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The Collapse of the Maya

The Mayan society of Central America (2000 B.C-A.D 1500), like other ancient states, was characterized by populations unprecedented both in their size and density. It was not just the number of people that lived in the Mayan city-states but also the relatively small area into which they were concentrated. To support such populations, societies developed various intensive agricultural including large-scale irrigation and hill-slope (the cutting of horizontal ridges into hillsides so they can be farmed). These were designed both to increase yields from a given area and to increase the absolute amount of land under cultivation. These strategies were in essence very successful: they made it possible to feed larger populations than ever before and supported the growth of cities. But they also placed considerable strains on the environment and rendered it increasingly fragile and vulnerable to unexpected climatic events, and even to short-term fluctuations. Thus, the argument is that because of their size and ever more intensive agriculture, the Mayan and other ancient state societies were fundamentally unsustainable.

Claims about environment degradation and disaster have figured prominently in discussion of the collapse of the Mayan city-states of the Central American lowlands. When two explorers came upon the Mayan cities in the 1830s, they were struck by the sight of tall pyramids and elaborately carved stones among luxuriant forest growth. Here was the archetypal picture of a great lost civilization: abandoned cities submerged in vegetation. Theories of catastrophic collapse or apocalyptic overthrow came naturally to mind to explain these dramatic scenes.

Recent studies of the Mayan collapse (beginning around A.D 900) have emphasized the gradual and progressive nature of the process, beginning in the earliest in the South and advancing northward. It was not a single, sudden event, as had once been thought. Warfare and social unrest are thought to have played a part, but these may well have arisen through pressure from other causes. The Mayan cities had, after all, flourished for over 500 years and had frequently been at war with each other.

But what about the possibility of food shortages? These could have come about through either natural or humanly induced changes in the environment. Increasingly fierce competition between Mayan cities led to an upsurge of monument construction during the eighth and ninth centuries A.D, which would have placed added strain on agricultural production and expansion. Interstate

rivalry may hence have pushed the Maya toward overexploitation of their fragile ecosystem. Deforestation and soil erosion might ultimately have destroyed the capacity of the land to support the high population levels of the Mayan cities, leading to famine, social unrest, and the collapse of the major Mayan centers.

Yet it may be incorrect to lay the blame entirely on human action. Several of the lowland cities, such as Tikal, appear to have depended heavily on the cultivation of raised fields set in the marshy depressions known as bajos, which today flood intermittently in the rainy season but may originally have been permanent lakes. The raise-field system of intensive cultivation (created by digging surrounding canals and using the soil removed to elevate the fields for planting) allows year-round food production through the constant supply of soil nutrients that erode into the drainage ditches dug around the raised fields, nutrients that are then collected and replaced. Stable water levels were essential to this subsistence system, but evidence from Lake Chichancanab in Yucatan shows that between A.D 800 and A.D 1000 this region suffered its driest period of climate in several thousand years. We may expect that as a result water level fell, and the raised fields in many areas became unusable. But the human response must be viewed through the lens of the social, political, and cultural circumstances. These exerted a powerful mediating effect on the way the Maya endeavored to cope with their difficulties. Had population levels been lower, the impact of the drought may not have been catastrophic, as it was, the Maya were already reaching the limits of the available subsistence capacity, and Mayan elites had espoused certain social and political agendas (including expensive warfare and competition with each other). It was against this specific background that a period of drought led quickly to crisis and collapse.

Paragraph 1

The Mayan society of Central America (2000 B.C-A.D 1500), like other ancient states, was characterized by populations unprecedented both in their size and density. It was not just the number of people that lived in the Mayan city-states but also the relatively small area into which they were concentrated. To support such populations, societies developed various intensive agricultural including large-scale irrigation and hill-slope (the cutting of horizontal ridges into hillsides so they can be farmed). These were designed both to increase yields from a given area and to increase the absolute amount of land under cultivation. These

strategies were in essence very successful: they made it possible to feed larger populations than ever before and supported the growth of cities. But they also placed considerable strains on the environment and rendered it increasingly fragile and vulnerable to unexpected climatic events, and even to short-term fluctuations. Thus, the argument is that because of their size and ever more intensive agriculture, the Mayan and other ancient state societies were fundamentally unsustainable.

1. According to paragraph 1, ancient societies increased their agricultural output by
 - A. increasing the percentage of the population that worked as farmers
 - B. creating large irrigation systems
 - C. being highly selective of the fields they would farm
 - D. moving more people into the city to free up farmland
2. Which of the following can be inferred from paragraph 1 about the intensive agricultural methods of the Maya?
 - A. They helped the Maya overcome short-term fluctuations in the climate.
 - B. They could not supply all of the food required for the growth of Mayan cities.
 - C. They strained the environment more than the Maya's previous farming techniques did.
 - D. They were invented by the Maya to help them grow new kinds of crops.

Paragraph 2

Claims about environment degradation and disaster have figured prominently in discussion of the collapse of the Mayan city-states of the Central American lowlands. When two explorers came upon the Mayan cities in the 1830s, they were struck by the sight of tall pyramids and **elaborately** carved stones among luxuriant forest growth. Here was the archetypal picture of a great lost civilization: **abandoned** cities submerged in vegetation. Theories of catastrophic collapse or apocalyptic overthrow came naturally to mind to explain these dramatic scenes.

3. The word "**elaborately**" in the passage is closest in meaning to
 - A. with great detail
 - B. artistically
 - C. mysteriously
 - D. gently hand-made
4. The word "**abandoned**" in the passage is closest in meaning to

- A. carefully hidden
- B. destroyed
- C. enormous
- D. no longer occupied

5. In paragraph 2, the author implies which of the following about the collapse of the Mayan city-states?

- A. The fact that vegetation had grown over the ruins of Mayan buildings indicates that environmental degradation did not contribute to the Mayan collapse.
- B. Early explorers supposed that there was a catastrophic collapse of the Mayan city states largely because this view fit their preconceived ideas about lost civilizations.
- C. The condition of the tall pyramids and carved stones discovered by early explorers proves that Mayan city-states were violently overthrown.
- D. The Mayan cities were abandoned because they became submerged in vegetation

Paragraph 3

Recent studies of the Mayan collapse (beginning around A.D 900) have emphasized the gradual and progressive nature of the process, beginning in the earliest in the South and advancing northward. It was not a single, sudden event, as had once been thought. Warfare and social unrest are thought to have played a part, but these may well have arisen through pressure from other causes. The Mayan cities had, after all, **flourished for over 500 years and had frequently been at war with each other.**

6. Why does the author include the information that Mayan cities had “flourished for over 500 years and had frequently been at war with each other”?

- A. To identify a possible reason for the eventual collapse of Mayan society
- B. To make the point that war and social unrest alone do not account for the Mayan collapse
- C. To explain why recent studies argue that human actions were responsible for the Mayan collapse
- D. To provide evidence that frequent wars weakened Mayan society only very gradually

7. According to paragraph 3, recent studies claim which of the following about the Mayan collapse?

- A. It was caused primarily by frequent wars between rival city-states.
- B. It was caused by a single sudden event.
- C. It was preceded by social unrest in northern city-states.
- D. It began in southern city-states and spread to others.

Paragraph 4

But what about the possibility of food shortage? These could have come about through either natural or humanly induced changes in the environment. Increasingly fierce competition between Mayan cities led to an upsurge of monument construction during the eighth and ninth centuries A.D, which would have placed added strain on agricultural production and expansion. Interstate rivalry may hence have pushed the Maya toward overexploitation of their fragile ecosystem. Deforestation and soil erosion might ultimately have destroyed the capacity of the land to support the high population levels of the Mayan cities, leading to famine, social unrest, and the collapse of the major Mayan centers.

8. All of the following are mentioned in paragraph 4 as possible direct or indirect caused of food shortages EXCEPT

- A. increased monument construction
- B. rivalries between states
- C. deforestation and station
- D. introduction of new crops

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Paragraph 5

Yet it may be incorrect to lay the blame **entirely** on human action. Several of the lowland cities, such as Tikal, appear to have depended heavily on the cultivation of raised fields set in the marshy depressions known as bajos, which today flood **intermittently** in the rainy season but may originally have been permanent lakes. The raise-field system of intensive cultivation (created by digging surrounding canals and using the soil removed to elevate the fields for planting) allows year-round food production through the constant supply of soil nutrients that erode into the drainage ditches dug around the raised fields, nutrients that are then collected and replaced. Stable water levels were essential to this subsistence system, but evidence from Lake Chichancanab in Yucatan shows that between

A.D 800 and A.D 1000 this region suffered its driest period of climate in several thousand years. We may expect that as a result water level fell, and the raised fields in many areas became unusable. But the human response must be viewed through the lens of the social, political, and cultural circumstances. These exerted a powerful mediating effect on the way the Maya endeavored to cope with their difficulties. Had population levels been lower, the impact of the drought may not have been catastrophic, as it was, the Maya were already reaching the limits of the available subsistence capacity, and Mayan elites had espoused certain social and political agendas (including expensive warfare and competition with each other). It was against this specific background that a period of drought led quickly to crisis and collapse.

9. The word “**entirely**” in the passage is closest in meaning to

- A. generally
- B. clearly
- C. completely
- D. specifically

10. The word “**intermittently**” in the passage is closest in meaning to

- A. constantly
- B. periodically
- C. usually
- D. especially

11. According to paragraph 5, why did the raised fields in many areas become unusable?

- A. The marshy depressions around the fields flooded in the rainy season
- B. Intensive cultivation of the fields drained the soil of nutrients.
- C. The area where the fields were located experienced a drop in water levels.
- D. Unstable design caused the failure of the drainage ditches.

12. According to paragraph 5, all of the following made it more difficult for the Maya to cope with effects of the drought EXCEPT

- A. failure to properly cultivate the fields
- B. high population levels
- C. competition between Mayan groups
- D. warfare

Paragraph 5

Yet it may be incorrect to lay the blame entirely on human action. 【A】 Several of the lowland cities, such as Tikal, appear to have depended heavily on the cultivation of raised fields set in the marshy depressions known as bajos, which today flood intermittently in the rainy season but may originally have been permanent lakes. 【B】 The raise-field system of intensive cultivation (created by digging surrounding canals and using the soil removed to elevate the fields for planting) allows year-round food production through the constant supply of soil nutrients that erode into the drainage ditches dug around the raised fields, nutrients that are then collected and replaced. 【C】 Stable water levels were essential to this subsistence system, but evidence from Lake Chichancanab in Yucatan shows that between A.D 800 and A.D 1000 this region suffered its driest period of climate in several thousand years. 【D】 We may expect that as a result water level fell, and the raised fields in many areas became unusable. But the human response must be viewed through the lens of the social, political, and cultural circumstances. These exerted a powerful mediating effect on the way the Maya endeavored to cope with their difficulties. Had population levels been lower, the impact of the drought may not have been catastrophic, as it was, the Maya were already reaching the limits of the available subsistence capacity, and Mayan elites had espoused certain social and political agendas (including expensive warfare and competition with each other). It was against this specific background that a period of drought led quickly to crisis and collapse.

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

Nature apparently also contributed to the food shortages.

Where would the sentence best fit?

14. **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.

Since the discovery of the Mayan ruins in the 1830s, researchers have tried to explain the collapse of Mayan civilization.

Answer choices

- A. The Mayan attempt to develop intensive agricultural methods to support large populations in relatively small areas probably was unsuccessful and could have caused the Mayan collapse.
- B. The discovery of intact pyramids submerged in vegetation among the Mayan ruins led researchers to believe that Mayan cities were simply overgrown rather than catastrophically destroyed.
- C. Warfare and rivalry between Mayan states may have caused food shortages that contributed to the eventual collapse of Mayan civilization.
- D. Early theories that the Mayan collapse was a sudden, catastrophic event were followed by views that treated the collapse as a gradual process.
- E. The continuing warfare and social unrest that started in the North and spread to the South provided researchers with evidence that the Mayan collapse took hundreds of years to occur.
- F. Drought between A. D. 800 and A.D. 1000 likely caused the Mayan system of intensive irrigated agriculture to fall, which could have brought about a rapid collapse of the Mayan states.

Forms of Locomotion

Using metabolic energy as “currency” to measure the “cost” of locomotion—that is, the amount of energy that must be spent to move from one place to another—we can compare the costs of different types of locomotion. Terrestrial locomotion—walking or running—is the most expensive form of locomotion. Given that humans are naturally terrestrial, many people may be surprised to learn that walking is so costly. The cost per kilogram of locomotion for human running is about five times higher than for the flight of a typical bird, and ten times more expensive than for fish swimming.

Just why is locomotion so cheap for a fish? The main reason is that the water supports most of the body weight of such a swimmer, so all the animal needs to do to swim is to produce enough force to overcome the drag of its own body. Most aquatic animals have nearly the same density as the water in which they swim, so they do almost no work to support their weight against gravity. However, swimming is cheap only for those animals well adapted to swimming completely submerged. When animals such as ducks and muskrat swim on the surface, they use two or three times more energy to swim on the surface than when submerged, and as much as twenty times more energy than fish of a similar size. This is because of what is called the “bow wave” any object moving on the surface of water pushes up a bow wave at the front, which streams alongside and trails back. Boat designers have long known that the bigger the bow wave, the harder it is to push a boat through the water. The bow wave produces extra drag on anybody moving on the surface of water. An animal swimming on the surface of the water uses extra energy in order to overcome drag. Thus, for our purposes, efficient “swimming” means underwater locomotion by animals with streamlined bodies, not the exhausting, inefficient locomotion of humans in swimming pools.

Flying animals move through air that is less dense and less viscous than water, so why does flying cost more than swimming? First, most flying animals move much faster than a swimmer in order to produce enough lift (the upward force necessary to overcome gravity). This higher speed increases the drag that a flyer must overcome. Furthermore, a flyer has an extra source of drag that a swimmer does not have: the extra drag that comes from lift production. In a way, the extra drag represents the cost of supporting the flyer’s weight in air.

Walking (or running or galloping) is so costly because it involves at least three processes that require muscular work. The first is simply supporting the body’s weight. The second is overcoming the friction in joints and muscles, and the third is constantly producing accelerations (speeding up) and decelerations (slowing

down). The exact proportion of muscular effort that goes into these three processes depends on the anatomy of a given animal, but the third process probably accounts for most of the energy used by the muscles. When a person takes a step, first one foot pushes off, which accelerates the body. Then the other foot swings forward and hits the ground, and as the weight shifts onto that foot, the body decelerates. Some of the leg muscles actively tense to act as shock absorbers during this deceleration. Momentum carries the body over the grounded foot, at which time that foot pushes off to accelerate the body, and the cycle repeats.

In terms of energy, walking is inefficient because of the acceleration and deceleration required with every step. Both the decelerations and accelerations need muscular effort and thus energy use. In swimming and flying, animals accelerate and decelerate relatively little over the course of a tail stroke or a wingbeat, so less energy is consumed by this process. As an analogy, consider riding a bicycle. When a person rides a bicycle, the bicycle does not accelerate or decelerate much with each turn of the pedal. Thus, a person can ride a bicycle much faster than he or she could run using the same amount of effort.

Paragraph 1

Using metabolic energy as “currency” to measure the “cost” of locomotion—that is, the amount of energy that must be spent to move from one place to another—we can compare the costs of different types of locomotion. Terrestrial locomotion—walking or running—is the most expensive form of locomotion. Given that humans are naturally terrestrial, many people may be surprised to learn that walking is so costly. The cost per kilogram of locomotion for human running is about five times higher than for the flight of a typical bird, and ten times more expensive than for fish swimming.

1. According to paragraph 1, which of the following is true of the cost of locomotion?

- A. For humans, the cost of running is lower than the cost of swimming.
- B. The type of locomotion that comes most naturally to an animal is also the type of locomotion that is least expensive.
- C. The more metabolic energy required for locomotion, the more expensive the locomotion is considered to be.
- D. The faster a particular form of locomotion is, the more metabolic energy it requires.

Paragraph 2

Just why is locomotion so cheap for a fish? The main reason is that the water supports most of the body weight of such a swimmer, so all the animal needs to do to swim is to produce enough force to overcome the drag of its own body. Most aquatic animals have nearly the same density as the water in which they swim, so they do almost no work to support their weight against gravity. However, swimming is cheap only for those animals well adapted to swimming completely submerged. When animals such as ducks and muskrat swim on the surface, they use two or three times more energy to swim on the surface than when submerged, and as much as twenty times more energy than fish of a similar size. This is because of what is called the “bow wave” any object moving on the surface of water pushes up a bow wave at the front, which streams alongside and trails back. Boat designers have long known that the bigger the bow wave, the harder it is to push a boat through the water. The bow wave produces extra drag on anybody moving on the surface of water. An animal swimming on the surface of the water uses extra energy in order to overcome drag. Thus, for our purposes, efficient “swimming” means underwater locomotion by animals with streamlined bodies, not the **exhausting**, inefficient locomotion of humans in swimming pools.

2. Paragraph 2 suggests which of the following about the drag faced by aquatic animals?

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- A. The closer an aquatic animal's body density is to the density of the water, the less drag the animal must overcome.
- B. Aquatic animals that swim on the surface must overcome fewer sources of drag than animals that swim underwater.
- C. The drag faced by most fish swimming underwater is much greater than previously thought.
- D. All fish must overcome at least two forces of drag—the drag produced by their own bodies and by the bow wave.

3. According to paragraph 2, which of the following animal types is the most efficient swimmer?

- A. Animals that are well suited to swimming completely submerged
- B. Animals such as ducks and muskrat
- C. Animals that spend their time both on the surface of the water and completely underwater
- D. Animals that produce only a small bow wave

4. Select the TWO answer choices that, according to paragraph 2, are true of the swimming behavior of ducks and muskrat. To receive credit you must select TWO answer choices.

A. Ducks and muskrat require far more energy to swim on the surface than fish of a similar size require to swim underwater.

B. Ducks and muskrat must overcome drag produced by the bow wave when swimming both on the surface and submerged.

C. Ducks and muskrat spend as much time underwater as possible in order to use less energy in swimming.

D. Ducks and muskrat are more efficient when swimming underwater than when swimming on the surface.

5. What is the author's purpose in mentioning "Boat designers" in a discussion of the amount of energy used in swimming?

A. To illustrate the point that large animals are not efficient swimmers because they produce very large bow waves

B. To make a comparison between the type of drag produced by the bow wave and the type produced by an animal's weight

C. To suggest that boat designers could design better boats if they studied locomotion in animals

D. To apply a principle used in boat design to further illustrate why surface swimming is inefficient

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6. The word "exhausting" in the passage is closest in meaning to

A. enjoyable

B. corresponding

C. extremely tiring

D. very complicated

Paragraph 3

Flying animals move through air that is less dense and less viscous than water, so why does flying cost more than swimming? First, most flying animals move much faster than a swimmer in order to produce enough lift (the upward force necessary to overcome gravity). This higher speed increases the drag that a flyer must overcome. Furthermore, a flyer has an extra source of drag that a swimmer does not have: the extra drag that comes from lift production. In a way, the extra drag represents the cost of supporting the flyer's weight in air.

7. The word "Furthermore" in the passage is closest in meaning to

A. Unfortunately

B. In addition

- C. However
- D. Consequently

8. According to paragraph 3, flying requires more energy than swimming for all of the following reasons **EXCEPT**:

- A. A flying animal must overcome more drag because it moves more quickly than a swimming animal.
- B. A flying animal must expend more energy to create lift than a swimming animal does.
- C. More energy is required for a flying animal to support its weight in air than for a swimming animal to support its weight in water.
- D. Because air has a lower density than water does, more energy is required for an animal to move through air than through water.

Paragraph 4

Walking (or running or galloping) is so costly because it involves at least three processes that require muscular work. The first is simply supporting the body's weight. The second is overcoming the friction in joints and muscles, and the third is constantly producing accelerations (speeding up) and decelerations (slowing down). The exact proportion of muscular effort that goes into these three processes depends on the anatomy of a given animal, but the third process probably accounts for most of the energy used by the muscles. When a person takes a step, first one foot pushes off, which accelerates the body. Then the other foot swings forward and hits the ground, and as the weight shifts onto that foot, the body decelerates. Some of the leg muscles actively tense to act as shock absorbers during this deceleration. Momentum carries the body over the grounded foot, at which time that foot pushes off to accelerate the body, and the cycle repeats.

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9. According to paragraph 4, which of the following statements is true about the energy expended by animals in walking?

- A. It requires more energy for a walking animal to overcome the friction in its joints and muscles than to support its body weight.
- B. The process involved in walking that usually requires the most energy is producing accelerations and decelerations.
- C. Whether or not walking requires more energy than other types of locomotion depends on the anatomy of a given animal.
- D. The energy generated by momentum during walking is greater than the amount of energy expended in accelerating and decelerating.

Paragraph 5

In terms of energy, walking is inefficient because of the acceleration and deceleration required with every step. Both the decelerations and accelerations need muscular effort and thus energy use. In swimming and flying, animals accelerate and decelerate relatively little over the course of a tail stroke or a wingbeat, so less energy is consumed by this process. As an analogy, consider riding a bicycle. When a person rides a bicycle, the bicycle does not accelerate or decelerate much with each turn of the pedal. Thus, a person can ride a bicycle much faster than he or she could run using the same amount of effort.

10. The word "consumed" in the passage is closest in meaning to

- A. saved
- B. depended on
- C. transferred
- D. used up

11. Paragraph 5 states that swimming and flying are more efficient than walking because

- A. swimming and flying animals make tail strokes and wingbeats much less often than walking animals take steps
- B. swimming and flying animals use more muscles than walking animals do
- C. swimming and flying do not require as much acceleration and deceleration with every movement
- D. animals that are swimming or flying can accelerate and decelerate more quickly than can animals that are walking

12. What is the author's purpose in discussing "riding a bicycle"?

- A. To explain why walking requires more energy than swimming and flying
- B. To contrast the amount of energy used in riding a bicycle with the amount of energy used in swimming and flying
- C. To suggest that humans should ride a bicycle instead of running or walking in order to conserve energy
- D. To provide an example of an activity for which accelerations and decelerations require a great deal of muscular effort

Paragraph 3

Flying animals move through air that is less dense and less viscous than water, so why does flying cost more than swimming? First, most flying animals move much faster than a swimmer in order to produce enough lift (the upward force necessary to overcome gravity). [A] This higher speed increases the drag that a flyer must

overcome. [B] Furthermore, a flyer has an extra source of drag that a swimmer

does not have: the extra drag that comes from lift production. [C] In a way, the extra drag represents the cost of supporting the flyer's weight in air. [D]

13. Look at the four choices that indicate where the following sentence can be added to the passage.

Thus, the need to overcome resistance to fast forward motion plus the muscular effort needed just to keep from falling makes flying more energy intensive than swimming.

Where would the sentence best fit?

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

Drag your choices to the spaces where they belong. To review the passage, click on **View Text**.

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The amount of energy required for movement depends on the type of locomotion.

Answer Choices

- A. Swimming is cheaper than flying for animals that swim completely submerged but not for animals that swim on the surface of the water.
- B. The demands of creating lift and overcoming drag make flying a more costly form of locomotion than swimming.
- C. The costs of lift and drag are greater for walking and running than they are for swimming.
- D. For animals that are well adapted to underwater swimming, locomotion requires very little energy because they do not have to support their own body weight.
- E. Running and walking require more energy than other types of locomotion mainly because of the amount of muscular effort involved in constantly slowing the body down and speeding it up.
- F. Riding a bicycle at a fast pace requires much less energy than either running or walking.

Mexican Mural Art

The first major modern art movement in Latin America was Mexican muralism, which featured large-scale murals painted on the wall surfaces of public buildings. One of the most persistent strands in Latin American art in the last 80 years has been an engagement with political and social issues, including the struggle for social justice. This in turn has been accompanied by a desire for authentic forms of self-expression and freedom from cultural dependency. Although these preoccupations have taken many different forms, Mexican muralism was the first, and its influence was the most far-reaching. Muralism flourished in Mexico in the years immediately following the Mexican Revolution (1910-1920) as a result of a combination of circumstances: a climate of revolutionary optimism and cultural experimentation that challenged traditional Eurocentrism, a small but strong group of relatively mature artists of energy, ideas, and ability, and a visionary minister of education, Jose Vasconcelos. Vasconcelos believed that Mexico was destined to play a central role on the international stage. He understood that ideas could be more quickly assimilated through images than through any other medium, and he had the courage to allocate the funds, and the walls of public buildings, to the artists to do with as they liked.

The muralists shared a belief in the power of art to transform society for the better, to challenge social, political, economic, and cultural stereotypes, and to enrich the intellectual life of their country. During the 1920s and 1930s, they covered miles of wall with paintings representing aspects of Mexico's past and present and the future to which all aspired. Although Mexican muralism is representational and often narrative in form, it should be recognized as a modern movement, it was modernizing in intent, in that it challenged the old order—culturally, socially, and politically. By definition, it was a public, accessible form of art—not a commodity that could be bought and sold by the wealthy elite. Its purpose was to educate, inform, enlighten, politicize and thus empower the general public, in particular the working classes.

The muralist movement was not a unified force, however. The painters who were its leaders took different directions and did not always see eye to eye. Diego Rivera (1886-1957) sought to promote a pluralistic vision of Mexican society by drawing on the rich heritage of the pre-Columbian past (before Christopher Columbus arrived in the Americas in 1492) and contemporary popular culture, and he investigated pre-Columbian styles and techniques in an effort to create an aesthetic language that was new and Mexican. He was deeply influenced by native pictographic traditions of communication in which pictures represent written

words and ideas, and he sought to develop a modern equivalent, a visual language that could be read like a book. The art of Jose Clemente Orozco (1883-1949) is less optimistic: he saw both the pre-Columbian past and the revolutionary present in a more negative light, the former as barbarous, the latter often tarnished by corruption and cruelty. He offers no comforting narratives and his expressive, aggressive technique serves as a metaphor of Mexico's harsh, contradictory reality. David Alfaro Siqueiros (1898-1976) was the most politically active of the three and was an internationalist both ideologically and artistically. In his art he deliberately avoided traditional materials and methods, preferring to use modern industrial paints and spray guns. His works look forward to a fully socialist future where the workers will have won the right to the benefits of the modern industrial era, and his often fragmented, complex imagery does not patronize or make concessions to his audience.

The Mexican muralist movement is undoubtedly one of the most important manifestations of twentieth-century Mexican culture. Its impact elsewhere in the region, as well as in the United States and Europe, has been enormous. The work of Rivera, Orozco, and Siqueiros triggered a homegrown muralist movement in the United States in cities like New York City, Detroit, Los Angeles, and San Francisco. The influence of the Mexicans on the modern Spanish painter Picasso's first mural and almost his only major explicitly propagandist work of art—his famous

Guernica of 1937—is unmistakable even though the artist himself would have derived it. In Latin America, Mexican-influenced muralism has recurred whenever artists have felt the need to make a clear, public statement in a language that has not been borrowed from outside.

Paragraph 1

The first major modern art movement in Latin America was Mexican muralism, which featured large-scale murals painted on the wall surfaces of public buildings. One of the most **persistent** strands in Latin American art in the last 80 years has been an engagement with political and social issues, including the struggle for social justice. This in turn has been accompanied by a desire for authentic forms of self-expression and freedom from cultural dependency. Although these preoccupations have taken many different forms, Mexican muralism was the first, and its influence was the most far-reaching. Muralism flourished in Mexico in the years immediately following the **Mexican Revolution** (1910-1920) as a result of a combination of circumstances: a climate of revolutionary optimism and cultural experimentation that challenged traditional Eurocentrism, a small but strong group of relatively mature artists of energy, ideas, and ability, and a visionary minister of education, Jose Vasconcelos. Vasconcelos believed that Mexico was

destined to play a central role on the international stage. He understood that ideas could be more quickly assimilated through images than through any other medium, and he had the courage to allocate the funds, and the walls of public buildings, to the artists to do with as they liked.

1. The word "persistent" in the passage is closest in meaning to
 - A. important
 - B. fascinating
 - C. lasting
 - D. powerful
2. According to paragraph 1, Mexican muralism is concerned with
 - A. the attempt to make art a more important subject in the Latin American educational system
 - B. the combination of European art traditions with authentic Latin American art forms
 - C. the creation of a just society and an independent form of cultural expression
 - D. the use of art to raise funds for the construction of new public buildings
3. The author mentions the "Mexican Revolution" in the passage in order to
 - A. explain how the Mexican government used muralism to challenge European political beliefs
 - B. emphasize an important reason that Mexican muralism thrived
 - C. give an example of one the most popular subjects of muralism
 - D. emphasize the success of Mexican artists who participated in political conflicts
4. It can be inferred from paragraph 1 that the muralists got most of their financial support from
 - A. opponents of traditional Europe art
 - B. wealthy art lovers
 - C. other muralists from around the world
 - D. the Mexican government
5. According to paragraph 2, in what way can Mexican muralism be regarded as a characteristically modern art movement?
 - A. It was representational and often narrative in form.
 - B. It was supported by a small but enlightened artistic elite.
 - C. It questioned traditional ideas.
 - D. It emphasized the future rather than dwelling on the past.

Paragraph 3

The muralist movement was not a unified force, however. The painters who were its leaders took different directions and did not always see eye to eye. Diego Rivera (1886-1957) sought to **promote** a pluralistic vision of Mexican society by drawing on the rich heritage of the pre-Columbian past (before Christopher Columbus arrived in the Americas in 1492) and contemporary popular culture, and he investigated pre-Columbian styles and techniques in an effort to create an aesthetic language that was new and Mexican. He was deeply influenced by native pictographic traditions of communication in which pictures represent written words and ideas, and he sought to develop a modern equivalent, a visual language that could be read like a book. The art of Jose Clemente Orozco (1883-1949) is less optimistic: he saw both the pre-Columbian past and the revolutionary present in a more negative light, the former as barbarous, the latter often tarnished by corruption and cruelty. He offers no comforting narratives and his expressive, aggressive technique serves as a metaphor of Mexico's harsh, **contradictory** reality. David Alfaro Siqueiros (1898-1976) was the most politically active of the three and was an internationalist both ideologically and artistically. In his art he deliberately avoided traditional materials and methods, preferring to use modern industrial paints and spray guns. His works look forward to a fully socialist future where the workers will have won the right to the benefits of the modern industrial era, and his often fragmented, complex imagery does not patronize or make concessions to his audience.

