out of work
 - (C) were recorded by optical sensors
 - (D) were only effective for dialogue sequences

Questions 10–13

Experiments have shown that in selecting personnel for a job, interviewing is at best a hindrance and may even cause harm. These studies have disclosed that the judgments of interviewers differ markedly and bear little or no relationship to the adequacy of job applicants. Of the many reasons why this should be the case, three in particular stand out. The first reason is related to an error of judgment known as the halo effect. If a person has one noticeable good trait, their other characteristics will be judged as better than they really are. Thus, an individual who dresses smartly and shows self-confidence is likely to be judged capable of doing a job well regardless of his or her real ability. The horns effect is essentially the same error, but focuses on one particular bad trait. Here the individual will be judged as incapable of doing a good job.

Interviewers are also prejudiced by an effect called the primacy effect. This error occurs when interpretation of later information is distorted by earlier connected information. Hence, in an interview situation, the interviewer spends most of the interview trying to confirm the impression given by the candidate in the first few moments. Studies have repeatedly demonstrated that such an impression is unrelated to the aptitude of the applicant.

The phenomenon known as the contrast effect also skews the judgment of interviewers. A suitable candidate may be underestimated because he or she contrasts with a previous one who appears exceptionally intelligent. Likewise, an average candidate who is preceded by one who gives a weak showing may be judged as more suitable than he or she really is.

Since interviews as a form of personnel selection have been shown to be inadequate, other selection procedures have been devised that more accurately predict candidate suitability. Of the various tests devised, the predictor that appears to do this most successfully is cognitive ability as measured by a variety of verbal and spatial tests.

10. What does the author mean by the phrase "essentially the same error"?
- (A) The effect of the error is the same.
 - (B) The error is based on the same kind of misjudgment.
 - (C) The effect focuses only on negative traits.
 - (D) The individual is considered less capable of the job.
11. Which of the following applicants would probably be hired for the job based on an interview in which the typical interview errors are made?
- (A) A well-dressed, confident person following someone who appears very intelligent
 - (B) An unconfident, well-dressed person following someone who is well-dressed and confident
 - (C) A well-dressed, confident person following someone who has apparent flaws
 - (D) A confident person following a well-dressed, confident person

12. Which of the following statements would the author most likely agree with concerning the actions of an interviewer looking for the best applicant for a job?
- (A) The interviewer should spend time trying to confirm a first impression.
 - (B) The interviewer should be confident and well-dressed.
 - (C) The interviewer should be aware that this process is a hindrance to finding the right person.
 - (D) The interviewer should look for other ways to choose the best applicant.
13. The paragraphs following the passage most likely discuss which of the following?
- (A) Other reasons for misjudgments about applicants
 - (B) More information on the kinds of judgmental effects
 - (C) More information on tests measuring cognitive ability
 - (D) Other selection procedures included in interviewing

PRACTICE WITH SUMMARIES AND CHARTS

Your ability to understand how a reading passage is organized and to grasp the relationships between details and main ideas will be tested in the Reading section of the TOEFL test. In the last item for each reading passage, you will be required to extract information from the entire passage and arrange the given text options into a summary or a category chart. Your ability to recognize and understand compare-and-contrast, cause-and-effect, and agree-and-disagree relationships, as well as steps in a process, will help you to succeed on these questions.

Summary questions

These questions require you to understand the main ideas that together form a summary of the passage. You will be given the first sentence in a summary and a list of other sentences. You will then be asked to choose which of the other sentences complete the summary by clicking on your choices and dragging them into a box. It is not necessary for you to put them in the correct order. The number of choices will be apparent by the number of spaces in the box.

Incorrect answer choices can be sentences that are details from the passage but are not critical to the understanding of the passage or to the formation of a summary. Incorrect choices can also be sentences that contain ideas that were not explicitly stated or information that is not mentioned within the passage.

Category chart questions

These questions require you to organize important material from the passage into a chart. You will be given a two-column chart with answer choices on the left and category headings on the right. You will then be asked to sort the answer choices under the appropriate headings by clicking on the choices and dragging them from the left column to the right. You will not always use all of the answer choices.

Incorrect answer choices may include information that is not mentioned in the text. Incorrect choices can also be incorrect generalizations or conclusions.

Exercises R22–R24 Use Exercises R22–R24 to build your skills in recognizing the relationships between details and main ideas in reading passages.

EXERCISE R22 *Understanding summaries*

Read each passage and the statements that follow it. Write *S* in the blank if the sentence summarizes the passage. Write *D* if the sentence expresses a detail in the passage. If the sentence expresses ideas not found in the passage, write *N*.

The Pre-Raphaelite brotherhood was a school of artists formed in about 1848. The Pre-Raphaelites' ideal was absolute fidelity to nature. For a time, this school of painting greatly influenced art developments throughout Europe. However, within a decade, the movement had disbanded.

- A. N The Pre-Raphaelite movement formed in 1848 broke up within ten years due to European influences on the brotherhood.
- B. S The Pre-Raphaelite movement, which advocated a faithful portrayal of nature, influenced European art developments in the mid-nineteenth century.
- C. D The Pre-Raphaelites brought their ideals of a true portrayal of nature to their painting.

For *A* you should write *N* because there is no information in the passage concerning the reason the brotherhood disbanded. For *B* you should write *S* because this sentence summarizes the passage. For *C* you should write *D* because this is a restatement of a detail in the passage.

1. Because winning or losing a race in skiing can be a matter of a tiny fraction of a second, skiing equipment has undergone many changes. Even clothing has changed as skiers search for ways to increase speed. Now they wear one-piece suits that cling to their bodies in order to reduce wind resistance. Nothing is worn under these tight-fitting suits as anything extra may mean the loss of an important millisecond.
 - A. ____ Skiers are always searching for ways to change their appearance for an important race.
 - B. ____ Skiing equipment and clothing have been developed specifically to increase racing speeds.
 - C. ____ Clothes that cling to a skier's body cause less wind resistance.
2. Rice is the only major grain crop that is grown almost exclusively as human food. Some remarkable genetic advances have made it possible to cultivate high-yield varieties that are resistant to disease and insect pests. Because rice constitutes an essential part of the diet for much of the world's population, these advances have averted disasters that otherwise would have left millions of people severely underfed.
 - A. ____ Rice has been genetically modified for use as animal feed.
 - B. ____ New rice varieties have prevented many people from going hungry.
 - C. ____ Genetic advances have led to high-yield rice varieties.

3. Addiction to cigarette smoking is basically an addiction to nicotine. Those who are attempting to overcome their addiction have found the most common cures ineffective. Switching to low-nicotine cigarettes simply causes problem smokers to smoke more. Cigarettes without any of this chemical substance are usually rejected because they don't satisfy smokers' needs. One aid, which some quitters have found effective, is a chewing gum containing nicotine, which allows them to stop without the unpleasant withdrawal symptoms. A similar kind of treatment provides a measured nicotine dose through an inhaler.
- A. ____ Smokers have tried to overcome their addiction to cigarettes using various methods.
- B. ____ Nicotine is the chemical substance that all cigarettes contain.
- C. ____ Methods that provide those trying to quit smoking with a way to get nicotine without smoking a cigarette have been effective in some cases.
4. Two-thirds of China's vast territory is either mountainous or covered by desert. Every spring, windstorms come raging out of the mountains and cross the great deserts, gathering dust. A dense cloud of dust forms that is hundreds of miles wide. It is blown thousands of miles, traveling from the North Pacific to the Gulf of Alaska and from there moving south and then east. As the prevailing winds lose their velocity, dust particles fall from the cloud. It is believed that as much as 10 percent of the soil in Hawaii comprises dust particles collected from China's deserts and dispersed in the journey across the Pacific.
- A. ____ As the winds abate, dust particles drop from the clouds.
- B. ____ The raging windstorms are increasing the great deserts in China.
- C. ____ The winds coming out of China scatter dust particles across the Pacific.

EXERCISE R23 *Identifying summary ideas*

Each of the passages below is followed by an introductory sentence that begins a brief summary of the passage. Choose the letters of the three statements that express the most important ideas in the passage. Incorrect choices express minor details or are not presented in the passage.

In 1836, crews building a canal from Washington, D.C., to the Ohio River found a major obstacle in their path: a long, steep crest of mountains known as Paw Paw Ridge. Various options for surmounting this hurdle were proposed. One idea, to build directly over the sheer cliffs, proved impractical. Another option was to create a series of aqueducts to skirt around the difficult terrain. This idea was rejected because of the anticipated time and expense.

The company's project engineer, Lee Montgomery, finally decided to tunnel through the ridge, a distance of about one kilometer. This was expected to take only two years. Perhaps this was optimistic on his part, given that power drills and dynamite had not yet been invented. Montgomery had invested much of his own money in the project and was keen to see the deadlines met. However, the construction crews found that the ridge was composed of soft shale, which frequently caved in and hampered progress. Other problems followed. Cholera, aided by the unsanitary living conditions, swept through the shantytowns, claiming many lives. At one point the laborers could not be paid.

The major obstacle for the completion of the Paw Paw Canal was the Paw Paw Ridge.

- (A) The Paw Paw Canal is named after the mountain ridge that had to be traversed.
- (B) Several ideas for overcoming the Paw Paw Ridge Canal were considered.
- (C) It was decided that a one-kilometer tunnel was the best way to overcome the barrier.
- (D) Power drills and dynamite were not available during the time that the canal was being built.
- (E) The project was beset with financial setbacks, disease, and unexpected terrain characteristics.
- (F) Unpaid laborers held protests that led to the loss of lives.

You should choose *B* because the first paragraph states and discusses ideas that were considered for overcoming the obstacle, *C* because it concerns the decision on how the ridge was to be dealt with, and *E* because these were obstacles encountered during the tunneling. *A* might be inferred but is not stated as fact. *D* is a detail. The laborers were unpaid at one point, but there is no mention of their possible response as stated in *F*.

1. A recent survey found that nine out of ten drivers admit to having felt intense anger toward other drivers at some time. "Road rage" seems to be on the rise, and several explanations for this have been presented. First, there are more cars today competing for road space. People also are far more subject to time constraints. A person who must meet a time deadline, but is caught in a tangle of traffic, may feel increasingly frustrated. Soon this stress may result in an outburst of road rage ranging anywhere from pounding on the car horn to getting out of the car and attacking another driver.

Of the three major responses to stress which have evolved – fight, flight, or freeze – only one is available to the driver who is suddenly caught behind a dawdler in the fast lane. The car itself prohibits the driver from fleeing the situation or freezing in one place. The only stress response left is fight.

Another explanation may be that people are not as courteous as they used to be. A person who is worried about getting to work on time, having a report ready for the afternoon mail, and running into the boss while coming into the office late may forget how to be polite. Other drivers become the enemy and the car, a weapon.

Road rage has become a serious problem that is on the rise.

- (A) These days the roads are very congested.
- (B) Stress caused by the frustration of dealing with the traffic is a major reason for people to succumb to road rage.
- (C) The major responses to stress are fight, flight, or freeze.
- (D) The fight response is the only recourse for the driver who cannot flee nor freeze because of the situation the car puts him or her in.
- (E) The car is now a weapon and all other drivers are the enemy.
- (F) The stresses of modern-day living may cause people to forget courtesy and give in to road rage.

2. For a fossil to be found, a complicated series of steps must occur in sequence. The first is that the animal (or plant) must be buried quickly. Animals that die on the plains or in the mountains are soon found by scavengers, such as hyenas or ceratosaurs, and rapidly reduced to bone chips. Most animals that are fossilized are caught in a flash flood, or die in or near a river and are buried in a sand bar, or are caught in a sandstorm. If the current in the river is fairly strong, even those few animals that die in the water are soon torn apart and their bones scattered over acres of river bottom. It is estimated that perhaps one animal in a thousand is fossilized, likely a generous estimate.

The second condition necessary for an animal to be fossilized is that it must be buried in a depositional area: that is, more and more layers of mud or gravel must be laid down over it. If the area is subject to erosion – and nearly all land surfaces are – the fossil will soon be washed out and destroyed.

The third step is that this depositional area must at some time become an erosional area, so that wind and water wear it down and uncover the buried remains.

The fourth step necessary for the recovery of a fossil is that when the fossil is uncovered, someone knowledgeable has to walk along that ridge, or study the face of that cliff, and locate the fossil and recover it. The time frame for this recovery varies, but it is necessarily short. The fossil is protected, but also invisible, until it is exposed. As soon as it is exposed, wind and water attack it, and they can destroy it quickly. The best fossils are found when someone spots an exposed bone that turns out to be part of a buried skeleton and is therefore still well preserved. But many fine fossils have been washed away because no one happened to see them when they were first exposed, or the people who saw them didn't realize what they were seeing.

The conditions that have to be met in order for a fossil to be found are relatively rare.

- (A) Animals that die are quickly eaten by scavengers and reduced to bone chips within a short period of time.
 - (B) For an animal or a plant to become fossilized, it must be buried before other animals or the elements destroy the body.
 - (C) A fossilized animal must first be covered by layers of soil for a length of time and then be uncovered by erosional forces.
 - (D) A fossil must be protected from the elements for as long as it is buried.
 - (E) The best fossils are those that have not been washed away and scattered before they are found.
 - (F) An exposed fossil needs to be found and recognized by someone for what it is before it is destroyed by the elements.
3. One of the major hazards for deep-sea divers is decompression sickness (DCS), more commonly known as "the bends." This sometimes fatal condition is caused by gas bubbles forming in the bloodstream if the diver ascends too rapidly. These bubbles travel in the blood and may become lodged anywhere in the body. Most commonly, they get trapped in joints, particularly the spine. The resulting pain causes the diver to bend over, hence the name of the condition.
- The reason gas bubbles form has to do with the saturation and desaturation of body tissues with various gases. At increasingly great depths, the diver breathes air at higher pressures. This results in an increased quantity of air being dissolved in the bloodstream. Different body tissues are saturated with different gases from the air at different rates. When the diver rises to the surface, oxygen is used by the body tissues, carbon dioxide is released quickly, and nitrogen remains. The nitrogen needs to be released gradually from the bloodstream and body tissues. If nitrogen is

subjected to a too rapid pressure reduction, it forms bubbles. Not only do these bubbles collect in joints, but they also become trapped in capillaries. This prevents blood and oxygen from supplying necessary nutrients to body tissues, which consequently begin to die.

Saturation and desaturation are affected by various factors such as the depth, length of time, and amount of exertion under water. There are other factors that must be taken into account when determining a safe ascent rate. These include the diver's sex and body build, the number of dives undertaken within the previous 12 hours, the time spent at the dive location before the dive, and the composition of the respiration gas.

Diving tables set guidelines based on statistical probabilities of getting the bends. However, someone who stays within the suggested limits can still get DCS. Since even a mild case can leave a diver permanently disabled, it is imperative that divers recognize the symptoms. Unfortunately, such symptoms can be similar to those of the flu or a strained muscle, something that occurs frequently when divers are handling heavy equipment, using improperly fitted gear, or engaging in unaccustomed activity. Because even professionals can have difficulty diagnosing DCS, the most reliable test is to recompress the patient and see whether the symptoms abate.

Decompression sickness (DCS) is a sometimes fatal condition that affects deep-sea divers.

- (A) DCS is the formation of gas bubbles in the bloodstream caused by the different saturation and desaturation rates of gases under pressure.
 - (B) Most people are more familiar with the term "the bends," referring to the way a diver bends over in pain.
 - (C) Body tissues die when nitrogen prevents blood and oxygen from bringing important nutrients.
 - (D) Saturation and desaturation rates of gases are affected by factors that divers need to take into consideration.
 - (E) DCS can be misdiagnosed as the flu.
 - (F) The best way to diagnose DCS is to put the patient through recompression.
4. One of the most basic laws of economics is that nothing of value is free. Sometimes this is dubbed "tanstaaf." The word *tanstaaf* is formed from the initials of the statement: "There ain't no such thing as a free lunch." What this means is that everything that has value must be paid for in currency, labor, or by some other means.

Not only do people have to pay for everything that has value, but governments do as well. Governments have a lot of expenditures – public buildings, roads, military, etc. – and to get the necessary money, they tax their citizens. Nobody likes to pay taxes, and history has shown that when taxes get too high, people eventually revolt and overthrow the offending government. To avoid raising taxes, a government must find another way to deal with the problem of getting money to meet its expenses.

A case in point is the government of the Roman Empire. The Roman government taxed its citizens in order to pay for the expenses of running such a vast empire. It became apparent that if it raised taxes further, it risked provoking unrest. So it came up with the idea of clipping the denarius, a coin made of 94 percent silver. When the tax collectors brought in people's taxes paid in silver coins, the Roman treasury clipped, or shaved the edges off, the coins. The clippings were minted into new coins. For a time, this gave the government the money necessary for its budget.



But it did not take the Roman people long to realize that some of their coins were missing silver. Therefore, they either refused to accept the clipped coins or charged more coins for their goods or services.

In later centuries a system called reeding came into practice. A reeded coin has grooves along its edge making it easy to see whether or not clipping has taken place. But since the Roman government still needed money and clipping no longer served its purpose, the Roman treasury started melting down coins and reminting them with a mixture of base metal, such as copper. However, each time a coin was melted down and reminted with a base-metal mixture, the content of precious metal became less and that of base metal, more. When the Roman people realized that their money was being debased, they responded by hoarding coins. Whenever they got a good coin, one with a high percentage of silver in it, they kept it. They spent only bad coins, those with a low percentage of silver. This behavior is explained by Gresham's Law, which states: Bad money drives good money out of circulation. When debasement happens, money loses its value and prices inevitably rise.

The Roman government tried various ways of dealing with the economic problem of running their Empire.

- (A) The Roman officials understood the concept of *tanstaafl* – that nothing of value is free.
- (B) Like Roman people, the Roman government had expenses, which in the case of the Empire included building cities, maintaining roads, and keeping an army.
- (C) The Roman Treasury met expenditures by taxing citizens until further tax increases would have caused discontent.
- (D) The Roman currency was the denarius, which was composed of 94 percent silver.
- (E) By clipping silver from an old coin, the Treasury was able to mint new coins until the people became wise and the coins had to be reeded.
- (F) A further need for money caused the Roman Treasury to start the practice of minting coins that were debased.

EXERCISE R24 Organizing information into charts

In the following exercise, each passage is followed by a list of answer choices and two categories. Follow the specific instructions underneath each passage about how to match the answer choices to the correct categories. Not all of the answer choices will be used.

Early Greek columns were built in two main styles, or orders – the Doric and the Ionic – named after Greek dialects. Of these two orders, the Ionic is the more slender – but is most notably different in the decoration of the capital, the part that rests on top of the column. While the capital of the Doric column is plain and unadorned, that of the Ionic is characterized by two pairs of prominent spiral scrolls, one pair on each side of the capital, which may have been inspired by curling leaves of foliage. Between the scrolls other ornamentation, such as an egg and dart pattern, were often carved for added embellishment.

Questions 1–13

Cellular Slime Molds

Cellular slime molds are extraordinary life forms that exhibit features of both fungi and protozoa, although often classed for convenience with fungi. At one time they were regarded as organisms of ambiguous taxonomic status, but more recent analysis of DNA sequences has shown that slime molds should be regarded as inhabiting their own separate kingdom. Their uniqueness lies in their unusual life cycle, which alternates between a feeding stage in which the organism is essentially unicellular and a reproductive stage in which the organism adopts a multicellular structure. At the first stage they are free-living, separate amoebae, usually inhabiting the forest floor and ingesting bacteria found in rotting wood, dung, or damp soil. But their food supplies are relatively easily exhausted since the cells' movements are restricted and their food requirements rather large.

When the cells become starved of nutrition, the organism initiates a new genetic program that permits the cells to eventually find a new, food-rich environment. At this point, the single-celled amoebae combine together to form what will eventually become a multicellular creature. The mechanism by which the individual members become a single entity is essentially chemical in nature. At first, a few of the amoebae start to produce periodic chemical pulses that are detected, amplified, and relayed to the surrounding members, which then move toward the pulse origin. In time, these cells form many streams of cells, which then come together to form a single hemispherical mass. This mass sticks together through the secretion of adhesion molecules.

The mass now develops a tip, which elongates into a finger-like structure of about 1 or 2 millimeters in length. This structure eventually falls over to form a miniature slug, moving as a single entity orienting itself toward light. During this period the cells within the mass differentiate into two distinct kinds of cell. Some become prestalk cells, which later form into a vertical stalk, and others form prespore cells, which become the spore head.

As the organism migrates, it leaves behind a track of slime rather like a garden slug. Once a favorable location has been found with a fresh source of bacteria to feed on, the migration stops and the colony metamorphoses into a fungus-like organism in a process known as "culmination." The front cells turn into a stalk, and the back cells climb up the stalk and form a spherical-shaped head, known as the sorocarp. This final fruiting body is about 2 millimeters in height. The head develops into spores, which are dispersed into the environment and form the next generation of amoebae cells. Then the life cycle is repeated. Usually the stalk disappears once the spores have been released.

The process by which the originally identical cells of the slime mold become transformed into multicellular structures composed of two different cell types – spore and stalk – is of great interest to developmental biologists since it is analogous* to an important process found in higher organisms in which organs with highly specialized functions are formed from unspecialized stem cells. Early experiments showed which parts of the slime mold organism contributed to the eventual stalk and which parts to the head. Scientists stained the front part of a slug with a red dye and attached it to the back part of a different slug. The hybrid creature developed as normal. The experimenters then noted that the stalk of the fruiting body was stained red and that the spore head was unstained. Clearly, the anterior part of the organism culminated in the stalk and the posterior part in the spore head. Nowadays, experiments using DNA technology and fluorescent proteins or enzymes to label the prespore and prestalk cells have been undertaken. This more molecular approach gives more precise results than using staining dyes but has essentially backed up the results of the earlier dye studies.

*analogous: similar

1. According to paragraph 1, how the slime mold should be classified used to be
- (A) unknown
 - (B) uncertain
 - (C) controversial
 - (D) unfamiliar

Paragraph 1 is marked with an arrow [➡].

➡ Cellular slime molds are extraordinary life forms that exhibit features of both fungi and protozoa, although often classed for convenience with fungi. At one time they were regarded as organisms of ambiguous taxonomic status, but more recent analysis of DNA sequences has shown that slime molds should be regarded as inhabiting their own separate kingdom. Their uniqueness lies in their unusual life cycle, which alternates between a feeding stage in which the organism is essentially unicellular and a reproductive stage in which the organism adopts a multicellular structure. At the first stage they are free-living, separate amoebae, usually inhabiting the forest floor and ingesting bacteria found in rotting wood, dung, or damp soil. But their food supplies are relatively easily exhausted since the cells' movements are restricted and their food requirements rather large.

2. The word "ingesting" in the passage is closest in meaning to
- (A) chewing
 - (B) catching
 - (C) absorbing
 - (D) consuming

Cellular slime molds are extraordinary life forms that exhibit features of both fungi and protozoa, although often classed for convenience with fungi. At one time they were regarded as organisms of ambiguous taxonomic status, but more recent analysis of DNA sequences has shown that slime molds should be regarded as inhabiting their own separate kingdom. Their uniqueness lies in their unusual life cycle, which alternates between a feeding stage in which the organism is essentially unicellular and a reproductive stage in which the organism adopts a multicellular structure. At the first stage they are free-living, separate amoebae, usually inhabiting the forest floor and ingesting bacteria found in rotting wood, dung, or damp soil. But their food supplies are relatively easily exhausted since the cells' movements are restricted and their food requirements rather large.

3. According to the passage, what is unusual about the slime molds' life cycle?
- (A) They inhabit their own kingdom.
 - (B) They are organisms whose classification is ambiguous.
 - (C) They alternate between unicellular and multicellular structures.
 - (D) They are free-living organisms.

[Refer to the full passage.]

4. According to the passage, what is the primary reason the cells need to combine into a single larger creature?
- (A) To move to find a new food source
 - (B) To slow the rate of ingesting food
 - (C) To become separate creatures
 - (D) To create their own kingdom

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

Starvation is reached when the population of cells is high in relation to the abundance of the food source.

Where would the sentence best fit?

Choose the letter of the square that shows where the sentence should be added.

6. The word "entity" in the passage is closest in meaning to
- (A) division
 - (B) species
 - (C) piece
 - (D) unit

7. The word "others" in the passage refers to
- (A) cells
 - (B) stalks
 - (C) spores
 - (D) kinds

[Refer to the full passage.]

When the cells become starved of nutrition, the organism initiates a new genetic program that permits the cells to eventually find a new, food-rich environment. **A** At this point, the single-celled amoebae combine together to form what will eventually become a multicellular creature. **B** The mechanism by which the individual members become a single entity is essentially chemical in nature. **C** At first, a few of the amoebae start to produce periodic chemical pulses that are detected, amplified, and relayed to the surrounding members, which then move toward the pulse origin. **D** In time, these cells form many streams of cells, which then come together to form a single hemispherical mass. This mass sticks together through the secretion of adhesion molecules.

When the cells become starved of nutrition, the organism initiates a new genetic program that permits the cells to eventually find a new, food-rich environment. At this point, the single-celled amoebae combine together to form what will eventually become a multicellular creature. The mechanism by which the individual members become a single entity is essentially chemical in nature. At first, a few of the amoebae start to produce periodic chemical pulses that are detected, amplified, and relayed to the surrounding members, which then move toward the pulse origin. In time, these cells form many streams of cells, which then come together to form a single hemispherical mass. This mass sticks together through the secretion of adhesion molecules.

The mass now develops a tip, which elongates into a finger-like structure of about 1 or 2 millimeters in length. This structure eventually falls over to form a miniature slug, moving as a single entity orienting itself toward light. During this period the cells within the mass differentiate into two distinct kinds of cell. Some become prestalk cells, which later form into a vertical stalk, and others form prespore cells, which become the spore head.

8. All of the following are mentioned in paragraph 4 as being parts of the multicellular slug EXCEPT

(A) the head
(B) the stalk
(C) legs
(D) spores

Paragraph 4 is marked with an arrow [➡].

➡ As the organism migrates, it leaves behind a track of slime rather like a garden slug. Once a favorable location has been found with a fresh source of bacteria to feed on, the migration stops and the colony metamorphoses into a fungus-like organism in a process known as "culmination." The front cells turn into a stalk, and the back cells climb up the stalk and form a spherical-shaped head, known as the sorocarp. This final fruiting body is about 2 millimeters in height. The head develops into spores, which are dispersed into the environment and form the next generation of amoebae cells. Then the life cycle is repeated. Usually the stalk disappears once the spores have been released.

9. In paragraph 4, why does the author refer to the fungus-like organism as a fruiting body?

(A) Because it has become one entity
(B) Because it is 2 millimeters in height
(C) Because it now has a stalk and head
(D) Because it has reached its reproductive stage

Paragraph 4 is marked with an arrow [➡].

➡ As the organism migrates, it leaves behind a track of slime rather like a garden slug. Once a favorable location has been found with a fresh source of bacteria to feed on, the migration stops and the colony metamorphoses into a fungus-like organism in a process known as "culmination." The front cells turn into a stalk, and the back cells climb up the stalk and form a spherical-shaped head, known as the sorocarp. This final fruiting body is about 2 millimeters in height. The head develops into spores, which are dispersed into the environment and form the next generation of amoebae cells. Then the life cycle is repeated. Usually the stalk disappears once the spores have been released.

10. Which of the sentences below best expresses the essential information in the highlighted sentence? Incorrect choices change the meaning in important ways or leave out essential information.

(A) The next generation of amoebae cells disperses into the environment by attaching themselves to spores on the head.
(B) After the spores that form the head are scattered around the area, they develop into a new generation of amoebae cells.
(C) The spores develop into amoebae cells and then become spread around the head of the slug.
(D) The spores spread throughout an area and develop into a new generation of amoebae cells.

As the organism migrates, it leaves behind a track of slime rather like a garden slug. Once a favorable location has been found with a fresh source of bacteria to feed on, the migration stops and the colony metamorphoses into a fungus-like organism in a process known as "culmination." The front cells turn into a stalk, and the back cells climb up the stalk and form a spherical-shaped head, known as the sorocarp. This final fruiting body is about 2 millimeters in height. The head develops into spores, which are dispersed into the environment and form the next generation of amoebae cells. Then the life cycle is repeated. Usually the stalk disappears once the spores have been released.

11. It can be inferred that developmental biologists are especially interested in the slime mold because
- (A) the change in degree of specialization in its cells helps them to understand cell development in more complex organisms
 - (B) it is convenient to perform experiments on a creature that is composed of two different cell types
 - (C) scientists could form hybrid organisms in their experiments using the same process that slime mold uses to transform itself
 - (D) it is easy to find specimens on which to perform experiments

[Refer to the full passage.]

12. According to the passage, the recent DNA studies
- (A) give similar results to the dye studies
 - (B) contradict the dye studies
 - (C) are less exact than the dye studies
 - (D) have introduced confusion about the dye study results

[Refer to the full passage.]

13. **Directions:** Select the appropriate phrases from the answer choices and match them to the stage of slime mold life cycle to which they relate. TWO of the answer choices will NOT be used. This question is worth 4 points.

Write the letters of the answer choices in the spaces where they belong.
Refer to the full passage.

Answer Choices

- (A) Alteration between feeding and reproduction
- (B) Bacteria-consuming amoebae inhabiting the forest floor
- (C) Culmination of dyed cells in stalk and head
- (D) Development of sorocarp
- (E) Dispersal of spores
- (F) Mass formed through the secretion of adhesion molecules
- (G) Migration oriented to fresh source of food
- (H) Production of chemical pulses causing members to merge
- (I) Transformation of cells into stalk and head

Unspecialized Cells

Specialized Cells

Questions 14–26

The Coriolis Force

In the early part of the twentieth century, the Norwegian scientist and polar explorer Fridtjof Nansen noted that icebergs did not follow the path of the wind as common sense had assumed. Instead they tended to move to the right side of the direction in which the wind blew. A student of Nansen's, V. W. Ekman, showed that the rotation of the Earth leading to an inertial force known as the Coriolis force was responsible for this phenomenon. He further demonstrated that in the Northern Hemisphere the deflection was toward the right of the prevailing wind, and in the Southern Hemisphere the deflection was toward the left. The icebergs observed by Nansen were moved by ocean currents that also moved at an angle to the prevailing wind.

The Coriolis force itself is caused by the fact that the Earth rotates on its axis once per day, and hence all points on the planet have the same rotational velocity; that is, they take one whole day to complete a rotational circle. However, since a complete rotation around the Earth is shorter the further one is away from the equator, different points on the Earth travel at different speeds depending on degree of latitude. For example, a point on the equator travels the whole distance around the sphere (about 40,000 kilometers), whereas a point near the poles will travel a much shorter distance. Therefore, we can say that the linear speed of a point depends on its latitude above or below the equator. Thus the actual linear speed of a point on the surface is faster the nearer that point is to the equator.

Now if an untethered object (or current) is moving northward away from the equator in the Northern Hemisphere, it will also maintain the initial speed imparted to it by the eastward rotation of the Earth. That eastward deflection is faster at the equator than at more northerly (or southerly) latitudes, and thus, when the object reaches a more northerly point, it will be traveling faster in an eastward direction than the surrounding ground or water. The moving object will appear to be forced away from its path by some mysterious phenomenon. In reality the ground is simply moving at a different speed from the original speed at the object's (or current's) home position. The resulting direction of movement will therefore be at an angle of about 45 degrees to the original direction, so an object traveling north will move to the right in the Northern Hemisphere and to the left in the Southern Hemisphere with respect to the rotating Earth. An object traveling south will be deflected to the left in the Northern Hemisphere and to the right in the Southern Hemisphere.

As the surface water in the ocean is moved by the wind, it tends to veer* off at an angle of 45 degrees to the right or left. This movement exerts a drag on the water immediately below it, and the Coriolis force causes this layer to move and also to deflect to the right or left. This layer in turn drags the layer below, which in turn is deflected. At successively deeper layers, the water is deflected in relation to the layer above until at a depth of around 150 meters, the water is moving in a direction opposite to the surface water. At successively greater depths, the frictional forces between layers reduce the energy of the flow, causing water to move more slowly the deeper the layer. The resulting deflections produce a spiral pattern known as the Ekman spiral. The net movement of water is roughly at 90 degrees from the wind direction and is known as Ekman transport.

This phenomenon is an important factor in the movement of water in the oceans. Among other things, it creates zones of upwelling by forcing surface waters apart and other zones of downwelling by forcing surface waters together. For example, wind blowing parallel to the shore may create a net movement of water at 90 degrees away from the shore. Nutrient-rich deeper ocean water will upwell to take the place of the displaced water and thus profoundly influence the marine ecosystem.

*veer: to suddenly change direction

14. The phrase "path of the wind" in the passage is closest in meaning to

(A) wind strength
(B) wind variation
(C) wind direction
(D) wind phenomenon

In the early part of the twentieth century, the Norwegian scientist and polar explorer Fridtjof Nansen noted that icebergs did not follow the path of the wind as common sense had assumed. Instead they tended to move to the right side of the direction in which the wind blew. A student of Nansen's, V. W. Ekman, showed that the rotation of the Earth leading to an inertial force known as the Coriolis force was responsible for this phenomenon. He further demonstrated that in the Northern Hemisphere the deflection was toward the right of the prevailing wind, and in the Southern Hemisphere the deflection was toward the left. The icebergs observed by Nansen were moved by ocean currents that also moved at an angle to the prevailing wind.