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6. The word "**promote**" in the passage is closest in meaning to

- A. express
- B. create
- C. emphasize
- D. encourage

7. The word "**contradictory**" in the passage is closest in meaning to

- A. discouraging
- B. conflicting
- C. unchanging
- D. unusual

8. Paragraph 3 makes all of the following points about artist Diego Rivera **EXCEPT**:

- A. He used elements of pre-Columbian art to help make a new, modern art.
- B. He tried to develop a visual language that communicated as clearly as native pictographs had.

- C. He used art to express his ideas of what Mexican society should be like.
 - D. He tried but failed to unify the muralist movement.
9. According to paragraph 3, which of the following was true of Orozco's art?
- A. It was concerned with Mexican problems of the past and the present.
 - B. It presented the pre-Columbian past favorably.
 - C. Its images were intended to be pleasing to viewers.
 - D. Its technique was more typical of international artists than Mexican artists.
10. According to paragraph 3, which of the following is NOT true of David Alfaro Siqueiros?
- A. He used modern industrial materials rather than traditional materials in his art.
 - B. He designed images that were intentionally meant to please his audience.
 - C. He believed in socialism and viewed the future of workers in the modern industrial era favorably.
 - D. He took an international approach to both politics and art.

Paragraph 4

The Mexican muralist movement is undoubtedly one of the most important **manifestations** of twentieth-century Mexican culture. Its impact elsewhere in the region, as well as in the United States and Europe, has been enormous. The work of Rivera, Orozco, and Siqueiros triggered a homegrown muralist movement in the United States in cities like New York City, Detroit, Los Angeles, and San Francisco. The influence of the Mexicans on the modern Spanish painter Picasso's first mural and almost his only major explicitly propagandist work of art—his famous **Guernica** of 1937—is unmistakable even though the artist himself would have derived it. In Latin America, Mexican-influenced muralism has recurred whenever artists have felt the need to make a clear, public statement in a language that has not been borrowed from outside.

11. The word "**manifestations**" in the passage is closest in meaning to
- A. expressions
 - B. modifications
 - C. contributions
 - D. components
12. The author mentions Picasso's mural "**Guernica**" in order to

- A. provide an example of one of the biggest European influences on Mexican muralism
- B. indicate that politically motivated murals were as popular in Europe as they were in Mexico
- C. explain why the influence of Mexican muralism was especially strong among Spanish artists
- D. provide evidence that the Mexican muralists had a significant impact on the international art world

Paragraph 4

【A】 The Mexican muralist movement is undoubtedly one of the most important manifestations of twentieth-century Mexican culture. 【B】 Its impact elsewhere in the region, as well as in the United States and Europe, has been enormous. 【C】 The work of Rivera, Orozco, and Siqueiros triggered a homegrown muralist movement in the United States in cities like New York City, Detroit, Los Angeles, and San Francisco. 【D】 The influence of the Mexicans on the modern Spanish painter Picasso's first mural and almost his only major explicitly propagandist work of art—his famous Guernica of 1937—is unmistakable even though the artist himself would have derived it. In Latin America, Mexican-influenced muralism has recurred whenever artists have felt the need to make a clear, public statement in a language that has not been borrowed from outside.

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13. Look at the four choices that indicate where the following sentence can be added to the passage.

However, its influence was not limited to Mexico itself

Where would the sentence best fit?

42. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

Drag your choices to the spaces where they belong. To review the passage, click on **View Text**.

Mexican muralism, the first major modern art movement in Latin America, has been highly influential throughout the Americas and internationally.



Answer Choices

- A. The Mexican Revolution resulted in a new respect for traditional culture, leading the muralists to paint scenes depicting the everyday lives of poor Mexicans.
- B. Jose Vasconcelos made Mexico an important international player by promoting the art and ideas of the revolutionary muralists.
- C. The leaders of the muralist movement—Rivera, Orozco, and Siqueiros—all believed in the transformative power of art but differed in terms of their artistic methods and political beliefs.
- D. The muralists challenged cultural and economic stereotypes and experimented with both pre- Columbian and industrial themes, styles, and techniques.
- E. Mexican muralism was a traditional representational art focused on Mexico's pre- Columbian society and culture.
- F. In the 1920s and 1930s, following the Mexican Revolution, a talented group of artists painted many large-scale, politically motivated murals on public buildings.

Documenting the Incas

The Incas ruled a vast empire in western South America when the Spaniards encountered them in the sixteenth century. Although the Incas had no writing system of their own, historical information about Incas is available to researchers because early Spaniards wrote documents about them. However, there are drawbacks to use the written record. First, the Spanish writers were describing activities and institutions that were very different from their own, but they often described Inca culture in terms of their own society. As an example, consider the list of kings given by the Incas. As presented in the historical chronology, Spanish sources indicate there were thirteen kings who ruled sequentially. The names were given to them by Inca informants. However, one school of thought in Inca studies suggests that the names were not actual people, but, rather, titles filled by different individuals. Thus, the number of actual kings may have been fewer, and several titles may have been filled at the same time. The early Spanish writers, being unfamiliar with such a system of titles, simply translated it into something they were familiar with (a succession of kings). Given that the Inca empire expanded only during the time of the last four kings, or as a result of the actions of the individuals in those four positions, this question is not deemed significant for an understanding of the Incas. But the example shows that biases and inaccuracies may have been introduced inadvertently from the very beginning of the written Spanish reports about the Incas. Moreover, early writers often copied information from each other---so misinformation was likely to be passed on and accepted as true by later scholars.

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Second, both Spanish writers and Incan informants sometimes had motives for being deliberately deceitful. For example, in an effort to gain status in the Spaniards' eyes, Incas might say that they formerly had been more important in the Inca empire than they actually were. Spanish officials as well were occasionally untruthful when it served their purposes. For example, Spaniards might deliberately underreport the productivity of a region under their authority so they could sell the additional products and keep the money, rather than hand it over to the Spanish Crown.

Third, it should be noted that the Spaniards' main sources of information were the Incas themselves, often members of the Inca ruling class. Therefore, what was recorded was the Incas' point of view about their own history and empire. Some modern authorities question whether the history of Incas happened as they said it did. Although some of their history is certainly more myth than truth, many, if not most, scholars agree that the history of the last four Inca kings is probably accurate. The same is true of other things told to the Spanish writers: the more recently an event is said to have occurred, the more likely it is to have actually happened.

A fourth problem relates to the nature of the Inca conquests of the other people

in the Americas before the Spanish arrived and how accurate the accounts of those conquests are---whether related by the Spaniards or by the Incas on whom they relied. It was certainly in the Inca's interest to describe themselves as invincible and just. However, lacking accounts by conquered people about their interactions with the Incas, it is unknown how much of the information of the Inca conquest as related by the ruling class is factual.

Finally, there is a certain vagueness in the historical record regarding places and names. Many Spanish writers listed places they had visited within the empire, including both provinces and towns. However, other writers traveling along the same routes sometimes recounted different lists of places. In addition, it is difficult to identify the exact locations of towns and other geographic points of reference because of the widespread movements of people over the past five centuries.

For all these reasons, the historical record must be carefully evaluated to determine whether it is accurate and to verify the locations of past events. One approach is to cross-check information from a number of authors. Another approach is to conduct archaeological research. Regardless of the problems, historical documents review some important information about the Incas.

Paragraph 1

The Incans ruled a vast empire in western South America when the Spaniards encountered them in the sixteenth century. Although the Incas had no writing system of their own, historical information about Incas is available to researchers because early Spaniards wrote documents about them. However, there are drawbacks to use the written record. First, the Spanish writers were describing activities and institutions that were very different from their own, but they often described Inca culture in terms of their own society. As an example, consider the list of kings given by the Incas. As presented in the historical chronology, Spanish sources indicate there were thirteen kings who ruled sequentially. The names were given to them by Inca informants. However, one school of thought in Inca studies suggests that the names were not actual people, but, rather, titles filled by different individuals. Thus, the number of actual kings may have been fewer, and several titles may have been filled at the same time. The early Spanish writers, being unfamiliar with such a system of titles, simply translated it into something they were familiar with (a succession of kings). Given that the Inca empire expanded only during the time of the last four kings, or as a result of the actions of the individuals in those four positions, this question is not deemed significant for an understanding of the Incas. But the example shows that biases and inaccuracies may have been introduced inadvertently from the very beginning of the written Spanish reports about the Incas. Moreover, early writers often copied information from each other---so misinformation was likely to be passed on and accepted as true by later scholars.

1. The word "vast" in the passage is closest in meaning to
 - A. ancient
 - B. wealthy
 - C. powerful
 - D. extensive
2. The word "drawbacks" in the passage is closest in meaning to
 - A. requirements
 - B. techniques
 - C. exceptions
 - D. disadvantages
3. The word "sequentially" in the passage is closest in meaning to
 - A. Secretly
 - B. one after another
 - C. formerly
 - D. in partnership with each other
4. According to paragraph 1, why does the written record about the Incan civilization depend on the reports of Spaniards?
 - A. The Incas destroyed their written records to prevent the Spaniards from benefiting from them.
 - B. The Incas did not have a writing system.
 - C. The Spaniards destroyed all records written by the Incas.
 - D. Incan records were written on materials that do not preserve well.
5. According to paragraph 1, sixteenth century's Spaniards may have been incorrect about which of the following aspects of the Incan empire
 - A. its size during the reigns of the last four kings
 - B. the total number of Incan kings
 - C. the kinds of power that Incan kings were able to exercise
 - D. the extent to which Incan kings were able to control activities within their empire
6. Which of the following can be inferred from paragraph 1 about the Incan system of rulers?
 - A. It was first introduced when the expansion of the Incan empire began.
 - B. It required that multi-rulers share a particular title at the same time.
 - C. It was sometimes confusing to the Incan informants of the Spaniards.
 - D. It was unlike the system used in sixteenth century Spain.

Paragraph 2

Second, both Spanish writers and Incan informants sometimes had motives for being deliberately deceitful. For example, in an effort to gain status in the Spaniards' eyes, Incas might say that they formerly had been more important in the Inca empire than they actually were. Spanish officials as well were occasionally untruthful when it served their purposes. For example, Spaniards might deliberately underreport the productivity of a region under their authority so they could sell the additional products and keep the money, rather than hand it over to the Spanish Crown.

7. Which of the following is mentioned in paragraph 2 as a possible motive for deliberate inaccuracy in official Spanish reports of the Incas?

- A. The desire of some Spanish officials to appear more important than they really were
- B. The need to please Spanish rulers by making productivity seem greater than it really was
- C. The desire of the Incas to make their empire seem more successful than it really was
- D. The desire of most Spanish officials to enrich themselves

Paragraph 3

Third, it should be noted that the Spaniards' main sources of information were the Incas themselves, often members of the Inca ruling class. Therefore, what was recorded was the Incas' point of view about their own history and empire. Some modern authorities question whether the history of Incas happened as they said it did. Although some of their history is certainly more myth than truth, many, if not most, scholars agree that the history of the last four Inca kings is probably accurate. The same is true of other things told to the Spanish writers: the more recently an event is said to have occurred, the more likely it is to have actually happened.

8. Why does the author indicate that the Spaniards' main sources of information were the Incas themselves

- A. To argue that the Spaniards made great efforts to obtain the most information
- B. To explain why some scholars think that the documentary history of the Incan empire may not be correct
- C. To question the idea that more recent events in the Incan empire are more likely to be accurate than are more ancient ones
- D. To explain how scholars are able to determine that the history of the last four Incan kings is probably correct

Paragraph 4

A fourth problem relates to the nature of the Inca conquests of the other people in the Americas before the Spanish arrived and how accurate the accounts of those conquests are---whether related by the Spaniards or by the Incas on whom they relied. It was certainly in the Inca's interest to describe themselves as invincible and **just**. However, lacking accounts by conquered people about their interactions with the Incas, it is unknown how much of the information of the Inca conquest as related by the ruling class is factual.

9. The word "**just**" in the passage is closest in meaning to
- A. fair
 - B. strong
 - C. independent
 - D. wise
10. According to paragraph 4, why is there some doubt whether Spanish accounts of the Incan conquests of other people are accurate?
- A. The Spaniards included some information about which Incan informants disagreed.
 - B. The conquered people's tales of the Incan conquests sometimes differed from the Inca's tales of them
 - C. The Spanish accounts of the Incan conquest were based on information from Incan informants only.
 - D. Some archaeological evidence does not support the Spanish accounts.

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Paragraph 5

Finally, there is a certain vagueness in the historical record regarding places and names. Many Spanish writers listed places they had visited within the empire, including both provinces and towns. However, other writers traveling along the same routes sometimes recounted different lists of places. In addition, it is difficult to identify the exact locations of towns and other geographic points of reference because of the widespread movements of people over the past five centuries.

11. According to paragraph 5, what is a reason that place names in the historical record are sometimes vague?
- A. When people moved they often gave new provinces and towns the same names as places they came from.
 - B. Different writers in historical record listed different names for places along the same routes.
 - C. Most writers of the historical record traveled little within the empire.

D. The names of provinces and towns often did not reflect geographic points of reference.

Paragraph 6

For all these reasons, the historical record must be carefully evaluated to determine whether it is accurate and to verify the locations of past events. One approach is to cross-check information from a number of authors. Another approach is to conduct archaeological research. Regardless of the problems, historical documents review some important information about the Incas.

12. Which of the following is mentioned in paragraph 6 as a method for verifying accuracy of an account of a past event?

- A. Comparing accounts of the event given by different writers
- B. Investigating whether a particular author's accounts of other events have proved accurate
- C. Investigating whether the author of an account actually presented as the event described.
- D. Determining whether the author of an account was able to crosscheck information with multiple informants

Paragraph 1

The Incans ruled a vast empire in western South America when the Spaniards encountered them in the sixteenth century. [A] Although the Incas had no writing system of their own, historical information about Incas is available to researchers because early Spaniards wrote documents about them. [B] However, there are drawbacks to use the written record. [C] First, the Spanish writers were describing activities and institutions that were very different from their own, but they often described Inca culture in terms of their own society. [D] As an example, consider the list of kings given by the Incas. As presented in the historical chronology, Spanish sources indicate there were thirteen kings who ruled sequentially. The names were given to them by Inca informants. However, one school of thought in Inca studies suggests that the names were not actual people, but, rather, titles filled by different individuals. Thus, the number of actual kings may have been fewer, and several titles may have been filled at the same time. The early Spanish writers, being unfamiliar with such a system of titles, simply translated it into something they were familiar with (a succession of kings). Given that the Inca empire expanded only during the time of the last four kings, or as a

result of the actions of the individuals in those four positions, this question is not deemed significant for an understanding of the Incas. But the example shows that biases and inaccuracies may have been introduced inadvertently from the very beginning of the written Spanish reports about the Incas. Moreover, early writers often copied information from each other---so misinformation was likely to be passed on and accepted as true by later scholars.

13. Look at the four choices that indicate where the following sentence can be added to the passage.

Official accounts, legal papers, and letters written during that period provide a wealth of information about the Incan empire and the Incas' way of life.

Where would the sentence best fit?

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

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The accuracy of the historical record concerning the Incas is problematic.

- A. Numerous aspects of Incan life were recorded in the sixteenth century but many historical documents created at this time were lost or destroyed.
- B. Many Spaniards were interested primarily in the expansion of the Incan empire and therefore ignored other periods of Incan history. Mostly, principally,
- C. The fact that the Incan informants remained sources of information about themselves as well as inconsistencies in place names call the sound aspects of the accounts into question.
- D. Descriptions of Incan society may often be influenced by the cultural biases of people writing about Incas.
- E. Incorrect information may sometimes have been knowingly included in historical records because it was advantageous to the person including such information.
- F. The movement of people due to the Incan conquest and the settlement of

the Spanish has caused much confusion about place names in the historical record.

Birdsong

Birdsong is the classic example of how genes (hereditary information) and environment both have a crucial role to play in the behavioral development of animals. Since the pioneering work of W. H. Thorpe on chaffinches (a common European bird), many species have been studied, and it has become clear both that learning plays an important role for all species and also that there are constraints on what they are able to learn.

Thorpe was able to show that learning from others was involved in chaffinch birds through a series of experiments on hand-reared chicks (young birds). As in most other species, only the males sing. Thorpe found that, if he raised young males in total isolation from all others, the song they produced was quite different from that of a normal adult. It was about the right length and in the correct frequency range, it was also split up into a series of notes as it should be. But these notes lacked the detailed structure found in wild birds, nor was the song split up into distinct phrases as it usually is. This suggested that song development requires some social influence. Later experiments in which researchers played recordings of songs to young birds showed just how precise this influence was, many of them would learn the exact pattern of the recording they had heard. A remarkable feature here was in the first few weeks of life, yet they did not sing themselves until about eight months old. They are thus able to store a memory of the sound within their brain and then match their own output to their collection of it when they mature.

Young chaffinches normally learn only chaffinch song, though Thorpe found they could be trained to sing the song of a tree pipit (another type of bird), which is very similar to that of their own species. In general, however, the constraints on learning which birds have ensure that they only learn songs appropriate to the species to which they themselves belong. These constraints may be in their brain's circuitry, the young bird hatching with a rough idea of the sounds that it should copy. The crude song of a bird reared in isolation gives some clues as to what this rough idea may be the length, the frequency range and the breaking up into notes are all aspects of chaffinch song shared between normal birds and those reared in

isolation. In other cases the constraints are more social, young birds only being prepared to learn from individuals with whom they have social interactions. Thus, in a number of species, it has been found that they will not copy from recordings, but will do so from a live tutor. In some cases this may occur when they are young birds, but in others the main learning period is when they set up their territories and interact with neighbors for the first time, enabling them to match their neighbor's songs and so countersing with them. Whatever the nature of the learning rules in a particular species, there is no doubt that they are effective, it is very unusual to hear a wild bird singing a song which is not typical of its own species despite the many different songs which often occur in a small patch of woodland.

However, not all birds show the same learning pattern as do chaffinches. There are some species which produce normal sounds even if deaf, so that they cannot hear their own efforts, much less copy those of others. The cooing of doves and the crowing of cocks are examples here. In other cases, such as parrots and hill mynahs, birds can be trained to copy a huge variety of sounds, though those they learn in the wild are usually more restricted. The amazing capability of mynahs has apparently arisen simply because birds in an area learn a small number of their calls from each other, males from males and females from females, and these calls are highly varied in structure. The ability to master them has led the birds, incidentally, to be capable of saying "hello" and mimicking a wide variety of other sounds.

Paragraph 1

Birdsong is the classic example of how genes (hereditary information) and environment both have a crucial role to play in the behavioral development of animals. Since the **pioneering** work of W. H. Thorpe on chaffinches (a common European bird), many species have been studied, and it has become clear both that learning plays an important role for all species and also that there are constraints on what they are able to learn.

1. The word "**pioneering**" in the passage is closest in meaning to

- A. recent
- B. famous
- C. original
- D. controversial

Paragraph 2

Thorpe was able to show that learning from others was involved in chaffinch birds through a series of experiments on hand-reared chicks (young birds). As in most other species, only the males sing. Thorpe found that, if he raised young males in total isolation from all others, the song they produced was quite different from that of a normal adult. It was about the right length and in the correct frequency range, it was also split up into a series of notes as it should be. But these notes lacked the detailed structure found in wild birds, nor was the song split up into **distinct** phrases as it usually is. This suggested that song development requires some social influence. Later experiments in which researchers played recordings of songs to young birds showed just how precise this influence was, many of them would learn the exact pattern of the recording they had heard. A remarkable feature here was in the first few weeks of life, yet they did not sing themselves until about eight months old. They are thus able to store a memory of the sound within their brain and then match their own output to their collection of it when they mature.

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2. The word “**distinct**” in the passage is closest in meaning to
- A. short
 - B. simple
 - C. separate
 - D. similar
3. According to paragraph 2, all of the following are characteristics of the songs of the young chaffinches in Thorpe’s experiment EXCEPT:
- A. They were not identical to the songs of normal adult chaffinches.
 - B. They lacked the complex form of the songs of wild chaffinches.

- C. They were as long as the songs of normal adult chaffinches.
 - D. They were clearly different from each other.
4. According to paragraph 2, researchers discovered which of the following by playing recordings of songs to chaffinches?
- A. Chaffinches could no longer be taught to reproduce sounds after the first few weeks of life.
 - B. Chaffinches could not reproduce songs with exactly the same patterns of recorded songs.
 - C. Chaffinches at the age of eight months could recall and reproduce a song that they heard in the first few weeks of life.
 - D. Chaffinches that learned a song from recordings in the first few weeks of life were later unable to copy the sounds of mature chaffinches.
5. All of the following are mentioned in paragraph 2 as characteristic of wild chaffinches EXCEPT:
- A. They are able to copy songs very precisely.
 - B. Their song development requires interaction with other chaffinches.
 - C. Their songs are not as well-structured as the songs of other birds.
 - D. It is the males of the species that do the singing.

Paragraph 3

Young chaffinches normally learn only chaffinch song, though Thorpe found they could be trained to sing the song of a tree pipit (another type of bird), which is very similar to that of their own species. In general, however, the constraints on learning which birds have ensure that they only learn songs appropriate to the species to which they themselves belong. These constraints may be in their brain's circuitry, the young bird hatching with a rough idea of the sounds that it should copy. The crude song of a bird reared in isolation gives some clues as to what this rough idea may be the length, the frequency range and the breaking up into notes are all aspects of chaffinch song shared between normal birds and those reared in isolation. In other cases the constraints are more social, young birds only being

prepared to learn from individuals with whom they have social interactions. Thus, in a number of species, it has been found that they will not copy from recordings, but will do so from a live tutor. In some cases this may occur when they are young birds, but in others the main learning period is when they set up their territories and interact with neighbors for the first time, **enabling** them to match their neighbor's songs and so countersing with them. Whatever the nature of the learning rules in a particular species, there is no doubt that they are effective, it is very unusual to hear a wild bird singing a song which is not typical of its own species despite the many different songs which often occur in a small patch of woodland.

6. The word “**enabling**” in the passage is closest in meaning to
- A. allowing
 - B. challenging
 - C. forcing
 - D. preparing
7. It can be inferred from paragraph 3 that one of the functions of songs in birds is to
- A. bring together birds living in groups with birds living in isolation
 - B. help young birds distinguish other young birds from adults
 - C. make possible interactions between birds of different species
 - D. help birds to establish territories
8. 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. Songs produced by chaffinches reared in isolation are cruder than the songs of wild birds.
 - B. The song of a bird reared in isolation suggests which aspects of chaffinch song may be inborn.
 - C. Comparing the crude songs of chaffinches reared in isolation to the songs of

wild chaffinches suggests differences as well as similarities.

- D. By studying the song aspects of chaffinches reared in isolation, researchers have gained a better understanding of the songs produced by wild birds.
9. According to paragraph 3, in some species, young birds do not copy songs from recordings because
- A. they learn to sing only by live interactions with other birds
 - B. their ability to learn from recordings occurs later in life
 - C. they can only learn songs from the birds living in their area of woodland
 - D. they can only learn songs from other birds of their own species
10. Why does the author mention that it is very unusual to hear a wild bird singing a song which is not typical of its own species?
- A. To explain why a variety of different bird songs are often heard in a relatively small area
 - B. To argue that social constraints have a greater impact upon learning than do genetic constraints
 - C. To provide an example of how the process of learning rules varies from one species to another
 - D. To illustrate how effective the different constraints upon learning are in young birds

Paragraph 4

However, not all birds show the same learning pattern as do chaffinches. There are some species which produce normal sounds even if deaf, so that they cannot hear their own efforts, much less copy those of others. The cooing of doves and the crowing of cocks are examples here. In other cases, such as parrots and hill mynahs, birds can be trained to copy a huge variety of sounds, though those they learn in the wild are usually more **restricted**. The amazing capability of mynahs has apparently arisen simply because birds in an area learn a small number of their calls from each other, males from males and females from females, and these calls are highly varied in structure. The ability to master them has led the birds,

incidentally, to be capable of saying “hello” and mimicking a wide variety of other sounds.

11. The word “**restricted**” in the passage is closest in meaning to

- A. important
- B. popular
- C. limited
- D. accurate

12. According to paragraph 4, why are mynahs able to learn to make a wide variety of sounds?

- A. They have the ability to imitate any sound that they are exposed to
- B. The frequency with which mynahs travel from one small area to another exposes them to a wide variety of sounds.
- C. They are exposed in the wild to calls that are very different from each other.
- D. An acute sense of hearing allows them to listen to and copy many different sounds. Young chaffinches normally learn only chaffinch song, though Thorpe found they could be trained to sing the song of a tree pipit (another type of bird), which is very similar to that of their own species.

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Paragraph 3

■In general, however, the constraints on learning which birds have ensure that they only learn songs appropriate to the species to which they themselves belong.

■These constraints may be in their brain’s circuitry, the young bird hatching with a rough idea of the sounds that it should copy. ■The crude song of a bird reared in

isolation gives some clues as to what this rough idea may be the length, the frequency range and the breaking up into notes are all aspects of chaffinch song shared between normal birds and those reared in isolation. ■In other cases the constraints are more social, young birds only being prepared to learn from individuals with whom they have social interactions.

13. Look at the four squares [■] that indicate where the following sentence could

be added to the passage.

Are these constraints genetic, environmental, or both?

Where would the sentence best fit?

- 14. 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.**

A combination of hereditary and environmental factors is believed to determine the sounds that birds are able to produce.

Answer choices

- A. Although only male chaffinches are able to sing in the wild, Thorpe found that he could teach hand-reared females to copy songs from recordings and live tutors.
- B. Chaffinches reared in isolation produce songs that differ significantly from those of normal birds, suggesting that some social influence is important for learning a song precisely.
- C. Birds vary a great deal with respect to both the variety of sounds they are able to learn and the conditions that must be present for them to be able to learn their species' song.
- D. Chaffinches that are exposed only to other bird species for the first few weeks of their life are likely to learn the songs of those species instead of the chaffinch song.
- E. Researchers believe that both the circuitry of a bird's brain and its interactions with other birds of the same species may prevent birds from learning the songs of other species.
- F. The ability of deaf birds to produce their normal species' song suggests that genes play a much greater role than environment in determining the behavior of most bird species.

The Role of Diapause

If conditions within an organism's environment occasionally or regularly become harsh, it may be advantageous for an organism to have a resistant stage built into the life cycle. In such a life history strategy, the organism suspends any growth, reproduction, or other activities for a period of time so that they may occur at a later, more hospitable time. This genetically determined resting stage, characterized by the cessation of development and protein synthesis and suppression of the metabolic rate, is called *diapause*. Many other kinds of resting stages, with different levels of suppression of physiological activities, are known. Some of these resistant stages can be extremely long-lived. In one case, seeds of the arctic lupine, a member of the pea family recovered from ancient lemming burrows in the Arctic, germinated in three days even though they were carbon-dated at more than 10,000 years old!

Unfavorable conditions that are relatively predictable probably pose a simpler problem for organisms than do unpredictable conditions. Adaptations to the regular change of seasons in the temperate and polar regions may be relatively simple. For example, many seeds require a period of *stratification*, exposure to low temperatures for some minimum period, before they will germinate. This is a simple adaptation to ensure that germination occurs following the winter conditions rather than immediately prior to their onset. In contrast, unfavorable conditions that occur unpredictably pose considerable problems for organisms. In fact, unpredictability is probably a greater problem than is the severity of the unfavorable period. How can organisms cope with the unpredictable onset of good or poor conditions?

Many adaptations to this general problem are based on a resting stage that awaits favorable conditions. We will consider two examples from the vertebrates. The first is the red kangaroo. This marsupial inhabits the deserts of central Australia where the onset of rains and the resulting sudden growth of vegetation are extremely unpredictable. Obviously, it is advantageous for a kangaroo female to produce young at a time when plant productivity is sufficient to support her offspring. For such a relatively large mammal, however, gestation (the period of development during pregnancy) is so long that if a female waited to mate and carry the young until after the rains came, the favorable period might be past. The kangaroo's life history adaptation to this problem involves the use of embryonic diapause during gestation (development in the uterus).

After a 31-day gestation period, the female gives birth to a tiny helpless young typical of marsupials. The newborn crawls into the mother's pouch and attaches to a teat where it continues to grow and develop. After 235 days it leaves the pouch but remains with the mother and obtains milk from her. Two days after giving birth, the female mates again. The fertilized egg enters a 204-day period of diapause during which it remains in the uterus but does not attach. It then implants, and 31 days later, birth of the second young occurs. Note that the first young leaves the pouch at just this time. Again, the female mates, fertilization occurs, and another diapause follows. The eventual result is that at any one time, the female has three young at various stages of development one in diapause, one in the pouch, and one outside the pouch. Among other benefits, this allows her to freeze the development of an embryo during times of drought and food shortage until the offspring in the pouch is able to leave.

A similar strategy – accelerated development combined with a resting stage – has also allowed amphibians to inhabit deserts. The spadefoot toads, such as Couch's spadefoot toad, inhabit some of the most severe deserts in North America. Adults of this species burrow deeply into the substrate where it is cooler and perhaps more moist. Here they enter into a resting state in which they are covered with a protective layer of dead skin. When it rains, the adults emerge and congregate to mate at temporary ponds. Development is greatly accelerated: the eggs hatch within 48 hours, and the tadpoles change into toads at 16- 18 days. Consequently, they can complete the life cycle during the brief window of favorable conditions, then return to the resistant resting stage to await the next rainfall. Resting stages thus comprise a series of adaptations that allow the species to avoid the most difficult conditions for life.