15. The phrase "this phenomenon" in the passage refers to

(A) the movement of icebergs
(B) the rotation of the Earth
(C) the direction of the wind
(D) the inertial Coriolis force

In the early part of the twentieth century, the Norwegian scientist and polar explorer Fridtjof Nansen noted that icebergs did not follow the path of the wind as common sense had assumed. Instead they tended to move to the right side of the direction in which the wind blew. A student of Nansen's, V. W. Ekman, showed that the rotation of the Earth leading to an inertial force known as the Coriolis force was responsible for this phenomenon. He further demonstrated that in the Northern Hemisphere the deflection was toward the right of the prevailing wind, and in the Southern Hemisphere the deflection was toward the left. The icebergs observed by Nansen were moved by ocean currents that also moved at an angle to the prevailing wind.

16. The word "rotates" in the passage is closest in meaning to

(A) spins
(B) travels
(C) twirls
(D) swivels

The Coriolis force itself is caused by the fact that the Earth rotates on its axis once per day, and hence all points on the planet have the same rotational velocity; that is, they take one whole day to complete a rotational circle. However, since a complete rotation around the Earth is shorter the further one is away from the equator, different points on the Earth travel at different speeds depending on degree of latitude. For example, a point on the equator travels the whole distance around the sphere (about 40,000 kilometers), whereas a point near the poles will travel a much shorter distance. Therefore, we can say that the linear speed of a point depends on its latitude above or below the equator. Thus the actual linear speed of a point on the surface is faster the nearer that point is to the equator.

17. We can infer that rotational velocity is

(A) the same as speed in kph
(B) different at different latitudes
(C) the same at different latitudes
(D) dependent on latitude

[Refer to the full passage.]

18. In paragraph 2, the author explains the differences in linear speed by
- (A) arguing that an object moving north moves faster
 - (B) describing the linear velocity of the Earth
 - (C) identifying the eastward deflection of a current
 - (D) relating speed to the distance of a point from the equator

Paragraph 2 is marked with an arrow [➡].

➡ The Coriolis force itself is caused by the fact that the Earth rotates on its axis once per day, and hence all points on the planet have the same rotational velocity; that is, they take one whole day to complete a rotational circle. However, since a complete rotation around the Earth is shorter the further one is away from the equator, different points on the Earth travel at different speeds depending on degree of latitude. For example, a point on the equator travels the whole distance around the sphere (about 40,000 kilometers), whereas a point near the poles will travel a much shorter distance. Therefore, we can say that the linear speed of a point depends on its latitude above or below the equator. Thus the actual linear speed of a point on the surface is faster the nearer that point is to the equator.

19. According to the passage, a point near the equator in the Northern Hemisphere travels
- (A) at the same speed as any other point
 - (B) faster than a point at a higher latitude
 - (C) slower than a point in the Southern Hemisphere
 - (D) at different speeds in different seasons

[Refer to the full passage.]

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

And conversely, if the object is traveling southward toward the equator, it will be moving more slowly than the surrounding land or water.

Where would the sentence best fit?

Choose the letter of the square that shows where the sentence should be added.

Now if an untethered object (or current) is moving northward away from the equator in the Northern Hemisphere, it will also maintain the initial speed imparted to it by the eastward rotation of the Earth. **A** That eastward deflection is faster at the equator than at more northerly (or southerly) latitudes, and thus, when the object reaches a more northerly point, it will be traveling faster in an eastward direction than the surrounding ground or water. **B** The moving object will appear to be forced away from its path by some mysterious phenomenon. In reality the ground is simply moving at a different speed from the original speed at the object's (or current's) home position. **C** The resulting direction of movement will therefore be at an angle of about 45 degrees to the original direction, so an object traveling north will move to the right in the Northern Hemisphere and to the left in the Southern Hemisphere with respect to the rotating Earth. **D** An object traveling south will be deflected to the left in the Northern Hemisphere and to the right in the Southern Hemisphere.

21. According to paragraph 4, where does water move in a direction contrary to surface layers of water?

(A) Directly below the surface
 (B) At 90 degrees to the surface
 (C) At all depths below the surface
 (D) At 150 meters below the surface

Paragraph 4 is marked with an arrow [➡].

➡ As the surface water in the ocean is moved by the wind, it tends to veer off at an angle of 45 degrees to the right or left. This movement exerts a drag on the water immediately below it, and the Coriolis force causes this layer to move and also to deflect to the right or left. This layer in turn drags the layer below, which in turn is deflected. At successively deeper layers, the water is deflected in relation to the layer above until at a depth of around 150 meters, the water is moving in a direction opposite to the surface water. At successively greater depths, the frictional forces between layers reduce the energy of the flow, causing water to move more slowly the deeper the layer. The resulting deflections produce a spiral pattern known as the Ekman spiral. The net movement of water is roughly at 90 degrees from the wind direction and is known as Ekman transport.

22. In paragraph 4, why does the author explain that the wind tends to deflect the water to the right or left?

(A) To explain the concept of upwelling
 (B) To demonstrate the effect of the Coriolis force
 (C) To point out causes of rotational velocity
 (D) To introduce the movement of ocean currents

Paragraph 4 is marked with an arrow [➡].

➡ As the surface water in the ocean is moved by the wind, it tends to veer off at an angle of 45 degrees to the right or left. This movement exerts a drag on the water immediately below it, and the Coriolis force causes this layer to move and also to deflect to the right or left. This layer in turn drags the layer below, which in turn is deflected. At successively deeper layers, the water is deflected in relation to the layer above until at a depth of around 150 meters, the water is moving in a direction opposite to the surface water. At successively greater depths, the frictional forces between layers reduce the energy of the flow, causing water to move more slowly the deeper the layer. The resulting deflections produce a spiral pattern known as the Ekman spiral. The net movement of water is roughly at 90 degrees from the wind direction and is known as Ekman transport.

23. The word "deflected" in the passage is closest in meaning to

(A) turned
 (B) pushed
 (C) shoved
 (D) urged

As the surface water in the ocean is moved by the wind, it tends to veer off at an angle of 45 degrees to the right or left. This movement exerts a drag on the water immediately below it, and the Coriolis force causes this layer to move and also to deflect to the right or left. This layer in turn drags the layer below, which in turn is deflected. At successively deeper layers, the water is deflected in relation to the layer above until at a depth of around 150 meters, the water is moving in a direction opposite to the surface water. At successively greater depths, the frictional forces between layers reduce the energy of the flow, causing water to move more slowly the deeper the layer. The resulting deflections produce a spiral pattern known as the Ekman spiral. The net movement of water is roughly at 90 degrees from the wind direction and is known as Ekman transport.

24. Based on the information in paragraphs 1 and 4, which of the following best explains the term "Coriolis force"?

[Refer to the full passage.]

- (A) The force that creates currents
- (B) The force that moves icebergs
- (C) The force that opposes wind movement
- (D) The force that deflects ocean water

25. According to the passage, the Ekman spiral may affect

[Refer to the full passage.]

- (A) the distribution of ocean life forms
- (B) the direction of the wind
- (C) the speed of ocean currents
- (D) the frictional forces of water layers

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 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.

Write the letters of the answer choices in the spaces where they belong.
Refer to the full passage.

Different linear speeds at different latitudes on the Earth cause the prevailing winds in the Earth's Northern and Southern Hemispheres to deflect water movements, thus creating Ekman spirals.

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Answer Choices

- | | |
|--|---|
| <p>(A) Due to the Coriolis force, icebergs move at a right angle to the prevailing wind.</p> <p>(B) Because of the Earth's rotation, objects moving away from or toward the equator travel at different speeds in relation to fixed points at different latitudes.</p> <p>(C) In order to reach the correct destination, an airplane pilot must adjust direction to compensate for the Coriolis force.</p> | <p>(D) Because of deflection and differences in linear speed, ocean currents move at an angle to the wind.</p> <p>(E) Water at successively lower levels is deflected at an angle to the layer immediately above it, and this creates a spiral.</p> <p>(F) Due to upwelling of water, marine life is rich in areas where Ekman spirals operate.</p> |
|--|---|

Questions 27–39

The Battle of Gettysburg

In June 1863, a Confederate army under the command of General Lee encountered a Union army commanded by General Meade near the town of Gettysburg, Pennsylvania. The ensuing battle, which lasted three days, is considered the most important single engagement of the American Civil War in that it effectually ended the Confederates' last major invasion of the North. Once the Southern Confederate army's offensive strategy was destroyed at Gettysburg, the Southern states were forced to fight a defensive war in which their weaker manufacturing capacity and transportation infrastructure led ultimately to defeat.

General Lee had ordered his Confederate army to invade the northern state of Pennsylvania in the hope of enticing the Union army into a vulnerable position. The strategy was also aimed at increasing the war weariness of the North and ultimately at leading Abraham Lincoln's government into concluding a peace deal and recognizing the independence of the Confederate South.

On the morning of July 1, the battle opened with Confederate troops attacking a Union cavalry division to the west of Gettysburg at McPherson Ridge. The Union forces were outnumbered but managed to hold their positions initially. Reinforcements came to both sides, but eventually the Union forces were overpowered and were driven back to the south of Gettysburg. Thousands of their soldiers were captured in this retreat. During the night the bulk of the Union army arrived and the troops labored to create strong defensive positions along Cemetery Ridge, a long rise of land running southward from outside the town, and on two hills just to the north and east of this crest. When it was fully assembled, the whole Union army formed a defensive arc resembling a fishhook. The Confederate forces, about one mile distant, faced the Union positions from the west and north in a larger concave arc.

Throughout July 2 Lee's forces attacked both Union flanks, leaving thousands of dead on both sides. To the south the Confederates overran the Union's advance lines, but they failed to dislodge the Union forces from their main positions. A strategically important hill on the Union army's left flank known as Little Round Top was stormed by the Confederates, but Meade's forces fought a skillful defensive battle and the attacks were unsuccessful. There was a devastating number of casualties on both sides.

On the third day of battle, General Lee decided to concentrate his attack on the center of the Union forces ranged along Cemetery Ridge. He reasoned, against the advice of others in his senior staff, that since the Union forces had reinforced both their flanks, their central defensive positions would be weaker and easier to overrun. As a prelude to the attack, the Confederate artillery bombarded the ridge for two hours, but inflicted less damage than they had expected, due to poor visibility. When the bombardment ceased, a Confederate infantry force of about 13,000 men charged courageously across the open land toward the Union lines on Cemetery Ridge about a mile away. This attack, now known as Pickett's Charge after the general whose division led it, failed in its objective to break the Union line.

With the failure of Pickett's Charge, the battle was essentially over and Lee's retreat began the following day. His exhausted army staggered toward safer territory in the South, leaving behind a scene of terrible devastation. Both sides had suffered excessive losses of men, but the Union had succeeded in preventing the Confederates from invading the North. So Gettysburg proved to be a decisive turning point in the Civil War and was celebrated as the biggest Union victory of the war.

27. The word "engagement" in the passage is closest in meaning to

(A) agreement
(B) meeting
(C) battle
(D) defeat

28. In paragraph 1, the author suggests that the Confederates lost the Civil War largely because their

(A) leaders were ineffective
(B) industrial capacity was weaker
(C) soldiers were unprofessional
(D) strategy was poorly planned

Paragraph 1 is marked with an arrow [➡].

29. Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.

(A) General Lee tried to lure his soldiers into invading the North in order to defeat the Union army.
(B) The Union army was in danger of an invasion by General Lee's army due to its location in Pennsylvania.
(C) In the hope of luring the Union army into an exposed situation, General Lee's forces marched into Pennsylvania.
(D) The state of Pennsylvania was a suitable location for drawing out the Union army into a dangerous situation.

In June 1863, a Confederate army under the command of General Lee encountered a Union army commanded by General Meade near the town of Gettysburg, Pennsylvania. The ensuing battle, which lasted three days, is considered the most important single engagement of the American Civil War in that it effectually ended the Confederates' last major invasion of the North. Once the Southern Confederate army's offensive strategy was destroyed at Gettysburg, the Southern states were forced to fight a defensive war in which their weaker manufacturing capacity and transportation infrastructure led ultimately to defeat.

➡ In June 1863, a Confederate army under the command of General Lee encountered a Union army commanded by General Meade near the town of Gettysburg, Pennsylvania. The ensuing battle, which lasted three days, is considered the most important single engagement of the American Civil War in that it effectually ended the Confederates' last major invasion of the North. Once the Southern Confederate army's offensive strategy was destroyed at Gettysburg, the Southern states were forced to fight a defensive war in which their weaker manufacturing capacity and transportation infrastructure led ultimately to defeat.

General Lee had ordered his Confederate army to invade the northern state of Pennsylvania in the hope of enticing the Union army into a vulnerable position. The strategy was also aimed at increasing the war weariness of the North and ultimately at leading Abraham Lincoln's government into concluding a peace deal and recognizing the independence of the Confederate South.

30. What can be inferred from paragraph 2 about the North's attitude about the war?

- (A) It was angry at the loss of freedoms.
- (B) It was keen on continuing the war.
- (C) It was keen on independence.
- (D) It was tired of waging war.

Paragraph 2 is marked with an arrow (➡).

➡ General Lee had ordered his Confederate army to invade the northern state of Pennsylvania in the hope of enticing the Union army into a vulnerable position. The strategy was also aimed at increasing the war weariness of the North and ultimately at leading Abraham Lincoln's government into concluding a peace deal and recognizing the independence of the Confederate South.

31. We can infer from the passage that, at Gettysburg, the Union army largely played which kind of strategy?

- (A) An offensive strategy
- (B) A strategy of hit and run
- (C) A defensive strategy
- (D) A strategy of wait and see

[Refer to the full passage.]

32. The phrase "this crest" in the passage refers to

- (A) the Confederate forces
- (B) Cemetery Ridge
- (C) Union army reinforcements
- (D) the town of Gettysburg

On the morning of July 1, the battle opened with Confederate troops attacking a Union cavalry division to the west of Gettysburg at McPherson Ridge. The Union forces were outnumbered but managed to hold their positions initially. Reinforcements came to both sides, but eventually the Union forces were overpowered and were driven back to the south of Gettysburg. Thousands of their soldiers were captured in this retreat. During the night the bulk of the Union army arrived and the troops labored to create strong defensive positions along Cemetery Ridge, a long rise of land running southward from outside the town, and on two hills just to the north and east of this crest. When it was fully assembled, the whole Union army formed a defensive arc resembling a fishhook. The Confederate forces, about one mile distant, faced the Union positions from the west and north in a larger concave arc.

33. Why does the author say the positions of the Union army resembled a fishhook?

- (A) To give the reader a mental picture of the troops' positions
- (B) To explain the appearance of the sharp pointed hooks used as weapons
- (C) To suggest that taking a fishhook formation is a good tactic in war
- (D) To imply that the ridge had a curved shape like that of a fishhook

[Refer to the full passage.]

34. The word "devastating" in the passage is closest in meaning to

(A) important
(B) desperate
(C) decisive
(D) ruinous

Throughout July 2 Lee's forces attacked both Union flanks, leaving thousands of dead on both sides. To the south the Confederates overran the Union's advance lines, but they failed to dislodge the Union forces from their main positions. A strategically important hill on the Union army's left flank known as Little Round Top was stormed by the Confederates, but Meade's forces fought a skillful defensive battle and the attacks were unsuccessful. There was a devastating number of casualties on both sides.

35. All of the following are implied in paragraph 5 as contributing to the failure of Pickett's Charge EXCEPT

(A) General Lee's refusal to listen to his generals' opinion
(B) the Confederate artillery's failure to cause much damage
(C) the Union's center being stronger than anticipated
(D) the Confederate infantry not performing at full strength

Paragraph 5 is marked with an arrow (➡).

➡ On the third day of battle, General Lee decided to concentrate his attack on the center of the Union forces ranged along Cemetery Ridge. He reasoned, against the advice of others in his senior staff, that since the Union forces had reinforced both their flanks, their central defensive positions would be weaker and easier to overrun. As a prelude to the attack, the Confederate artillery bombarded the ridge for two hours, but inflicted less damage than they had expected, due to poor visibility. When the bombardment ceased, a Confederate infantry force of about 13,000 men charged courageously across the open land toward the Union lines on Cemetery Ridge about a mile away. This attack, now known as Pickett's Charge after the general whose division led it, failed in its objective to break the Union line.

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

They were subjected to heavy artillery and rifle fire and sustained a huge number of casualties.

Where would the sentence best fit?

Choose the letter of the square that shows where the sentence should be added.

On the third day of battle, General Lee decided to concentrate his attack on the center of the Union forces ranged along Cemetery Ridge. **A** He reasoned, against the advice of others in his senior staff, that since the Union forces had reinforced both their flanks, their central defensive positions would be weaker and easier to overrun. **B** As a prelude to the attack, the Confederate artillery bombarded the ridge for two hours, but inflicted less damage than they had expected, due to poor visibility. **C** When the bombardment ceased, a Confederate infantry force of about 13,000 men charged courageously across the open land toward the Union lines on Cemetery Ridge about a mile away. **D** This attack, now known as Pickett's Charge after the general whose division led it, failed in its objective to break the Union line.

37. According to the passage, the battle of Gettysburg ended with

- (A) Lee signing a document of surrender
- (B) the Southern territories becoming much safer
- (C) Lee's army devastating the countryside in their retreat
- (D) a high death toll for both the Union and the Confederates

[Refer to the full passage.]

38. According to the passage, why was the battle of Gettysburg so decisive?

- (A) The Confederates lost so many troops.
- (B) It created war weariness on both sides.
- (C) The Confederates failed to capture Northern territory.
- (D) The Union troops gained confidence.

[Refer to the full passage.]

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 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.

Write the letters of the answer choices in the spaces where they belong.
Refer to the full passage.

The battle of Gettysburg was the battle that turned the tide of the American Civil War.

• • •

Answer Choices

- | | |
|--|--|
| <p>(A) The Confederate army's strategy was aimed at getting the North to seek a peace deal.</p> <p>(B) The fighting was heavy from the beginning, and after two indecisive but bloody days, the main battle lines were drawn with reinforcements coming to both sides.</p> <p>(C) The initial fighting was heavy, but at the end of the first two days General Meade's army seemed to be in a superior position.</p> | <p>(D) The Union army successfully overran most of General Meade's positions on the Confederates' left flank.</p> <p>(E) A large-scale and devastating infantry advance by troops of the Confederate army failed to dislodge the Union army from their positions.</p> <p>(F) The invading Confederate army retreated, leaving the North in a stronger position militarily and strategically.</p> |
|--|--|

PRACTICE WITH COHESION

Cohesion refers to how well your writing flows. Your responses on the TOEFL test will receive a higher score if your paragraphs are cohesive. You can achieve this by practicing the techniques listed below.

- Organizing ideas in a logical sequence
- Connecting ideas with transitional expressions
- Defining uncommon terms
- Using parallel structures
- Rephrasing or replacing key words
- Being consistent in your use of tense, person, and number

See Practice with Cohesion, p. 317, for complete explanations of these techniques.

Exercises W1–W4 Use Exercises W1–W4 to develop your skills in writing cohesively.

EXERCISE W1 *Connecting ideas using transitional expressions*

Complete the paragraphs by choosing the transition word or phrase that best joins the two parts of the sentence. (For more information on transition words, see Grammar Review: Connecting Ideas, p. 116.)

Traffic has become very troublesome in the downtown areas of many large cities. _____, town planning authorities have pedestrianized many important shopping districts.

- (A) Furthermore
- (B) In contrast
- (C) Consequently
- (D) Secondly

You would choose C. The word *consequently* indicates a result of a situation. The pedestrianizing of shopping districts is a result of the troublesome traffic.

Questions 1–7

_____1_____ the exhaust from cars contributes to greenhouse gases, I think that students should not use cars powered by gasoline. _____2_____ city buses usually pass by the university, many universities have a special shuttle bus that is provided for student transportation. _____3_____, many students can get to class by either city buses or university buses. _____4_____ option is for students to ride to class on bicycles. Not only is this good exercise, _____5_____ it is also easier to find a space to leave a bicycle than to find a parking space for a car on a crowded university campus. _____6_____, students

who live close to campus can enjoy a leisurely walk to their classes. _____⁷_____, it seems that students don't want to give up using their cars.

- | | |
|-------------------------|----------------------|
| 1. (A) So that | 5. (A) nevertheless |
| (B) Earlier | (B) particularly |
| (C) Because | (C) and |
| (D) Although | (D) but |
| 2. (A) Even though | 6. (A) Whereas |
| (B) Granted that | (B) Finally |
| (C) Since | (C) Still |
| (D) Meanwhile | (D) Hence |
| 3. (A) Therefore | 7. (A) Unfortunately |
| (B) Initially | (B) As a result |
| (C) Simultaneously | (C) For instance |
| (D) Alternatively | (D) Specifically |
| 4. (A) To illustrate an | |
| (B) Another | |
| (C) The resulting | |
| (D) To summarize an | |

Questions 8–12

_____⁸_____ most women in Germany during her time, Caroline Herschel was not allowed to learn anything other than useful household skills such as knitting. _____⁹_____, all this changed for her in 1772, _____¹⁰_____ her astronomer brother, William, took her to live with him in England. _____¹¹_____ he taught her mathematics, she began to help him keep a record of his discoveries. The two would often stay up until dawn, gazing upward. _____¹²_____, they built their own telescopes, which were even bigger and better than those at the Royal Observatory in Greenwich.

- | | |
|---------------------|-----------------------|
| 8. (A) Since | 11. (A) To illustrate |
| (B) Before | (B) For example |
| (C) Yet | (C) Besides |
| (D) Like | (D) After |
| 9. (A) Consequently | 12. (A) Particularly |
| (B) However | (B) Eventually |
| (C) Specifically | (C) Therefore |
| (D) Thus | (D) In summary |
| 10. (A) when | |
| (B) thereafter | |
| (C) if | |
| (D) subsequently | |

EXERCISE W2 *Defining words and phrases*

Practice defining words by giving a three-part definition of the following words. For more information and practice, see Defining Unknown Terms, p. 318, and Exercise S8, p. 320.

human migration

Human migration is the movement of people who are relocating
in order to find a more satisfactory living environment.

1. passive smoking

2. subsistence farming

3. expectorant

4. nonfiction

5. trowel

EXERCISE W3 *Connecting ideas using parallel structures*

Rewrite the incorrect part of each sentence to create a parallel structure. For information on parallel structures, see Grammar Review: Parallel Structures and Exercise G19, p. 115. For more practice, see Using Parallel Structures, p. 318, and Exercise S9, p. 320.

Labels should include the information that allows shoppers to compare the ingredients and weighing of the food they are buying.

the ingredients and weight of the food

1. The questionnaire indicated that many students wanted to study in the library rather than home.

2. From this experience, I learned not only to read the instructions more carefully, but also pay attention to safety features.

3. My mathematics teacher required us to work on a set of problems individually, compare our answers with a classmate, and then working together on those answers that did not agree.

4. Bryce Canyon is 56 square miles of towering pinnacles, and with eroded forms that are grotesque.



5. Today sheepdogs are seen both in their traditional role as working animals and they are pets.

6. Julius Caesar did not conquer Britain but instead stayed a few weeks, took some hostages, and he returned to Gaul.

EXERCISE W4 Adding cohesion

Read the following paragraphs. Rewrite the paragraphs by rephrasing key words and using pronouns and demonstratives to add cohesion. For more information and practice, see Exercises S10 and S11, p. 321.

I have always wanted to see Old Faithful Geyser in Yellowstone National Park. Besides the Old Faithful Geyser, vast wilderness areas can be found in Yellowstone National Park. Interesting wildlife inhabits the vast wilderness areas. The interesting wildlife found in Yellowstone National Park includes bison, moose, elk, and bears.

I have always wanted to see Old Faithful Geyser in Yellowstone National Park.
Besides this geyser, vast wilderness areas can be found there. Interesting wildlife
inhabits these areas. Wild animals found in the park include bison, moose, elk,
and bears.

1. Adults tend to cherish soft values. Soft values are family, health, and career satisfaction, to name a few. Soft values are hard to put a monetary value on. In contrast, children take for granted soft values that apply to their lives. Children put more importance on material objects, such as a favorite toy. Material objects become less important to children as they become more interested in best friends.

2. The boundary that separates the Earth's crust from the upper mantle is commonly called the Moho. The Moho is like an exaggerated mirror image of the surface profile. So the highest mountain ranges result in the deepest thickness of crust. Beneath the highest mountain ranges, the thickness of the crust can attain 50 miles. Beneath the oceans, the thickness of the crust is about 3 miles, whereas beneath the continents the thickness of the crust averages about 20 miles. The reason for the Moho profile is that the material that makes up the upper mantle is denser than the crust and therefore, the crust floats rather like an iceberg floats in

the sea. You can get an idea of how the material floats like icebergs by thinking of different-sized ice cubes in a glass of water. The biggest ice cube in the water extends to the highest point and also to the greatest depth.

PRACTICE WITH WRITING CONCISELY

Being concise means writing in a way that expresses your essential ideas without extra words that do not add anything important. You can achieve this by practicing the techniques listed below.

Avoiding "empty" words and phrases

Empty words and phrases don't add important or relevant information. Many empty phrases can be deleted entirely. Look at the following example:

- | | |
|------------------|--|
| Inconcise | When all things are considered, young adults of today live more satisfying lives than those of their parents, in my opinion. |
| Concise | Young adults of today live more satisfying lives than those of their parents. |

Other empty phrases can be replaced with more concise constructions. Look at the following example:

- | | |
|------------------|---|
| Inconcise | Due to the fact that our grandparents were under an obligation to help their parents, they did not have the options that young people have at this point in time. |
| Concise | Because our grandparents were obligated to help their parents, they did not have the options that young people have now. |

Avoiding repetition

Although sometimes it is necessary to repeat a phrase, useless repetition weakens your writing. Not only should you try to avoid repeating words and phrases, avoid repetition of meaning as well.

Sometimes a word or phrase carries meaning that is already supplied by other words in the sentence and is therefore unnecessary. Look at the following example:

- | | |
|---------------------|---|
| Inconcise | The farm my grandfather grew up on was large in size. |
| Concise | The farm my grandfather grew up on was large. |
| More concise | My grandfather grew up on a large farm. |



Your developmental paragraphs support your thesis statement. If you support a thesis statement that does not answer the question, you may not get credit for your essay.

Exercises W10–W14 Use Exercises W10–W14 to practice writing introductions.

EXERCISE W10 *Writing introductory statements*

On the lines below, write an introductory statement that states the general topic for the question you chose in Exercise W8.

In your opinion, what is the most important characteristic a successful student must have? Describe the characteristic and give reasons for your opinion.

In order to be successful, a student must have certain characteristics.

The general topic that you are asked to discuss is characteristics of successful students. That general topic is stated in the first sentence.

EXERCISE W11 *Narrowing the topic*

Reread the statement of the general topic that you wrote in Exercise W10. Narrow the topic by focusing on the main point of the question. On the lines below, write a statement that focuses on the specific point you will be discussing.

The general topic was introduced in the statement:

In order to be successful, a student must have certain characteristics.

You write a statement that focuses on a specific point:

Perhaps the most important characteristic is diligence.

EXERCISE W12 *Writing your thesis statement*

Look at the statement with the general topic that you wrote in Exercise W10 and how you narrowed the topic to focus on the main point of the question in Exercise W11. On the lines below, write a thesis statement that:

1. Will guide the essay toward answering the question
2. Can be supported by the ideas you generated in your mind map



The introductory sentences from the example boxes in Exercises W10 and W11 are:
In order to be successful, a student must have certain characteristics. Perhaps the most important characteristic is diligence.

Now you could write:

Being diligent is essential for many reasons.

This thesis statement tells the readers that the essay will discuss the reasons why being diligent is essential to a student's success. *Reasons* is the controlling idea that focuses this essay.

EXERCISE W13 Improving your introductory paragraph

Reread the introductory statements in the example box in Exercise W12. What needs to be added to make a complete introductory paragraph?

To make a complete introductory paragraph, you could add:

- A definition

In order to be successful, a student must have certain characteristics. Perhaps the most important characteristic is diligence. **A person who is diligent works hard in a very careful and steady way. Being diligent is essential for success for many reasons.**

- Another sentence that narrows the topic

In order to be successful, a student must have certain characteristics. **These characteristics include such qualities as motivation and intelligence. However,** perhaps the most important characteristic of all is diligence. A person who is diligent works hard in a very careful and steady way. Being diligent is an essential characteristic for many reasons.

Reread the introductory statements you wrote in Exercises W10–W12. Ask yourself the following questions:

1. Have I introduced the general topic of the question I have been asked to answer?
2. Have I narrowed the general topic to a specific topic?
3. Would a definition or further explanation improve my introduction?
4. Have I included a thesis statement that tells my reader exactly what I am going to discuss?

Rewrite your introductory statements in paragraph form, adding any improvements or additional information you think is needed.

Exercises W15–W23 Use Exercises W15–W23 to develop your skills in writing developmental paragraphs.

EXERCISE W15 *Writing topic sentences for your developmental paragraphs*

In Exercise W9, you crossed out all of the ideas in your mind map that did not support the main point you chose to cover in your essay. On the lines below, write a topic sentence for each of the developmental paragraphs that you have decided to focus on after refining your mind map in Exercise W9. It is not necessary to have more than two or three paragraphs to support your thesis statement.

I. One reason a student must work hard is the number of assignments that must be completed.

According to the example above, the topic for the developmental paragraph is: one reason to work hard. The controlling idea is the number of assignments.

II. Another reason for a student to be diligent is that there are many tests to prepare for.

According to the example above, the topic for this developmental paragraph is: another reason to be diligent. The controlling idea is that there are many tests to prepare for.

I. _____

II. _____

III. _____

IV. _____



EXERCISE W16 *Checking topic sentences for your developmental paragraphs*

Reread the topic sentences on student diligence in the example box in Exercise W15. Answer the following questions:

1. Is the number of assignments to be completed a reason for a student to be diligent?
2. Is the number of tests to be taken a reason for a student to be diligent?

Compare the topic sentences you wrote in Exercise W15 with the thesis statement you wrote for your introductory paragraph in Exercise W12. Answer the following questions:

3. What are the topics presented in your topic sentences?
4. What are the controlling ideas in your topic sentences?
5. Do your topic sentences support your thesis statement?

Rewrite any topic sentences that do not support your thesis statement.

EXERCISE W17 Writing supporting ideas

Use your topic sentences from Exercises W15 and W16 to create an outline. Write your supporting ideas in the order you want to present them. Check to make sure that all the ideas support the topic sentence that you wrote. You may have fewer or more ideas than the number of spaces given below.

I.	<u>One reason a student must work hard is the number of assignments</u>
	<u>that must be completed.</u>
A.	<u>reading lots of assignments</u>
B.	<u>writing papers</u>
C.	<u>doing lab experiments</u>
II.	<u>Another reason for a student to be diligent is that there are many tests</u>
	<u>to prepare for.</u>
A.	<u>weekly quizzes</u>
B.	<u>midterm exams</u>
C.	<u>final exams</u>

- I. _____

 A. _____
 B. _____
 C. _____
 D. _____
- II. _____

 A. _____
 B. _____
 C. _____
 D. _____
- III. _____

 A. _____
 B. _____
 C. _____
 D. _____
- IV. _____

 A. _____
 B. _____
 C. _____
 D. _____

EXERCISE W18 *Practice in adding details*

Write one sentence that adds a detail to each of the following ideas. Use facts, examples, personal experiences, or descriptions.

1. The capital city of my country is _____.

2. My favorite pastime is reading.

3. It is important for me to score well on the TOEFL test.

4. A long vacation at the beach is a nice way to relax.

5. Habits such as smoking are hard to break.

6. Many bad traffic accidents could be prevented.

7. Modern architecture has its critics as well as its admirers.

8. The suburban shopping mall has taken away a lot of business from city centers.

EXERCISE W19 *Adding details to paragraphs*

Many paragraphs can be made better by adding details. Look at the example box below. Asking and answering the kinds of questions shown in the box will help you strengthen your paragraphs.

On your own paper, rewrite the "weak" paragraphs shown on the next page using the questions as a guide for adding details.

Although seat belts have been shown to save lives, people give a number of reasons for not using them. First, many people think they are a nuisance. Second, many people are lazy. Third, some people don't believe they will have an accident. Finally, some people are afraid the seat belt will trap them in their car. All of these reasons seem inadequate since statistics show that wearing seat belts saves lives and prevents serious injuries.

The paragraph can be improved by adding details to answer the following questions:

- Why don't people like seat belts?
- In what way are people lazy?
- Why do people think they won't have an accident?
- Under what circumstances might people get trapped?



Summary of ideas

The main points from the listening passage that are summarized in the response are:

1. The original belief as to the cause of ulcers is under question. Temporary relief casts doubt on the reading as this points to the symptoms being treated instead of a cure being found.
2. The effectiveness of antibiotics in ulcer treatment points to the underlying cause being a bacterium. This casts doubt on the effectiveness of acid-suppressing medicines in the treatment of ulcers.
3. The damage to the tissue lining by stomach acids and enzymes is possible because of the damage caused by the bacteria. This casts doubt on the primary cause being lifestyle choices.