Paragraph 1

If conditions within an organism's environment occasionally or regularly become harsh, it may be advantageous for an organism to have a resistant stage built into the life cycle. In such a life history strategy, the organism suspends any growth, reproduction, or other activities for a period of time so that they may occur at a later, more hospitable time. This genetically determined resting stage, characterized by the cessation of development and protein synthesis and suppression of the metabolic rate, is called *diapause*. Many other kinds of resting stages, with different levels of suppression of physiological activities, are known.

Some of these resistant stages can be extremely long-lived. In one case, **seeds of the arctic lupine**, a member of the pea family recovered from ancient lemming burrows in the Arctic, germinated in three days even though they were carbon-dated at more than 10,000 years old!

1. According to paragraph 1, why do some organisms have a resting stage during their life cycle?

- A. To recover from injuries suffered during harsh conditions
- B. To devote all of their energy to a period of growth and reproduction
- C. To wait for local conditions to become favorable for important life events
- D. To prepare to move to a different environment if conditions become harsh

2. Why does the author mention “seeds of the arctic lupine”?

- A. To argue that members of the pea family are extremely resistant to cold temperatures
- B. To provide information about what ancient lemmings ate during their long resting periods
- C. To provide an example of an organism with a resting stage that has many different levels of suppression of physiological activities.
- D. To support the claim that some resting stages last an extremely long time

Paragraph 2

Unfavorable conditions that are relatively predictable probably pose a simpler problem for organisms than do unpredictable conditions. Adaptations to the regular change of seasons in the temperate and polar regions may be relatively simple. For example, many seeds require a period of *stratification*, exposure to low temperatures for some minimum period, before they will germinate. This is a simple adaptation to ensure that germination occurs following the winter conditions rather than immediately prior to their onset. In contrast, unfavorable conditions that occur unpredictably pose considerable problems for organisms. In fact, unpredictability is probably a greater problem than is the **severity** of the unfavorable period. How can organisms cope with the unpredictable onset of good or poor conditions?

3. According to paragraph 2, why do many seeds require a period of stratification?

- A. To slowly build up a tolerance for lower and lower temperatures
- B. To guarantee that the seeds grow after and not before
- C. To make sure that the seeds can deal with unpredictable conditions
- D. To give the seeds enough time to germinate before winter begins

4. The word “**severity**” in the passage is closest in meaning to

- A. length
- B. harshness
- C. unexpectedness
- D. completeness

Paragraph 4

After a 31-day gestation period, the female gives birth to a tiny helpless young typical of marsupials. The newborn crawls into the mother’s pouch and attaches to a teat where it continues to grow and develop. After 235 days it leaves the pouch but remains with the mother and obtains milk from her. Two days after giving birth, the female mates again. The fertilized egg enters a 204-day period of diapause during which it remains in the uterus but does not attach. It then implants, and 31 days later, birth of the second young occurs. Note that the first young leaves the pouch at just this time. Again, the female mates, fertilization occurs, and another diapause follows. The eventual result is that at any one time, the female has three young at various stages of development one in diapause, one in the pouch, and one outside the pouch. Among other benefits, this allows her to freeze the development of an embryo during times of drought and food shortage until the offspring in the pouch is able to leave.

5. According to paragraph 4, all of the following statements are true about the young offspring of the red kangaroo EXCEPT:

- A. After birth, a newborn crawls into the mother’s pouch where it grows and develops.
- B. After a young kangaroo leaves its mother’s pouch, it still needs its mother’s milk.
- C. A mother usually gives birth to three baby kangaroos at the same time.
- D. A baby kangaroo spends 235 days in the mother’s pouch after its birth.

6. Paragraph 4 supports all of the following statements about the red kangaroo of central Australia EXCEPT:

- A. A female kangaroo mates again shortly after her newborn enters her pouch.
- B. During diapause, a young kangaroo stays in the female's pouch and growth of a second fertilized egg inside the uterus is delayed.
- C. A female kangaroo can freeze the development of her young at each stage of their development.
- D. The adaptation of diapause enables female kangaroos to ensure the survival of their young during periods of environmental stress.

7. What is the main purpose of paragraph 4 in the passage?

- A. To give the details of an adaptation mentioned in paragraph 3
- B. To describe an adaptation different from the one explained in paragraph 3
- C. To introduce an adaptation that is described in detail in paragraph 5
- D. To discuss an adaptation that is not as successful as the one discussed in

Paragraph 5

A similar strategy – accelerated development combined with a resting stage – has also allowed amphibians to inhabit deserts. The spadefoot toads, such as Couch's spadefoot toad, inhabit some of the most severe deserts in North America. Adults of this species burrow deeply into the substrate where it is cooler and perhaps more moist. Here they enter into a resting state in which they are covered with a protective layer of dead skin. When it rains, the adults emerge and **congregate** to mate at temporary ponds. Development is greatly accelerated: the eggs hatch within 48 hours, and the tadpoles change into toads at 16- 18 days. **Consequently**, they can complete the life cycle during the brief window of favorable conditions, then return to the resistant resting stage to await the next rainfall. Resting stages thus **comprise** a series of adaptations that allow the species to avoid the most difficult conditions for life.

8. The word “**congregate**” in the passage is closest in meaning to

- A. begin
- B. gather
- C. hurry
- D. expect

9. The word “**Consequently**” in the passage is closest in meaning to
- A. Eventually
 - B. In addition
 - C. As a result
 - D. However
10. The word “**comprise**” in the passage is closest in meaning to
- A. consist of
 - B. bring about
 - C. are similar to
 - D. take the place of
11. According to paragraph 5, how do amphibians such as spadefoot toad survive the severe heat conditions in the North American deserts?
- A. They dig down into the ground and go into a resistant resting state.
 - B. They remain in the ponds that develop after it has rained.
 - C. They lose their outer layer of skin.
 - D. Their eggs lie dormant until the desert air becomes cooler and more moist.
12. According to paragraph 5, which of the following occurs during the life cycle of the spadefoot toad?
- A. The female’s eggs hatch under the surface of the desert.
 - B. The adults mate during the dry period.
 - C. The newborn grows into an adult before unfavorable conditions.
 - D. The newborn enters a resting stage before it becomes an adult.

Paragraph 2

Unfavorable conditions that are relatively predictable probably pose a simpler problem for organisms than do unpredictable conditions. Adaptations to the regular change of seasons in the temperate and polar regions may be relatively simple. For example, many seeds require a period of *stratification*, exposure to low temperatures for some minimum period, before they will germinate. ■ This is a simple adaptation to ensure that germination occurs following the winter conditions rather than immediately prior to their onset. ■ In contrast, unfavorable conditions that occur unpredictably pose considerable problems for organisms. ■ In

fact, unpredictability is probably a greater problem than is the severity of the unfavorable period. ■How can organisms cope with the unpredictable onset of good or poor conditions?

13. Look at the four squares [■] that indicate where the following sentence could be added to the passage. Where would the sentence best fit?

Such adaptations to predictable conditions can also be made by animals, such as by hibernating during the coldest months.

14.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.**

Some organisms adapt to periodic harsh conditions by building a resistant stage, or diapause, into their life cycle.

Answer choices

- A. The diapause stage evolved very early and is most common in species that first appeared more than 10,000 years ago.
- B. Unpredictable conditions are more problematic for organisms than are fairly predictable changes such as the seasons.
- C. The female red kangaroo adapts to unfavorable conditions by delaying the development of her fertilized egg until an embryo would be able to move into the pouch.
- D. Some seeds may germinate in three days even if they have been exposed to very low temperatures for a long time.
- E. Some marsupials can care for three newborns in their pouch at the same time, allowing the young to leave the pouch only when conditions are favorable for their growth.
- F. Some amphibians adapt to desert life by combining accelerated development with resting stages deep underground.

The Plow and the Horse in Medieval Europe

One of the most important factors driving Europe's slow emergence from the economic stagnation of the Early Middle Ages (circa 500-1000 B.C.E.) was the improvement of agricultural technology. One innovation was a new plow, with a curved attachment (moldboard) to turn over wet, heavy soils, and a knife (or coulter) in front of the blade to allow a deeper and easier cut. This more complex plow replaced the simpler "scratch" plow that merely made a shallow, straight furrow in the ground. In the lands around the Mediterranean, with light rains and mild winters, this had been fine, but in the wetter terrain north and west of the Danube and the Alps, such a plow left much to be desired, and it is to be wondered if it was used at all. Cleared lands would more likely have been worked by hand tilling, with little direct help from animals, and the vast forests natural to Northern Europe remained either untouched, or perhaps cleared in small sections by fire, and the land probably used only so long as the ash-enriched soil yielded good crops and then abandoned for some other similarly cleared field. Such a pattern of agriculture and settlement was no basis for sustained cultural or economic life.

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With the new heavy plow, however, fields could be cleared, sowed, and maintained with little more difficulty than in the long-settled lands of Southern Europe, while the richness of the new soils, the reliability of the rains, and the variety of crops now possible made for an extremely productive agriculture. The new tool, however, imposed new demands, technical, economic, and social. The heavy plow was a substantial piece of capital, unlike a simple hand hoe, and this had the same sorts of implications that capitalization always has—it favored the concentration of wealth and control. Moreover, making full use of it required more animal power, and this had a host of implications of its own. The full importance of this was even more apparent in the centuries after 1000, when oxen began to give way in certain parts of Western Europe to horses.

The powerful, rugged farm horse was itself a product of improvement during the Middle Ages, and it was part of complex set of technical changes and capabilities. The introduction of new forms of equipment for horses transformed this animal into the single most important assist to human labor and travel.

Instead of the old harness used by the ancient Greeks and Romans, there appeared from Central Asia the rigid, padded horse collar. Now, when the horse pulled against a load, no longer did the load pull back against its neck and windpipe but rather rode on the sturdy shoulders. When this innovation was combined with the iron horseshoe, the greater speed and stamina of the horse displaced oxen wherever it could be afforded. The large importance of this lay not only in more efficient farmwork, but in swifter and surer transportation between town and countryside. The farmer with horses could move products to market more frequently and at greater distances than with only oxen, and the urban development that was to transform the European economic and social landscape after the eleventh century was propelled in large part by these new horse-centered transport capabilities.

Another indicator of how compelling and important was the new horse agriculture was its sheer cost. Unlike oxen and other cattle, horses cannot be supported exclusively on hay and pasturage, they require, particularly in northern climates where pasturing seasons are short, cropped food, such as oats and alfalfa. Unlike grass and hay, these are grown with much of the same effort and resources applied to human nourishment, and thus their acquisition represents a sacrifice, in a real sense, of human food. The importance of this in a world that usually lived at the margins of sufficient diet is hard to overstate. The increased resources that went into making the horse central to both the medieval economy and in a separate but related development, medieval warfare, are the surest signs of the great utility the animal now assumed.

Paragraph 1

One of the most important factors driving Europe's slow emergence from the economic **stagnation** of the Early Middle Ages (circa 500-1000 B.C.E.) was the improvement of agricultural technology. One innovation was a new plow, with a curved attachment (moldboard) to turn over wet, heavy soils, and a knife (or coulter) in front of the blade to allow a deeper and easier cut. This more complex plow replaced the simpler "scratch" plow that merely made a shallow, straight furrow in the ground. In the lands around the Mediterranean, with light rains and mild winters, this had been fine, but in the wetter terrain north and west of the

Danube and the Alps, such a plow left much to be desired, and it is to be wondered if it was used at all. Cleared lands would more likely have been worked by hand tilling, with little direct help from animals, and the vast forests natural to Northern Europe remained either untouched, or perhaps cleared in small sections by fire, and the land probably used only so long as the ash-enriched soil yielded good crops and then abandoned for some other similarly cleared field. Such a pattern of agriculture and settlement was no basis for **sustained** cultural or economic life.

1. The word “ stagnation “ in the passage is closest in meaning to
 - A. instability
 - B. lack of growth
 - C. dependence on others
 - D. decline
2. According to paragraph 1, what was the main advantage of the new plow over the scratch plow?
 - A. The new plow created straighter rows.
 - B. The new plow was easier for animals to pull.
 - C. The new plow could dig deeper into the soil.
 - D. The new plow was easier to make
3. The word “ **sustained** “ in the passage is closest in meaning to
 - A. continued
 - B. established
 - C. ordinary
 - D. active
4. According to paragraph 1, the scratch plow was particularly unsuited to
 - A. the lands around the Mediterranean.
 - B. places where the soil was often dry.
 - C. places where land was cleared and worked by hand.
 - D. places where the soil was particularly wet and heavy.

5. Paragraph 1 implies which of the following about agriculture before the introduction of the new plow?
- A. Limited rainfall had prevented large-scale agricultural development.
 - B. Most of Europe's developed agricultural communities were located in the south.
 - C. Several other important innovations immediately preceded the development of the new plow.
 - D. Much of Europe's forestland had been converted to agricultural use.
6. 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. Tilling by hand was so difficult that cleared land in Northern Europe was often abandoned and allowed to return to its natural forested state.
 - B. Cleared land was probably tilled by hand, while the forests of Northern Europe were cleared only in small sections and used for short periods.
 - C. In the vast natural forests of Northern Europe, farmers had to work the land by hand, with little direct help from animals.
 - D. Fire enabled northern European farmers to enrich cleared land enough to cultivate their crops for short periods of time.

Paragraph 2

With the new heavy plow, however, fields could be cleared, sowed, and maintained with little more difficulty than in the long-settled lands of Southern Europe, while the richness of the new soils, the reliability of the rains, and the variety of crops now possible made for an extremely productive agriculture. The new tool, however, imposed new demands, technical, economic, and social. The heavy plow was a substantial piece of capital, unlike a simple hand hoe, and this had the same sorts of **implications** that capitalization always has—it favored the concentration of wealth and control. Moreover, making full use of it required more animal power, and this had a host of **implications** of

its own. The full importance of this was even more apparent in the centuries after 1000, when oxen began to give way in certain parts of Western Europe to horses.

7. The word “**implications**” in the passage is closest in meaning to
- A. requirements
 - B. inequalities
 - C. consequences
 - D. disadvantages
8. What can be inferred from the information that the new plow “**avored the concentration of wealth and control**”?
- A. Wealthy farmers in the south had a significant economic advantage over farmers in the north.
 - B. The production and sale of the new plow became an important source of capital.
 - C. The new plow was more popular in parts of Europe where oxen were used for farming than in parts where horses were used.
 - D. Greater economic equality existed in northern Europe before the introduction of the new plow.

Paragraph 3

The powerful, rugged farm horse was itself a product of improvement during the Middle Ages, and it was part of complex set of technical changes and capabilities. The introduction of new forms of equipment for horses transformed this animal into the single most important assist to human labor and travel. Instead of the old harness used by the ancient Greeks and Romans, there appeared from Central Asia the rigid, padded horse collar. Now, when the horse pulled against a load, no longer did the load pull back against its neck and windpipe but rather rode on the sturdy shoulders. When this innovation was combined with the iron horseshoe, the greater speed and stamina of the horse displaced oxen wherever it could be afforded. The large importance of this lay not only in more

efficient farmwork, but in swifter and surer transportation between town and countryside. The farmer with horses could move products to market more frequently and at greater distances than with only oxen, and the urban development that was to transform the European economic and social landscape after the eleventh century was propelled in large part by these new horse-centered transport capabilities.

9. According to paragraph 3, which of the following contributed to the dramatic rise in the agricultural use of horses in Europe?
- A. A powerful new breed of farm horse was brought to Europe from Central Asia.
 - B. Farmers began using rigid, padded collars that allowed horses to pull heavy loads more easily.
 - C. For the first time, horses became cheaper than oxen.
 - D. Farmers began studying the farming techniques used by the ancient Greeks and Romans.
10. According to paragraph 3, what role did horses play in the larger social changes of the eleventh century?
- A. The raising and selling of horses became important economic and cultural activities in Europe.
 - B. Horses stimulated the growth of urban areas by providing quick, reliable transportation.
 - C. Owners of successful horse-based farms became influential members of society.
 - D. Horse transportation enabled Europeans to interact with other cultures like those of Central Asia.

Paragraph 4

Another indicator of how compelling and important was the new horse agriculture was its sheer cost. Unlike oxen and other cattle, horses cannot be supported **exclusively** on hay and pasturage, they require, particularly in northern climates where pasturing seasons are short, cropped food, such as oats

and alfalfa. Unlike grass and hay, these are grown with much of the same effort and resources applied to human nourishment, and thus their acquisition represents a sacrifice, in a real sense, of human food. The importance of this in a world that usually lived at the margins of sufficient diet is hard to overstate. The increased resources that went into making the horse central to both the medieval economy and in a separate but related development, medieval warfare, are the surest signs of the great utility the animal now assumed.

11. The word “**exclusively**” in the passage is closest in meaning to
- A. cheaply
 - B. easily
 - C. reliably
 - D. solely
12. In paragraph 4, why does the author emphasize the amount of effort and resources needed to grow alfalfa and oats?
- A. To illustrate how valuable horses were by showing how much farmers were willing to sacrifice to keep them.
 - B. To provide evidence that, in medieval Europe, both horses and humans lived at the margins of a sufficient diet.
 - C. To argue that it made more sense to devote land to growing food for humans than to growing food for horses.
 - D. To explain why oxen and other cattle that ate grass and hay continued to be more common than horses.

One innovation was a new plow, with a curved attachment (moldboard) to turn over wet, heavy soils, and a knife (or coulter) in front of the blade to allow a deeper and easier cut. ■□ This more complex plow replaced the simpler “scratch” plow that merely made a shallow, straight furrow in the ground. ■□ In the lands around the Mediterranean, with light rains and mild winters, this had been fine, but in the wetter terrain north and west of the Danube and the Alps, such a plow left much to be desired, and it is to be wondered if it was used at all. ■ Cleared

lands would more likely have been worked by hand tilling, with little direct help from animals, and the vast forests natural to Northern Europe remained either untouched, or perhaps cleared in small sections by fire, and the land probably used only so long as the ash-enriched soil yielded good crops and then abandoned for some other similarly cleared field. ■ Such a pattern of agriculture and settlement was no basis for sustained cultural or economic life.

13. Look at the four choices that indicate where the following sentence could be added to the passage.

In fact, it sliced the ground so thoroughly that fields could be planted after only one plowing rather than the two needed before.

Where would the sentence best fit?

14. **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.**

Agricultural innovations with important social and economic consequences occurred in eleventh-century Europe

Answer choices

- A. Light rains and unpredictable winters had made most of the soil in Europe unsuitable for enough agriculture to sustain economic development.
- B. Farmers switched from oxen to horses to pull their plows because inexpensive pasturage for oxen decreased significantly in the centuries after 1000 B.C.E.
- C. The introduction of iron horseshoes enabled farmers to transport goods farther than they could with the more expensive oxen.
- D. Improvements in the design of plows opened up vast areas of land in Northern Europe that had previously been unusable for sustained agriculture.
- E. With help from a new kind of harness from Asia, horses were able to pull

the new heavy plow and to transport goods to market more quickly and frequently.

F. The horse came to be valued so greatly that farmers devoted some of their land to growing crops for their horses rather than using this land to grow food for their families.

The Origins of Plant and Animal Domestication

The emergence of plant and animal domestication represented a monumental change in the ways that humans interacted with Earth's resources: the rate at which Earth's surface was modified and the rates of human population growth. The development of agriculture was accompanied by fundamental changes in the organization of human society: disparities in wealth, hierarchies of power, and urbanization.

Phrases like “plant and animal domestication” and “the invention of agriculture” create the impression that humans made the transition to cultivating plants and tending animals rather abruptly, maybe with a flash of insight. Most scholars don't think so. It seems more likely that humans used and manipulated wild plants and animals for many hundreds of thousands of years. The transition to gardens, fields, and pastures was probably gradual, the natural outgrowth of a long familiarity with the environmental requirements, growth cycles, and reproductive mechanisms of whatever plants and animals humans liked to eat, ride, or wear.

For years, scholars argued that the practices of cultivation and animal domestication were invented in one or two locations on Earth and then diffused from those centers of innovation. Genetic studies are now showing that many different groups of people in many different places around the globe learned independently to create especially useful plants and animals through selective breeding. Probably both independent invention and diffusion played a role in agricultural innovation. Sometimes the ideas of domestication and cultivation were relayed to new places. In other cases the farmers or herders themselves moved into new zones, taking agriculture or improvements such as new tools or new methods or new plants and animals with them.

Scholars used to assume that people turned to cultivating instead of gathering their food either because they had to in order to feed burgeoning populations, or because agriculture provided such obviously better nutrition. It now seems that neither of these explanations is valid. First of all, the risk attached to exploring new food sources when there were already too many mouths to feed would be too great. Second, agriculture did not necessarily improve nutrition or supplies of food. A varied diet based on gathered (and occasionally hunted) food probably provided a wider, more secure range of nutrients than an early agriculturally based diet of only one or two cultivated crops. More likely, populations expanded after agricultural successes, and not before.

Richard MacNeish, an archaeologist who studied plant domestication in Mexico and Central America, suggested that the chance to trade was at the heart of agricultural origins worldwide. Many of the known locations of agricultural innovation lie near early trade centers. People in such places would have had at

least two reasons to pursue cultivation and animal raising; they would have had access to new information, plants, and animals brought in by traders, and they would have had a need for something to trade with the people passing through. Perhaps, then, agriculture was at first just a profitable hobby for hunters and gatherers that eventually, because of market demand, grew into the primary source of sustenance. Trade in agricultural products may also have been a hobby that led to trouble.

E. N. Anderson, writing about the beginnings of agriculture in China, suggests that agricultural production for trade may have been the impetus for several global situations now regarded as problems: rapid population growth, social inequalities, environmental degradation, and famine. Briefly explained, his theory suggests that groups turned to raising animals and plants in order to reap the profits of trading them. As more labor was needed to supply the trade, humans produced more children. As populations expanded, more resources were put into producing food for subsistence and for trade. Gradually, hunting and gathering technology was abandoned as populations, with their demands for space, destroyed natural habitats. Meanwhile, a minority elite emerged when the wealth provided by trade did not accrue equally to everyone. Yet another problem was that a drought or other natural disaster could wipe out an entire harvest, thus, as ever larger populations depended solely on agriculture, famine became more common.

Paragraph 1

The emergence of plant and animal domestication represented a **monumental** change in the ways that humans interacted with Earth's resources: the rate at which Earth's surface was modified and the rates of human population growth. The development of agriculture was accompanied by fundamental changes in the organization of human society: disparities in wealth, hierarchies of power, and urbanization.

1. The word "**monumental**" in the passage is closest in meaning to

- A. innovative
- B. surprising
- C. complex
- D. enormous

Paragraph 2

Phrases like "plant and animal domestication" and "the invention of agriculture" create the impression that humans made the transition to cultivating plants and tending animals rather abruptly, maybe with a flash of insight. Most scholars don't think so. It seems more likely that humans used and **manipulated** wild plants and animals for many hundreds of thousands of years. **The transition**

to gardens, fields, and pastures was probably gradual, the natural outgrowth of a long familiarity with the environmental requirements, growth cycles, and reproductive mechanisms of whatever plants and animals humans liked to eat, ride, or wear.

2. According to paragraph 2, phrases such as “plant and animal domestication” and “the invention of agriculture” encourage which of the following wrong ideas?

A. Early farmers were fairly advanced in their knowledge of plants and animals.

B. Agriculture and animal domestication arose as a result of systematic study and experimentation.

C. The change from hunting and gathering to farming and raising animals occurred quickly.

D. Early efforts to raise plants and animals were generally successful.

3. The word “manipulated” in the passage is closest in meaning to

A. observed

B. consumed

C. skillfully used

D. protected

4. 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 change to land cultivation was a slow process because humans were familiar with the needs of relatively few plants and animals.

B. The cultivation of land occurred gradually as it was the product of extensive human experience observing plants and animals of value to humans.

C. Gardens, fields, and pastures were outgrowths of the desire for plants and animals that humans knew from long familiarity were good to eat, wear, or ride.

D. People learned about environmental requirements, growth cycles, and reproductive mechanisms through their long familiarity with plants and animals that they liked to eat, ride, and wear.

Paragraph 3

For years, scholars argued that the practices of cultivation and animal domestication were invented in one or two locations on Earth and then diffused from those centers of innovation. Genetic studies are now showing that many different groups of people in many different places around the globe learned independently to create especially useful plants and animals through selective breeding. Probably both independent invention and diffusion played a role in

agricultural innovation. Sometimes the ideas of domestication and cultivation were relayed to new places. In other cases the farmers or herders themselves moved into new zones, taking agriculture or improvements such as new tools or new methods or new plants and animals with them.

5. What do genetic studies suggest about the theory that “cultivation and animal domestication were invented in one or two locations on Earth and then diffused from those centers of innovation”?

- A. The theory underestimates the speed at which cultivation and animal domestication were diffused.
- B. The theory underestimates the number of locations in which cultivation and animal domestication arose independently.
- C. The theory overemphasizes the importance of selective breeding in cultivation and animal domestication.
- D. The theory overemphasizes the importance of cultivation and animal domestication to some groups of people.

Paragraph 4

Scholars used to assume that people turned to cultivating instead of gathering their food either because they had to in order to feed burgeoning populations, or because agriculture provided such obviously better nutrition. It now seems that neither of these explanations is valid. First of all, the risk attached to exploring new food sources when there were already too many mouths to feed would be too great. Second, agriculture did not necessarily improve nutrition or supplies of food. A varied diet based on gathered (and occasionally hunted) food probably provided a wider, more secure range of nutrients than an early agriculturally based diet of only one or two cultivated crops. More likely, populations expanded after agricultural successes, and not before.

6. According to paragraph 4, what advantages did the diet of hunter-gatherers probably have over an early agricultural diet?

- A. It required less effort for them to acquire food that was nutritious.
- B. It allowed their populations to expand across wider areas.
- C. It provided a greater variety of foods needed for them to stay healthy.
- D. It allowed them to have more children.

7. According to paragraph 4, what was the most likely relationship between population growth and food cultivation?

- A. Population growth encouraged the development of food cultivation.
- B. Population growth was dependent on the development of a varied diet of cultivated foods.

C. Successful methods of food cultivation were developed before population growth occurred.

D. Food cultivation was more successful in situations where population growth was limited.

Paragraph 5

Richard MacNeish, an archaeologist who studied plant domestication in Mexico and Central America, suggested that the chance to trade was at the heart of agricultural origins worldwide. Many of the known locations of agricultural innovation lie near early trade centers. People in such places would have had at least two reasons to pursue cultivation and animal raising; they would have had access to new information, plants, and animals brought in by traders, and they would have had a need for something to trade with the people passing through. Perhaps, then, agriculture was at first just a profitable hobby for hunters and gatherers that eventually, because of market demand, grew into the primary source of sustenance. Trade in agricultural products may also have been a hobby that led to trouble.

8. The word “pursue” in the passage is closest in meaning to

- A. practice
- B. encourage
- C. prefer
- D. combine

9. Which of the following most accurately reflects the statement discussed in paragraph 5, on efforts to cultivate plants and animals?

- A. The efforts often failed because hunter-gatherers had limited access to new information about plants and animals.
- B. The efforts were begun out of a desire to produce goods for trade rather than to increase their growers' food supplies.
- C. The efforts were sometimes abandoned so hunter-gatherers could become involved in the more profitable activity of trading.
- D. The efforts were not profitable until people began trading food that they had raised for other goods.

Paragraph 5

Richard MacNeish, an archaeologist who studied plant domestication in Mexico and Central America, suggested that the chance to trade was at the heart of agricultural origins worldwide. Many of the known locations of agricultural innovation lie near early trade centers. People in such places would have had at least two reasons to pursue cultivation and animal raising; they would have had

access to new information, plants, and animals brought in by traders, and they would have had a need for something to trade with the people passing through. Perhaps, then, agriculture was at first just a profitable hobby for hunters and gatherers that eventually, because of market demand, grew into the primary source of sustenance. Trade in agricultural products may also have been a hobby that led to trouble.

Paragraph 6

E. N. Anderson, writing about the beginnings of agriculture in China, suggests that agricultural production for trade may have been the impetus for several global situations now regarded as problems: rapid population growth, social inequalities, environmental degradation, and famine. Briefly explained, his theory suggests that groups turned to raising animals and plants in order to reap the profits of trading them. As more labor was needed to supply the trade, humans produced more children. As populations expanded, more resources were put into producing food for subsistence and for trade. Gradually, hunting and gathering technology was abandoned as populations, with their demands for space, destroyed natural habitats. Meanwhile, a minority elite emerged when the wealth provided by trade did not accrue equally to everyone. Yet another problem was that a drought or other natural disaster could wipe out an entire harvest, thus, as ever larger populations depended solely on agriculture, famine became more common.

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10. Which of the following most accurately reflect the relationship between paragraph 6 and a topic discussed in paragraph 5?

- A. Paragraph 6 discusses a series of events that calls into question the theory that plants and animals were raised for purposes of trade.
 - B. Paragraph 6 presents evidence supporting the claim that many sites of agricultural innovation were located near trade centers.
 - C. Paragraph 6 identifies problems that led to the raising of plants and animals as the primary source of sustenance.
 - D. Paragraph 6 traces negative developments that arose possibly as a result of raising plants and animals for trade.
10. According to paragraph 7, soil on steep slopes tends to remain poorly developed because

11. The word “subsistence” in the passage is closest in meaning to

- A. profit
- B. surplus
- C. enjoyment
- D. survival

Paragraph 3

For years, scholars argued that the practices of cultivation and animal domestication were invented in one or two locations on Earth and then diffused from those centers of innovation. 【A】 Genetic studies are now showing that many different groups of people in many different places around the globe learned independently to create especially useful plants and animals through selective breeding. 【B】 Probably both independent invention and diffusion played a role in agricultural innovation. 【C】 Sometimes the ideas of domestication and cultivation were relayed to new places. In other cases the farmers or herders themselves moved into new zones, taking agriculture or improvements such as new tools or new methods or new plants and animals with them. 【D】

12. Look at the four choices that indicate where the following sentence could be added to the passage.

Among the many places that are now known to be centers of independent domestication are Mesopotamia, Central China, and Mesoamerica.

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Where would the sentence best fit? Click on a choice to add the sentence to the passage.

13. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

Drag your choices to the spaces where they belong. To review the passage, click on View Text.