Conclusion

The concluding paragraph begins with a mention of the importance of the antibiotic treatment. The fact that stress is still thought by some people to be a factor ties the listening to the reading and completes the response.

PRACTICE WITH PARAPHRASES AND SUMMARIES

- To write an effective response for the integrated writing task on the TOEFL iBT test, it is necessary to extract information from both the reading and the listening passages. To use this information in your response, you will need to be able to paraphrase and summarize ideas.

A *summary* is your condensed version of the ideas presented in a reading passage or a lecture. A *paraphrase* is an idea that you have restated in your own words. When you paraphrase or summarize, it is important to:

- Keep the same meaning as the original. Be careful not to change the meaning.
- Include only the author's information. Be careful not to add new information.

For a more complete explanation of paraphrasing and summarizing, see Note Taking, Paraphrasing, and Summarizing, pp. 52–62.



Exercises W33–W36 Use Exercises W33–W36 to practice your skills in paraphrasing and summarizing.

EXERCISE W33 *Paraphrasing sentences*

Rewrite the sentences on the next page in your own words.

Not until Edward Jenner developed the first anti-smallpox serum in 1796 was there protection against this terrible disease.

Defense against smallpox was achieved in the late eighteenth century with
Edward Jenner's anti-smallpox serum.

Notice how the paraphrase differs from the original passage grammatically and in the words used. However, a different term cannot be substituted for the name of the disease or for the name of the man who developed the serum.

1. The Mediterranean monk seal is distinguished from the more familiar gray seal by its size.

2. Estimates from scientists suggest that only one percent of the world's extinct animals and plants have been identified.

3. Early sailors, navigating sometimes in uncharted seas, faced many hazards in reaching their destination.

4. This report from the United Nations suggests that water will be at the heart of many future international disputes.

5. Square-rigged ships, which can attain high speeds only when traveling with the trade winds, are no longer commercially viable.

6. A fine tomb, erected in the sixteenth century, marks the grave of the poet Geoffrey Chaucer.

7. There are up to 600 butterfly species worldwide known collectively as "swallowtails."

8. Even though city parks often serve as places of public entertainment and festivals, they can also be places where people can find peace and solitude.

9. Drying food by means of solar energy is an ancient process applied wherever crops and climatic conditions make it possible.

10. The Victorian constructions of Haight-Ashbury are among the few architectural survivors of the San Francisco earthquake of 1906.

EXERCISE W34 *Checking paraphrases*

Compare the following sentences and the paraphrase of those sentences. If the paraphrase does not mean the same as the original sentences, rewrite it so that it conveys the same meaning.

Original: People who have made significant contributions to humanity are granted a financial award from a legacy left by the Swedish scientist Alfred B. Nobel.

Paraphrase: Alfred B. Nobel from Sweden awarded important people money to help others.

The Swedish scientist Alfred B. Nobel left money to be awarded to people who have done something important to help humankind.

There are several mistakes in the paraphrase of the statement. Nobel left money when he died – he does not personally give out these awards. The award is not given to important people, but to people who make important contributions to society. People are awarded the money for what they have done; they are not given the prize money to help other people.

Original: Some Paleolithic artifacts are given special names indicating the location of their discovery.

Paraphrase: Paleolithic artifact names sometimes refer to the place they were discovered.

The paraphrase above contains correct information, so it does not need to be rewritten.

1. *Original:* The Seeing Eye Puppy-Raising Program places future guide dogs with volunteers who start preparing the puppies for the job ahead.

Paraphrase: Volunteers prepare Seeing Eye dogs for the future needs of the blind by raising puppies for the program.

2. *Original:* The black moths surviving in industrial areas have become genetically more tolerant of pollution.

Paraphrase: The black moth has survived industrialization by genetically adapting to pollution.

3. *Original:* Windmills have made a comeback in Denmark, where centuries ago the people of this windswept country used wind power to pump water and grind grain.

Paraphrase: In Denmark, a windy country, the people have returned to using windmills to pump water and grind grain.



4. *Original:* In order to develop to its full potential, a baby needs to be physically able to respond to the environment.
Paraphrase: Full physical potential is needed in order for a baby to be able to respond to the environment.
-
-
5. *Original:* Crazy Horse's vision of a painted rider galloping through a storm was seen as a sign that he would become a great warrior leading his people into battle.
Paraphrase: Crazy Horse's people believed that his dream of a warrior riding through a storm was an indication of his impending leadership in battle.
-
-

EXERCISE W35 Writing summaries of listening passages

Listen to the following passages. Pause the recording after each one. Write a one-sentence summary of the passage you hear.

You hear:

Since the dawn of civilization, the bow and arrow have been used to secure food, protect people from enemies, and provide competitive games of skill. Although archery is no longer a necessary skill for survival, it is becoming increasingly popular as a sport. Today's bows are much easier to handle than those of the past were, but the basic form has not changed.

You could write:

While shooting with bow and arrow is no longer needed for survival, recreational archery is gaining popularity.

The essential information of the paragraph is that people still practice archery. The list of reasons for practicing it in the past and the change in bows for easier handling are details that can be excluded from the summary.

START ►

1. _____
2. _____
3. _____

STOP ■

EXERCISE W36 Revising summaries of listening passages

Listen to the following lecture segments. Pause the recording after each one and read the summary of the lecture segment you just heard. The summary gives incorrect information. Rewrite the summary to give correct information.

You hear:

Scientists have reported that positive thinkers seem to live healthier lives. Even though this theory has not yet been proved, there is no doubt that positive thinkers live happier lives. They look at life with an attitude of hope that influences their environment in a way that creates positive results.

You read:

Positive results leading to healthier lives influence positive thinkers according to a theory proposed by scientists.

You could write:

According to a theory on positive thinking, the well-being of a person can
be influenced by how he or she regards life.

START ►

1. The main advantage of herding animals instead of killing them is that they can be bred selectively to produce more milk or more meat.

2. Fun-seekers maintain their thinking abilities into their old age because they have played general knowledge games.

3. The *kiva* was a circular walled area with a hole that held the entrance to the underworld for the Anasazi people of the American Southwest.

STOP ■

PRACTICE WITH INTEGRATING PASSAGES

The integrated writing task requires that you explain how the points made in the listening passage support or provide a different perspective on the points made in the reading passage. The passages you read and hear will contain numerous ideas. In order to explain how these ideas compare, you will need to paraphrase and summarize them.

Exercises W37–W40 Use Exercises W37–W40 to practice combining information from your paraphrases of the reading passages and your summaries of the listening passages.

EXERCISE W37 *Paraphrasing main ideas in reading passages*

Read the following passages. On your own paper, paraphrase the main ideas.



Questions 1–12

Panspermia

The idea that life did not originate on Earth, but was carried here either deliberately or by natural processes, has its roots at least as far back as the ancient Greeks. This idea, often referred to as *panspermia*, took on a scientific form in the work of various nineteenth-century authors. It later gained widespread popular appeal through the work of the Swedish chemist Svante Arrhenius, who argued that spores of life could survive in space and travel between star systems through the pressure of solar radiation.

The panspermia hypothesis eventually fell out of favor for a variety of reasons. Skeptics pointed out that microorganisms could not possibly survive the damage caused by ultraviolet radiation and cosmic rays while being propelled out of a solar system away from a star. Indeed, it was unclear how biological material could escape from a planet by natural processes in the first place. If unprotected, the molecules of life would quickly be destroyed by radiation near the ejecting planet. Furthermore, it was not clear how microorganisms, having made a journey across the huge distances of interstellar space, could have safely descended to the surface of the Earth or any other planet. Arrhenius himself argued that organisms caught inside meteorites would be subjected to incandescent* temperatures while entering the atmosphere of a terrestrial body. Such heat would destroy any life-forms lucky enough to have survived to this point.

Despite the seeming implausibility* of the panspermia hypothesis, some theorists have resurrected the notion in recent decades since laboratory research has shown that many of the objections to the hypothesis can be overcome. Scientists have shown that microorganisms protected from radiation by grains of material could be ejected from a solar system if the repulsive force (p) of the ejecting star is greater than the attractive force (g) of the star's gravity. Such ejecting stars cannot be too luminous since brighter stars emit too much ultraviolet radiation for the survival of bacteria. Organisms can only enter new solar systems whose stars' p/g ratio is low, thus allowing the gravity to pull the microbes into the planetary orbits. According to some researchers, material ejected from a planetary system could also eventually become part of an interstellar molecular cloud, which eventually produces a new planetary system as well as a large number of comets. Comets can retain microorganisms protected by other material and water, and impact onto new planets, which by then would have cooled sufficiently for the life in the grains to take hold.

Further supporting evidence about the likelihood of survival of bacteria traveling through space and entering a planetary atmosphere has been gained from studies of a meteorite of Martian origin found in Antarctica in 1984. Whether or not the meteorite contains fossils of Martian bacteria (and many researchers now seem to reject this possibility), microscopic studies of its internal structure have shown that the interior was not heated to more than 40 degrees Celsius since before leaving the Martian surface. In other words, neither the original impact that must have ejected the rock away from the Martian surface nor the heat generated by its entry into the Earth's atmosphere did, in fact, melt or vaporize the internal portions of the meteorite. So it is quite possible that any life-form that had undergone such a trip would survive. As for the long journey itself, experiments aboard a European Space Agency mission have shown that bacterial spores can survive in deep space for at least five years. This is sufficient time for viable interplanetary travel, although not, of course, for interstellar travel.

Today, the panspermia hypothesis is being regarded with less skepticism than formerly. Although the orthodox view is still that life evolved on Earth (and possibly other planets in the universe) without extraterrestrial input, more and more research is pointing to the feasibility

of some form of interstellar "seeding." Wickramasinghe and Hoyle, who championed the hypothesis of the interstellar transmission of life during the 1970s, argued persuasively that prebiotic chemicals have been shown to exist by remote sensing data of Comet Halley. Furthermore, they point out that evidence for viable microorganisms existing in comets could be attained in the near future if unmanned space missions could capture and return to Earth with cometary material.

***incandescent:** producing a bright light after being heated to a high temperature

***implausibility:** the condition of being difficult to believe

1. Early supporters of the panspermia hypothesis

- (A) rejected the main elements of the hypothesis
- (B) argued that some primitive life has been detected on a comet
- (C) pointed out that space missions will find life elsewhere
- (D) suggested that the "seeds" of life may have been deliberately planted

[Refer to the full passage.]

2. The word "propelled" in the passage is closest in meaning to

- (A) rejected
- (B) plunged
- (C) heaved
- (D) thrust

The panspermia hypothesis eventually fell out of favor for a variety of reasons. Skeptics pointed out that microorganisms could not possibly survive the damage caused by ultraviolet radiation and cosmic rays while being propelled out of a solar system away from a star. Indeed, it was unclear how biological material could escape from a planet by natural processes in the first place. If unprotected, the molecules of life would quickly be destroyed by radiation near the ejecting planet. Furthermore, it was not clear how microorganisms, having made a journey across the huge distances of interstellar space, could have safely descended to the surface of the Earth or any other planet. Arrhenius himself argued that organisms caught inside meteorites would be subjected to incandescent temperatures while entering the atmosphere of a terrestrial body. Such heat would destroy any life-forms lucky enough to have survived to this point.

3. According to the passage, the panspermia hypothesis fell out of favor for all of the following reasons EXCEPT

- (A) the potential damage caused by ultraviolet radiation
- (B) the unlikelihood of natural processes leading to the ejection of biological material
- (C) the probability that heat would destroy incoming life-forms
- (D) the knowledge that life can't exist elsewhere in the universe

[Refer to the full passage.]

4. The word "resurrected" in the passage is closest in meaning to

- (A) destroyed
- (B) reintroduced
- (C) initiated
- (D) succeeded

Despite the seeming implausibility of the panspermia hypothesis, some theorists have resurrected the notion in recent decades since laboratory research has shown that many of the objections to the hypothesis can be overcome. Scientists have shown that microorganisms protected from radiation by grains of material could be ejected from a solar system if the repulsive force (p) of the ejecting star is greater than the attractive force (g) of the star's gravity. Such ejecting stars cannot be too luminous since brighter stars emit too much ultraviolet radiation for the survival of bacteria. Organisms can only enter new solar systems whose stars' p/g ratio is low, thus allowing the gravity to pull the microbes into the planetary orbits. According to some researchers, material ejected from a planetary system could also eventually become part of an interstellar molecular cloud, which eventually produces a new planetary system as well as a large number of comets. Comets can retain microorganisms protected by other material and water, and impact onto new planets, which by then would have cooled sufficiently for the life in the grains to take hold.

5. The word "retain" in the passage is closest in meaning to

(A) prevent
(B) erode
(C) avert
(D) keep

Despite the seeming implausibility of the panspermia hypothesis, some theorists have resurrected the notion in recent decades since laboratory research has shown that many of the objections to the hypothesis can be overcome. Scientists have shown that microorganisms protected from radiation by grains of material could be ejected from a solar system if the repulsive force (p) of the ejecting star is greater than the attractive force (g) of the star's gravity. Such ejecting stars cannot be too luminous since brighter stars emit too much ultraviolet radiation for the survival of bacteria. Organisms can only enter new solar systems whose stars' p/g ratio is low, thus allowing the gravity to pull the microbes into the planetary orbits. According to some researchers, material ejected from a planetary system could also eventually become part of an interstellar molecular cloud, which eventually produces a new planetary system as well as a large number of comets. Comets can retain microorganisms protected by other material and water, and impact onto new planets, which by then would have cooled sufficiently for the life in the grains to take hold.

6. According to the passage, the panspermia hypothesis is

(A) of historical interest only
(B) being taken seriously again
(C) not really good science
(D) probably true

[Refer to the full passage.]



7. The word "its" in the passage refers to

- (A) the Martian
- (B) the bacteria
- (C) the meteorite
- (D) the interior

Further supporting evidence about the likelihood of survival of bacteria traveling through space and entering a planetary atmosphere has been gained from studies of a meteorite of Martian origin found in Antarctica in 1984. Whether or not the meteorite contains fossils of Martian bacteria (and many researchers now seem to reject this possibility), microscopic studies of its internal structure have shown that the interior was not heated to more than 40 degrees Celsius since before leaving the Martian surface. In other words, neither the original impact that must have ejected the rock away from the Martian surface nor the heat generated by its entry into the Earth's atmosphere did, in fact, melt or vaporize the internal portions of the meteorite. So it is quite possible that any life-form that had undergone such a trip would survive. As for the long journey itself, experiments aboard a European Space Agency mission have shown that bacterial spores can survive in deep space for at least five years. This is sufficient time for viable interplanetary travel, although not, of course, for interstellar travel.

8. The phrase "such a trip" in the passage refers to

- (A) a journey from Mars to Earth
- (B) the descent through Earth's atmosphere
- (C) a trip from another solar system
- (D) interstellar traveling

Further supporting evidence about the likelihood of survival of bacteria traveling through space and entering a planetary atmosphere has been gained from studies of a meteorite of Martian origin found in Antarctica in 1984. Whether or not the meteorite contains fossils of Martian bacteria (and many researchers now seem to reject this possibility), microscopic studies of its internal structure have shown that the interior was not heated to more than 40 degrees Celsius since before leaving the Martian surface. In other words, neither the original impact that must have ejected the rock away from the Martian surface nor the heat generated by its entry into the Earth's atmosphere did, in fact, melt or vaporize the internal portions of the meteorite. So it is quite possible that any life-form that had undergone such a trip would survive. As for the long journey itself, experiments aboard a European Space Agency mission have shown that bacterial spores can survive in deep space for at least five years. This is sufficient time for viable interplanetary travel, although not, of course, for interstellar travel.

9. According to the passage, the meteorite found in Antarctica
- (A) does not contain bacteria fossils
 - (B) might contain bacteria fossils
 - (C) has fossils originating on Earth
 - (D) could not originate from Mars

[Refer to the full passage.]

10. Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.

- (A) Nowadays, the panspermia hypothesis has been more or less rejected.
- (B) Currently, the panspermia hypothesis is looked on with more astonishment than previously.
- (C) These days, the panspermia hypothesis is judged more plausible than before.
- (D) The modern scientific establishment now generally accepts the validity of the panspermia hypothesis.

Today, the panspermia hypothesis is being regarded with less skepticism than formerly. Although the orthodox view is still that life evolved on Earth (and possibly other planets in the universe) without extraterrestrial input, more and more research is pointing to the feasibility of some form of interstellar "seeding." Wickramasinghe and Hoyle, who championed the hypothesis of the interstellar transmission of life during the 1970s, argued persuasively that prebiotic chemicals have been shown to exist by remote sensing data of Comet Halley. Furthermore, they point out that evidence for viable microorganisms existing in comets could be attained in the near future if unmanned space missions could capture and return to Earth with cometary material.

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

However, even if organisms were somehow shielded inside fine grains of carbon they would be too heavy to be ejected from a planetary system by the pressure of radiation.

Where would the sentence best fit?

Choose the letter of the square that shows where the sentence should be added.

The panspermia hypothesis eventually fell out of favor for a variety of reasons. [A] Skeptics pointed out that microorganisms could not possibly survive the damage caused by ultraviolet radiation and cosmic rays while being propelled out of a solar system away from a star. Indeed, it was unclear how biological material could escape from a planet by natural processes in the first place. [B] If unprotected, the molecules of life would quickly be destroyed by radiation near the ejecting planet. [C] Furthermore, it was not clear how microorganisms, having made a journey across the huge distances of interstellar space, could have safely descended to the surface of the Earth or any other planet. [D] Arrhenius himself argued that organisms caught inside meteorites would be subjected to incandescent* temperatures while entering the atmosphere of a terrestrial body. Such heat would destroy any life-forms lucky enough to have survived to this point.

PRACTICE TEST 1

12. **Directions:** Select the appropriate phrases from the answer choices and match them to the category to which they relate. THREE of the answer choices will NOT be used. This question is worth 4 points.

Write the letters of the answer choices in the spaces where they belong.
Refer to the full passage.

Answer Choices

- (A) Prebiotic chemicals exist in comets.
- (B) Bright stars emit a lot of ultraviolet radiation.
- (C) Distances in interstellar space are huge.
- (D) Comets are made up of water and other materials.
- (E) Interstellar space has ultraviolet radiation and cosmic rays.
- (F) Meteorites are subjected to burning temperatures when entering Earth's atmosphere.
- (G) Meteorites from Mars have been found on Earth in areas of Antarctica where the cold temperatures protected life-forms.
- (H) The meteorite found in Antarctica contained frozen fossils.
- (I) Bacterial spores have been shown capable of surviving for several years in space.
- (J) Stars with a repulsive force greater than their attractive force are able to eject material.

Arguments Against Panspermia Hypothesis

Support for Panspermia Hypothesis

Questions 13–25

Ocean Energy Systems

In recent years, the oceans have been seen as a potential source of energy. Oceans are huge reservoirs of renewable energy, which have yet to be properly harnessed*. Some estimates say that during the second decade of this century, ocean energy sources will generate more than 1,000 megawatts of electricity, which is enough to power a million homes in the industrialized world. Several technologies have been developed for exploiting these resources in a practical way, among which ocean thermal energy conversion (OTEC) is one of the most promising. Experimental OTEC plants have been constructed using different operating principles, although as yet no large-scale commercially viable plant has been launched.

The basic operation behind this system uses the heat energy stored in the oceans as a source of power. The plant exploits the difference in water temperature between the warm surface waters heated by the sun and the colder waters found at ocean depths. A minimum temperature difference of 20 degrees Celsius between surface and depth is required for efficient operation, and this situation is typically found only in tropical and subtropical regions of the world. There are two basic kinds of OTEC system: the open cycle system and the closed cycle system. In the open cycle system, the warm surface water is converted into steam in a partial vacuum and this steam drives a turbine connected to an electrical generator. In a closed cycle system, the warm surface water is used to boil a fluid, such as ammonia, which has a low boiling point. In both systems cold water pumped up from the ocean depths condenses the vapor. In the open system, the steam is condensed back into a liquid by cold water pumped from deep-ocean water and then discharged. In the closed system, the condensed ammonia is used to repeat the cycle continuously. Various hybrid systems using characteristics of both open and closed cycle plants have also been designed.

The OTEC system is potentially an important source of clean, renewable energy, which could significantly reduce our reliance on fossil fuels and nuclear fission. Unlike other forms of renewable energy, such as those provided directly by the sun and wind, OTEC plants can generate power 24 hours per day, 365 days per year. Furthermore, the design of this technology avoids any significant release of carbon dioxide into the atmosphere. OTEC can offer other important benefits apart from power production. Aquaculture is one important spinoff. It may also be economically feasible to extract minerals from the pumped seawater. Freshwater for drinking and irrigation is another by-product, and this will be an important advantage in regions where freshwater is limited.

Some drawbacks to this form of power generation have been noted. Perhaps the biggest drawback at present is the high capital cost of initial construction due mainly to the expense of the large pipeline used to pump water from 1,000 meters below the surface. Furthermore, the conversion of thermal to electrical energy in the OTEC system works at very low efficiency, which means that these plants will have to use a lot of water to generate practical amounts for the power grid. For this reason, the net power output is reduced, since a significant portion of the output must be used to pump water. There are also potential ecological drawbacks, since the water discharges will change the water temperature and disturb some marine habitats. This impact could, however, be minimized if the water is discharged at greater depths.

The main obstacle created by high initial expenses will have to be met before OTEC competes with conventional alternatives, and until such time, OTEC will remain restricted to experimental plants. When technology permits lower start-up costs, this technology will make an important contribution to world energy requirements.

*harnessed: controlled for use



13. The word "viable" in the passage is closest in meaning to

(A) clever
(B) feasible
(C) optimistic
(D) convenient

In recent years, the oceans have been seen as a potential source of energy. Oceans are huge reservoirs of renewable energy, which have yet to be properly harnessed. Some estimates say that during the second decade of this century, ocean energy sources will generate more than 1,000 megawatts of electricity, which is enough to power a million homes in the industrialized world. Several technologies have been developed for exploiting these resources in a practical way, among which ocean thermal energy conversion (OTEC) is one of the most promising. Experimental OTEC plants have been constructed using different operating principles, although as yet no large-scale commercially viable plant has been launched.

14. It can be inferred from the passage that

(A) renewable energy can be put into reservoirs
(B) the experimental plants are ready to be launched
(C) the oceans could be used in the future to generate electricity
(D) 1,000 megawatts of electricity is the amount needed in the average home

[Refer to the full passage.]

15. According to the passage, what can be inferred about the factor that allows the ocean to be used as an energy source?

(A) The oceans are so large that they can produce a lot of energy.
(B) In polar climates, the sun does not sufficiently heat the deeper water for practical energy use.
(C) The oceans can store vast amounts of heat energy to be used to run basic electricity plants.
(D) The plants are typically found in the tropical and subtropical regions of the world because of the warm weather.

[Refer to the full passage.]

16. According to the passage, in what way are the basic kinds of OTEC systems similar?

- (A) They turn surface water into steam.
- (B) They use cold water to cause condensation.
- (C) They discharge unused water into the ocean.
- (D) They convert water in a vacuum.

[Refer to the full passage.]

17. The phrase "other forms" in the passage refers to energy produced through

- (A) fossil fuels and nuclear fission
- (B) chemical reactions
- (C) OTEC systems
- (D) sun and wind

The OTEC system is potentially an important source of clean, renewable energy, which could significantly reduce our reliance on fossil fuels and nuclear fission. Unlike other forms of renewable energy, such as those provided directly by the sun and wind, OTEC plants can generate power 24 hours per day, 365 days per year. Furthermore, the design of this technology avoids any significant release of carbon dioxide into the atmosphere. OTEC can offer other important benefits apart from power production. Aquaculture is one important spinoff. It may also be economically feasible to extract minerals from the pumped seawater. Freshwater for drinking and irrigation is another by-product, and this will be an important advantage in regions where freshwater is limited.

18. In paragraph 3, what can be inferred about the different sources of energy?

- (A) We rely too much on fossil fuels and nuclear fission.
- (B) Renewable energy releases a lot of carbon dioxide into the atmosphere.
- (C) Energy from OTEC is provided directly by the sun and wind.
- (D) Energy forms other than OTEC do not have important benefits.

Paragraph 3 is marked with an arrow [➡].

➡ The OTEC system is potentially an important source of clean, renewable energy, which could significantly reduce our reliance on fossil fuels and nuclear fission. Unlike other forms of renewable energy, such as those provided directly by the sun and wind, OTEC plants can generate power 24 hours per day, 365 days per year. Furthermore, the design of this technology avoids any significant release of carbon dioxide into the atmosphere. OTEC can offer other important benefits apart from power production. Aquaculture is one important spinoff. It may also be economically feasible to extract minerals from the pumped seawater. Freshwater for drinking and irrigation is another by-product, and this will be an important advantage in regions where freshwater is limited.

22. Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.

- (A) Water outflow temperatures could upset local marine life.
- (B) Water discharges will disturb the ecology of the oceans.
- (C) The OTEC system has a tendency to upset marine environments.
- (D) Outflows of water will affect the ocean temperature at great depths.

Some drawbacks to this form of power generation have been noted. Perhaps the biggest drawback at present is the high capital cost of initial construction due mainly to the expense of the large pipeline used to pump water from 1,000 meters below the surface. Furthermore, the conversion of thermal to electrical energy in the OTEC system works at very low efficiency, which means that these plants will have to use a lot of water to generate practical amounts for the power grid. For this reason, the net power output is reduced, since a significant portion of the output must be used to pump water. There are also potential ecological drawbacks, since the water discharges will change the water temperature and disturb some marine habitats. This impact could, however, be minimized if the water is discharged at greater depths.

23. Which of the following statements most accurately reflects the author's opinion about OTEC technology?

- (A) OTEC will eventually supply most of the world's energy needs.
- (B) The disadvantages of OTEC energy outweigh its advantages.
- (C) OTEC technology has a useful role to play in total energy production.
- (D) Only very large OTEC plants can be made efficient.

[Refer to the full passage.]

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

The nutrient-rich cold water is an excellent medium for growing phytoplankton, which provide support for various commercially exploitable fish and shellfish.

Where would the sentence best fit?

Choose the letter of the square that shows where the sentence should be added.

The OTEC system is potentially an important source of clean, renewable energy, which could significantly reduce our reliance on fossil fuels and nuclear fission. **A** Unlike other forms of renewable energy, such as those provided directly by the sun and wind, OTEC plants can generate power 24 hours per day, 365 days per year. Furthermore, the design of this technology avoids any significant release of carbon dioxide into the atmosphere. OTEC can offer other important benefits apart from power production. **B** Aquaculture is one important spinoff. **C** It may also be economically feasible to extract minerals from the pumped seawater. **D** Freshwater for drinking and irrigation is another by-product, and this will be an important advantage in regions where freshwater is limited.

25. **Directions:** An introductory sentence for a brief summary of the passage is provided below. Complete the summary by circling the THREE answer choices that express the most 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.**

Write the letters of the answer choices in the spaces where they belong.
Refer to the full passage.

The OTEC system of power generation is a promising source of energy.

•
•
•

Answer Choices

- | | |
|--|--|
| (A) OTEC systems use ocean temperature differences at different climates to create a significant amount of energy. | (D) OTEC plants can produce more than enough electricity to supply over a million energy users. |
| (B) OTEC systems can produce clean, renewable energy without harmful environmental effects. | (E) The OTEC system can generate power nonstop, unlike other renewable resources like sun and wind energy. |
| (C) The OTEC system's pump would require a significant amount of energy of the total output. | (F) The OTEC system has the added benefit of providing nutritious cold water suitable for fish production. |

Neolithic Agriculture Development

In the Neolithic period, starting around 10,000 years ago, perhaps the most important economic revolution in human history occurred – the commencement of agriculture and the domestication of animals for human consumption. From this point in time, people could start to rely on a more consistent and much increased food supply. As a corollary of this, considerably larger populations could be supported and people could settle in one place without the need to migrate in search of food supplies. Equally important, the surpluses of crops and animals meant that not all the population needed to dedicate their time and energy to farming; some could now learn specialized skills such as crafts or trade. The building of permanent settlements where skills could be developed brought about the conditions necessary for the first growth of towns. But several thousand years elapsed between the beginnings of agriculture and the rise of what we call civilization about 6,000 years ago.

Recent evidence seems to indicate that while the Neolithic revolution first took place in the Middle East – in the valleys of the Tigris-Euphrates and of the Nile – it occurred independently in other areas of the world. The origins of the revolution are not known in great detail, but it is known that the wild grasses that were the ancestors of wheat and barley grew natively in the Eastern Mediterranean area. It may be that Mesolithic (Middle Stone Age) foragers* simply supplemented their diet by reaping these wild grasses, and later came to understand the advantage of returning some of the grain to the soil as seed. Whatever the case, we know that at an early date people living in the Eastern Mediterranean region, who lived by hunting, fishing, and gathering, began to make sickles, with stone teeth set in bone handles. Such tools were certainly used for reaping some grass crop, whether cultivated or wild.

Around this time, other communities in the Middle East cultivated plants from which they learned how to obtain flour. Evidence shows that they ground down the grain with a simple type of mill, consisting of a large saddle-shaped stone on which a smaller stone was rubbed up and down. The livestock they bred – cattle, sheep, pigs, and goats – was exploited for their meat, skins, and milk.

Both in Egypt and Mesopotamia, the periodic floods of great rivers such as the Nile and the Tigris-Euphrates not only supplied water to the fields but also brought down fresh soil in the form of fertile muddy sediments. This sediment was deposited on flood plains around such rivers, thus annually restoring the fruitfulness of the land. This regular flooding and sediment deposit allowed these early farmers to continue cultivating the same fields repeatedly for generations without exhausting the fertility of the soil, and crop surpluses were, therefore, available to allow an increase in population and a growth in trade and skills development. The area available for cultivation was expanded when people learned to draw off the river water into man-made irrigation canals and ditches, watering and fertilizing larger and larger areas of land.

The practice of artificial irrigation affected the soil in various ways, but not always for the good. Since the channels were often shallow, there was frequently a great loss of water through evaporation in a hot climate. This could lead to a marked increase in soil salinity, since the salts held in solution or suspension were deposited as the water evaporated, and too much salinity could eventually damage the soil. But overall the effect of the irrigation system was to create an artificial environment – and to some extent an artificial climate – with a range of conditions that favored both human experiment and agricultural development. Beyond this, settled agriculture led to the development of property rights and hence to a legal framework and mechanisms to enforce laws. This in turn led to a more extensive and hierarchical government organization and hence to the development of large, stable communities.

*foragers: people who go searching for food

26. The word "corollary" in the passage is closest in meaning to

- (A) basis
- (B) result
- (C) source
- (D) purpose

In the Neolithic period, starting around 10,000 years ago, perhaps the most important economic revolution in human history occurred – the commencement of agriculture and the domestication of animals for human consumption. From this point in time, people could start to rely on a more consistent and much increased food supply. As a corollary of this, considerably larger populations could be supported and people could settle in one place without the need to migrate in search of food supplies. Equally important, the surpluses of crops and animals meant that not all the population needed to dedicate their time and energy to farming; some could now learn specialized skills such as crafts or trade. The building of permanent settlements where skills could be developed brought about the conditions necessary for the first growth of towns. But several thousand years elapsed between the beginnings of agriculture and the rise of what we call civilization about 6,000 years ago.

27. According to paragraph 1, what condition allowed people to learn specialized skills?

- (A) The ability to migrate
- (B) The growth of population
- (C) The surplus of farm products
- (D) The spread of settlements

Paragraph 1 is marked with an arrow [➡].

➡ In the Neolithic period, starting around 10,000 years ago, perhaps the most important economic revolution in human history occurred – the commencement of agriculture and the domestication of animals for human consumption. From this point in time, people could start to rely on a more consistent and much increased food supply. As a corollary of this, considerably larger populations could be supported and people could settle in one place without the need to migrate in search of food supplies. Equally important, the surpluses of crops and animals meant that not all the population needed to dedicate their time and energy to farming; some could now learn specialized skills such as crafts or trade. The building of permanent settlements where skills could be developed brought about the conditions necessary for the first growth of towns. But several thousand years elapsed between the beginnings of agriculture and the rise of what we call civilization about 6,000 years ago.

28. According to paragraph 1, why did people migrate before the Neolithic revolution?

- (A) To search for better climates
- (B) To improve trading skills
- (C) To avoid enemies
- (D) To find food

Paragraph 1 is marked with an arrow [➡].

➡ In the Neolithic period, starting around 10,000 years ago, perhaps the most important economic revolution in human history occurred – the commencement of agriculture and the domestication of animals for human consumption. From this point in time, people could start to rely on a more consistent and much increased food supply. As a corollary of this, considerably larger populations could be supported and people could settle in one place without the need to migrate in search of food supplies. Equally important, the surpluses of crops and animals meant that not all the population needed to dedicate their time and energy to farming; some could now learn specialized skills such as crafts or trade. The building of permanent settlements where skills could be developed brought about the conditions necessary for the first growth of towns. But several thousand years elapsed between the beginnings of agriculture and the rise of what we call civilization about 6,000 years ago.

29. Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.

- (A) The conditions for the growth of the first towns were established in permanent settlements where skills developed.
- (B) The first towns and the skills that were developed were also found in the earliest permanent settlements.
- (C) Skills were developed and early permanent settlements were established before towns could be built.
- (D) The conditions necessary for permanent settlements and the practice of skills were found in the first towns.

In the Neolithic period, starting around 10,000 years ago, perhaps the most important economic revolution in human history occurred – the commencement of agriculture and the domestication of animals for human consumption. From this point in time, people could start to rely on a more consistent and much increased food supply. As a corollary of this, considerably larger populations could be supported and people could settle in one place without the need to migrate in search of food supplies. Equally important, the surpluses of crops and animals meant that not all the population needed to dedicate their time and energy to farming; some could now learn specialized skills such as crafts or trade. The building of permanent settlements where skills could be developed brought about the conditions necessary for the first growth of towns. But several thousand years elapsed between the beginnings of agriculture and the rise of what we call civilization about 6,000 years ago.

30. The word "independently" in the passage is closest in meaning to

- (A) separately
- (B) collectively
- (C) individually
- (D) originally

Recent evidence seems to indicate that while the Neolithic revolution first took place in the Middle East – in the valleys of the Tigris-Euphrates and of the Nile – it occurred independently in other areas of the world. The origins of the revolution are not known in great detail, but it is known that the wild grasses that were the ancestors of wheat and barley grew natively in the Eastern Mediterranean area. It may be that Mesolithic (Middle Stone Age) foragers simply supplemented their diet by reaping these wild grasses, and later came to understand the advantage of returning some of the grain to the soil as seed. Whatever the case, we know that at an early date people living in the Eastern Mediterranean region, who lived by hunting, fishing, and gathering, began to make sickles, with stone teeth set in bone handles. Such tools were certainly used for reaping some grass crop, whether cultivated or wild.

31. According to paragraph 2, sickles found in the eastern Mediterranean are evidence that

- (A) the makers of these sickles were skilled craftsmen
- (B) wild grasses were eaten before domesticated grasses
- (C) the sickles were useful for fishing and hunting
- (D) grasses were cut down for food consumption

Paragraph 2 is marked with an arrow [➡].

➡ Recent evidence seems to indicate that while the Neolithic revolution first took place in the Middle East – in the valleys of the Tigris-Euphrates and of the Nile – it occurred independently in other areas of the world. The origins of the revolution are not known in great detail, but it is known that the wild grasses that were the ancestors of wheat and barley grew natively in the Eastern Mediterranean area. It may be that Mesolithic (Middle Stone Age) foragers simply supplemented their diet by reaping these wild grasses, and later came to understand the advantage of returning some of the grain to the soil as seed. Whatever the case, we know that at an early date people living in the Eastern Mediterranean region, who lived by hunting, fishing, and gathering, began to make sickles, with stone teeth set in bone handles. Such tools were certainly used for reaping some grass crop, whether cultivated or wild.

32. The word "fertile" in the passage is closest in meaning to

- (A) forceful
- (B) productive
- (C) creative
- (D) shallow

Both in Egypt and Mesopotamia, the periodic floods of great rivers such as the Nile and the Tigris-Euphrates not only supplied water to the fields but also brought down fresh soil in the form of fertile muddy sediments. This sediment was deposited on flood plains around such rivers, thus annually restoring the fruitfulness of the land. This regular flooding and sediment deposit allowed these early farmers to continue cultivating the same fields repeatedly for generations without exhausting the fertility of the soil, and crop surpluses were, therefore, available to allow an increase in population and a growth in trade and skills development. The area available for cultivation was expanded when people learned to draw off the river water into man-made irrigation canals and ditches, watering and fertilizing larger and larger areas of land.

33. According to paragraph 4, why was it easy for people to grow food near large rivers?

- (A) Flooding eroded the soil.
- (B) The soil was continuously enriched.
- (C) Surplus crops were regular.
- (D) The population was large enough.

Paragraph 4 is marked with an arrow [➡].

➡ Both in Egypt and Mesopotamia, the periodic floods of great rivers such as the Nile and the Tigris-Euphrates not only supplied water to the fields but also brought down fresh soil in the form of fertile muddy sediments. This sediment was deposited on flood plains around such rivers, thus annually restoring the fruitfulness of the land. This regular flooding and sediment deposit allowed these early farmers to continue cultivating the same fields repeatedly for generations without exhausting the fertility of the soil, and crop surpluses were, therefore, available to allow an increase in population and a growth in trade and skills development. The area available for cultivation was expanded when people learned to draw off the river water into man-made irrigation canals and ditches, watering and fertilizing larger and larger areas of land.

34. According to paragraph 4, why did early Neolithic people build irrigation ditches?

- (A) To increase the growing areas
- (B) To enlarge the fertilized areas
- (C) To produce crop surpluses
- (D) To water the early canals

Paragraph 4 is marked with an arrow [➡].

➡ Both in Egypt and Mesopotamia, the periodic floods of great rivers such as the Nile and the Tigris-Euphrates not only supplied water to the fields but also brought down fresh soil in the form of fertile muddy sediments. This sediment was deposited on flood plains around such rivers, thus annually restoring the fruitfulness of the land. This regular flooding and sediment deposit allowed these early farmers to continue cultivating the same fields repeatedly for generations without exhausting the fertility of the soil, and crop surpluses were, therefore, available to allow an increase in population and a growth in trade and skills development. The area available for cultivation was expanded when people learned to draw off the river water into man-made irrigation canals and ditches, watering and fertilizing larger and larger areas of land.

35. The word "This" in the passage refers to

- (A) irrigation
- (B) hot climate
- (C) evaporation
- (D) loss of water

The practice of artificial irrigation affected the soil in various ways, but not always for the good. Since the channels were often shallow, there was frequently a great loss of water through evaporation in a hot climate. This could lead to a marked increase in soil salinity, since the salts held in solution or suspension were deposited as the water evaporated, and too much salinity could eventually damage the soil. But overall the effect of the irrigation system was to create an artificial environment – and to some extent an artificial climate – with a range of conditions that favored both human experiment and agricultural development. Beyond this, settled agriculture led to the development of property rights and hence to a legal framework and mechanisms to enforce laws. This in turn led to a more extensive and hierarchical government organization and hence to the development of large, stable communities.

36. According to paragraph 5, what negative effect did the building of irrigation ditches create?

- (A) Too much salt in the soil
- (B) A worsening climate
- (C) Destruction of settlements
- (D) Too much experimentation

Paragraph 5 is marked with an arrow [➡].

➡ The practice of artificial irrigation affected the soil in various ways, but not always for the good. Since the channels were often shallow, there was frequently a great loss of water through evaporation in a hot climate. This could lead to a marked increase in soil salinity, since the salts held in solution or suspension were deposited as the water evaporated, and too much salinity could eventually damage the soil. But overall the effect of the irrigation system was to create an artificial environment – and to some extent an artificial climate – with a range of conditions that favored both human experiment and agricultural development. Beyond this, settled agriculture led to the development of property rights and hence to a legal framework and mechanisms to enforce laws. This in turn led to a more extensive and hierarchical government organization and hence to the development of large, stable communities.

37. What can be inferred from paragraph 5 about the development of an organized government?

- (A) Stable communities function best with a hierarchical government.
- (B) Human experiment is most often practiced if government enforces laws.
- (C) An organized government is necessary to extend artificial irrigation.
- (D) The need to enforce property laws required government organization.

Paragraph 5 is marked with an arrow [➡].

➡ The practice of artificial irrigation affected the soil in various ways, but not always for the good. Since the channels were often shallow, there was frequently a great loss of water through evaporation in a hot climate. This could lead to a marked increase in soil salinity, since the salts held in solution or suspension were deposited as the water evaporated, and too much salinity could eventually damage the soil. But overall the effect of the irrigation system was to create an artificial environment – and to some extent an artificial climate – with a range of conditions that favored both human experiment and agricultural development. Beyond this, settled agriculture led to the development of property rights and hence to a legal framework and mechanisms to enforce laws. This in turn led to a more extensive and hierarchical government organization and hence to the development of large, stable communities.

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

In much of the Middle East region, the earth was mainly watered not by rain but by natural irrigation.

Where would the sentence best fit?

Choose the letter of the square that shows where the sentence should be added.

A Both in Egypt and Mesopotamia, the periodic floods of great rivers such as the Nile and the Tigris-Euphrates not only supplied water to the fields but also brought down fresh soil in the form of fertile muddy sediments. **B** This sediment was deposited on flood plains around such rivers, thus annually restoring the fruitfulness of the land. **C** This regular flooding and sediment deposit allowed these early farmers to continue cultivating the same fields repeatedly for generations without exhausting the fertility of the soil, and crop surpluses were, therefore, available to allow an increase in population and a growth in trade and skills development. **D** The area available for cultivation was expanded when people learned to draw off the river water into man-made irrigation canals and ditches, watering and fertilizing larger and larger areas of land.

39. **Directions:** An introductory sentence of 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 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.

Write the letters of the answer choices in the spaces where they belong.

Refer to the full passage.

During the Neolithic period, people started to domesticate animals, grow crops, and build permanent settlements, leading eventually to the beginnings of civilization.

• • •

Answer Choices

- | | |
|---|--|
| <p>(A) It is likely that early hunters ate wild grasses and later understood how to cultivate, reap, and grind grain.</p> <p>(B) The floodwaters of rivers in the Middle East enriched the soil, which led to food surpluses and an enlarged population.</p> <p>(C) At one time, people in the Eastern Mediterranean region lived by hunting animals, catching fish, and gathering edible plants.</p> | <p>(D) We know that early people learned how to cultivate grasses since they developed a simple type of grinding mill.</p> <p>(E) The large increase in the number of irrigation canals led to the worsening of the soil condition due to deposits of salt.</p> <p>(F) Artificial irrigation increased the arable area, and despite some negative effects, overall this development led to improvement in life and eventually to an organized government system.</p> |
|---|--|

Questions 1-12

Two Atomic Clocks

The nucleus of a radioactive atom disintegrates spontaneously and forms an atom of a different element while emitting radiation in the process. The original atom is called the parent isotope* and its stable product is called the daughter or progeny isotope. For example, rubidium-87 decays by emitting an electron from its nucleus to form a stable daughter called strontium-87. Because the rate of nuclear decay is constant regardless of temperature and pressure conditions, radioactive decay provides a dependable way of keeping time. Radioactive isotopes alter from one type of atom to another at a fixed rate from the moment they are created anywhere in the universe. Since we can calculate the decay rate and also count the number of newly formed progeny atoms and the remaining parent atoms, we can use the ratio as a kind of clock to measure the age of minerals and other materials.

The rate at which a radioactive element decays is known as the half-life of the element. This is the time necessary for one-half of the original number of radioactive atoms in a sample to decay into a daughter product. After two half-lives, the number of atoms remaining after the first half-life will have decayed by half again. Thus, the number of remaining parent atoms is reduced geometrically over time. With some elements, the half-life is very long. Rubidium-87, for example, has a half-life that has been estimated at nearly 48.8 billion years, much longer than the current estimated age of the universe. With other elements, this period can be as short as a few days or even minutes. If we know the half-life of a decaying element, it is possible to calculate the ratio of parent to stable progeny that will remain after any given period of time.

Geologists use a sensitive instrument called a mass spectrometer to detect tiny quantities of the isotopes of the parent and progeny atoms. By measuring the ratio of these, they can calculate the age of the rock in which the rubidium originally crystallized. Because the number of progeny is growing as the parent is decaying and this is occurring at a constant rate, after one-half life the ratio is one parent to one progeny. After two half-lives the ratio is 1 to 3.

Rubidium-87 has often been used to date rocks since it is a widespread element. Various elements including rubidium are incorporated into minerals as they crystallize from magma* or metamorphic rock. During this process the rubidium is separated from any strontium progeny that existed before the rock formed and so we know that the measurable alteration from parent to progeny can be dated from this point. As the radioactive decay of rubidium-87 begins, new progeny atoms of strontium-87 start to accumulate in the rock. In the dating of rocks using these elements, it is important that the rock sample has not been altered subsequent to its formation by other geologic processes or contamination of any kind. Rocks as old as 4.6 billion years can be dated with some degree of reliability using this method.

Another radioactive element useful for dating is carbon-14, which decays into nitrogen-14. With a half-life of 5,730 years, carbon-14 decays much more rapidly than rubidium-87 and so is useful for measuring the ages of objects from the recent historical and geologic past, such as fossils, bones, wood, and other organic materials. Whereas rubidium-87 is incorporated into rocks during their formation, carbon-14, which is an essential element of the cells of organisms, becomes incorporated into living tissues as organisms grow. The ratio of carbon-14 to stable carbon isotopes in the organism is the same as it is in the atmosphere. When a living organism dies, no more carbon dioxide is absorbed and so no new carbon isotopes are added. The daughter nitrogen-14 isotope, existing in gaseous form, leaks out of the dead organism, and thus, we cannot use it to compare the ratio of original to daughter as is done with rubidium-87 and its daughter. However, as the amount of carbon-14 in the dead organism becomes less over time, we can compare the proportion of this isotope remaining with the proportion that is in the atmosphere and from this calculate the approximate number

of years since the organism has died. Dating dead organic material by this method is moderately reliable in samples up to about 50,000 years old, but beyond that the accuracy becomes unreliable.

*isotope: one of the differing forms of an atomic element

*magma: material that is in liquid form and which cools on the Earth's surface to form rock

1. The word "alter" in the passage is closest in meaning to

(A) adapt
(B) change
(C) revise
(D) vary

The nucleus of a radioactive atom disintegrates spontaneously and forms an atom of a different element while emitting radiation in the process. The original atom is called the parent isotope and its stable product is called the daughter or progeny isotope. For example, rubidium-87 decays by emitting an electron from its nucleus to form a stable daughter called strontium-87. Because the rate of nuclear decay is constant regardless of temperature and pressure conditions, radioactive decay provides a dependable way of keeping time. Radioactive isotopes alter from one type of atom to another at a fixed rate from the moment they are created anywhere in the universe. Since we can calculate the decay rate and also count the number of newly formed progeny atoms and the remaining parent atoms, we can use the ratio as a kind of clock to measure the age of minerals and other materials.

2. The rate of nuclear decay in rubidium-87

(A) is always the same
(B) changes over time
(C) depends on temperature
(D) depends on temperature and pressure

[Refer to the full passage.]

3. The word "This" in the passage refers to

(A) element
(B) half-life
(C) rate
(D) time

The rate at which a radioactive element decays is known as the half-life of the element. This is the time necessary for one-half of the original number of radioactive atoms in a sample to decay into a daughter product. After two half-lives, the number of atoms remaining after the first half-life will have decayed by half again. Thus, the number of remaining parent atoms is reduced geometrically over time. With some elements, the half-life is very long. Rubidium-87, for example, has a half-life that has been estimated at nearly 48.8 billion years, much longer than the current estimated age of the universe. With other elements, this period can be as short as a few days or even minutes. If we know the half-life of a decaying element, it is possible to calculate the ratio of parent to stable progeny that will remain after any given period of time.

4. The half-life of an element

[Refer to the full passage.]

- (A) is a reliable way of measuring sample size
- (B) is a measure of decay rate in radioactive elements
- (C) is considered an unreliable way of calculating age
- (D) is approximately half the age of the atoms it contains

5. What can be inferred about the reliability of using radioactive atoms to calculate ages of rock samples?

[Refer to the full passage.]

- (A) The reliability increases over time.
- (B) The reliability decreases with older samples.
- (C) The reliability of the parent atom is greater than the progeny.
- (D) The reliability of the progeny atom is greater than the parent.

6. According to the passage, from what point can we measure the ages of rocks?

[Refer to the full passage.]

- (A) From the point at which rubidium-87 became part of the rock structure
- (B) From the point at which strontium-87 started to decay
- (C) From the point at which the rocks rubidium-87 and strontium-87 joined
- (D) From the point at which later contamination entered the rock samples

9. According to paragraph 5, why can't scientists compare the ratio of carbon-14 to nitrogen-14?
- (A) The amount of nitrogen-14 is not predictable.
 - (B) The ratio of these two elements doesn't change.
 - (C) Nitrogen-14 has an unpredictable decay rate.
 - (D) Carbon-14 tends to evaporate too quickly.

Paragraph 5 is marked with an arrow [➡].