Agriculture invention and animal domestication caused lasting changes to how humans live and to the physical surface of Earth.

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Answer Choices

- A. The transition from hunting and gathering to raising plants and animals was gradual and led to significant changes in the organization of human societies.
- B. Scholars now believe that agriculture and animal domestication began independently in many separate locations and then spread to new areas.
- C. As trade in agricultural products grew and social inequalities arose, new crops were developed specifically to feed the labor needed to support societies.
- D. Although it is now clear that agriculture developed independently in many places, often the most efficient techniques arose by combining practices of different cultures.
- E. Agriculture became more widespread when human populations realized that an agricultural diet supplemented through trade could provide as much nutrition as the hunter-gatherer diet.
- F. Because high humidity speeds up both leaching processes and erosion, soils in humid regions take much longer to reach equilibrium than soils in dry regions, and are seldom as fertile.

Preventing Overgrowth among Tree Branches

One way trees prevent themselves from having too many branches is simply by shedding (dropping off) branches once they have fulfilled their purpose. This happens as the tree gets bigger and grows new outer layers of foliage that shade the inner and lower branches. In most large trees, the center of the canopy contains only large branches, small branches and fine twigs are found only at the canopy's edge. In the shaded center, the small branches that would once have occupied that space are long gone. Trees like the true cypresses regularly shed small twigs complete with leaves toward the end of summer. Most other trees shed only branches that prove unproductive. If a branch is not producing enough carbohydrate to cover its own running costs—i.e., it needs to be subsidized by other branches because, for example, it is being shaded and receives little light—it will usually be got rid of. This prevents unproductive branches from being a drain on the tree and removes the wind drag (the force of air resistance) from useless branches.

Branches are shed for reasons other than lack of light. In dry parts of the world, it is common for trees and shrubs to lose smaller branches to save water. Small branches have the thinnest bark (the protective outer covering of a tree) and greatest surface area and thus are the source of most water loss once the leaves have been lost. The creosote bush of United States deserts self-prunes, or removes parts of itself, in the face of extreme heat or drought, starting from the highest and most exposed twigs and working downward to bigger and bigger branches, it's a desperate act because if the creosote bush loses too much food, it dies. Shedding branches can also be useful for self-propagation. Most poplar trees and willow trees characteristic of waterways will readily drop branches, which take root when washed up on muddy banks further downstream.

How are branches shed? In the simplest cases, dead branches rot and fall off, or healthy branches are snapped off by wind, snow, and animals. Some willows have a brittle zone at the base of small branches that encourages breaking in the wind, seemingly for propagation. Other cases of “natural pruning” are more startling: elm trees, and to a certain extent others, such as oaks, have a reputation for dropping large branches (up to half a meter in diameter) with no warning on calm, hot afternoons. Such dramatic shedding appears to be due to a combination of internal water stress coupled with heat expansion affecting cracks and decayed wood.

Many trees, however, shed branches deliberately. In this situation, branches are shed in the same way as foliage in autumn by the prior formation of a corky layer that leaves the wound sealed over with cork, which in turn is undergrown with wood the following year. In hardwoods, branches up to a meter in length and several centimeters in diameter can be shed normally after the leaves have fallen

in the autumn (maples are unusual in casting branches mainly in spring and early summer). Oaks tend to shed small twigs up to the thickness of a pencil, beech may shed larger ones, and birches dump whole branches of dead twigs. Pine trees shed their clusters of needles (which really are short branches), and members of the redwood family shed their small branchlets with leaves. Typically in hardwood trees, something around 10 percent of terminal branches are lost each year through a mixture of deliberate shedding and being broken off.

Another way of reducing potential congestion is to make some branches smaller than others. Branches in the shade grow smaller than those in the sun. But trees can also regulate branch length from within. In many trees there is a clear distinction between long and short branches or shoots. The long shoots build the framework of the tree, making it bigger. The job of the short shoots (called spur shoots by horticulturalists) is to produce leaves, and commonly flowers, at more or less the same position every year. To maintain flexibility, any one shoot can switch from long to short or vice versa depending on internal factors, light levels, and damage.

Paragraph 1

One way trees prevent themselves from having too many branches is simply by shedding (dropping off) branches once they have fulfilled their purpose. This happens as the tree gets bigger and grows new outer layers of foliage that shade the inner and lower branches. In most large trees, the center of the canopy contains only large branches, small branches and fine twigs are found only at the canopy's edge. In the shaded center, the small branches that would once have occupied that space are long gone. Trees like the true cypresses regularly shed small twigs complete with leaves toward the end of summer. Most other trees shed only branches that prove unproductive. If a branch is not producing enough carbohydrate to cover its own running costs—i.e., it needs to be subsidized by other branches because, for example, it is being shaded and receives little light—it will usually be got rid of. This prevents unproductive branches from being a drain on the tree and removes the wind drag (the force of air resistance) from useless branches.

1. All of the following situations are mentioned in paragraph 1 for a tree to shed its branches EXCEPT

- A. endangering other branches
- B. building up on a tree
- C. wasting a tree's resources
- D. growing larger

2. 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 tree will usually shed branches that use more carbohydrate than they produce.
- B. Branches that are shaded usually do not receive enough light to produce all the carbohydrate they need.
- C. If a tree gets rid of a branch, it is usually because other branches lack enough carbohydrate to subsidize it.
- D. If a branch is shaded and cannot produce as much carbohydrate as it needs, it will usually be subsidized by other branches.

3. According to paragraph 1 most twigs of the true cypresses would be arranged in which of the following manner

- A. Most small twigs on true cypresses have been found located at the margins of the canopy.
- B. The shaded center areas of true cypresses are generally occupied by many small twigs and branches.
- C. True cypresses shed twigs that grow on large, unproductive branches.
- D. True cypresses seasonally shed small twigs without regard to whether they are productive or not.

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Paragraph 2

Branches are shed for reasons other than lack of light. In dry parts of the world, it is common for trees and shrubs to lose smaller branches to save water. Small branches have the thinnest bark (the protective outer covering of a tree) and greatest surface area and thus are the source of most water loss once the leaves have been lost. The creosote bush of United States deserts self-prunes, or removes parts of itself, in the face of extreme heat or drought, starting from the highest and most **exposed** twigs and working downward to bigger and bigger branches; it's a desperate act because if the creosote bush loses too much wood, it dies. Shedding branches can also be useful for self-propagation. Most poplar trees and willow trees characteristic of waterways will readily drop branches, which take root when washed up on muddy banks further downstream.

4. Which of the following best describes the role of the explanation offered in paragraph 2?

- A. Paragraph 2 questions this explanation by providing counterexamples of some trees.
- B. Paragraph 2 presents additional evidence supporting this explanation.
- C. Paragraph 2 discusses some additional reasons why trees shed branches

D. Paragraph 2 points out some additional consequences for trees besides the shedding of Branches

5. The word “exposed” in the passage is closet in meaning to

- A. distant
- B. unprotected
- C. easily replaced
- D. unproductive

6. According to paragraph 2, what is true of the creosote bush of United States deserts?

- A. It tends to grow small branches during dry parts of the year.
- B. It loses more water through its bark than through its leaves.
- C. It loses its lower branches only after losing upper ones.
- D. It sheds branches for the purpose of propagating itself.

Paragraph 3

How are branches shed? In the simplest cases, dead branches rot and fall off, or healthy branches are snapped off by wind, snow, and animals. Some willows have a brittle zone at the base of small branches that encourages breaking in the wind, seemingly for propagation. Other cases of “natural pruning” are more startling: elm trees, and to a certain extent others, such as oaks, have a reputation for dropping large branches (up to half a meter in diameter) with no warning on calm, hot afternoons. Such dramatic shedding appears to be due to a combination of internal water stress coupled with heat expansion affecting cracks and decayed wood.

7. The phrase “with no warning” in the passage is closet in meaning to

- A. without any benefit
- B. without any stress
- C. without any indication beforehand
- D. without any damage

8. All of the following are mentioned in paragraph 3 as a way in which branches can be lost EXCEPT:

- A. being broken off by the wind
- B. being shed for propagation
- C. becoming rotten
- D. becoming too large in diameter

9. Which of the following is mentioned in paragraph 3 in the shedding of large

branches by oaks on calm, hot afternoons?

- A. The development of a brittle zone at the base of the branches
- B. The enlargement of cracks in the branches due to heat
- C. The rise of sudden bursts of wind that snap off decayed wood
- D. The seasonal need to propagate new trees

Paragraph 4

Many trees, however, shed branches deliberately. In this situation, branches are shed in the same way as foliage in autumn by the prior formation of a corky layer that leaves the wound sealed over with cork, which in turn is undergrown with wood the following year. In hardwoods, branches up to a meter in length and several centimeters in diameter can be shed normally after the leaves have fallen in the autumn (maples are unusual in casting branches mainly in spring and early summer). Oaks tend to shed small twigs up to the thickness of a pencil, beech may shed larger ones, and birches dump whole branches of dead twigs. Pine trees shed their clusters of needles (which really are short branches), and members of the redwood family shed their small branchlets with leaves. Typically in hardwood trees, something around 10 percent of terminal branches are lost each year through a mixture of deliberate shedding and being broken off.

10. According to paragraph 4, what information can be learned from the deliberate shedding of branches by the trees?

- A. Limiting the size of branches being shed to comparatively small ones
- B. Forming a new layer of wood to seal the wounded area immediately after shedding
- C. Shedding leaves at the same time that branches are being shed
- D. Forming a layer of protective tissue before branch shedding begins

Paragraph 5

Another way of reducing potential **congestion** is to make some branches smaller than others. Branches in the shade grow smaller than those in the sun. But trees can also regulate branch length from within. In many trees there is a clear distinction between long and short branches or shoots. The long shoots build the framework of the tree, making it bigger. The job of the short shoots (called spur shoots by horticulturalists) is to produce leaves, and commonly flowers, at more or less the same position every year. To maintain flexibility, any one shoot can switch from long to short or vice versa depending on internal factors, light levels, and damage.

11. The word “**congestion**” in the passage is closest in meaning to

- A. loss

- B. damage
- C. overcrowding
- D. stress

12. According to paragraph 5, what is the main purpose of the long branches or shoots?

- A. To regulate the length of large branches
- B. To increase the size of the tree
- C. To produce leaves and flowers
- D. To help create shaded areas

Paragraph 1-2

One way trees prevent themselves from having too many branches is simply by shedding (dropping off) branches once they have fulfilled their purpose. This happens as the tree gets bigger and grows new outer layers of foliage that shade the inner and lower branches. In most large trees, the center of the canopy contains only large branches, small branches and fine twigs are found only at the canopy's edge. In the shaded center, the small branches that would once have occupied that space are long gone. Trees like the true cypresses regularly shed small twigs complete with leaves toward the end of summer. Most other trees shed only branches that prove unproductive. If a branch is not producing enough carbohydrate to cover its own running costs—i.e., it needs to be subsidized by other branches because, for example, it is being shaded and receives little light—it will usually be got rid of. This prevents unproductive branches from being a drain on the tree and removes the wind drag (the force of air resistance) from useless branches. 【A】 Branches are shed for reasons other than lack of light. 【B】 In dry parts of the world, it is common for trees and shrubs to lose smaller branches to save water. 【C】 Small branches have the thinnest bark (the protective outer covering of a tree) and greatest surface area and thus are the source of most water loss once the leaves have been lost. 【D】 The creosote bush of United States deserts self-prunes, or removes parts of itself, in the face of extreme heat or drought, starting from the highest and most exposed twigs and working downward to bigger and bigger branches, it's a desperate act because if the creosote bush loses too much food, it dies. Shedding branches can also be useful for self-propagation. Most poplar trees and willow trees characteristic of waterways will readily drop branches, which take root when washed up on muddy banks further downstream.

13. Look at the four choices that indicate where the following sentence could

be added to the passage.

A tree will also shed branches if its water supply is insufficient

Where would the sentence best fit? Click on a choice to add the sentence to the passage.

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

Drag your choices to the spaces where they belong. To review the passage, click on View Text.

For trees to remain healthy as they grow and as circumstances change, tree branches must change in various ways.

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Answer Choices

- A. Trees can benefit from shedding inefficient branches that consume more carbohydrates than they produce or that are a major source of water loss.
- B. Branches can be lost as a result of damage from whether, animals, or disease, but they can also be shed when they are no longer useful, much as leaves are shed in autumn.
- C. While branch shedding is common and may be necessary for a tree's survival, the corky layer that forms at sites where branches have been shed prevents additional growth in those areas for several years.
- D. Shedding large branches is such a desperate act for survival that the creosote bush is one of the few plants to use this mechanism for removing wood.
- E. Larger trees can self-propagate when water stress and heat expansion break off branches, as long as the shed branches fall on or can be transported to a location favorable for taking root.
- F. Trees prevent branch overcrowding in part by varying branch length through internal mechanisms such as having shoots that can switch from long to short or from short to long, as needed.

Surface Fluids on Venus and Earth

A fluid is a substance, such as a liquid or gas, in which the component particles (usually molecules) can move past one another. Fluids flow easily and conform to the shape of their containers. The geologic processes related to the movement of fluids on a planet's surface can completely resurface a planet many times. These processes derive their energy from the Sun and the gravitational forces of the planet itself. As these fluids interact with surface materials, they move particles about or react chemically with them to modify or produce materials. On a solid planet with a hydrosphere and an atmosphere, only a tiny fraction of the planetary mass flows as surface fluids. Yet the movements of these fluids can drastically alter a planet. Consider Venus and Earth, both terrestrial planets with atmospheres.

Venus and earth are commonly regarded as twin planets but not identical twins. They are about the same size, are composed of roughly the same mix of materials, and may have been comparably endowed at their beginning with carbon dioxide and water. However, the twins evolved differently, largely because of differences in their distance from the Sun. With a significant amount of internal heat, Venus may continue to be geologically active with volcanoes, rifting, and folding. However, it lacks any sign of a hydrologic system (water circulation and distribution): there are no streams, lakes, oceans, or glaciers. Space probes suggest that Venus may have started with as much water as Earth, but it was unable to keep its water in liquid form. Because Venus receives more heat from the Sun, water released from the interior evaporated and rose to the upper atmosphere where the Sun's ultraviolet rays broke the molecules apart. Much of the freed hydrogen escaped into space, and Venus lost its water. Without water, Venus became less and less like Earth and kept an atmosphere filled with carbon dioxide. The carbon dioxide acts as a blanket, creating an intense greenhouse effect and driving surface temperatures high enough to melt lead and to prohibit the formation of carbonate minerals. Volcanoes continually vented more carbon dioxide into the atmosphere. On Earth, liquid water removes carbon dioxide from the atmosphere and combines it with calcium, from rock weathering, to form carbonate sedimentary rocks. Without liquid water to remove carbon from the atmosphere, the level of carbon dioxide in the atmosphere of Venus remains high.

Like Venus, Earth is large enough to be geologically active and for its gravitational field to hold an atmosphere. Unlike Venus, it is just the right distance from the Sun so that temperature ranges allow water to exist as a liquid, a solid,

and a gas. Water is thus extremely mobile and moves rapidly over the planet in a continuous hydrologic cycle. Heated by the Sun, the water moves in great cycles from the oceans to the atmosphere, over the landscape in river systems, and ultimately back to the oceans. As a result, Earth's surface has been continually changed and eroded into delicate systems of river valleys—a remarkable contrast to the surfaces of other planetary bodies where impact craters dominate. Few areas on Earth have been untouched by flowing water. As a result, river valleys are the dominant feature of its landscape. Similarly, wind action has scoured fine particles away from large areas, depositing them elsewhere as vast sand seas dominated by dunes or in sheets of loess. These fluid movements are caused by gravity flow systems energized by heat from the Sun. Other geologic changes occur when the gases in the atmosphere or water react with rocks at the surface to form new chemical compounds with different properties. An important example of this process was the removal of most of Earth's carbon dioxide from its atmosphere to form carbonate rocks. However, if earth were a little closer to the Sun, its oceans would evaporate, if it were farther from the Sun, the oceans would freeze solid. Because liquid water was present, self-replicating molecules of carbon, hydrogen, and oxygen developed life early in Earth's history and have radically modified its surface, blanketing huge parts of the continents with greenery. Life thrives on this planet, and it helped create the planet's oxygen and nitrogen-rich atmosphere and moderate temperatures.

Paragraph 1

A fluid is a substance, such as a liquid or gas, in which the component particles (usually molecules) can move past one another. Fluids flow easily and conform to the shape of their containers. The geologic processes related to the movement of fluids on a planet's surface can completely resurface a planet many times. These processes derive their energy from the Sun and the gravitational forces of the planet itself. As these fluids interact with surface materials, they move particles about or react chemically with them to **modify** or produce materials. On a solid planet with a hydrosphere and an atmosphere, only a tiny fraction of the planetary mass flows as surface fluids. Yet the movements of these fluids can **drastically** alter a planet. Consider Venus and Earth, both terrestrial planets with atmospheres.

1. The word "**modify**" in the passage is closest in meaning to

- A. obtain
- B. change
- C. replace
- D. absorb

2. The word “**drastically**” in the passage is closest in meaning to

- A. gradually
- B. permanently
- C. extensively
- D. possibly

3. Paragraph 1 supports all of the following statements about fluids EXCEPT

- A. They can chemically react with particles on a planet’s surface.
- B. Most of their mass does not flow but remains in place.
- C. Their movement can reshape the surface of certain kinds of planets.
- D. Their movement is driven by the Sun and by gravity.

Paragraph 2

Venus and earth are commonly regarded as twin planets but not identical twins. They are about the same size, are composed of roughly the same mix of materials, and may have been comparably endowed at their beginning with carbon dioxide and water. However, the twins evolved differently, largely because of differences in their distance from the Sun. With a significant amount of internal heat, Venus may continue to be geologically active with volcanoes, rifting, and folding. However, it lacks any sign of a hydrologic system (water circulation and distribution): there are no streams, lakes, oceans, or glaciers. Space probes suggest that Venus may have started with as much water as Earth, but it was unable to keep its water in liquid form. Because Venus receives more heat from the Sun, water released from the interior evaporated and rose to the upper atmosphere where the Sun’s ultraviolet rays broke the molecules apart. Much of the freed hydrogen escaped into space, and Venus lost its water. Without water, Venus became less and less like Earth and kept an atmosphere filled with carbon dioxide. The carbon dioxide acts as a blanket, creating an intense greenhouse effect and driving surface temperatures high enough to melt lead and to **prohibit** the formation of carbonate minerals. Volcanoes continually vented more carbon

dioxide into the atmosphere. On Earth, liquid water removes carbon dioxide from the atmosphere and combines it with calcium, from rock weathering, to form carbonate sedimentary rocks. Without liquid water to remove carbon from the atmosphere, the level of carbon dioxide in the atmosphere of Venus remains high.

4. The word “**prohibit**” in the passage is closet in meaning to
- A. prevent
 - B. speed up
 - C. affect
 - D. encourage
5. According to paragraph 2, what is one difference between Earth and Venus?
- A. Earth has less water in its atmosphere than Venus does.
 - B. Earth has a hydrologic system, but Venus does not.
 - C. Earth is less geologically active than Venus is.
 - D. Earth has more carbon dioxide than Venus does.
6. It can be inferred from paragraph 2 that Earth evolved differently than Venus did in part because
- A. there was more volcanic activity on early Venus than on early Earth
 - B. they received different amounts of solar energy
 - C. their interiors contained different amounts of heat
 - D. their early atmospheres contained different levels of oxygen and nitrogen
7. According to paragraph 2, all of the following played a role in keeping carbon dioxide levels high in the atmosphere of Venus EXCEPT
- A. the breaking apart of water molecules by ultraviolet rays
 - B. the evaporation of water released from the planet’s interior
 - C. the escape of hydrogen into space
 - D. the release of molecules from melting metals such as lead

Paragraph 3

Like Venus, Earth is large enough to be geologically active and for its gravitational field to hold an atmosphere. Unlike Venus, it is just the right distance from the Sun so that temperature ranges allow water to exist as a liquid, a solid,

and a gas. Water is thus extremely mobile and moves rapidly over the planet in a continuous hydrologic cycle. Heated by the Sun, the water moves in great cycles from the oceans to the atmosphere, over the landscape in river systems, and **ultimately** back to the oceans. As a result, Earth's surface has been continually changed and eroded into delicate systems of river valleys—a remarkable contrast to the surfaces of other planetary bodies where impact craters dominate. Few areas on Earth have been untouched by flowing water. As a result, river valleys are the dominant feature of its landscape. Similarly, wind action has scoured fine particles away from large areas, depositing them elsewhere as vast sand seas dominated by dunes or in sheets of loess. These fluid movements are caused by gravity flow systems energized by heat from the Sun. Other geologic changes occur when the gases in the atmosphere or water react with rocks at the surface to form new chemical compounds with different properties. An important example of this process was the removal of most of Earth's carbon dioxide from its atmosphere to form carbonate rocks. However, if earth were a little closer to the Sun, its oceans would evaporate, if it were farther from the Sun, the oceans would freeze solid. Because liquid water was present, self-replicating molecules of carbon, hydrogen, and oxygen developed life early in Earth's history and have radically modified its surface, blanketing huge parts of the continents with greenery. Life thrives on this planet, and it helped create the planet's oxygen and nitrogen-rich atmosphere and moderate temperatures.

8. The word **"ultimately"** in the passage is closest in meaning to

- A. finally
- B. slowly
- C. repeatedly
- D. constantly

9. According to paragraph 3, Earth's surface is different from the surfaces of many other planetary bodies in which of the following ways?

- A. It is more strongly marked by river valleys and erosion.
- B. It is more geologically active.
- C. It is covered by impact craters.
- D. It has an atmosphere.

10. According to paragraph 3, why is water able to move so freely on Earth?

- A. Earth's temperatures are such that water exists in solid, liquid, and gas forms.
- B. Earth is large enough to be geologically active and for its gravitational field to hold an atmosphere.
- C. Earth's surface allows river valleys to develop across the landscape.
- D. Earth has active winds that blow across seas and oceans, causing fluid movements.

11. Why does the author point out that on Earth “gases in the atmosphere or water react with rocks at the surface to form new chemical compounds”?

- A. To explain why scientists believe that few areas on Earth have been untouched by flowing water
- B. To identify one of several ways in which the movement of fluids can affect the surface of a planet
- C. To provide evidence that fluid movements are caused by gravity
- D. To identify an effect of wind scouring fine particles away from large areas

12. 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. Life on Earth is responsible for many changes to the planet's surface, including blankets of greenery.
- B. Self-replicating molecules of carbon, hydrogen, and oxygen led to the development of life early in Earth's history.
- C. The presence of water made it possible for the life to develop early in Earth's history and to significantly change its surface.
- D. Early in life's history on Earth, self-replicating molecules of carbon, hydrogen, and oxygen began blanketing the surface in greenery.

Venus and earth are commonly regarded as twin planets but not identical twins. They are about the same size, are composed of roughly the same mix of materials, and may have been comparably endowed at their beginning with carbon dioxide and water. However, the twins evolved differently, largely because of differences in their distance from the Sun. With a significant amount of internal heat, Venus may continue to be geologically active with volcanoes, rifting, and folding. ■However, it lacks any sign of a hydrologic system (water circulation

and distribution): there are no streams, lakes, oceans, or glaciers. ■Space probes suggest that Venus may have started with as much water as Earth, but it was unable to keep its water in liquid form. ■Because Venus receives more heat from the Sun, water released from the interior evaporated and rose to the upper atmosphere where the Sun's ultraviolet rays broke the molecules apart. ■Much of the freed hydrogen escaped into space, and Venus lost its water. Without water, Venus became less and less like Earth and kept an atmosphere filled with carbon dioxide. The carbon dioxide acts as a blanket, creating an intense greenhouse effect and driving surface temperatures high enough to melt lead and to prohibit the formation of carbonate minerals. Volcanoes continually vented more carbon dioxide into the atmosphere. On Earth, liquid water removes carbon dioxide from the atmosphere and combines it with calcium, from rock weathering, to form carbonate sedimentary rocks. Without liquid water to remove carbon from the atmosphere, the level of carbon dioxide in the atmosphere of Venus remains high.

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

Venus may not have always been this way.

Where would the sentence best fit?

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14. **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.**

Over time, the movement of surface fluids has greatly changed Venus and Earth.

Answer Choices

- A. Although Venus is about the same size as Earth, its greater volcanic activity has added considerably to carbon dioxide levels in its atmosphere.
- B. Like Venus, Earth has an atmosphere, but Earth's atmosphere has far more oxygen and nitrogen than does the atmosphere of Venus.
- C. On Earth, chemical reactions involving fluids remove carbon dioxide from the atmosphere by giving rise to carbonate rocks, and winds energized by gravity flow systems move fine particles from one place to another.

- D. Because Venus lost the water it originally had, most of its carbon dioxide remained in its atmosphere, causing the planet to become very warm.
- E. On Earth, the dominance of river valley landscapes and the existence of life are due to the planet's hydrologic cycle.
- F. The evaporation of liquid water from Earth's surface is largely limited by the life forms that have developed, particularly the vegetation.

Effects of the Commercial Revolution

In the third and the second millennia B.C. long-distance trade supposedly had the character of an expedition. By the start of the last millennium B.C., however, a new approach to engaging in such trade emerged. Based on the principle of colorization, it was pioneered by the Phoenicians and Greeks, who established colonies along the Mediterranean Sea. The new approach to long-distance trade, known as the commercial revolution, led to changes in a number of political and economic patterns.

For the first time, the planting of colonies in distant lands became possible. The Phoenician settlements in the central and western Mediterranean, such as Carthage, and the slightly later establishment of Greek colonies are early examples, while the settlement of south Arabians in Eritrea around the middle of the last millennium marks the subsequent spread of this sort of commercial consequence to the Horn of Africa. In the third or second millennia B. C., a state such as Egypt might colonize areas outside its heartland, such as Nubia. But this colonization comprised military outposts and ethnic settlements that were planted to hold the contiguous territories of a land empire, not distant localities far separated from the home country

The commercial revolution constructed the economic basis as well for a new kind of town or city, an urban center that above all serviced trade and was home to the crafts and occupational specializations that went along with commercial development. The urban locations of earlier times commonly drew trade simply because their populations had included a privileged elite of potential consumers. Such towns had arisen in the first place as political and religious centers of the society, they attracted population because power and influence resides there and access to position and wealth could be gained through service to the royal or priestly leadership.

Wherever the effects of the commercial revolution penetrated over the last millennium B. C., kings and emperors increasingly lost their ability to treat trade as a royalty sponsored activity, intended to preserve the commodities of trade as the privileges of immemorial power and position. Instead, their policies shifted toward controlling geographical accessibility to the products of commerce and to ensuring security and other conditions that attracted and enhanced the movement of goods. No longer could kings rely on agriculturally supported and religiously based claims to an ability to protect their lands and people; now they also had to overtly support the material prosperity of their people compared to other societies. And rather than exerting a monopoly over prestige commodities, as had Egyptian kings of the third and second millennia, and redistributing such commodities in ways designed to reinforce the allegiance of their subjects and enhance the awesomeness of their position, rulers turned to the taxation of trade and to the

creation and control of currency, more and more relying on duties and other revenues to support the apparatus of the state. It was no historical accident that the first metal coinage in the world began to be made in eighth-century Anatolia (modern Turkey) and that the use of coins rapidly spread with the expanding commercial revolution. The material bases and the legitimizations of state authority as we know them today had begun to take shape.

The commercial revolution tended also to spread a particular pattern of exchange. The early commercial centers of the Mediterranean most characteristically offered manufactured goods—purple dye, metal goods, wine, olive oil, and so forth—for the raw materials or the partially processed natural products of other regions. As the commercial revolution spread, this kind of exchange tended to spread with it, with the recently added areas of commerce providing new kinds of raw materials or new sources for familiar products of the natural world, and the longer established commercial centers—which might themselves have lain at the margins of this transformation—producing, or acting as the intermediaries—producing, or acting as the intermediaries in the transmission of, manufactured commodities. India, for instance, had developed by the turn of the era into a major exporter of its own cotton textiles, as well as naturally occurring materials, such as gems of various kinds, and at the same time its merchants were the intermediaries of the silk trade.

Paragraph 1

In the third and the second millennia B.C. long-distance trade supposedly had the character of an expedition. By the start of the last millennium B.C., however, a new approach to engaging in such trade emerged. Based on the principle of colonization, it was pioneered by the Phoenicians and Greeks, who established colonies along the Mediterranean Sea. The new approach to long-distance trade, known as the commercial revolution, led to changes in a number of political and economic patterns.

1. The word “pioneered” in the passage is closest in meaning to
 - A. adopted
 - B. described
 - C. demonstrated
 - D. introduced

Paragraph 2

For the first time, the planting of colonies in distant lands became possible. The Phoenician settlements in the central and western Mediterranean, such as Carthage, and the slightly later establishment of Greek colonies are early examples, while the settlement of south Arabians in Eritrea around the middle of the last

millennium marks the subsequent spread of this sort of commercial consequence to the Horn of Africa. In the third or second millennium B. C., a state such as Egypt might colonize areas outside its heartland, such as Nubia. But this colonization comprised military outposts and ethnic settlements that were planted to hold the contiguous territories of a land empire, not distant localities far separated from the home country.

2. All of the following groups are mentioned in paragraph 2 as establishing distant trading outposts in the last millennium B. C. EXCEPT

- A. the Greeks
- B. the Egyptians
- C. the Phoenicians
- D. the south Arabians

3. The word “subsequent” in the passage is closest in meaning to

- A. initial
- B. anticipated
- C. later
- D. increasing

4. In paragraph 2, why does the author mention the colonization of Nubia by the Egyptians?

- A. To prove that colonization was first carried out by the military
- B. To indicate that Egypt was a major military power in the third and second millennia B. C.
- C. To illustrate how large the geographic area of colonization had become over several millennia
- D. To show that the purpose of colonization during the third and second millennia B. C. differed from that of the last millennium B. C.

5. The word “comprised” in the passage is closest in meaning to

- A. resulted in
- B. focused on
- C. was inspired by
- D. consisted of

Paragraph 3

The commercial revolution constructed the economic basis as well for a new kind of town or city, an urban center that above all serviced trade and was home to the crafts and occupational specializations that went along with commercial development. The urban locations of earlier times commonly drew trade simply

because their populations had included a privileged elite of potential consumers. Such towns had arisen in the first place as political and religious centers of the society, they attracted population because power and influence resides there and access to position and wealth could be gained through service to the royal or priestly leadership.

6. According to paragraph 3, before the emergence of the commercial revolution, trade

- A. enabled craftspeople and occupational specialists to gain power and influence in society
- B. centered on the ruling elite and those groups closely associated with them
- C. was primarily conducted by people serving the royal and religious leadership
- D. was a major reason why urban centers were established

Paragraph 4

Wherever the effects of the commercial revolution penetrated over the last millennium B. C., kings and emperors increasingly lost their ability to treat trade as a royalty sponsored activity, intended to preserve the commodities of trade as the privileges of immemorial power and position. Instead, their policies shifted toward controlling geographical accessibility to the products of commerce and to ensuring security and other conditions that attracted and enhanced the movement of goods. No longer could kings rely on agriculturally supported and religiously based claims to an ability to protect their lands and people; now they also had to overtly support the material prosperity of their people compared to other societies. And rather than exerting a monopoly over prestige commodities, as had Egyptian kings of the third and second millennia, and redistributing such commodities in ways designed to reinforce the allegiance of their subjects and enhance the awesomeness of their position, rulers turned to the taxation of trade and to the creation and control of currency, more and more relying on duties and other revenues to support the apparatus of the state. It was no historical accident that the first metal coinage in the world began to be made in eighth-century Anatolia (modern Turkey) and that the use of coins rapidly spread with the expanding commercial revolution. The material bases and the legitimizations of state authority as we know them today had begun to take shape.

7. The word “enhanced” in the passage is closest in meaning to

- A. improved
- B. influenced
- C. protected
- D. necessitated

8. The word “reinforce” in the passage is closet in meaning to
- A. demand
 - B. strengthen
 - C. earn
 - D. repay
9. According to paragraph 4, as the commercial revolution expanded, rulers focused on
- A. taxation and the development and control of money
 - B. monopolizing prestige commodities
 - C. distributing prestige commodities to ensure the allegiance of their subjects
 - D. protecting their land to legitimize their authority
10. What can be inferred from paragraph 4 about Anatolia?
- A. Its merchants specialized in the trading of prestige commodities.
 - B. It was the first place to use currency for the taxation of trade.
 - C. It contained enormous supplies of metal compared with other states in the region.
 - D. Trade remained a royally sponsored activity there long after the emergence of the commercial revolution.

Paragraph5

The commercial revolution tended also to spread a particular pattern of exchange. The early commercial centers of the Mediterranean most characteristically offered manufactured goods—purple dye, metal goods, wine, olive oil, and so forth—for the raw materials or the partially processed natural products of other regions. As the commercial revolution spread, this kind of exchange tended to spread with it, with the recently added areas of commerce providing new kinds of raw materials or new sources for familiar products of the natural world, and the longer established commercial centers—which might themselves have lain at the margins of this transformation—producing, or acting as the intermediaries in the transmission of, manufactured commodities. India, for instance, had developed by the turn of the era into a major exporter of its own cotton textiles, as well as naturally occurring materials, such as gems of various kinds, and at the same time its merchants were the intermediaries of the silk trade.

11. 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. During the commercial revolution, newer centers of trade acted as intermediaries in the exchange of different types of manufactured goods.

B. Longer-established trading centers were familiar with the unprocessed products of the natural world, but depended on other areas as sources for manufactured commodities.

C. Eventually, the commercial revolution led to a trading system whereby newly established commercial centers provided the resources needed for the production of goods while older trading centers produced the goods or assisted in their distribution.

D. The commercial revolution depended on a system of trade where consumers valued novelty in the manufactured goods they acquired, but, at the same time, they wanted to be familiar with the natural products they received.

12. Paragraph 5 supports which of the following statements about Indian merchants at the time of the commercial revolution?

A. They imported cotton, silk, and other high-quality fabrics intended for the Indian market.

B. They obtained various kinds of gems from intermediaries in the silk trade.

C. They were simultaneously exporters of manufactured and natural products and intermediaries for goods produced elsewhere.

D. They created a highly sophisticated textile industry at the same time that they were engaged in the processing of natural products.

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Paragraph 3

[A] The commercial revolution constructed the economic basis as well for a new kind of town or city, an urban center that above all serviced trade and was home to the crafts and occupational specializations that went along with commercial development. **[B]** The urban locations of earlier times commonly drew trade simply because their populations had included a privileged elite of potential consumers. **[C]** Such towns had arisen in the first place as political and religious centers of the society, they attracted population because power and influence resides there and access to position and wealth could be gained through service to the royal or priestly leadership. **[D]**

13. Look at the four choices that indicate where the following sentence could be added to the passage.

It was significantly different from the typical centers that existed before the commercial revolution.

Where would the sentence best fit? Click on a choice to add the sentence to the passage.

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

Drag your choices to the spaces where they belong. To review the passage, click on View Text.

The commercial revolution of the last millennium B. C. resulted in both political and economic changes.

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-
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Answer Choices

- A. New kinds of urban centers emerged that focused on commerce and encouraged craft and occupational specializations.
- B. Rulers in the last millennium began to promote the material prosperity of their people through support and improvement of commerce.
- C. More established commercial centers supplied final products to newer regions in exchange for raw materials.
- D. During the first millennium B. C., new political and religious centers arose that based their power on their ability to protect their lands and people.
- E. The focus on raw materials switched the balance of power from the manufacturing centers to the control of the exporters of the natural products.
- F. Military occupation of neighboring lands became a major means of expanding trade into new territories.

European Context of the Scientific Revolution

The Scientific Revolution represents a turning point in world history. By 1700 European scientists had overthrown the science and worldviews of the ancient philosophers: Aristotle and Ptolemy. Europeans in 1700 lived in a vastly different intellectual world than that experienced by their predecessors in, say, 1500. The role and power of science, as a way of knowing about the world and as an agency with the potential of changing the world, likewise underwent profound restricting as part of the Scientific Revolution.

The social context for science in Europe in the sixteenth and seventeenth centuries had changed in several dramatic ways from the Middle Ages (roughly, 500 C.E. to the 1400s C.E.). Advances in military technology, the European voyages of exploration, and contact with the New World altered the context in which the Scientific Revolution unfolded. The geographical discovery of the Americas generally undermined the closed Eurocentric cosmos of the later Middle Ages, and the science of geography provided a stimulus of its own to the Scientific Revolution. With an emphasis on observational reports and practical experience, new geographical discoveries challenged accepted knowledge. Cartography (mapmaking) thus provided exemplary new ways of learning about the world in general, ways self-evidently superior to mastering established doctrines from dusty books. Many of the scientists of the Scientific Revolution seem to have been involved in one fashion or another with geography or cartography.

In the late 1430s, Johannes Gutenberg, apparently independently of the development of woodblock printing in Asia, invented printing with movable type, and the spread of this powerful new technology after 1450 likewise altered the cultural landscape of early modern Europe. The new medium created a revolution in communications that increased the amount and accuracy of information available and made copying of books by scribes obsolete. Producing some 13,000 works by 1500, printing presses spread rapidly throughout Europe and helped to break down the monopoly of learning in universities and to create a new group of nonreligious intellectuals. Indeed, the first printshops became something of intellectual centers themselves, with authors, publishers, and workers collaborating in unprecedented ways in the production of new knowledge. Renaissance humanism, that renowned philosophical and literary movement emphasizing human values and the direct study of classical Greek and Latin texts, is hardly conceivable without the technology of printing that sustained the efforts of learned humanists. Regarding science, the advent of printing and humanist scholarship brought another wave in the recovery of ancient texts. Whereas Europeans first learned of ancient Greek science largely through translations from the Arabic in the twelfth century, in the later fifteenth century scholars brought forth new editions from Greek originals and uncovered influential new sources,

notably the Greek mathematician Archimedes. Similarly, printing disseminated previously obscure handbooks of technical and magical secrets that proved influential in the developing Scientific Revolution.

Particularly in Italy, the revival of cultural life and the arts in the late fourteenth and fifteenth centuries commonly known as the Renaissance must also be considered as an urban and comparatively secular phenomenon, aligned with courts and courtly patronage but not with the universities, which were religiously base. One associates the great flourish of artistic activity of the Renaissance with such talents as Donatello, Leonardo da Vinci, Raphael, and Michelangelo. In comparison with medieval art, the use of perspective—a projection system that realistically renders the three dimensions of space onto the two dimensions of a canvas—represents a new feature typical of Renaissance painting, and through the work of Leon Battista Alberti, Albrecht Durer, and others, artists learned to practice mathematical rules governing perspective. So noteworthy was this development that historians have been inclined to place Renaissance artists at the forefront of those uncovering new knowledge about nature in the fifteenth and sixteenth centuries. Whatever one may make of that claim, early modern artists needed accurate knowledge of human muscular anatomy for lifelike renditions, and an explosion of anatomical research in the Renaissance may be attributed to this need in the artistic community.

Paragraph 1

The Scientific Revolution represents a turning point in world history. By 1700 European scientists had overthrown the science and worldviews of the ancient philosophers: Aristotle and Ptolemy. Europeans in 1700 lived in a vastly different intellectual world than that experienced by their predecessors in, say, 1500. The role and power of science, as a way of knowing about the world and as an agency with the potential of changing the world, likewise underwent profound restricting as part of the Scientific Revolution.

1. The word “profound” in the passage is closest in meaning to
 - A. frequent
 - B. intense
 - C. challenging
 - D. careful
2. According to paragraph 1, what was new about the intellectual world of 1700?
 - A. Scientists were aware that they were participating in a turning point in world history.
 - B. Beliefs about nature developed by ancient philosophers were no longer accepted.

- C. People believed that science had changed the world.
- D. The impact of the Scientific Revolution was being felt in all aspects of European life.

Paragraph 2

The social context for science in Europe in the sixteenth and seventeenth centuries had changed in several dramatic ways from the Middle Ages (roughly, 500 C.E. to the 1400s C.E.). Advances in military technology, the European voyages of exploration, and contact with the New World altered the context in which the Scientific Revolution unfolded. The geographical discovery of the Americas generally undermined the closed Eurocentric cosmos of the later Middle Ages, and the science of geography provided a stimulus of its own to the Scientific Revolution. With an emphasis on observational reports and practical experience, new geographical discoveries challenged accepted knowledge. Cartography (mapmaking) thus provided exemplary new ways of learning about the world in general, ways self-evidently superior to mastering established doctrines from dusty books. Many of the scientists of the Scientific Revolution seem to have been involved in one fashion or another with geography or cartography.

3. According to paragraph 2, all of the following influenced European scientific thought during the sixteenth and seventeenth centuries EXCEPT

- A. progress in military technology
- B. explorative journeys made by Europeans
- C. views expressed in the scholarship of the Middle Ages
- D. the development of cartography

4. According to paragraph 2, how did the study of geography influence the Scientific Revolution?

- A. It supported established doctrines in the European-centered world.
- B. It created new ways of learning through recording observations and practical experiences.
- C. It contributed to advances in military technology.
- D. It allowed scientists from different regions to exchange information.

Paragraph 3

In the late 1430s, Johannes Gutenberg, apparently independently of the development of woodblock printing in Asia, invented printing with movable type, and the spread of this powerful new technology after 1450 likewise altered the cultural landscape of early modern Europe. The new medium created a revolution in communications that increased the amount and accuracy of information available and made copying of books by scribes **obsolete**. Producing some 13,000

works by 1500, printing presses spread rapidly throughout Europe and helped to break down the monopoly of learning in universities and to create a new group of nonreligious intellectuals. Indeed, the first print shops became something of intellectual centers themselves, with authors, publishers, and workers collaborating in unprecedented ways in the production of new knowledge. **Renaissance humanism**, that renowned philosophical and literary movement emphasizing human values and the direct study of classical Greek and Latin texts, is hardly conceivable without the technology of printing that sustained the efforts of learned humanists. Regarding science, the advent of printing and humanist scholarship brought another wave in the recovery of ancient texts. Whereas Europeans first learned of ancient Greek science largely through translations from the Arabic in the twelfth century, in the later fifteenth century scholars brought forth new editions from Greek originals and uncovered influential new sources, notably the Greek mathematician Archimedes. Similarly, printing disseminated previously **obscure** handbooks of technical and magical secrets that proved influential in the developing Scientific Revolution.

5. The word “**obsolete**” in the passage is closest in meaning to
- A. costly
 - B. less frequent
 - C. unappealing
 - D. out of date
6. The word “**obscure**” in the passage is closest in meaning to
- A. little known
 - B. expensive
 - C. forbidden
 - D. celebrated
7. Paragraph 3 suggests that before 1500 the transmission of knowledge in Europe was
- A. stimulated by printing developments in Asia
 - B. dependent on collaborations between scribes and publishers
 - C. limited to religious intellectuals in academic settings
 - D. influenced by philosophical rather than literary sources
8. The author discusses “**Renaissance humanism**” in order to
- A. demonstrate that printing presses facilitated the spread of humanistic thought
 - B. discuss why print shops declined as intellectual centers
 - C. compare the beliefs of classical humanists to the Renaissance humanists

D. emphasize the importance of the direct study of Greek and Latin texts

9. According to paragraph 3, what effect did the invention of printing have on science in Europe?

A. Scientists were able to publish books for humanists and other non-scientific intellectuals.

B. Europeans gained access to new editions of texts as well as new sources of knowledge.

C. Translations of Arabic texts documenting scientific discoveries became widely available.

D. Humanistic study declined as a result of the advance of scientific study.

Paragraph 4

Particularly in Italy, the revival of cultural life and the arts in the late fourteenth and fifteenth centuries commonly known as the Renaissance must also be considered as an urban and comparatively secular phenomenon, aligned with courts and courtly patronage but not with the universities, which were religiously base. One **associates** the great flourish of artistic activity of the Renaissance with such talents as Donatello, Leonardo da Vinci, Raphael, and Michelangelo. In comparison with medieval art, the use of perspective—a projection system that realistically renders the three dimensions of space onto the two dimensions of a canvas—represents a new feature typical of Renaissance painting, and through the work of Leon Battista Alberti, Albrecht Durer, and others, artists learned to practice mathematical rules governing perspective. So noteworthy was this development that historians have been inclined to place Renaissance artists at the forefront of those uncovering new knowledge about nature in the fifteenth and sixteenth centuries. **Whatever one may make of that claim, early modern artists needed accurate knowledge of human muscular anatomy for lifelike renditions, and an explosion of anatomical research in the Renaissance may be attributed to this need in the artistic community.**

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10. The word “**associates**” in the passage is closet in meaning to

A. compares

B. appreciates

C. connects

D. presents

11. According to paragraph 4, Renaissance artistic contributed to the Scientific Revolution by

A. reviving medieval mathematical and scientific sources for study

B. establishing institutions for the study of mathematics and scientific

principles in art

C. creating paintings that contributed to the wealth of the courts and courtly patronage of science

D. using mathematical information to realistically represent space in art

12. 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. Early modern artists claim to have uncovered new knowledge about nature and human muscular anatomy before the explosion of anatomical research.

B. Artists' need for accurate knowledge in order to realistically represent the human body may have caused the sudden increase in anatomical studies in the Renaissance.

C. Whatever other claims are made about early modern art, it is accurate to state that Renaissance artists were concerned with creating lifelike representations.

D. The need for early modern artists to create lifelike renditions developed after the explosion of anatomical research made human anatomy clear.

Paragraph 2

【A】 The social context for science in Europe in the sixteenth and seventeenth centuries had changed in several dramatic ways from the Middle Ages (roughly, 500 C.E. to the 1400s C.E.). 【B】 Advances in military technology, the European voyages of exploration, and contact with the New World altered the context in which the Scientific Revolution unfolded. The geographical discovery of the Americas generally undermined the closed Eurocentric cosmos of the later Middle Ages, and the science of geography provided a stimulus of its own to the Scientific Revolution. 【C】 With an emphasis on observational reports and practical experience, new geographical discoveries challenged accepted knowledge. Cartography (mapmaking) thus provided exemplary new ways of learning about the world in general, ways self-evidently superior to mastering established doctrines from dusty books. 【D】 Many of the scientists of the Scientific Revolution seem to have been involved in one fashion or another with geography or cartography.

13. Look at the four choices that indicate where the following sentence could be added to the passage.

Given the advantages these new approaches offered, it is hardly surprising that sciences associated with exploration attracted great intellectual interest.

Where would the sentence best fit? Click on a choice to add the sentence to the passage.

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

Drag your choices to the spaces where they belong. To review the passage, click on View Text.

European society experienced a period known as the Renaissance.

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Answer Choices

- A. The discovery of the Americas stimulated the science of geography and cartography which in turn emphasized observation and practical experience.
- B. The invention of movable type increased the accuracy and availability of information, and a new group of nonreligious scholars emerged.
- C. The growth of both artistic and scientific activity in Renaissance Italy was encouraged by the financial support of universities and wealthy merchants.
- D. Johannes Gutenberg's invention of printing in the late 1430s appears to have been unrelated to earlier developments in print technology in Asia.
- E. European intellectuals first discovered the existence of ancient Greek science and mathematic texts in the late fifteenth century, when translations from the Arabic finally became available.
- F. The revival of culture and art in fourteenth-century Italy encouraged the development of perspective and the adherence to mathematical rules in painting.

Greek Sacred Groves and Parks

In Greek and Roman civilization, parks were associated with spirituality, public recreation, and city living. Greek philosophers pondered the meaning of nature and its innermost workings, the relationships between animals and humankind, and how matter related to spirit. The philosophy of Aristotle (384—332 B.C.) advanced the fundamental notion of nature as the embodiment of everything outside culture, an essence opposed to art and artificiality. This sense of nature and culture as distinct opposites continues to govern ideas about the environment and society today. Meanwhile, the suggestion of a state of nature, wholesome and pure, defined in opposition to civilized life, found acceptance in Aristotle's time through the concept of the Golden Age—a legendary ideal that had significance for landscape planning and artistic experiment. Described by Greek poets and playwrights, the Golden Age of perpetual spring depicted an era before the adoption of agriculture, when humans embraced nature's wonder and communicated with spirits in sacred woods. In *The Odyssey* (800 B.C.), Homer, the great Greek writer, described a garden that was a place of constant productivity, where “fruit never fails nor runs short, winter and summer alike.”

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Greek interest in spirituality and nature manifested itself in the tradition of the sacred grove. Usually comprised of a few trees, a spring, or a mountain crag, sacred groves became intensely mystical places by their associations with gods, spirits, or celebrated folk heroes. Twisted trees, sections of old-growth forest, and rocks or caves typically surrounded the naturalistic shrines and altars. As the Roman official and writer Pliny the Elder (A.D. 23—79) put it, “Trees were the first temples of the gods, and even now simple country people dedicate a tree of exceptional height to a god with the ritual of olden times, and we... worship forests and the very silences they contain.”

The Greeks were not alone in their spiritual veneration of nature. Examples of pantheism—the belief that God and the universe or nature are the same—and the worship of trees permeated many cultures. The nations of northern Europe utilized trees as places of worship. In Scandinavian mythology, the tree called Yggdrasil held up the world, its branches forming the heavens and its roots stretching into

the underworld. A spring of knowledge bubbled at its base, and an eagle perched amid its sturdy branches. The Maori people of New Zealand celebrated a tree that separated the sky from the earth. For many ancient civilizations, trees signified life, permanence, and wisdom.

In some spiritual traditions, landscapes such as gardens or deserts were treated as abstract emblems of spiritual states such as innocence or despair. Rather than symbolic landscapes, as in the Judeo-Christian tradition, Greek sacred groves operated as literal homes of the gods. Instead of being confined to prehistory or celestial space, spiritual parkscapes were present within the existing cultural terrain. One could not visit a symbol of peace and serenity, but one could experience these qualities in a sacred grove.

The spiritual significance of the sacred grove mandated specific preservationist measures. Civil restrictions and environmental codes of practice governed the use of such spaces. Enclosing walls prevented sheep from desecrating sacred sites, while patrolling priests issued spiritual guidance along with fines for vandalism. Laws forbade hunting, fishing, or the cutting of trees. Those not dissuaded by monetary penalties were threatened with the anger of the resident gods.

Such environmental care suggested to historian J. Donald Hughes that sacred groves represented “classical national parks.” By helping to insulate sacred groves from pressures of deforestation, erosion, and urbanization, Greek codes protected ecosystems from destruction. Sacred groves nonetheless represented imperfect parkscapes. Some encompassed relatively small areas such as a section of a hillside or a series of caves. Meanwhile, the fundamental purpose of the grove –the visitation of resident gods –sometimes promoted activities not entirely conducive to modern concepts of conservation. Animals were routinely captured to serve as sacrifices to the gods. Many groves witnessed horticultural and architectural improvements. Flowers were planted, trails cut, and statues, fountains, and caves installed for the benefit of visitors. The grove served as a recreational center for Greek society, a realm of ritual, performance, feasting, and even chariot racing.

Paragraph 1

In Greek and Roman civilization, parks were associated with spirituality,

public recreation, and city living. Greek philosophers **pondered** the meaning of nature and its innermost workings, the relationships between animals and humankind, and how matter related to spirit. The philosophy of Aristotle (384—332 B.C.) advanced the **fundamental** notion of nature as the embodiment of everything outside culture, an essence opposed to art and artificiality. This sense of nature and culture as distinct opposites continues to govern ideas about the environment and society today. Meanwhile, the suggestion of a state of nature, wholesome and pure, defined in opposition to civilized life, found acceptance in Aristotle’s time through the concept of the Golden Age—a legendary ideal that had significance for landscape planning and artistic experiment. Described by Greek poets and playwrights, the Golden Age of perpetual spring depicted an era before the adoption of agriculture, when humans embraced nature’s wonder and communicated with spirits in sacred woods. In *The Odyssey* (800 B.C.), Homer, the great Greek writer, described a garden that was a place of constant productivity, where “fruit never fails nor runs short, winter and summer alike.”

1. The word “**pondered**” in the passage is the closest in meaning to
 - A. explained
 - B. argued over
 - C. thought about
 - D. understood
2. The word “**fundamental**” in the passage is the closest in meaning to
 - A. famous
 - B. basic
 - C. revolutionary
 - D. original
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. Aristotle used the concept of the Golden Age to explain how the pure beauty

- of nature could be recreated in a new, carefully planned state.
- B. During the Golden Age of Aristotle's time, human activities such as landscape planning and art reached the height of creativity.
 - C. In ancient Greek thought, both art and nature were characterized by purity
 - D. During Aristotle's time, the idea that nature is pure and distinct from civilization was expressed in the idea of the perfect Golden Age, which influenced both art and landscape design.
4. In paragraph 1, why does the author include the quotation from *The Odyssey*?
- A. To support the idea that modern ideas about nature have not changed much since the ancient Greeks
 - B. To contrast Homer's ideas about nature with those of Aristotle
 - C. To argue that the adoption of agriculture advanced Greek culture
 - D. To give an example of an ancient Greek description of the Greek description of the Golden Age and wholesomeness within a Golden Age

Paragraph 2

Greek interest in spirituality and nature manifested itself in the tradition of the sacred grove. Usually comprised of a few trees, a spring, or a mountain crag, sacred groves became intensely mystical places by their associations with gods, spirits, or celebrated folk heroes. Twisted trees, sections of old-growth forest, and rocks or caves typically surrounded the naturalistic shrines and altars. As the Roman official and writer Pliny the Elder (A.D. 23—79) put it, "Trees were the first temples of the gods, and even now simple country people dedicate a tree of exceptional height to a god with the ritual of olden times, and we... worship forests and the very silences they contain."

5. In paragraph 2, the author quotes Pliny the Elder in order to support the claim that
- A. only simply country people believed in gods who lived in forests
 - B. Greek beliefs about forests differed from Roman beliefs about forests
 - C. sacred groves had mystical meanings because of their association with gods

- D. Greeks were more interested in nature than in spirituality

Paragraph 3

The Greeks were not alone in their spiritual veneration of nature. Examples of pantheism –the belief that God and the universe or nature are the same – and the worship of trees permeated many cultures. The nations of northern Europe utilized trees as places of worship. In Scandinavian mythology, the tree called Yggdrasil held up the world, its branches forming the heavens and its roots stretching into the underworld. A spring of knowledge bubbled at its base, and an eagle perched amid its sturdy branches. The Maori people of New Zealand celebrated a tree that separated the sky from the earth. For many ancient civilizations, trees signified life, permanence, and wisdom.

6. What is the purpose of paragraph 3 in the larger discussion of ancient Greek beliefs?
- A. To connect the Greek view of nature to the associations between nature and religion that exist in many different cultures in the world
 - B. To contrast the history and development of Greek religion to the development of other religions of the time
 - C. To demonstrate the influences of Greek beliefs on other religions
 - D. To argue that ancient religions eventually rejected the spirituality of trees

Paragraph 4

In some spiritual traditions, landscapes such as gardens or deserts were treated as abstract emblems of spiritual states such as innocence or despair. Rather than symbolic landscapes, as in the Judeo-Christian tradition, Greek sacred groves operated as literal homes of the gods. Instead of being confined to prehistory or celestial space, spiritual parksapes were present within the existing cultural terrain. One could not visit a symbol of peace and serenity, but one could experience these qualities in a sacred grove.

7. It can be inferred from paragraph 4 that the ancient Greeks believed that their

gods

- A. resided only in celestial space
- B. actually lived on Earth
- C. did not exist in prehistoric times
- D. were only representations of ideas

Paragraph 5

The spiritual significance of the sacred grove **mandated** specific preservationist measures. Civil restrictions and environmental codes of practice governed the use of such spaces. Enclosing walls prevented sheep from desecrating sacred sites, while patrolling priests issued spiritual guidance along with fines for vandalism. Laws forbade hunting, fishing, or the cutting of trees. Those not dissuaded by monetary penalties were threatened with the anger of the resident gods.

8. The word “**mandated**” in the passage is closest in meaning to
- A. contributed to
 - B. produced
 - C. limited
 - D. required
9. All of the following are mentioned in paragraph 5 as ways the Greeks protected their sacred groves EXCEPT
- A. by building protective walls around the groves
 - B. by allowing only priests in sacred groves
 - C. by punishing those who cut trees, hunted or fished in the groves
 - D. by telling people that the gods could punish vandals of the groves

Paragraph 6

Such environmental care suggested to historian J. Donald Hughes that sacred groves represented “classical national parks.” By helping to insulate sacred groves from pressures of deforestation, erosion, and urbanization, Greek codes protected

ecosystems from destruction. Sacred groves nonetheless represented imperfect parkscapes. Some encompassed relatively small areas such as a section of a hillside or a series of caves. Meanwhile, the fundamental purpose of the grove –the visitation of resident gods –sometimes **promoted** activities not entirely conducive to modern concepts of conservation. Animals were routinely captured to serve as sacrifices to the gods. Many groves witnessed horticultural and architectural improvements. Flowers were planted, trails cut, and statues, fountains, and caves installed for the benefit of visitors. The grove served as a recreational center for Greek society, a realm of ritual, performance, feasting, and even chariot racing.

10. The word “**promoted**” in the passage is closest in meaning to
- A. repeated
 - B. altered
 - C. encouraged
 - D. performed
11. Why are the sacred groves of the ancient Greeks referred to as “imperfect parkscapes” in the passage?
- A. The Greeks protected their sacred groves from deforestation and erosion but allowed people to build houses on the grounds.
 - B. The ancient Greeks often changed the environment of the groves by adding plants, building shrines, and capturing animals for sacrifice.
 - C. The Greeks allowed only religious ceremonies in the groves.
 - D. The ancient Greeks had strict size limits on how big a sacred area could be.
12. Which of the following is NOT mentioned in paragraph 6 as a change made to the landscapes of sacred groves?
- A. The introduction of new animals to the area
 - B. The construction of statues and fountains
 - C. The planting of flowers
 - D. The creation of trails

Paragraph 4

In some spiritual traditions, landscapes such as gardens or deserts were treated as abstract emblems of spiritual states such as innocence or despair. [A] Rather than symbolic landscapes, as in the Judeo-Christian tradition, Greek sacred groves operated as literal homes of the gods. [B] Instead of being confined to prehistory or celestial space, spiritual parkscapes were present within the existing cultural terrain. [C] One could not visit a symbol of peace and serenity, but one could experience these qualities in a sacred grove. [D]

13. Look at the four choices that indicate where the following sentence could be added to the passage.

This, however, was not the Greek attitude.

Where would the sentence best fit?

14. **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.**

Ancient Greeks and Romans thought of parks and natural spaces as spiritual and recreational sites.

Answer Choices

- A. Sacred groves consisting of trees, springs, or mountains were organized as shrines to Greek gods.
- B. The belief in a divine presence in all natural things originated with the ancient Greeks and spread to other cultures around the world.
- C. In cultures where the climate made cultivation of sacred groves impossible, trees retained only a symbolic value in mythical stories.
- D. Because of their association with ancient Greek gods, spirits and heroes, there are still many sections of forest in modern Greece.

- E. Trees have played significant roles in the religious practices and beliefs of Greeks and numerous other cultures.
- F. Because groves were spiritually important to ancient Greeks, they were often protected from damage and were the sites of various communal activities.

The Chaco Phenomenon

A truly remarkable transformation in settlement patterns occurred in the San Juan basin in northwestern New Mexico in the late tenth and early eleventh centuries, with small household farmsteads giving way to aggregated communities centered on communal masonry buildings that are now called “great houses.” These structures are found throughout the basin but are concentrated in Chaco Canyon, where several examples contained hundreds of rooms and reached four stories in height. The largest great house is Pueblo Bonito, with over 600 rooms covering two acres. The entire episode of great house construction in Chaco, the Bonito phase (A.D. 900-1140), was obviously a time of immense cooperative effort. At least 200,000 wooden beams averaging 5 meters long and 20 centimeters in diameter were brought to the canyon from distances between 40 and 100 kilometers away to build a dozen great houses, signifying a huge labor investment and a complex production process. The bulk of construction took place in the eleventh century, but by A.D. 1140 it had ceased abruptly, after which there was a rapid decline in use of the great houses and apparent abandonment of the canyon in the thirteenth century.