➡ Another radioactive element useful for dating is carbon-14, which decays into nitrogen-14. With a half-life of 5,730 years, carbon-14 decays much more rapidly than rubidium-87 and so is useful for measuring the ages of objects from the recent historical and geologic past, such as fossils, bones, wood, and other organic materials. Whereas rubidium-87 is incorporated into rocks during their formation, carbon-14, which is an essential element of the cells of organisms, becomes incorporated into living tissues as organisms grow. The ratio of carbon-14 to stable carbon isotopes in the organism is the same as it is in the atmosphere. When a living organism dies, no more carbon dioxide is absorbed and so no new carbon isotopes are added. The daughter nitrogen-14 isotope, existing in gaseous form, leaks out of the dead organism, and thus, we cannot use it to compare the ratio of original to daughter as is done with rubidium-87 and its daughter. However, as the amount of carbon-14 in the dead organism becomes less over time, we can compare the proportion of this isotope remaining with the proportion that is in the atmosphere and from this calculate the approximate number of years since the organism has died. Dating dead organic material by this method is moderately reliable in samples up to about 50,000 years old, but beyond that the accuracy becomes unreliable.

10. According to paragraph 5, the amount of carbon-14 in an organism
- (A) replaces other carbon isotopes after an organism dies
 - (B) tends to be the same as the other carbon isotopes
 - (C) increases rapidly when an organism dies
 - (D) deteriorates from the moment of death

Paragraph 5 is marked with an arrow [➡].

➡ Another radioactive element useful for dating is carbon-14, which decays into nitrogen-14. With a half-life of 5,730 years, carbon-14 decays much more rapidly than rubidium-87 and so is useful for measuring the ages of objects from the recent historical and geologic past, such as fossils, bones, wood, and other organic materials. Whereas rubidium-87 is incorporated into rocks during their formation, carbon-14, which is an essential element of the cells of organisms, becomes incorporated into living tissues as organisms grow. The ratio of carbon-14 to stable carbon isotopes in the organism is the same as it is in the atmosphere. When a living organism dies, no more carbon dioxide is absorbed and so no new carbon isotopes are added. The daughter nitrogen-14 isotope, existing in gaseous form, leaks out of the dead organism, and thus, we cannot use it to compare the ratio of original to daughter as is done with rubidium-87 and its daughter. However, as the amount of carbon-14 in the dead organism becomes less over time, we can compare the proportion of this isotope remaining with the proportion that is in the atmosphere and from this calculate the approximate number of years since the organism has died. Dating dead organic material by this method is moderately reliable in samples up to about 50,000 years old, but beyond that the accuracy becomes unreliable.

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

Both the unstable carbon-14 and stable carbon isotopes are taken in from the carbon dioxide present in the atmosphere.

Where would the sentence best fit?

Choose the letter of the square that shows where the sentence should be added.

Another radioactive element useful for dating is carbon-14, which decays into nitrogen-14. **A** With a half-life of 5,730 years, carbon-14 decays much more rapidly than rubidium-87 and so is useful for measuring the ages of objects from the recent historical and geologic past, such as fossils, bones, wood, and other organic materials. Whereas rubidium-87 is incorporated into rocks during their formation, carbon-14, which is an essential element of the cells of organisms, becomes incorporated into living tissues as organisms grow. **B** The ratio of carbon-14 to stable carbon isotopes in the organism is the same as it is in the atmosphere. **C** When a living organism dies, no more carbon dioxide is absorbed and so no new carbon isotopes are added. **D** The daughter nitrogen-14 isotope, existing in gaseous form, leaks out of the dead organism, and thus, we cannot use it to compare the ratio of original to daughter as is done with rubidium-87 and its daughter. However, as the amount of carbon-14 in the dead organism becomes less over time, we can compare the proportion of this isotope remaining with the proportion that is in the atmosphere and from this calculate the approximate number of years since the organism has died. Dating dead organic material by this method is moderately reliable in samples up to about 50,000 years old, but beyond that the accuracy becomes unreliable.

12. **Directions:** Select the appropriate phrases from the answer choices and match the dating technique to which they relate. TWO of the answer choices will NOT be used. This question is worth 4 points.

Write the letters of the answer choices in the spaces where they belong.

Refer to the full passage.

Answer Choices

- (A) Can be used for dating artifacts made of bones or wood
- (B) Destroys progeny isotopes
- (C) Essential to living organisms
- (D) Has a half-life of billions of years
- (E) Incorporated into minerals when they crystallized
- (F) Progeny cannot be used for dating
- (G) Unreliable for dating samples
- (H) Used for dating dead trees
- (I) Used for dating rocks

Rubidium-87

Carbon-14



Communicating with the Future

In the 1980s the United States Department of Energy was looking for suitable sites to bury radioactive waste material generated by its nuclear energy programs. The government was considering burying the dangerous waste in deep underground chambers in remote desert areas. The problem, however, was that nuclear waste remains highly radioactive for thousands of years. The commission entrusted with tackling the problem of waste disposal was aware that the dangers posed by radioactive emissions must be communicated to our descendants of at least 10,000 years hence. So the task became one of finding a way to tell future societies about the risk posed by these deadly deposits.

Of course, human society in the distant future may be well aware of the hazards of radiation. Technological advances may one day provide solutions to this dilemma. But the belief in constant technological advancement is based on our perceptions of advances made throughout history and prehistory. We cannot be sure that society won't have slipped backward into an age of barbarism* due to any of several catastrophic events, whether the result of nature such as the onset of a new ice age or perhaps humankind's failure to solve the scourges of war and pollution. In the event of global catastrophe, it is quite possible that humans of the distant future will be on the far side of a broken link of communication and technological understanding.

The problem then becomes how to inform our descendants that they must avoid areas of potential radioactive seepage* given that they may not understand any currently existing language and may have no historical or cultural memory. So, any message dedicated to future reception and decipherment must be as universally understandable as possible.

It was soon realized by the specialists assigned the task of devising the communication system that any material in which the message was written might not physically endure the great lengths of time demanded. The second law of thermodynamics shows that all material disintegrates over time. Even computers that might carry the message cannot be expected to endure long enough. Besides, electricity supplies might not be available in 300 generations. Other media storage methods were considered and rejected for similar reasons.

The task force under the linguist Thomas Sebeok finally agreed that no foolproof way would be found to send a message across so many generations and have it survive physically and be decipherable by a people with few cultural similarities to us. Given this restriction, Sebeok suggested the only possible solution was the formation of a committee of guardians of knowledge. Its task would be to dedicate itself to maintaining and passing on the knowledge of the whereabouts and dangers of the nuclear waste deposits. This so-called atomic priesthood would be entrusted with keeping knowledge of this tradition alive through millennia and in developing the tradition into a kind of mythical taboo forbidding people to tamper in any way with the nuclear waste sites. Only the initiated atomic priesthood of experts would have the scientific knowledge to fully understand the danger. Those outside the priesthood would be kept away by a combination of rituals and legends designed to warn off intruders.

This proposal has been criticized because of the possibility of a break in continuity of the original message. Furthermore, there is no guarantee that any warning or sanction passed on for millennia would be obeyed, nor that it could survive with its original meaning intact. To counterbalance this possibility, Sebeok's group proposed a "relay system" in which information is passed on over relatively short periods of time, just three generations ahead. The message is then to be renewed and redesigned if necessary for the following three generations and so on over the required time span. In this way information could be relayed into the future and avoid the possibility of physical degradation.

PRACTICE TEST 2

A second defect is more difficult to dismiss, however. This is the problem of social exclusiveness brought about through possession of vital knowledge. Critics point out that the atomic priesthood could use its secret knowledge to control those who are scientifically ignorant. The establishment of such an association of insiders holding powerful knowledge not available except in mythic form to nonmembers would be a dangerous precedent for future social developments.

***barbarism:** a state of existence in which the experience, habits, and culture of modern life are absent

***seepage:** an amount of liquid or gas that flows through another substance

26. The word "chambers" in the passage is closest in meaning to

- (A) cavities
- (B) partitions
- (C) openings
- (D) fissures

In the 1980s the United States Department of Energy was looking for suitable sites to bury radioactive waste material generated by its nuclear energy programs. The government was considering burying the dangerous waste in deep underground chambers in remote desert areas. The problem, however, was that nuclear waste remains highly radioactive for thousands of years. The commission entrusted with tackling the problem of waste disposal was aware that the dangers posed by radioactive emissions must be communicated to our descendants of at least 10,000 years hence. So the task became one of finding a way to tell future societies about the risk posed by these deadly deposits.

27. What problem faced the commission assigned to deal with the burial of nuclear waste?

- (A) How to reduce the radioactive life of nuclear waste materials
- (B) How to notify future generations of the risks of nuclear contamination
- (C) How to form a committee that could adequately express various nuclear risks
- (D) How to choose burial sites so as to minimize dangers to people

[Refer to the full passage.]

28. In paragraph 2, the author explains the possible circumstances of future societies

- (A) to warn us about possible natural catastrophes
- (B) to highlight humankind's inability to resolve problems
- (C) to question the value of our trust in technological advances
- (D) to demonstrate the reason nuclear hazards must be communicated

Paragraph 2 is marked with an arrow [➡].

➡ Of course, human society in the distant future may be well aware of the hazards of radiation. Technological advances may one day provide solutions to this dilemma. But the belief in constant technological advancement is based on our perceptions of advances made throughout history and prehistory. We cannot be sure that society won't have slipped backward into an age of barbarism due to any of several catastrophic events, whether the result of nature such as the onset of a new ice age or perhaps humankind's failure to solve the scourges of war and pollution. In the event of global catastrophe, it is quite possible that humans of the distant future will be on the far side of a broken link of communication and technological understanding.

29. The word "scourges" in the passage is closest in meaning to

- (A) worries
- (B) pressures
- (C) afflictions
- (D) annoyances

Of course, human society in the distant future may be well aware of the hazards of radiation. Technological advances may one day provide solutions to this dilemma. But the belief in constant technological advancement is based on our perceptions of advances made throughout history and prehistory. We cannot be sure that society won't have slipped backward into an age of barbarism due to any of several catastrophic events, whether the result of nature such as the onset of a new ice age or perhaps humankind's failure to solve the scourges of war and pollution. In the event of global catastrophe, it is quite possible that humans of the distant future will be on the far side of a broken link of communication and technological understanding.

30. Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.

- (A) A message for future generations must be comprehensible to anyone in the world.
- (B) A universally understandable message must be deciphered for future generations.
- (C) Any message that is globally understandable must be received and deciphered.
- (D) The message that future generations receive and interpret must be dedicated.

The problem then becomes how to inform our descendants that they must avoid areas of potential radioactive seepage given that they may not understand any currently existing language and may have no historical or cultural memory. So, any message dedicated to future reception and decipherment must be as universally understandable as possible.

31. In paragraph 4, the author mentions the second law of thermodynamics

- (A) to contrast the potential life span of knowledge with that of material objects
- (B) to give the basic scientific reason behind the breakdown of material objects
- (C) to show that knowledge can be sustained over millennia
- (D) to support the view that nuclear waste will disperse with time

Paragraph 4 is marked with an arrow [➡].

➡ It was soon realized by the specialists assigned the task of devising the communication system that any material in which the message was written might not physically endure the great lengths of time demanded. The second law of thermodynamics shows that all material disintegrates over time. Even computers that might carry the message cannot be expected to endure long enough. Besides, electricity supplies might not be available in 300 generations. Other media storage methods were considered and rejected for similar reasons.

32. The word "Its" in the passage refers to

- (A) knowledge
- (B) guardians
- (C) committee
- (D) solution

The task force under the linguist Thomas Sebeok finally agreed that no foolproof way would be found to send a message across so many generations and have it survive physically and be decipherable by a people with few cultural similarities to us. Given this restriction, Sebeok suggested the only possible solution was the formation of a committee of guardians of knowledge. Its task would be to dedicate itself to maintaining and passing on the knowledge of the whereabouts and dangers of the nuclear waste deposits. This so-called atomic priesthood would be entrusted with keeping knowledge of this tradition alive through millennia and in developing the tradition into a kind of mythical taboo forbidding people to tamper in any way with the nuclear waste sites. Only the initiated atomic priesthood of experts would have the scientific knowledge to fully understand the danger. Those outside the priesthood would be kept away by a combination of rituals and legends designed to warn off intruders.

33. In paragraph 5, why is the proposed committee of guardians referred to as the "atomic priesthood"?

- (A) Because they would be an exclusive religious order
- (B) Because they would develop mythical taboos surrounding their traditions
- (C) Because they would use rituals and legends to maintain their exclusiveness
- (D) Because they would be an exclusive group with knowledge about nuclear waste sites

Paragraph 5 is marked with an arrow [➡].

➡ The task force under the linguist Thomas Sebeok finally agreed that no foolproof way would be found to send a message across so many generations and have it survive physically and be decipherable by a people with few cultural similarities to us. Given this restriction, Sebeok suggested the only possible solution was the formation of a committee of guardians of knowledge. Its task would be to dedicate itself to maintaining and passing on the knowledge of the whereabouts and dangers of the nuclear waste deposits. This so-called atomic priesthood would be entrusted with keeping knowledge of this tradition alive through millennia and in developing the tradition into a kind of mythical taboo forbidding people to tamper in any way with the nuclear waste sites. Only the initiated atomic priesthood of experts would have the scientific knowledge to fully understand the danger. Those outside the priesthood would be kept away by a combination of rituals and legends designed to warn off intruders.

34. The word "sanction" in the passage is closest in meaning to

- (A) security
- (B) approval
- (C) counsel
- (D) penalty

This proposal has been criticized because of the possibility of a break in continuity of the original message. Furthermore, there is no guarantee that any warning or sanction passed on for millennia would be obeyed, nor that it could survive with its original meaning intact. To counterbalance this possibility, Sebeok's group proposed a "relay system" in which information is passed on over relatively short periods of time, just three generations ahead. The message is then to be renewed and redesigned if necessary for the following three generations and so on over the required time span. In this way information could be relayed into the future and avoid the possibility of physical degradation.

35. According to the author, why did the task force under Sebeok propose a relay system for passing on information?

- (A) To compensate for the fact that meaning will not be stable over long periods of time
- (B) To show that Sebeok's ideas created more problems than they solved
- (C) To contrast Sebeok's ideas with those proposed by his main critics
- (D) To support the belief that breaks in communication are inevitable over time

[Refer to the full passage.]

36. According to paragraph 7, the second defect of the atomic priesthood proposal is that it could lead to

- (A) the possible misuse of exclusive knowledge
- (B) the establishment of a scientifically ignorant society
- (C) the priesthood's criticism of points concerning vital knowledge
- (D) the nonmembers turning knowledge into dangerous mythical forms

Paragraph 7 is marked with an arrow (➡).

➡ A second defect is more difficult to dismiss, however. This is the problem of social exclusiveness brought about through possession of vital knowledge. Critics point out that the atomic priesthood could use its secret knowledge to control those who are scientifically ignorant. The establishment of such an association of insiders holding powerful knowledge not available except in mythic form to nonmembers would be a dangerous precedent for future social developments.

37. All of the following are mentioned in the passage as difficulties in devising a communication system with the future EXCEPT

- (A) the loss of knowledge about today's civilization
- (B) the failure to maintain communication links
- (C) the inability of materials to endure over time
- (D) the exclusiveness of a priesthood

[Refer to the full passage.]

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

Perhaps scientists will find efficient ways to deactivate radioactive materials.

Where would the sentence best fit?

Choose the letter of the square that shows where the sentence should be added.

Of course, human society in the distant future may be well aware of the hazards of radiation. **A** Technological advances may one day provide solutions to this dilemma. **B** But the belief in constant technological advancement is based on our perceptions of advances made throughout history and prehistory. **C** We cannot be sure that society won't have slipped backward into an age of barbarism due to any of several catastrophic events, whether the result of nature such as the onset of a new ice age or perhaps humankind's failure to solve the scourges of war and pollution. **D** In the event of global catastrophe, it is quite possible that humans of the distant future will be on the far side of a broken link of communication and technological understanding.

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 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.**

Write the letters of the answer choices in the spaces where they belong.
Refer to the full passage.

The problem of how to pass on knowledge of the dangers posed by buried radioactive waste was addressed by a commission of experts.

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Answer Choices

- | | |
|--|---|
| <p>(A) A task force argued that a select group should be entrusted with passing on knowledge of the dangers of radioactive deposits by using a relay system.</p> <p>(B) Electricity supplies may not exist in the future, so computers should not be entrusted with storage of vital information.</p> <p>(C) Technological improvements will possibly allow future generations to decontaminate nuclear waste.</p> | <p>(D) The atomic priesthood proposal has been criticized due to its potential for creating a future society divided into those who hold special knowledge and those who don't.</p> <p>(E) The atomic priesthood would develop rituals and legends designed to warn off trespassers into the nuclear burial sites.</p> <p>(F) Various means of storing and passing on information are unreliable over time because of the difficulty of communicating with future societies and the likely physical decay of storage media.</p> |
|--|---|