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For more than a century archaeologists have struggled to understand the circumstances surrounding the rise and collapse of Chacoan society –dubbed the Chaco Phenomenon. In particular, research has focused on determining why such an apparently inhospitable place as Chaco, which today is extremely arid and has very short growing seasons, should have favored the concentration of labor that must have been required for such massive construction projects over brief periods of time. Until the 1970s, it was widely assumed that Chaco had been a forested oasis that attracted farmers who initially flourished but eventually fell victim to their own success and exuberance, as they denuded the canyon of trees and vegetation to build large great houses. In the 1980s this reconstruction was largely dismissed in response to evidence that there had never been a forest in Chaco, and that canyon soils had poor agricultural potential. As scientific interpretations about Chaco changed, the focus of explanatory models changed from the attractiveness of the canyon for farmers to the position of the canyon within a

regional network of dispersed agricultural communities.

The adoption of a regional perspective in explaining the Chaco Phenomenon was based in part on the discovery of formal trails connecting many of the great houses in Chaco, as well as linking the canyon to smaller great house located throughout the San Juan basin, the latter are referred to as Chaco “outliers.” These trails are densest around the concentration of great houses in the center, and the canyon itself is roughly at the center of the basin. Consequently, the canyon occupies the geographical and social center of the network formed by the connecting trails. The current consensus view is that religion provides the fundamental explanation for this centrifugal pattern.

Archaeologists now describe Chaco during the Bonito phase as a location of high devotional expression and the pilgrimage center of a sacred landscape. These descriptions emphasize aspects of the archaeological record presumed to be associated with ritual activity, including caches of turquoise beads and pendants, unusual ceramic vessels and wooden objects, several rooms with multiple human burials, and especially the large number of kivas (multipurpose rooms used for religious, political, and social functions) found in great houses. Most of these indicators occur only at Pueblo bonito, but archaeologists generally assume that all the great houses had a similar ritual function. In fact, some scholars have suggested that the great houses were temples rather than residences.

However, new geological field studies in Chaco have produced results that may require a significant reassessment of the assumption that the canyon was not a favorable agricultural setting. It appears that during the first half of the eleventh century, during the extraordinary boom in construction, a large volume of water and suspended sediment flowed into the canyon. A large natural lake may have existed at the western end of Chaco, near the biggest concentration of great houses. The presence of large quantities of water and, equally important, a source of sediment that replenished agricultural fields, presumably made the canyon an extremely attractive place for newly arriving people from the northern San Juan River basin.

Paragraph 1

A truly remarkable transformation in settlement patterns occurred in the San Juan basin in northwestern New Mexico in the late tenth and early eleventh centuries, with small household farmsteads giving way to aggregated communities centered on communal masonry buildings that are now called “great houses.” These structures are found throughout the basin but are concentrated in Chaco Canyon, where several examples contained hundreds of rooms and reached four stories in height. The largest great house is Pueblo Bonito, with over 600 rooms covering two acres. The entire episode of great house construction in Chaco, the Bonito phase (A.D. 900-1140), was obviously a time of immense cooperative effort. At least 200,000 wooden beams averaging 5 meters long and 20 centimeters in diameter were brought to the canyon from distances between 40 and 100 kilometers away to build a dozen great houses, **signifying** a huge labor investment and a complex production process. The bulk of construction took place in the eleventh century, but by A.D. 1140 it had **ceased** abruptly, after which there was a rapid decline in use of the great houses and apparent abandonment of the canyon in the thirteenth century.

1. The word “**signifying**” in the passage is closest in meaning to
 - A. creating
 - B. indicating
 - C. initiating
 - D. requiring
2. The word “**ceased**” in the passage is closest in meaning to
 - A. slowed down
 - B. accelerated
 - C. stopped
 - D. changed in style
3. According to paragraph 1, all of the following provide evidence that the Bonito phase was a time of immense cooperative effort EXCEPT
 - A. the large amounts of material needed

- B. the size of the Pueblo Bonito complex
- C. the unusual materials used in construction
- D. the distance the materials needed to be transported

Paragraph 2

For more than a century archaeologists have struggled to understand the circumstances surrounding the rise and collapse of Chacoan society –dubbed the Chaco Phenomenon. In particular, research has focused on determining why such an apparently inhospitable place as Chaco, which today is extremely arid and has very short growing seasons, should have favored the concentration of labor that must have been required for such massive construction projects over brief periods of time. Until the 1970s, it was widely assumed that Chaco had been a forested oasis that attracted farmers who initially flourished but eventually fell victim to their own success and exuberance, as they denuded the canyon of trees and vegetation to build large great houses. In the 1980s this reconstruction was largely dismissed in response to evidence that there had never been a forest in Chaco, and that canyon soils had poor agricultural potential. As scientific interpretations about Chaco changed, the focus of explanatory models changed from the attractiveness of the canyon for farmers to the position of the canyon within a regional network of dispersed agricultural communities.

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4. 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. Researchers have tried to establish why an area as dry as Chaco was the site of such large construction efforts
 - B. Researchers have tried to establish whether the concentration of massive construction projects in a brief period of time made Chaco the dry area that it is today.
 - C. Researchers have established that Chaco's brief growing season required a concentration of labor to produce large quantities of food in a short period of time.

- D. Researchers have established that the hot, dry climate of Chaco forced workers to complete construction on large buildings in short periods of time.
5. According to paragraph 2, before 1970, scholars believed that Chacoan society collapsed because
- A. Chaco never had the forests that were needed for the development of a stable agricultural economy
 - B. farmers used up the natural resources in Chaco that had originally allowed the society to succeed
 - C. Chaco suffered a long-term drought that prevented farmers from growing enough food
 - D. laborers left Chaco to find other work after they finished building the great houses there
6. It can be inferred from paragraph 2 that the pre-1970s theory about the Chaco Phenomenon
- A. was based on the widespread farm and tool remains found by archaeologists on the site
 - B. was largely reinforced by findings in the 1980s
 - C. was not supported by substantial evidence
 - D. was so strong that it went unchallenged for many decades
7. The word “dispersed” in the passage is closest in meaning to
- A. connected
 - B. scattered
 - C. stable
 - D. developed
8. According to paragraph 2, why did scientists change their view about the cause of the collapse of Chacoan society?
- A. They found evidence that Chaco had always lacked trees and good soil.
 - B. They discovered that Chaco Canyon was much drier than they had previously

believed.

- C. They learned that the population was not large enough to supply the laborers needed to build the great houses.
- D. They found evidence that the farming economy was excessively concentrated in the central canyon.

Paragraph 3

The adoption of a regional perspective in explaining the Chaco Phenomenon was based in part on the discovery of formal trails connecting many of the great houses in Chaco, as well as linking the canyon to smaller great house located throughout the San Juan basin, the latter are referred to as Chaco“outliers.” These trails are densest around the concentration of great houses in the center, and the canyon itself is roughly at the center of the basin. Consequently, the canyon occupies the geographical and social center of the network formed by the connecting trails. The current consensus view is that religion provides the fundamental explanation for this centrifugal pattern.

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Paragraph 4

Archaeologists now describe Chaco during the Bonito phase as a location of high devotional expression and the pilgrimage center of a sacred landscape. These descriptions emphasize aspects of the archaeological record presumed to be associated with ritual activity, including caches of turquoise beads and pendants, unusual ceramic vessels and wooden objects, several rooms with multiple human burials, and especially the large number of kivas (multipurpose rooms used for religious, political, and social functions) found in great houses. Most of these indicators occur only at Pueblo bonito, but archaeologists generally assume that all the great houses had a similar ritual **function**. In fact, some scholars have suggested that the great houses were temples rather than residences.

- 9. According to paragraph 3 and 4, which of the following best describes how archaeologists arrived at their current view of the nature of Chaco during the Bonito phase?

- A. They discovered a large number of kivas, which probably served as temporary houses for pilgrims on their way to the main temple.
 - B. They found a series of paths leading to the outlines, which seem to have been centers of trade for makers of jewelry and other products.
 - C. They found turquoise beads and pendants and other valuable objects, leading to the theory that the great houses were wealthy residences.
 - D. They discovered many objects and rooms associated with ritual activity, leading to the theory that Chaco was a religious center.
10. The word “**function**” in the passage is closest in meaning to
- A. center
 - B. practice
 - C. design
 - D. purpose

Paragraph 5

However, new geological field studies in Chaco have produced results that may require a significant reassessment of the assumption that the canyon was not a favorable agricultural setting. It appears that during the first half of the eleventh century, during the extraordinary boom in construction, a large volume of water and suspended sediment flowed into the canyon. A large natural lake may have existed at the western end of Chaco, near the biggest concentration of great houses. The presence of large quantities of water and, equally important, a source of sediment that replenished agricultural fields, presumably made the canyon an extremely attractive place for newly arriving people from the northern San Juan River basin.

11. According to paragraph 5, what is the possible significance of new geological field studies in Chaco?
- A. They indicate that during the construction boom the Chaco area probably did have enough water and sediment to attract farmers to that area.
 - B. They could undermine the theory of Chaco as a religious center.

- C. They show the presence of excessive amounts of water, which may have led to the departure of most of the people living there during the Bonito phase.
 - D. They suggest that the kind of sediment present in Chaco in the eleventh century was not favorable for agriculture.
12. Why does the author state that “A large natural lake may have existed at the western end of Chaco, near the biggest concentration of great houses.”
- A. To suggest that geological studies are better than archaeological studies in identifying the historical uses of land
 - B. To demonstrate that large construction projects require a large population of workers
 - C. To support the idea that Chaco may have been favorable to agriculture during the Bonito phase
 - D. To show that the Chacoan people preferred to build their homes near water

■The adoption of a regional perspective in explaining the Chaco Phenomenon was based in part on the discovery of formal trails connecting many of the great houses in Chaco, as well as linking the canyon to smaller great house located throughout the San Juan basin, the latter are referred to as Chaco “outliers.” ■These trails are densest around the concentration of great houses in the center, and the canyon itself is roughly at the center of the basin. ■Consequently, the canyon occupies the geographical and social center of the network formed by the connecting trails. ■The current consensus view is that religion provides the fundamental explanation for this centrifugal pattern.

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

Scholars have attempted to find a reason for this weblike arrangement of great houses around a central canyon.

Where would the sentence best fit?

14. **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.**

The population of the Chaco Canyon in New Mexico changed significantly between the tenth and eleventh centuries, as evidenced by the remains of its great houses.

Answer Choices

- A. Before the 1970s, scholars believed that the fall of Chacoan society was caused by farmers' cutting down all the trees to build their great houses.
- B. After discovering trails connecting Chaco to surrounding communities, scholars came to believe that there were many forested oases to support those communities.
- C. Archaeological evidence has led current scholars to believe that Chaco was a religious center during the Bonito phase.
- D. Archaeological findings indicate that Chaco Canyon was completely abandoned by the end of the thirteenth century.
- E. Researchers' finding in the 1980s revealed that Chaco Canyon had been a fertile agricultural area that caused the population near the center of the canyon to increase steadily during the Bonito phase.
- F. Recent geological studies indicating the presence of water in Chaco Canyon in the eleventh century may alter scholars' belief that the area was not favorable for farming.

Plant and Animal Life of the Pacific Islands

There are both great similarities and considerable diversity in the ecosystems that evolved on the islands of Oceania in and around the Pacific Ocean. The islands, such as New Zealand, that were originally parts of continents still carry some small plant and animal remnants of their earlier biota (animal and plant life), and they also have been extensively modified by evolution, adaptation, and the arrival of new species. By contrast, the other islands, which emerged via geological processes such as volcanism, possessed no terrestrial life, but over long periods, winds, ocean currents, and the feet, feathers, and digestive tracts of birds brought the seeds of plants and a few species of animals. Only those species with ways of spreading to these islands were able to undertake the long journeys, and the various factors at play resulted in diverse combinations of new colonists on the islands. One estimate is that the distribution of plants was 75 percent by birds, 23 percent by floating, and 2 percent by wind.

The migration of Oceanic biota was generally from west to east, with four major factors influencing their distribution and establishment. The first was the size and fertility of the islands on which they landed, with larger islands able to provide hospitality for a wider range of species. Second, the further east the islands, generally the less the species diversity, largely because of the distance that had to be crossed and because the eastern islands tended to be smaller, more scattered, and remote. This easterly decline in species diversity is well demonstrated by birds and coral fish. It is estimated that there were over 550 species of birds in New Guinea, 127 in the Solomon Islands, 54 in Fiji, and 17 in the Society Islands. From the west across the Pacific, the Bismarck Archipelago and the Solomon Islands have more than 90 families of shore fish (with many species within the families), Fiji has 50 families, and the Society Islands have 30. Third, the latitude of the islands also influenced the biotic mix, as those islands in relatively cooler latitudes, notably New Zealand, were unsuited to supporting some of the tropical plants with which Pacific islands are generally associated.

Finally, a fourth major factor in species distribution, and indeed in the shaping of Pacific ecosystems, was wind. It takes little experience on Pacific islands to be aware that there are prevailing winds. To the north of the equator these are called north-easterlies, while to the south they are called south-easterlies. Further south, from about 30° south, the winds are generally from the west. As a result on nearly every island of significant size there is an ecological difference between its windward and leeward (away from the wind) sides. Apart from the wind action itself on plants and soils, wind has a major effect on rain distribution. The Big Island of Hawaii offers a prime example; one can leave Kona on the leeward side in brilliant sunshine and drive across to the windward side where the city of Hilo

is blanketed in mist and rain.

While such localized plant life and climatic conditions are very noticeable, over Oceania as a whole there is relatively little biodiversity, and the smaller the island and the further east it lies, the less there is likely to be. When humans moved beyond the islands of Near Oceania (Australia, New Guinea, and the Solomon Islands), they encountered no indigenous mammals except for flying foxes, fruit bats, and seals on some islands. Other vertebrate species were restricted to flying animals and a few small reptiles. However, local adaptations and evolution over long periods of isolation promoted fascinating species adaptations to local conditions. Perhaps most notable, in the absence of mammals and other predators, are the many species of flightless and ground-nesting birds. Another consequence of evolution was that many small environments boasted their own endemic (native) species, often small in number, unused to serious predation, limited in range, and therefore vulnerable to disruption. In Hawaii, for example, the highly adapted 39 species and subspecies of honeycreepers, several hundred species of fruit flies, and more than 750 species of tree snails are often cited to epitomize the extent of localized Oceanic endemism (species being native to the area).

Paragraph 1

There are both great similarities and considerable diversity in the ecosystems that evolved on the islands of Oceania in and around the Pacific Ocean. The islands, such as New Zealand, that were originally parts of continents still carry some small plant and animal **remnants** of their earlier biota (animal and plant life), and they also have been extensively modified by evolution, adaptation, and the arrival of new species. By contrast, the other islands, which emerged via geological processes such as volcanism, possessed no terrestrial life, but over long periods, winds, ocean currents, and the feet, feathers, and digestive tracts of birds brought the seeds of plants and a few species of animals. Only those species with ways of spreading to these islands were able to undertake the long journeys, and the various factors at play resulted in diverse combinations of new colonists on the islands. One estimate is that the distribution of plants was 75 percent by birds, 23 percent by floating, and 2 percent by wind.

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1. The word “**remnants**” in the passage is closest in meaning to

- A. remainders
- B. reminders
- C. reproductions
- D. resemblances

2. The passage supports which of the following statements about species on volcanic islands?

- A. Volcanic island species are unlike the species found in other Pacific Ocean locations.
 - B. Volcanic islands lack the diversity of species found elsewhere in the Pacific.
 - C. Volcanic island species are all transplants from distant locations and exist in combinations not found elsewhere.
 - D. Volcanic island species differ from those on other islands in that animal species have greater diversity than plant species do.
3. According to paragraph 1, how did the majority of plant species arrive on islands created by geological processes such as volcanism?
- A. They were transported by ocean currents.
 - B. They were carried to the islands by birds.
 - C. They were brought to the islands by humans.
 - D. They were transported by winds.

Paragraph 2

The migration of Oceanic biota was generally from west to east, with four major factors influencing their distribution and establishment. The first was the size and fertility of the islands on which they landed, with larger islands able to provide hospitality for a wider range of species. Second, the further east the islands, generally the less the species diversity, largely because of the distance that had to be crossed and because the eastern islands tended to be smaller, more scattered, and remote. This easterly decline in species diversity is well demonstrated by birds and coral fish. It is estimated that there were over 550 species of birds in New Guinea, 127 in the Solomon Islands, 54 in Fiji, and 17 in the Society Islands. From the west across the Pacific, the Bismarck Archipelago and the Solomon Islands have more than 90 families of shore fish (with many species within the families), Fiji has 50 families, and the Society Islands have 30. Third, the latitude of the islands also influenced the biotic mix, as those islands in relatively cooler latitudes, notably New Zealand, were unsuited to supporting some of the tropical plants with which Pacific islands are generally associated.

4. The word “remote” in the passage is closest in meaning to
- A. unknown
 - B. isolated
 - C. hostile
 - D. infertile
5. In paragraph 2, what is the author’s purpose in mentioning the estimated numbers of birds and coral fish species on various Oceanic islands?
- A. To give examples of the wide range of species that can be found on Oceanic

islands

B. To demonstrate how much knowledge about Oceanic species has been accumulated

C. To illustrate the decline in species diversity from west to east on Oceanic islands

D. To identify the influence of latitude upon Oceanic plants and animals

6. 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. Because of its latitude, New Zealand had a relatively cooler climate than other Pacific islands.

B. New Zealand, like other Pacific islands, showed the effects of latitudes on its rich tropical plants.

C. Because the latitudinal position of an island also affected its biotic mix, islands in cooler latitudes did not support some tropical species typical of the Pacific islands.

D. Pacific islands were notable for their impressive biotic mix and association with tropical plants.

7. According to paragraph 2, all of the following types of islands are associated with higher species diversity EXCEPT

A. islands that are large in size

B. islands located in cool latitudes

C. islands located in the western part of Oceania

D. islands located near other landmasses

Paragraph 3

Finally, a fourth major factor in species distribution, and indeed in the shaping of Pacific ecosystems, was wind. It takes little experience on Pacific islands to be aware that there are prevailing winds. To the north of the equator these are called north-easterlies, while to the south they are called south-easterlies. Further south, from about 30° south, the winds are generally from the west. As a result on nearly every island of significant size there is an ecological difference between its windward and leeward (away from the wind) sides. Apart from the wind action itself on plants and soils, wind has a major effect on rain distribution. The Big Island of Hawaii offers a prime example; one can leave Kona on the leeward side in brilliant sunshine and drive across to the windward side where the city of Hilo is blanketed in mist and rain.

8. The Big Island of Hawaii is discussed in the passage as an example of
- A. the relationship between latitude and wind
 - B. how prevailing winds influence rainfall patterns
 - C. the relationship between rainfall and species distribution
 - D. the effects of wind action upon plants and soils
9. What can be inferred from paragraph 3 about Kona and Hilo?
- A. The ecosystems of Kona and Hilo differ from each other.
 - B. Kona and Hilo have approximately the same rainfall in a given year.
 - C. Kona receives northeasterly winds while Hilo receives southeasterly winds.
 - D. Both Kona and Hilo have plants and soils that are often damaged by winds.

Paragraph 4

While such localized plant life and climatic conditions are very noticeable, over Oceania as a whole there is relatively little biodiversity, and the smaller the island and the further east it lies, the less there is likely to be. When humans moved beyond the islands of Near Oceania (Australia, New Guinea, and the Solomon Islands), they encountered no indigenous mammals except for flying foxes, fruit bats, and seals on some islands. Other vertebrate species were restricted to flying animals and a few small reptiles. However, local adaptations and evolution over long periods of isolation promoted fascinating species adaptations to local conditions. Perhaps most notable, in the absence of mammals and other predators, are the many species of flightless and ground-nesting birds. Another consequence of evolution was that many small environments boasted their own endemic (native) species, often small in number, unused to serious predation, limited in range, and therefore vulnerable to disruption. In Hawaii, for example, the highly adapted 39 species and subspecies of honeycreepers, several hundred species of fruit flies, and more than 750 species of tree snails are often cited to epitomize the extent of localized Oceanic endemism (species being native to the area).

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10. The word “cited” in the passage is closest in meaning to
- A. expected
 - B. believed
 - C. compared
 - D. mentioned
11. According to paragraph 4, why have species of flightless and ground-nesting birds become so numerous on Oceanic islands?
- A. They have no predators on the islands.
 - B. They were some of the strongest species to arrive on the islands.
 - C. They live closer to their food sources than other species do.

D. They are affected less by climatic changes than other animals are.

12. Which of the following is NOT mentioned in paragraph 4 about the species that live on Oceanic islands?

- A. Certain species are native only to particular islands.
- B. Species that are native to Oceanic islands include relatively few mammals.
- C. Populations of most species are small in number.
- D. Some species have evolved over time to become predators.

Paragraph 1

There are both great similarities and considerable diversity in the ecosystems that evolved on the islands of Oceania in and around the Pacific Ocean. [A] The islands, such as New Zealand, that were originally parts of continents still carry some small plant and animal remnants of their earlier biota (animal and plant life), and they also have been extensively modified by evolution, adaptation, and the arrival of new species. [B] By contrast, the other islands, which emerged via geological processes such as volcanism, possessed no terrestrial life, but over long periods, winds, ocean currents, and the feet, feathers, and digestive tracts of birds brought the seeds of plants and a few species of animals. [C] Only those species with ways of spreading to these islands were able to undertake the long journeys, and the various factors at play resulted in diverse combinations of new colonists on the islands. [D] One estimate is that the distribution of plants was 75 percent by birds, 23 percent by floating, and 2 percent by wind.

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13. Look at the four choices that indicate where the following sentence could be added to the passage.

When varied ecosystems are present, they can be explained as resulting in part from the process that formed the islands.

Where would the sentence best fit? Click on a choice to add the sentence to the passage.

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

passage or are minor ideas in the passage. This question is worth 2 points.

Drag your choices to the spaces where they belong. To review the passage, click on **View Text**.

Biodiversity on Oceanic islands is dependent on a number of factors.

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-
-

Answer Choices

- A. Unlike Oceanic islands that were once part of continental landmasses, islands formed by such geological processes as volcanism contain only plants and animals that could be transported there.
- B. An island's size is less important than its latitude in determining species diversity.
- C. Though biodiversity is low on many Oceanic islands, many native species have evolved that are uniquely adapted to their local environments.
- D. Species distribution in Oceania is determined by the location of islands, their size, and the direction of the wind.
- E. Most Oceanic islands are similar to one another in latitude and contain plants and animals typical of tropical islands.

The absence of natural predators on the eastern Oceanic islands allowed many species of large mammals to evolve that were capable of inhabiting a wide range of territory.

Dinosaurs and Parental Care

From fossil evidence alone the question of whether or not dinosaurs cared for their young is very difficult to answer. Because behaviors are not preserved in the fossil record, we can only make inferences from indirect evidence. Parental care can be divided into two types of behavior, prehatching (building nests and incubating eggs—for example, sitting on top of them so as to warm the eggs and encourage hatching) and posthatching (feeding the young and guarding the nests). Most of our evidence comes from alleged dinosaur rookeries (places where nests are built). Several have been excavated in eastern Montana, where a large concentration of dinosaur nests was found at a place now called Egg Mountain. Most of these probably belonged to the hadrosaur *Maiasaura*. Preserved in these nests are the bones of baby dinosaurs. The finds at Egg Mountain and other sites around the world document that dinosaurs laid their eggs in nests.

The nests at Egg Mountain are reported to be equally spaced, separated by as much space corresponding to the length of an adult *Maiasaura*. From this arrangement scientists have inferred that the nests were separated in this way to allow incubation in a tightly packed nesting colony. Although this interpretation is open to challenge, the discovery of *Oviraptor* adults on top of *Oviraptor* egg clutches (as determined by embryos in some eggs), is relatively powerful evidence that at least these dinosaurs incubated their nests.

Evidence for parental care following hatching is much more controversial. Behavioral speculation based on indirect fossil evidence is dangerous because the data is not always as unambiguous as might appear. At Egg Mountain, many nests contain baby dinosaur bones. Not all the dinosaurs in the nest are the same size. Many of the small bones found in the nests are associated with jaws and teeth, teeth that show signs of wear. It seems reasonable to assume that the wear was caused by the chewing of the coarse plants that were the hatchlings' diet. Because the young were still in the nest, this food may have been brought to the rookery by foraging adults. This line of reasoning suggests that these animals had an advanced system of parental care. A closer look at the evidence clouds this interpretation. Analysis of dinosaur embryos indicates that worn surfaces are present on the teeth

of juveniles even before hatching. Just at a human baby moves inside the mother before birth, modern-day archosaurs also grind their teeth before birth, wearing the surface in some spots. Thus, the fossil evidence for an advanced parental care system in extinct dinosaurs is suggestive but inconclusive, and it is hard even to imagine the sort of paleontologic discovery that could settle this debate for good.

The strongest evidence that extinct dinosaurs had some form of advanced parental care system is based on an understanding of the phylogenetic relationships among dinosaurs and their closest living relatives. Living dinosaurs (birds), even primitive ones such as ostriches and kiwis, exhibit parental care, so some form of parental care can be inferred to have existed in the last common ancestor of all birds. Although unappreciated, crocodiles are reptiles that are also caring parents. They build nests, guard the nests, and in some cases dig their young out of the nest when they hear the chirping young ones hatching. The young even communicate with each other while still in the egg by high-frequency squeaks (as birds do). Some evidence suggests that this squeaking is a cue for the synchronization of the hatching. Since birds and crocodiles share a common ancestor, the simplest explanation for the characteristics they share (such as nest building and some form of parental care) is that they evolved only once—that these attributes were present in their common ancestor and passed on to its descendants. Because extinct dinosaurs also descended from that ancestor, the simplest and most general theory is that extinct dinosaurs also shared these characteristics, even though they cannot be directly observed, and we cannot be sure how elaborate their parental care was.

Paragraph 1

From fossil evidence alone the question of whether or not dinosaurs cared for their young is very difficult to answer. Because behaviors are not preserved in the fossil record, we can only make inferences from indirect evidence. Parental care can be divided into two types of behavior, prehatching (building nests and incubating eggs—for example, sitting on top of them so as to warm the eggs and encourage hatching) and posthatching (feeding the young and guarding the nests). Most of our evidence comes from alleged dinosaur rookeries (places where nests are built). Several have been excavated in eastern Montana, where a large

concentration of dinosaur nests was found at a place now called Egg Mountain. Most of these probably belonged to the hadrosaur *Maiasaura*. Preserved in these nests are the bones of baby dinosaurs. The finds at Egg Mountain and other sites around the world document that dinosaurs laid their eggs in nests.

1. The word “alleged” in the passage is closest in meaning to
 - A. scattered
 - B. supposed
 - C. isolated
 - D. exposed

2. Paragraph 1 answers which of the following questions about parental care in dinosaurs?
 - A. Which type of parental care was more important for the survival of dinosaur young, prehatching care or posthatching care?
 - B. Why were dinosaur remains in eastern Montana preserved rather than destroyed over time?
 - C. Did *Maiasaura* hadrosaurs provide types of parental care not provided by other dinosaurs?
 - D. What evidence supports the view that *Maiasaura* females laid their eggs in nests?

Paragraph 2

The nests at Egg Mountain are reported to be equally spaced, separated by as much as the length of an adult *Maiasaura*. From this arrangement scientists have inferred that the nests were separated in this way to allow incubation in a tightly packed nesting colony. Although this interpretation is open to challenge, the discovery of *Oviraptor* adults on top of *Oviraptor* egg clutches (as determined by embryos in some eggs), is relatively powerful evidence that at least these dinosaurs incubated their nests.

3. According to paragraph 1 and 2, the fossil record most clearly shows that

dinosaurs engaged in which of the following behaviors?

- A. Laying eggs in nests
- B. Hiding eggs
- C. Feeding young
- D. Storing food

4. According to paragraph 2, which of the following supports of the theory that the *Maiasaura* incubated their eggs?

- A. The examination of embryos found in some eggs.
- B. The large concentration of nests in one location.
- C. The amount of space between nests.
- D. The discovery of adult *Maiasaura* bones on top of egg clutches.

Paragraph 3

Evidence for parental care following hatching is much more controversial. Behavioral speculation based on indirect fossil evidence is dangerous because the data is not always as unambiguous as might appear. At Egg Mountain, many nests contain baby dinosaur bones. Not all the dinosaurs in the nest are the same size. Many of the small bones found in the nests are associated with jaws and teeth, teeth that show signs of wear. It seems reasonable to assume that the wear was caused by the chewing of the coarse plants that were the hatchlings' diet. Because the young were still in the nest, this food may have been brought to the rookery by foraging adults. This line of reasoning suggests that these animals had an advanced system of parental care. A closer look at the evidence clouds this interpretation. Analysis of dinosaur embryos indicates that worn surfaces are present on the teeth of juveniles even before hatching. Just as a human baby moves inside the mother before birth, modern-day archosaurs also grind their teeth before birth, wearing the surface in some spots. Thus, the fossil evidence for an advanced parental care system in extinct dinosaurs is suggestive but inconclusive, and it is hard even to imagine the sort of paleontologic discovery that could settle this debate for good.

5. The word “**controversial**” in the passage is closest in meaning to

- A. limited
 - B. convincing
 - C. relevant
 - D. debatable
6. The word “**inconclusive**” in the passage is closest in meaning to
- A. not decisive
 - B. insignificant
 - C. not valid
 - D. misleading
7. According to paragraph 3, the patterns of wear found on the teeth of young dinosaurs may indicate which of the following?
- A. Baby dinosaurs were eating food brought to them by their parents.
 - B. Early development of jaw and teeth varied according to a dinosaur's size.
 - C. Dinosaurs went foraging for food at an early age.
 - D. Baby dinosaurs did not begin to eat solid food until after they left the nest.
8. In paragraph 3, why does the author mention that baby archosaurs ground their teeth inside the egg?
- A. To support the claim that baby dinosaurs in the eggs shared certain behaviors with human babies before birth.
 - B. To contrast the behavior of baby archosaurs with that of other types of dinosaurs.
 - C. To cast doubt on the claim that adult dinosaurs fed their hatchlings in the nest.
 - D. To explain why the teeth of baby archosaurs were more worn than those of other juveniles.

Paragraph 4

The strongest evidence that extinct dinosaurs had some form of advanced parental care system is based on an understanding of the phylogenetic

relationships among dinosaurs and their closest living relatives. Living dinosaurs (birds), even primitive ones such as ostriches and kiwis, exhibit parental care, so some form of parental care can be inferred to have existed in the last common ancestor of all birds. Although unappreciated, crocodiles are reptiles that are also caring parents. They build nests, guard the nests, and in some cases dig their young out of the nest when they hear the chirping young ones hatching. The young even communicate with each other while still in the egg by high-frequency squeaks (as birds do). Some evidence suggests that this squeaking is a cue for the synchronization of the hatching. Since birds and crocodiles share a common ancestor, the simplest explanation for the characteristics they share (such as nest building and some form of parental care) is that they evolved only once—that these attributes were present in their common ancestor and passed on to its descendants. Because extinct dinosaurs also descended from that ancestor, the simplest and most general theory is that extinct dinosaurs also shared these characteristics, even though they cannot be directly observed, and we cannot be sure how elaborate their parental care was.

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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.

Phylogenetic: having to do with evolutionary development

- A. The simplest explanation for the similarities between birds and crocodiles is that they evolved at the same time.
- B. A common ancestor is probably the source of the shared traits of crocodiles and birds.
- C. The originally similar traits of birds and crocodiles increased after evolving through a shared ancestor.
- D. Only one shared pattern of behavior —that of nest building —was present in the common ancestor of birds and crocodiles.

10. The word “elaborate” in the passage is closest in meaning to

- A. widespread

- B. reliable
 - C. well developed
 - D. long lasting
11. Paragraph 4 answers all of the following questions about crocodiles EXCEPT
- A. What is the evidence that crocodiles are caring parents?
 - B. Why do crocodile parents communicate with the young inside their eggs?
 - C. What is a possible reason for the high-frequency sounds that crocodiles make inside their eggs?
 - D. How do crocodiles participate in the hatching process of their young?
12. In paragraph 4, the author discuss birds and crocodiles in order to
- A. contrast patterns of parenting behavior in both living and extinct animals.
 - B. provide evidence that sophisticated parental care behaviors evolved only relatively recently.
 - C. demonstrate that parental care behaviors have continued to evolve since the time of the dinosaurs.
 - D. support the theory that extinct dinosaurs probably inherited some kind of parental care system.

From fossil evidence alone the question of whether or not dinosaurs cared for their young is very difficult to answer. Because behaviors are not preserved in the fossil record, we can only make inferences from indirect evidence. Parental care can be divided into two types of behavior, prehatching (building nests and incubating eggs—for example, sitting on top of them so as to warm the eggs and encourage hatching) and posthatching (feeding the young and guarding the nests).

■ Most of our evidence comes from alleged dinosaur rookeries (places where nests are built). ■ Several have been excavated in eastern Montana, where a large concentration of dinosaur nests was found at a place now called Egg Mountain. Most of these probably belonged to the hadrosaur *Maiasura*. Preserved in these nests are the bones of baby dinosaurs. The finds at Egg Mountain and other sites around the world document that dinosaurs laid their eggs in nests.

13. Look at the four squares [■] that indicate where the following sentence could

be added to the passage.

Evidence of the former is easier to find than that of the latter.

Where would the sentence best fit?

14. **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.**
Scientists must use indirect evidence to determine whether extinct dinosaurs cared for their young.

Answer choices

- A. Because baby dinosaur bones and eggs were very delicate, there are relatively few preserved as fossils, so little is known about dinosaur young.
- B. Fossils from sites like Egg Mountain indicate that dinosaurs built nests, and perhaps that they incubated their eggs and fed their hatchlings.
- C. Fossil evidence such as the spacing of nests may indicate advanced parental care but can have different interpretations.
- D. Tightly packed Oviraptor rookeries indicate that dinosaurs may have tended to nest in large colonies in order to better protect both eggs and hatchlings.
- E. Discovery of hadrosaur bones of different sizes in the same nest may indicate that, in some species, older siblings took care of younger ones.
- F. The strongest evidence comes from extinct dinosaurs' nearest living relatives, birds and crocodiles, who do engage in many forms of parental care.

Colonial America and the Navigation Acts

In the seventeenth and eighteenth centuries, the British parliament enacted a number of laws, called Navigation Acts, governing commerce between Britain and its overseas colonies. For example, the Navigation Acts of 1660 and 1663 barred the empire's colonial merchants from exporting such commodities as sugar and tobacco anywhere except to England and from importing goods in non-English ships. Similarly, the Molasses Act of 1733 taxed all foreign molasses (a thick liquid drained from sugarcane and used to make rum) entering the mainland American colonies at sixpence per gallon. This act was intended less to raise revenue than to serve as a protective tariff (tax) that would benefit British West Indian sugar producers at the expense of their French rivals. By 1750 a long series of Navigation Acts were in force, with several effects on the North American colonial economy.

For one thing, the laws limited all imperial trade to British ships, defined as those with British ownership and crews that were three-quarters British. For purposes of the legislation, Parliament classified all colonists as British. This restriction not only contributed to Great Britain's rise as Europe's foremost shipping nation but also laid the foundations for an American shipbuilding industry and merchant marine. By the 1750s one-third of all imperial vessels were American-owned, mostly by merchants in the northeast and in mid-Atlantic colonies. The swift growth of this merchant marine diversified the northern colonial economy and made it more self-sufficient. The expansion of colonial shipping in turn accelerated urbanization by creating a need for centralized docks, warehouses, and repair shops in the colonies. By 1770 Philadelphia and New York City had emerged as two of the British Empire's busiest ports.

The Navigation Acts also barred the export of certain "enumerated goods" to foreign nations unless those items first passed through England or Scotland. The American mainland's chief items of this sort were tobacco, rice, furs, indigo (a Carolina plant that produced a blue dye), and naval supplies (such as masts and tar). Parliament never restricted grain, livestock, fish, lumber, or rum, which altogether made up 60 percent of American colonial exports. Furthermore, Anglo-American exporters of tobacco and rice—the chief commodities affected by enumeration—had their burdens reduced by two significant concessions. First, Parliament gave tobacco growers a monopoly over the British market by excluding foreign tobacco, even though this hurt British consumers. (Rice planters enjoyed a natural monopoly because they had no competitors.) Second, Parliament tried to minimize the added cost of landing tobacco and rice in Britain (where customs officials collected duties on both) by refunding the duties on all tobacco and rice that the colonists later shipped to other countries.

The navigation system's impact on the colonies encouraged economic diversification as well. Parliament used British tax money to pay modest incentives

to Americans producing such items as silk, iron, dyes, hemp, and lumber, which Britain would otherwise have had to import from other countries, and it raised the price of commercial rivals' imports by imposing protective tariffs on them. The trade laws did prohibit Anglo-Americans from competing with large-scale British manufacturing of certain products, most notably clothing. However, colonial tailors, hatters, and other small clothes manufacturers could continue to make any item of dress in their households or small shops. Manufactured by low-paid labor, British clothing imports generally undersold whatever the colonists could have produced given their higher labor costs. The colonists were also free to produce iron and built numerous ironworks.

Finally, the Navigation Acts made the colonies a protected market for low-priced consumer goods and other exports from Britain. Steady overseas demand for colonial products created a prosperity that enabled colonists to consume ever-larger amounts not only of clothing but of dishware, home furnishings, tea, and a range of other items both produced in Britain and imported by British and colonial merchants from elsewhere. Consequently, the share of British exports sold to the colonies rapidly increased from just 5 percent in 1700 to almost 40 percent by 1760. Cheap imported goods enabled many colonists to adopt a lifestyle similar to that of middle-class Britons.

Paragraph 1

In the seventeenth and eighteenth centuries, the British parliament enacted a number of laws, called Navigation Acts, governing commerce between Britain and its overseas colonies. For example, the Navigation Acts of 1660 and 1663 barred the empire's colonial merchants from exporting such commodities as sugar and tobacco anywhere except to England and from importing goods in non-English ships. Similarly, the Molasses Act of 1733 taxed all foreign molasses (a thick liquid drained from sugarcane and used to make rum) entering the mainland American colonies at sixpence per gallon. This act was intended less to raise revenue than to serve as a protective tariff (tax) that would benefit British West Indian sugar producers at the expense of their French rivals. By 1750 a long series of Navigation Acts were in force, with several effects on the North American colonial economy.

1. According to paragraph 1, the Navigation Acts of 1660 and 1663 did not allow
 - A. importing goods without paying taxes on them
 - B. importing goods made outside the British Empire
 - C. using English ships to transport goods to non-British colonies
 - D. using non-English ships to bring in goods from outside the colonies
2. What was the purpose of "the Molasses Act of 1733"?
 - A. To produce the funds needed to protect British West Indian sugar

producers from attack by the French

- B. To give British sugar producers in the West Indies an advantage over their French rivals
- C. To prevent rum from being made outside of the British West Indies
- D. To discourage the mainland American colonies from importing molasses

Paragraph 2

For one thing, the laws limited all imperial trade to British ships, defined as those with British ownership and crews that were three-quarters British. For purposes of the legislation, Parliament classified all colonists as British. This restriction not only contributed to Great Britain's rise as Europe's foremost shipping nation but also laid the foundations for an American shipbuilding industry and merchant marine. By the 1750s one-third of all imperial vessels were American-owned, mostly by merchants in the northeast and in mid-Atlantic colonies. The **swift** growth of this merchant marine diversified the northern colonial economy and made it more self-sufficient. The expansion of colonial shipping in turn accelerated urbanization by creating a need for centralized docks, warehouses, and repair shops in the colonies. By 1770 Philadelphia and New York City had emerged as two of the British Empire's busiest ports.

3. The word "**swift**" in the passage is closest in meaning to

- A. gradual
- B. fast
- C. protective
- D. long-term

4. According to paragraph 2, the Navigation Acts had all of the following effects on the northern colonies in North America EXCEPT:

- A. The region's economic dependence on Britain declined.
- B. The region's ports became increasingly busy.
- C. Shipbuilding and related industries grew in strength.
- D. Ownership of vessels by merchants in the northeast and mid-Atlantic colonies declined.

Paragraph 3

The Navigation Acts also barred the export of certain "enumerated goods" to foreign nations unless those items first passed through England or Scotland. The American mainland's chief items of this sort were tobacco, rice, furs, indigo (a Carolina plant that produced a blue dye), and naval supplies (such as masts and tar). Parliament never restricted **grain, livestock, fish, lumber, or rum**, which altogether made up 60 percent of American colonial exports. Furthermore, Anglo-

American exporters of tobacco and rice—the chief commodities affected by enumeration—had their burdens reduced by two **significant** concessions. First, Parliament gave tobacco growers a monopoly over the British market by excluding foreign tobacco, even though this hurt British consumers. (Rice planters enjoyed a natural monopoly because they had no competitors.) Second, Parliament tried to minimize the added cost of landing tobacco and rice in Britain (where customs officials collected duties on both) by refunding the duties on all tobacco and rice that the colonists later shipped to other countries.

5. Select the TWO answer choices that, according to paragraph 3, indicate how the Navigation Acts affected rice and tobacco exporters. To receive credit, you must select TWO answer choices.

- A. They first had to ship their products to either England or Scotland before shipping them elsewhere.
- B. Their exports were reduced by 60 percent.
- C. They received special concessions by Parliament.
- D. They had to use their own ships to export their products.

6. The author mentions “grain, livestock, fish, lumber, or rum” in the passage in order to

- A. indicate the colonial exports that were affected by enumeration
- B. provide examples of important commodities that had not been allowed to be exported before the Navigation Acts were introduced
- C. explain why Britain decided to introduce the Navigation Acts
- D. show how North American exporters quickly increased the exports of certain products to compensate for the restrictions imposed by the Navigation Acts

7. The word “**significant**” in the passage is closest in meaning to

- A. problematic
- B. considerable
- C. minor
- D. temporary

Paragraph 4

The navigation system’s impact on the colonies encouraged economic diversification as well. Parliament used British tax money to pay **modest** incentives to Americans producing such items as silk, iron, dyes, hemp, and lumber, which Britain would otherwise have had to import from other countries, and it raised the price of commercial rivals’ imports by imposing protective tariffs on them. The trade laws did prohibit Anglo-Americans from competing with large-scale British manufacturing of certain products, most notably clothing. However, colonial

tailors, hatters, and other small clothes manufacturers could continue to make any item of dress in their households or small shops. Manufactured by low-paid labor, British clothing imports generally undersold whatever the colonists could have produced given their higher labor costs. The colonists were also free to produce iron and built numerous ironworks.

8. The word “modest” in the passage is closest in meaning to

- A. direct
- B. relatively small
- C. adequate
- D. various

9. Paragraph 4 supports which of the following statements about why Britain did not pass laws restricting the small-scale manufacture of clothing in the colonies?

A. Such clothing presented no serious competition to clothing imported from Britain.

B. The British realized that any attempt to enforce such laws would be ineffective.

C. Clothing manufactured in the American colonies generally did not sell well in Britain.

D. The quality of clothing produced in the colonies was lower than that of British clothing.

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Paragraph 5

Finally, the Navigation Acts made the colonies a protected market for low-priced consumer goods and other exports from Britain. Steady overseas demand for colonial products created a prosperity that enabled colonists to consume ever-larger amounts not only of clothing but of dishware, home furnishings, tea, and a range of other items both produced in Britain and imported by British and colonial merchants from elsewhere. Consequently, the share of British exports sold to the colonies rapidly increased from just 5 percent in 1700 to almost 40 percent by 1760. Cheap imported goods enabled many colonists to adopt a lifestyle similar to that of middle-class Britons.

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. British and colonial merchants prospered because of a demand in the colonies for increasing amounts of consumer goods made in Britain.

B. Both the colonists and the British increasingly consumed clothing and other household items imported from foreign countries by colonial merchants.

C. The wealth gained from exporting their products enabled the colonists to buy increasing quantities of consumer goods brought into North America by British and colonial merchants.

D. As merchants increased their wealth, they began to widen the range of products they exported from North America to Britain and the British colonies elsewhere.

11. The word “Consequently” in the passage is closest in meaning to

- A. However
- B. Similarly
- C. In addition
- D. Therefore

12. According to paragraph 5, which of the following was one effect that the Navigation Acts had during the period from 1700 to 1760?

A. They reduced the attractiveness of most locally produced commodities for the American colonists.

B. They protected colonial merchants from having to compete with low-priced imports.

C. They greatly increased the importance of the American colonies as purchasers of British exports.

D. They raised the production costs for many commodities manufactured in the American colonies.

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Paragraph 3

The Navigation Acts also barred the export of certain “enumerated goods” to foreign nations unless those items first passed through England or Scotland. The American mainland’s chief items of this sort were tobacco, rice, furs, indigo (a Carolina plant that produced a blue dye), and naval supplies (such as masts and tar). Parliament never restricted grain, livestock, fish, lumber, or rum, which altogether made up 60 percent of American colonial exports. Furthermore, Anglo-American exporters of tobacco and rice—the chief commodities affected by enumeration—had their burdens reduced by two significant concessions. [A] First, Parliament gave tobacco growers a monopoly over the British market by excluding foreign tobacco, even though this hurt British consumers. [B] (Rice planters enjoyed a natural monopoly because they had no competitors.) [C] Second, Parliament tried to minimize the added cost of landing tobacco and rice in Britain (where customs officials collected duties on both) by refunding the duties on all

tobacco and rice that the colonists later shipped to other countries. [D]

13. Look at the four choices that indicate where the following sentence could be added to the passage.

About 85 percent of all North American tobacco and rice was eventually reexported and sold outside the British Empire.

Where would the sentence best fit? Click on a choice to add the sentence to the passage.

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

Drag your choices to the spaces where they belong. To review the passage, click on View Text.

The Navigation Acts put in place by Britain had significant effects on the economy of the American colonies.

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Answer Choices

- A. The acts were originally designed to force the French to gradually abandon their American colonies.
- B. Although the acts restricted colonists from exporting certain goods directly to foreign nations, important colonial products enjoyed both reduced duties and a monopoly of the British market.
- C. The British refusal to allow tobacco imports from foreign nations hurt both British consumers and the American colonial tobacco planters.
- D. The acts limited trade with the Empire to British ships, but by classifying all colonists as British, the acts allowed North Americans to develop their own ships.
- E. High tariffs on imports from the colonies served to protect British-made goods from having to compete with the less expensive goods the colonists could produce using low-cost labor.
- F. Trade laws protected some British manufacturing from colonial competition but encouraged colonial economic prosperity while making cheap British consumer goods ready available.

Mass Production: Method and Impact

The technological and managerial innovations of Thomas Alva Edison (the inventor of electricity) and the industrial leaders Andrew Carnegie (iron and steel) and John D. Rockefeller (oil) proved readily adaptable throughout United States industry, spurring marvels of productivity. Late-nineteenth-century industrialists often discovered that their factories produced more goods than the market could absorb. This was particular true in two kinds of businesses: those that manufactured devices for individual use, such as sewing machines and farm implements, and those that mass-produced consumer goods, such as matches, flour, soap, canned foods, and processed meats. Not surprisingly, these industries were trailblazers in developing advertising and marketing techniques. Strategies for encouraging consumer demand and for differentiating one product from another were an important component of the American post-Civil War industrial transformation.

The growth of the flour industry illustrates both the spread of mass production and the emergence of new marketing concepts. In the 1870s the nation's flour mills adopted the most advanced European manufacturing technologies and installed continuous-process machines that graded, cleaned, hulled, and packaged their product in one rapid operation. These companies, however, soon produced more flour than they could see. To sell this excess, the mills thought up new product lines, such as cake flours and breakfast cereals, and sold them using easy-to-remember brand names.

Through brand names, trademarks, guarantees, and slogans, manufacturers built demand for their products and won remarkable consumer loyalty. Americans in large numbers bought a brand of soap first made in Cincinnati, Ohio, because of the absurd overly precise but impressive pledge that it was "99 and 44/100ths percent pure." In the photographic field, George Eastman in the 1880s developed a paper-based photographic film as an alternate to the bulky, fragile glass plates then in use. Manufacturing a cheap camera for the masses and devising a catchy slogan ("you just press the button, we do the rest"). Eastman introduced a system whereby customers returned the 100-exposure film and the camera to the Rochester, New York, factory. There the film was developed, the camera reloaded, and everything shipped back to the customer—for a charge of ten dollars. In marketing a new technology, Eastman had revolutionized an industry and democratized a visual medium previously confined to a few.

By 1900 the chaos of early industrial competition, when thousands of small companies had struggled to enter a national market, had given way to an economy dominated by a few enormous firms. An industrial transformation that originated in railroading and expanded to steel and petroleum had spread to every area of United States business, and for those who could not compete in the era's

unforgiving economic environment, the cost could be measured in ruined fortunes, bankrupted companies, and shattered dreams. John D. Rockefeller, talking about businesses he wanted to acquire, said he wanted “only the big ones, one those who have already proved they can do a big business. As for the others, unfortunately they will have to die.”

The cost was high, too, for millions of American workers, immigrant and native born alike. The new industrial order was built on the backs of an army of laborers who were paid subsistence wages and who could be fired on a moment’s notice when hard times or new technologies made them expendable. Moreover, industrialization often devastated the environment with pollution in the relentless drive for efficiency and profit.

To be sure, this industrial revolution brought social benefits as well, in the form of labor-saving products, lower prices, and advances in transportation and communications. The benefits and liabilities were inextricably interconnected. The sewing machine, for example, created thousands of new factory jobs, made available a wider variety of clothing, and eased the lives of millions of consumers. At the same time, it encouraged greedy entrepreneurs to operate factories in which the poor worked long hours in unhealthy conditions pitifully low wages.

Whatever the final balance sheet of social gains and costs, one thing was clear: the United States had forced its way onto the world stage as an industrial nation, and the groundwork had been laid for a new social and economic order in the twentieth century.

Paragraph 1

The technological and managerial innovations of Thomas Alva Edison (the inventor of electricity) and the industrial leaders Andrew Carnegie (iron and steel) and John D. Rockefeller (oil) proved readily adaptable throughout United States industry, spurring marvels of productivity. Late-nineteenth-century industrialists often discovered that their factories produced more goods than the market could absorb. This was particular true in two kinds of businesses: those that manufactured devices for individual use, such as sewing machines and farm implements, and those that mass-produced consumer goods, such as matches, flour, soap, canned foods, and processed meats. Not surprisingly, these industries were trailblazers in developing advertising and marketing techniques. Strategies for encouraging consumer demand and for differentiating one product from another were an important **component** of the American post-Civil War industrial transformation.

1. The word “**component**” in the passage is closet in meaning to
 - A. theme
 - B. development

- C. part
- D. tool

2. According to paragraph 1, which of the following statements is true of Edison, Carnegie, and Rockefeller?

- A. They were famous inventors who became rich factory owners.
- B. They were the first to develop advertising and marketing techniques.
- C. Their ideas and methods were used to transform United States industry.
- D. Their companies produced mechanical devices and consumer goods.

3. According to paragraph 1, all of the following contributed to the industrial transformation in the post-Civil War United States EXCEPT

- A. a greater variety of consumer products
- B. new technological and managerial methods
- C. mass production of goods
- D. development of advertising and marketing techniques

Paragraph 2

The growth of the flour industry illustrates both the spread of mass production and the emergence of new marketing concepts. In the 1870s the nation's flour mills adopted the most advanced European manufacturing technologies and installed continuous-process machines that graded, cleaned, hulled, and packaged their product in one rapid operation. These companies, however, soon produced more flour than they could see. To sell this excess, the mills thought up new product lines, such as cake flours and breakfast cereals, and sold them using easy-to-remember brand names.

4. According to paragraph 2, the new technologies used by the flour mills led the flour industry to do which of the following?

- A. Produce additional flour to export to Europe
- B. Adopt European methods of marketing flour to consumers
- C. Produce goods based on market research of customer needs
- D. Develop special new products with easily recognizable names

Paragraph 3

Through brand names, trademarks, guarantees, and slogans, manufacturers built demand for their products and won remarkable consumer loyalty. Americans in large numbers bought a brand of soap first made in 1897 in Cincinnati, Ohio, because of the absurd overly precise but impressive pledge that it was "99 and 44/100ths percent pure." In the photographic field, George Eastman in the 1880s developed a paper-based photographic film as an alternate to the bulky, fragile

glass plates then in use. Manufacturing a cheap camera for the masses and devising a catchy slogan (“you just press the button, we do the rest”). Eastman introduced a system whereby customers returned the 100-exposure film and the camera to the Rochester, New York, factory. There the film was developed, the camera reloaded, and everything shipped back to the customer—for a charge of ten dollars. In marketing a new technology, Eastman had revolutionized an industry and democratized a visual medium previously confined to a few.

5. The word “remarkable” in the passage is closest in meaning to

- A. immediate
- B. extraordinary
- C. apparent
- D. steady

6. Why does the author mention a soap advertised as “99 and 44/100ths percent pure”?

- A. To make the point that the earliest product advertisements were very sophisticated
- B. To support the claim that advertising was effective in building demand and customer loyalty
- C. To suggest that the claims made by soap manufacturers were obviously untrue
- D. To contrast the ways in which soap and photographic processing were marketed

7. The phrase “confined to” in the passage is closest in meaning to

- A. available to
- B. known to
- C. limited to
- D. attractive to

8. According to paragraph 3, which of the following statements about George Eastman’s innovations in photography is true?

- A. He introduced a paper-based photographic film that was easy for customers to develop on their own.
- B. He manufactured a camera that was more expensive but easier to operate than earlier cameras.
- C. He introduced a system in which customers could exchange defective film and cameras for new ones.
- D. He provided customers with the service of developing their film and reloading their cameras.

Paragraph 4

By 1900 the chaos of early industrial competition, when thousands of small companies had struggled to enter a national market, had given way to an economy dominated by a few enormous firms. An industrial transformation that originated in railroading and expanded to steel and petroleum had spread to every area of United States business, and for those who could not compete in the era's unforgiving economic environment, the cost could be measured in ruined fortunes, bankrupted companies, and shattered dreams. John D. Rockefeller, talking about businesses he wanted to acquire, said he wanted "only the big ones, one those who have already proved they can do a big business. As for the others, unfortunately they will have to die."

9. According to paragraph 4, which of the following is true of the economic situation of the United States in the 1900s?

- A. A group of national industries was controlled by a single company.
- B. Many small companies failed and a few large companies dominated the economy.
- C. The expansion of the steel and petroleum industries depended on the railroad companies.
- D. A new national market made it possible for thousands of small companies to compete for business.

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Paragraph 5

The cost was high, too, for millions of American workers, immigrant and native born alike. The new industrial order was built on the backs of an army of laborers who were paid subsistence wages and who could be fired on a moment's notice when hard times or new technologies made them expendable. Moreover, industrialization often devastated the environment with pollution in the **relentless** drive for efficiency and profit.

10. The word "**relentless**" in the passage is closest in meaning to

- A. competitive
- B. unceasing
- C. reckless
- D. passionate

11. Which of the following can be inferred about the new technologies mentioned in paragraph 5?

- A. They were sometimes too expensive to introduce in the workplace.
- B. They forced laborers to work in more systematic ways.

- C. They helped to reduce the impact of industrialization on the environment.
- D. They helped make it possible for industries to reduce the workforce.

Paragraph 6

To be sure, this industrial revolution brought social benefits as well, in the form of labor-saving products, lower prices, and advances in transportation and communications. The benefits and liabilities were inextricably interconnected. The sewing machine, for example, created thousands of new factory jobs, made available a wider variety of clothing, and eased the lives of millions of consumers. At the same time, it encouraged greedy entrepreneurs to operate factories in which the poor worked long hours in unhealthy conditions pitifully low wages.

12. According to paragraphs 5 and 6, the transformation of United States industry had all of the following negative effects EXCEPT
- A. higher prices for consumers
 - B. environmental pollution
 - C. unhealthy working conditions
 - D. low pay for hard work

Paragraph 1

The technological and managerial innovations of Thomas Alva Edison (the inventor of electricity) and the industrial leaders Andrew Carnegie (iron and steel) and John D. Rockefeller (oil) proved readily adaptable throughout United States industry, spurring marvels of productivity. 【A】 Late-nineteenth-century industrialists often discovered that their factories produced more goods than the market could absorb. 【B】 This was particular true in two kinds of businesses: those that manufactured devices for individual use, such as sewing machines and farm implements, and those that mass-produced consumer goods, such as matches, flour, soap, canned foods, and processed meats. 【C】 Not surprisingly, these industries were trailblazers in developing advertising and marketing techniques. 【D】 Strategies for encouraging consumer demand and for differentiating one product from another were an important component of the American post-Civil War industrial transformation.

13. Look at the four choices that indicate where the following sentence could be added to the passage.

Edison's laboratory in Menlo Park, New Jersey, even became a model for the industrial research laboratories established by other corporations.

Where would the sentence best fit? Click on a choice to add the sentence to the passage.

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

Drag your choices to the spaces where they belong. To review the passage, click on View Text.

In the late nineteenth century, technological and managerial innovations greatly raised productivity and transformed United States industry.

Answer Choices

- A. Thomas Alva Edison, Andrew Carnegie, and John D. Rockefeller invented new technologies and management systems for the electrical, iron, steel, and oil industries.
- B. Americans became loyal consumers of manufactured products like breakfast cereal and soap primarily because of the high quality associated with the brand names.
- C. An economy characterized by competition between numerous small companies gave way to an economy in which only a few major companies were able to survive and dominate.
- D. As manufacturers produced more goods than the market could easily absorb, they developed new advertising and marketing techniques to stimulate demand for their products.
- E. George Eastman succeeded in creating a mass market for cameras not only by lowering manufacturing costs and selling prices but also by offering to develop film free of charge.
- F. The industrial transformation brought a number of social benefits, but it also encouraged the exploitation of workers and polluted the environment.

Art and Culture of Pacific Northwest Communities

The 1,600-kilometer stretch of the northwestern Pacific coast of North America (from southern Alaska to Washington State) provided an ideal environment for the growth of stable communities. Despite the northerly latitude, the climate is temperate. Natural resources were originally so rich that the inhabitants could subsist by fishing and hunting and gathering, without the need to domesticate stock or cultivate the land. Forests yielded an abundance of wood for buildings, for boats, and for sculpture. Beyond them the Rocky Mountains were an impenetrable barrier against raids. The area appears to have been settled around 500 A.D. by tribes of diverse origins speaking mutually unintelligible languages: from north to south they include the Tlingit, the Haida, the Tsimshian, the Bella Coola, the Kwakiutl, and the Nootka. The culture to which they contributed has, nevertheless, an underlying homogeneity and a distinct visual character.

The peoples of the Northwest engaged in trade as well as warfare with one another, and this may account for the diffusion of cultural traits and artistic motifs throughout the area. Much of their art was concerned with religious ritual objects. But the rest is secular and springs from a preoccupation with the hereditary basis of their complex social structures.

The Tlingit and other nations or language groups were collections of autonomous village communities composed of one or more families, each with its own chief, who inherited his position through matrilineal descent. They had no centralized political or religious organization, but cohesion was given by extensive kinship networks established through marriage, and men and women were obliged to many outside the larger divisions of clans and moieties (tribal subdivisions) into which they were born and into which the social group was divided by matrilineal or patrilineal descent. Thus families built up riches by marriage without any one family acquiring a dominant position.

Totem poles (see figure below), the most distinctive artistic product of the Northwest, were conspicuous declarations of prestige and of the genealogy (family history) by which it had been attained. These magnificent sculptures that probably originated as funerary monuments were first described by travelers in the late eighteenth century. Each one was carved from a single trunk of cedar, and the increasing availability of metal tools both permitted and encouraged more complex compositions and greater height—up to 27.4 meters. Their superimposed figures—eagles, beavers, whales, and so on—were crests (symbols of identity) that a chief inherited from his lineage, his clan, and his moiety. They were not objects of worship, though the animals carved on them might represent guardian spirits. Poles were designed according to a governing principle of bilateral symmetry, with their various elements interlocked so that they seem to grow organically out of one

another, creating a unity of symbolism, form, and surface.

Masks (see figure above) are the most varied of the carvings from the Northwest, where they were an essential part of communal life. In style they range from an almost abstract symbolism to combinations of human and animal features and to a lifelike naturalism sometimes bordering on caricature (a style that strongly exaggerates features or characteristics), taken to its extreme in Tlingit war helmets. Some differences must have been due to those among the cultures in which they were created, but their place of origin cannot always be ascertained as they seem to have passed from one contiguous nation to another in the course of trade or warfare. Although carvers worked according to established conventions, no two masks are identical and those with basic similarities reveal varying degrees of skill.

The major differences between masks were determined by their purpose. Some were representations of chiefs and their ancestors and made to be displayed and treasured as heirlooms. Although they appear to record the styles of facial tattooing customary in different groups, it is difficult to say how far they were intended to be portraits rather than generalized images. Many masks, sometimes quite large, were carved to be worn in dance-dramas that re-enacted and kept alive the cohesive myths of a culture. Often, Tlingit masks were made for religious leaders and incorporated the animals that were believed to be their spirit helpers. Conjuring up forces of nature from the ocean, the forests, or the sky, they mediated between life on Earth and the inscrutable powers around and above.

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Paragraph 1

The 1,600-kilometer stretch of the northwestern Pacific coast of North America (from southern Alaska to Washington State) provided an ideal environment for the growth of stable communities. Despite the northerly latitude, the climate is temperate. Natural resources were originally so rich that the inhabitants could subsist by fishing and hunting and gathering, without the need to domesticate stock or cultivate the land. Forests yielded an abundance of wood for buildings, for boats, and for sculpture. Beyond them the Rocky Mountains were an impenetrable barrier against raids. The area appears to have been settled around 500 A.D. by tribes of diverse origins speaking mutually unintelligible languages: from north to south they include the Tlingit, the Haida, the Tsimshian, the Bella Coola, the Kwakiutl, and the Nootka. The culture to which they contributed has, nevertheless, an underlying homogeneity and a distinct visual character.

1. According to paragraph 1, which of the following was NOT one of the factors that made the northwestern Pacific coast perfect for the development of stable communities?

- A. Temperate climate
- B. Natural protection from raids
- C. Abundant natural resources
- D. Easily cultivated land

2. When the author states that the tribes speak “mutually unintelligible” languages, this means that the tribes

- A. speak languages of similar difficulty
- B. cannot understand each other’s languages
- C. cannot understand the languages of tribes in neighboring areas
- D. understand the languages of tribes of similar origin

Paragraph 2

The peoples of the Northwest engaged in trade as well as warfare with one another, and this may account for the **diffusion** of cultural traits and artistic motifs throughout the area. Much of their art was concerned with religious ritual objects. But the rest is secular and springs from a preoccupation with the hereditary basis of their complex social structures.

3. The word “**diffusion**” in the passage is closest in meaning to

- A. development
- B. variety
- C. similarity
- D. spread

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Paragraph 3

The Tlingit and other nations or language groups were collections of **autonomous** village communities composed of one or more families, each with its own chief, who inherited his position through matrilineal descent. They had no centralized political or religious organization, but cohesion was given by extensive kinship networks established through marriage, and men and women were **obliged** to many outside the larger divisions of clans and moieties (tribal subdivisions) into which they were born and into which the social group was divided by matrilineal or patrilineal descent. Thus families built up riches by marriage without any one family acquiring a dominant position.

4. According to paragraph 3, what held together the collections of village communities?

- A. The control of one dominant family
- B. The establishment of wide kinship networks through marriage
- C. The participation in common religious practices

- D. The establishment of a central administrative authority
5. The word “autonomous” in the passage is closet in meaning to
- A. small
 - B. well organized
 - C. independent
 - D. wealthy
6. The word “obliged” in the passage is closet in meaning to
- A. required
 - B. allowed
 - C. forbidden
 - D. advised

Paragraph 4

Totem poles (see figure below), the most distinctive artistic product of the Northwest, were conspicuous declarations of prestige and of the genealogy (family history) by which it had been attained. These magnificent sculptures that probably originated as funerary monuments were first described by travelers in the late eighteenth century. Each one was carved from a single trunk of cedar, and the increasing availability of metal tools both permitted and encouraged more complex compositions and greater height—up to 27.4 meters. Their superimposed figures—eagles, beavers, whales, and so on—were crests (symbols of identity) that a chief inherited from his lineage, his clan, and his moiety. They were not objects of worship, though the animals carved on them might represent guardian spirits. Poles were designed according to a governing principle of bilateral symmetry, with their various elements interlocked so that they seem to grow organically out of one another, creating a unity of symbolism, form, and surface.

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7. According to paragraph 4, what was the significance of totem poles in the culture of the northwestern peoples?
- A. They showed a family's status and history.
 - B. They were thought to increase success in hunting.
 - C. They were objects of worship.
 - D. They were battle monuments.
8. According to paragraph 4, all of the following were true of totem poles EXCEPT:
- A. Each was made from a single tree.
 - B. They sometimes featured images of animals thought to provide protection against harm.

C. Larger numbers began to be made after metal tools became increasingly available.

D. Their decorative designs became more complex over time.

Paragraph 5

Masks (see figure above) are the most varied of the carvings from the Northwest, where they were an essential part of communal life. In style they range from an almost abstract symbolism to combinations of human and animal features and to a lifelike naturalism sometimes bordering on caricature (a style that strongly exaggerates features or characteristics), taken to its extreme in Tlingit war helmets. Some differences must have been due to those among the cultures in which they were created, but their place of origin cannot always be ascertained as they seem to have passed from one contiguous nation to another in the course of trade or warfare. Although carvers worked according to established conventions, no two masks are identical and those with basic similarities reveal varying degrees of skill.

9. The author mentions “Tlingit war helmets” in the passage to

- A. explain why masks were an essential part of communal life
- B. provide an example of masks representing a stylistic extreme
- C. identify one of the uses of masks
- D. provide an example of masks characterized by abstract symbolism

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. Some characteristics of masks must be due to cultural and national factors, such as whether they were made during a period of warfare or of peace and trade.

B. As one contiguous nation exchanged masks with another during trade or warfare, it became more difficult to determine the place of origin of masks.

C. Some differences among masks were probably due to their different origins, but because they passed from one nation to another, their origin cannot always be determined.

D. As masks of different cultural origins passed from one nation to another during trade or warfare, they acquired certain differences depending on how they were used.

Paragraph 6

The major differences between masks were determined by their purpose. Some were representations of chiefs and their ancestors and made to be displayed and treasured as heirlooms. Although they appear to record the styles of facial tattooing

customary in different groups, it is difficult to say how far they were intended to be portraits rather than generalized images. Many masks, sometimes quite large, were carved to be worn in dance-dramas that re-enacted and kept alive the cohesive myths of a culture. Often, Tlingit masks were made for religious leaders and incorporated the animals that were believed to be their spirit helpers. Conjuring up forces of nature from the ocean, the forests, or the sky, they mediated between life on Earth and the inscrutable powers around and above.

11. What can be inferred from paragraph 6 about masks representing chiefs and their ancestors?

- A. They were made to be exhibited and appreciated rather than used.
- B. They include scenes depicting the heroic achievements of chiefs and their ancestors.
- C. They were made from different materials than were other types of masks.
- D. They were sometimes worn by non-family members during religious rituals.

12. Paragraph 6 mentions all of the following as purposes of masks EXCEPT:

- A. They were made to be worn in dance-dramas.
- B. They were used as models for tattoo artists to copy.
- C. They were made for religious leaders and showed their animal spirit helpers.
- D. They were valued family possessions representing chiefs and their ancestors.

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Paragraph 5

【A】 Masks (see figure above) are the most varied of the carvings from the Northwest, where they were an essential part of communal life. 【B】 In style they range from an almost abstract symbolism to combinations of human and animal features and to a lifelike naturalism sometimes bordering on caricature (a style that strongly exaggerates features or characteristics), taken to its extreme in Tlingit war helmets. Some differences must have been due to those among the cultures in which they were created, but their place of origin cannot always be ascertained as they seem to have passed from one contiguous nation to another in the course of trade or warfare. 【C】 Although carvers worked according to established conventions, no two masks are identical and those with basic similarities reveal varying degrees of skill. 【D】

13. Look at the four choices that indicate where the following sentence could be added to the passage.

If we consider 100 raven masks made by different carvers, for example, some will have been well executed, others less so, and one may have been made by an exceptional carver.

Where would the sentence best fit? Click on a choice to add the sentence to the passage.

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

Drag your choices to the spaces where they belong. To review the passage, click on View Text.

The peoples who lived along the northwestern coast of North America had stable communities and a distinctive artistic style.

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Answer Choices

- A. The people lived on food from the sea, animals, and wild plants, and used wood from the forests for building construction, boat making, and sculpture.
- B. In the absence of a central political or religious organization, wide kinship networks established through interclan marriage helped to maintain social cohesion.
- C. Totem poles had a chief's symbols of identity imposed on them, and were thus used as objects of worship, whereas masks were used for secular purposes.
- D. Although the peoples of the northwestern communities came from various language groups, their languages were closely related and they could generally understand one another.
- E. The most remarkable artistic products of the northwestern peoples were totem poles and masks, which often represented families and their spirit guides.
- F. Carvers made masks using a principle of bilateral symmetry that resulted in the creation of a unity of symbolism, form, and surface.

Distribution of Seaweeds

Seaweeds are multicellular algae that inhabit the oceans. Despite their evolutionary distance from each other, seaweeds—such as brown algae, red algae, and green algae—have in common many aspects of their biology and contributions to the ecology of the seas.

Most species of seaweed are benthic (living on the seafloor); they grow on rock, sand, mud, and coral on the sea bottom. Other species live on other organisms and as part of fouling communities (plants and animals that live on pilings, boat bottoms, and other artificial surfaces). Some seaweeds attach to very specific surfaces, whereas other seaweeds are rather nonselective. In general, seaweeds inhabit about 2 percent of the seafloor. The presence of benthic seaweeds defines the inner continental shelf, where the marine community largely depends on the food and protection that seaweeds provide. Life on the outer continental shelf and in the deep sea is quite different in the absence of seaweeds. The distinction between the inner and outer shelves is based on the compensation depth of algae. The compensation depth is the depth of water at which there is just enough light for algae to survive. At that depth all the oxygen produced by photosynthesis is consumed by the algae's respiration, so that no further growth can occur.

The environmental factors that are most influential in governing the distribution of seaweeds are light and temperature. Some other abiotic (nonliving) factors critical in governing the distribution of seaweeds are duration of tidal exposure and desiccation (drying out), wave action and surge, salinity, and availability of mineral nutrients. The areas of the world most favorable to seaweed diversity include both sides of the North Pacific Ocean, Australia, southwestern Africa, and the Mediterranean Sea.

The vertical and horizontal distributions of seaweeds are limited in part by the availability of sunlight and, therefore, vary by depth, latitude, sea conditions, and season. It was once thought that the vertical distribution of red, brown, and green algae could be explained by their accessory photosynthetic pigments (photosynthetic pigments other than chlorophyll a), the presence of which gives the seaweeds their characteristic colors, a concept known as chromatic adaptation. Because green light penetrates deepest in coastal waters and the accessory pigments of red algae absorb mostly green wavelengths, red algae were thought to extend to the greatest depth. It followed that green algae, which have pigments absorbing mostly blue and red wavelengths that are diminished rapidly in seawater, should be found at the shallowest depths. Because accessory pigments of brown algae absorb intermediate wavelengths of light, brown algae would be expected to be most abundant at intermediate depths. Indeed, some recent evidence would seem to support the hypothesis of chromatic adaptation because the depth record (295 meters, or 973 feet) for seaweeds is held by a yet undescribed species of red

algae from the Bahamas. However, the green alga *Rhipiliopsis profunda* is close behind this record at 268 meters (884 feet).

The concept of chromatic adaptation was proposed in 1883, and the hypothesis was accepted for about 100 years, until it was realized that such zonation did not necessarily occur and that the distribution of seaweeds depended more on herbivory (the consumption of plant material), competition, varying concentration of the specialized pigments, and the ability of seaweeds to alter their forms of growth.

Temperature affects the distribution of seaweeds. The greatest diversity of algal species is in tropical waters. Farther north or south of the equator, the number of species decreases, and the species themselves are different. Many marine algae in colder latitudes are perennials, meaning that they live longer than two years. During the colder seasons only part of the alga remains alive, sometimes only a few cells, but most often a mass of stem like structures. When the temperature warms up in the spring, this body part initiates new growth. Temperature is not usually a limiting factor for algae that live in tropical and subtropical seas, although temperatures in intertidal areas (those areas between high and low tides) may become too warm and contribute to seasonal mass mortality of many seaweeds and the animals they shelter. At high latitudes, freezing and scouring by ice may eliminate seaweeds from the intertidal and shallow subtidal zones.

Paragraph 2

Most species of seaweed are benthic (living on the seafloor); they grow on rock, sand, mud, and coral on the sea bottom. Other species live on other organisms and as part of fouling communities (plants and animals that live on pilings, boat bottoms, and other **artificial** surfaces). Some seaweeds attach to very specific surfaces, whereas other seaweeds are rather nonselective. In general, seaweeds inhabit about 2 percent of the seafloor. The presence of benthic seaweeds defines the inner continental shelf, where the marine community largely depends on the food and protection that seaweeds provide. Life on the outer continental shelf and in the deep sea is quite different in the absence of seaweeds. The distinction between the inner and outer shelves is based on the compensation depth of algae. The compensation depth is the depth of water at which there is just enough light for algae to survive. At that depth all the oxygen produced by photosynthesis is consumed by the algae's respiration, so that no further growth can occur.

1. The word "**artificial**" in the passage is closest in meaning to
 - A. suitable
 - B. human-made
 - C. uneven

D. available

2. What can be inferred from paragraph 2 about the outer continental shelf?

A. The outer continental shelf contains more benthic seaweeds than the deep sea does.

B. The outer continental shelf lacks enough sunlight to support the growth of algae.

C. The outer continental shelf has a compensation depth that is about the same as that of the inner continental shelf.

D. The outer continental shelf has a greater variety of marine life than does the inner continental shelf.

3. According to paragraph 2, all of the following are true of seaweeds EXCEPT:

A. Seaweeds provide food and protection for other organisms.

B. Seaweeds can grow on both living and nonliving things.

C. Some seaweeds select specific surfaces to attach to, while others are not selective.

D. Two percent of seaweed species live on the ocean floor.

Paragraph 3

The environmental factors that are most influential in governing the distribution of seaweeds are light and temperature. Some other abiotic (nonliving) factors critical in governing the distribution of seaweeds are **duration** of tidal exposure and desiccation (drying out), wave action and surge, salinity, and availability of mineral nutrients. The areas of the world most favorable to seaweed diversity include both sides of the North Pacific Ocean, Australia, southwestern Africa, and the Mediterranean Sea.

4. The word “**duration**” in the passage is closest in meaning to

A. frequency

B. force of impact

C. length of time

D. occurrence

Paragraph 4

The vertical and horizontal distributions of seaweeds are limited in part by the availability of sunlight and, therefore, vary by depth, latitude, sea conditions, and season. It was once thought that the vertical distribution of red, brown, and green algae could be explained by their accessory photosynthetic pigments (photosynthetic pigments other than chlorophyll a), the presence of which gives the seaweeds their characteristic colors, a concept known as chromatic adaptation.

Because green light penetrates deepest in coastal waters and the accessory pigments of red algae absorb mostly green wavelengths, red algae were thought to extend to the greatest depth. It followed that green algae, which have pigments absorbing mostly blue and red wavelengths that are **diminished** rapidly in seawater, should be found at the shallowest depths. Because accessory pigments of brown algae absorb intermediate wavelengths of light, brown algae would be expected to be most abundant at intermediate depths. Indeed, some recent evidence would seem to support the hypothesis of chromatic adaptation because the depth record (295 meters, or 973 feet) for seaweeds is held by **a yet undescribed species of red algae from the Bahamas**. However, the green alga *Rhipiliopsis profunda* is close behind this record at 268 meters (884 feet).

5. The word “**diminished**” in the passage is closest in meaning to

- A. reduced
- B. scattered
- C. transmitted
- D. altered

6. According to the concept of chromatic adaptation explained in paragraph 4, which of the following types of algae should be found closest to the ocean’s surface?

- A. Red algae
- B. Blue algae
- C. Green algae
- D. Brown algae

7. Why does the author mention “**a yet undescribed species of red algae from the Bahamas**”?

- A. To suggest that the concept of chromatic adaptation applies only to algae living in deep waters
- B. To argue that location is more important than chromatic adaptation in determining the vertical distribution of algae
- C. To emphasize the difficulty of testing the concept of chromatic adaptation in deep waters
- D. To provide information that may confirm the idea that chromatic adaptation is responsible for the vertical distribution of algae

8. What can be inferred from the author’s discussion of the green algae *Rhipiliopsis profunda* in paragraph 4?

- A. Chromatic adaptation may not be an adequate explanation for the vertical distribution of algae.

- B. All types of algae share the same accessory photosynthetic pigments.
- C. Chromatic adaptation is responsible for the distribution of red algae but not for the distribution of green algae.
- D. Both red and green algae absorb red wavelengths.

Paragraph 5

The concept of chromatic adaptation was proposed in 1883, and the hypothesis was accepted for about 100 years, until it was realized that such zonation did not necessarily occur and that the distribution of seaweeds depended more on herbivory (the consumption of plant material), competition, varying concentration of the specialized pigments, and the ability of seaweeds to alter their forms of growth.

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. For about 100 years, chromatic adaptation was thought to have a greater impact on seaweed distribution than various other factors such as herbivory and competition.
- B. The hypothesis of chromatic adaptation was accepted for about 100 years until it was concluded that other factors could explain the distribution of seaweeds.
- C. About 100 years after the concept of chromatic adaptation was developed, it was realized that seaweed zonation occurred even in the absence of chromatic adaptation.
- D. Until the hypothesis of chromatic adaptation became widely accepted 100 years after it was proposed, various other factors were thought to determine the distribution of seaweeds.

Paragraph 6

Temperature affects the distribution of seaweeds. The greatest diversity of algal species is in tropical waters. Farther north or south of the equator, the number of species decreases, and the species themselves are different. Many marine algae in colder latitudes are perennials, meaning that they live longer than two years. During the colder seasons only part of the alga remains alive, sometimes only a few cells, but most often a mass of stem like structures. When the temperature warms up in the spring, this body part initiates new growth. Temperature is not usually a limiting factor for algae that live in tropical and subtropical seas, although temperatures in intertidal areas (those areas between high and low tides) may become too warm and contribute to seasonal mass mortality of many seaweeds and the animals they shelter. At high latitudes, freezing and scouring by ice may eliminate seaweeds from the intertidal and

shallow subtidal zones.

10. What is the author's purpose in discussing "temperatures in intertidal areas"?

- A. To emphasize the idea that warm temperatures can be just as dangerous to algae as cold temperatures
- B. To identify a limiting factor for algae common to both tropical seas and waters at higher latitudes
- C. To compare the causes of seaweed mortality in tropical seas and in seas at higher latitudes
- D. To note an exception to the idea that temperature does not limit the growth of algae in tropical and subtropical waters

11. The word "mortality" in the passage is closest in meaning to

- A. movement
- B. exposure
- C. death
- D. injury

12. According to paragraph 6, all of the following are true of perennials EXCEPT:

- A. Perennials live for more than two years.
- B. Only part of a perennial remains alive during the winter.
- C. A large number of the marine algae found in cold latitudes are perennials.
- D. Species in the tropics are more sensitive to temperature than are species in colder latitudes.

Paragraph 2

Most species of seaweed are benthic (living on the seafloor); they grow on rock, sand, mud, and coral on the sea bottom. Other species live on other organisms and as part of fouling communities (plants and animals that live on pilings, boat bottoms, and other artificial surfaces). [A] Some seaweeds attach to very specific surfaces, whereas other seaweeds are rather nonselective. In general, seaweeds inhabit about 2 percent of the seafloor. [B] The presence of benthic seaweeds defines the inner continental shelf, where the marine community largely depends on the food and protection that seaweeds provide. [C] Life on the outer continental shelf and in the deep sea is quite different in the absence of seaweeds. [D] The distinction between the inner and outer shelves is based on the

compensation depth of algae. The compensation depth is the depth of water at which there is just enough light for algae to survive. At that depth all the oxygen produced by photosynthesis is consumed by the algae's respiration, so that no further growth can occur.

13. Look at the four choices that indicate where the following sentence could be added to the passage.

They are most prevalent on the part of the sea bottom known as the continental shelf.

Where would the sentence best fit? Click on a choice to add the sentence to the passage.

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. **This question is worth 2 points.**

Drag your choices to the spaces where they belong. To review the passage, click on **View Text**.

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Seaweeds are multicellular algae living in the oceans.

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Answer Choices

- A. Seaweeds are limited to areas with enough light for them to survive, with most living on the seafloor and more species inhabiting warm waters than colder waters.
- B. Some recent evidence shows that the color of any species of seaweed is determined by the amount of chlorophyll a contained in its accessory pigments.
- C. The greatest diversity of seaweed is found in warm waters, and seaweed cannot survive when the temperature is either too hot or too cold.
- D. Seaweeds are distributed most evenly over areas of ocean that experience changing tides, strong waves, a dry climate, and high concentrations of salt and minerals.
- E. The chromatic-adaptation hypothesis was long thought to explain the vertical distribution of seaweed, but current belief is that distribution is

better explained by other factors.

Temperature extremes in tropical and subtropical areas as well as at high latitudes cause seaweeds to abandon the intertidal areas for the subtidal zones of the seafloor.

Water Supply in Venice

The city of Venice, built on saltwater marshes and crisscrossed by canals, experienced problems with its water supply for most of its history. One fifteenth-century French traveler noted that “in a city in which the inhabitants are in water up to their mouths, they often go thirsty ” How was the community to solve this important problem?

Water drawn from the lagoon (the large, shallow body of water between Venice and the Mediterranean Sea) and the canals within the city served many domestic uses such as washing and cooking inventories of even the most modest households list large numbers of buckets, which were emptied and rinsed, the ones used to carry the brackish (somewhat salty) canal water were kept separate from those intended for fresh water. Still, even serving such needs would have been impossible if the canals of Venice had been extremely polluted. The government was obliged to impose controls, and in the early fourteenth century, the Great Council prohibited the washing of all cloth and dyed woolens in the canals, adding that water used for dyeing could not be flushed into the canals. Henceforth dirty water of that sort was to go into the lagoon. Thanks to resistance on the part of the dyers, infractions were many, the law did not reflect common practice. A century later, however, most of the dye works that used blood or indigo (a dark blue dye) had shifted to the periphery of the city, as had all activities “that let off bad odors or smells” such as butchering. Blood, carcasses, and spoiled meat were to go into the lagoon. The canals of Venice began to be protected in the name of nascent ecological awareness.

Much more stringent measures were necessary to guarantee a supply of drinking water, however. In the early centuries of settlement in the lagoon basin, the populations depended on wells on the nearby coastal region. By the ninth century, however, with the increase in population density, cisterns became necessary. Basically, the cisterns were large, covered pits dug into the ground and lined with clay to hold water. The cisterns were located in the city, but unlike the wells, the cisterns were not supplied with water from the lagoon, they collected rainwater instead. Cisterns became widespread in the growing city.

Over a period of several hundred years, Venice developed an elaborate system of cisterns and gome-the gutters or pipes that carried rainwater to the cisterns and that, for a single cistern, might extend over an area of several streets. Wealthy households had their own cisterns. In less affluent areas of the city, cisterns were

often owned and maintained by neighborhood groups. In crowded parts of the city where landlords offered small house for rent, one or two cisterns were provided for each street. A network of public cisterns paralleled these private and semiprivate arrangements. Every public square in the city had a cistern to serve the poorest venetians.

In the thirteenth century, a decision was made to create 50 additional cisterns, primarily in the recently urbanized area at the edge of the city. At the same time, a campaign was launched to repair the existing cisterns. Expansion of the cistern system stopped during much of the fourteenth century as Venice, like other cities in Europe, suffered from bubonic plague. In the fifteenth century, however, a new program of cistern construction and repair was undertaken.

In spite of the expansion of the cistern system, Venice continued to have problems with its water supply, especially during dry periods. Flotillas of boats had to be dispatched to the mouths of nearby rivers—first to the Bottenigo, then to the Brenta—to fetch fresh water. The fresh water was then sold by the bucket or poured into the cisterns. The public authorities made efforts to take bolder action to ensure the supply of fresh water from this parallel source and a number of projects were suggested during the fourteenth and fifteenth centuries to channel river water and even to construct an aqueduct. However, the high cost of such initiatives precluded their execution.

Paragraph 1

The city of Venice, built on saltwater marshes and crisscrossed by canals, experienced problems with its water supply for most of its history. One fifteenth-century French traveler noted that **“in a city in which the inhabitants are in water up to their mouths, they often go thirsty”** How was the community to solve this important problem?

1. Why does the author include the quotation **“in a city in which the inhabitants are in water up to their mouths, they often go thirsty”**?

- A. To indicate that the French traveled to Venice frequently in the fifteenth century.
- B. To illustrate the opinion of other Europeans about the water situation in Venice.
- C. To suggest that the water supply problem of Venice continued well beyond the fifteenth century.

- D. To emphasize how serious the water problem was in Venice.

Paragraph 2

Water drawn from the lagoon (the large, shallow body of water between Venice and the Mediterranean Sea) and the canals within the city served many domestic uses such as washing and cooking inventories of even the most modest households list large numbers of buckets, which were emptied and rinsed, the ones used to carry the brackish (somewhat salty) canal water were kept separate from those intended for fresh water. Still, even serving such needs would have been impossible if the canals of Venice had been extremely polluted. The government was **obliged** to impose controls, and in the early fourteenth century, the Great Council prohibited the washing of all cloth and dyed woolens in the canals, adding that water used for dyeing could not be flushed into the canals. **Henceforth**, dirty water of that sort was to go into the lagoon. Thanks to resistance on the part of the dyers, infractions were many, the law did not reflect common practice. A century later, however, most of the dye works that used blood or indigo(a dark blue dye) had shifted to the periphery of the city, as had all activities “that let off bad odors or smells” such as butchering. Blood, carcasses, and spoiled meat were to go into the lagoon. The canals of Venice began to be protected in the name of nascent ecological awareness.

2. The word “**Henceforth**” in the passage is closest in meaning to
- A. Instead of this
 - B. In addition
 - C. From this time on
 - D. In effect
3. The word “**obliged**” in the passage is closest in meaning to
- A. forced
 - B. allowed
 - C. expected
 - D. persuaded
4. According to paragraph 2, why did the government place restrictions on dyers?
- A. To protect the city’s drinking water
 - B. To prevent the lagoon from being polluted
 - C. To keep canal water clean

- D. To discourage the use of blood and indigo for dyeing cloth
5. According to paragraph 2, how did dyers respond to the controls imposed by the government?
- A. They switched from using dyes that let off bad odors or smells to new dyes that smelled much better.
 - B. They resisted initially but eventually moved most of the dyeing operations outside the city center.
 - C. They argued that the government did not consider common practice before imposing the controls.
 - D. They started washing cloth and woolens dyed with blood and indigo in the lagoon.

Paragraph 3

Much more stringent measures were necessary to guarantee a supply of drinking water, however. In the early centuries of settlement in the lagoon basin, the populations depended on wells on the nearby coastal region. By the ninth century, however, with the increase in population density, cisterns became necessary. Basically, the cisterns were large, covered pits dug into the ground and lined with clay to hold water. The cisterns were located in the city, but unlike the wells, the cisterns were not supplied with water from the lagoon, they collected rainwater instead. Cisterns became widespread in the growing city.

6. It can be inferred from paragraph 3 that wells on the nearby coastal region
- A. were smaller in size than the cisterns located in the city
 - B. served as a water source for the growing number of cisterns in the city
 - C. increased in number as the population density increased
 - D. provided enough water for only a relatively small number of people

Paragraph 4

Over a period of several hundred years, Venice developed an elaborate system of cisterns and gutter-the gutters or pipes that carried rainwater to the cisterns and that, for a single cistern, might extend over an area of several streets. Wealthy households had their own cisterns. In less affluent areas of the city, cisterns were often owned and maintained by neighborhood groups. In crowded parts of the city where landlords offered small house for rent, one or two cisterns were provided

for each street. A network of public cisterns paralleled these private and semiprivate arrangements. Every public square in the city had a cistern to serve the poorest venetians.

7. According to paragraph 4, all of the following were true of Venice's system of cisterns and gome EXCEPT

- A. It was developed over several centuries
- B. It collected rainwater
- C. It was maintained with fees paid by the public
- D. It reflected the social and economic diversity of the city of Venice

Paragraph 5

In the thirteenth century, a decision was made to create 50 additional cisterns, primarily in the recently urbanized area at the edge of the city. At the same time, a campaign was **launched** to repair the existing cisterns. Expansion of the cistern system stopped during much of the fourteenth century as Venice, like other cities in Europe, suffered from bubonic plague. In the fifteenth century, however, a new program of cistern construction and repair was undertaken.

8. The word "**launched**" in the passage is closest in meaning to

- A. paid for
- B. started
- C. proposed
- D. agreed on

9. According to paragraph 5, all of the following had an effect on cisterns in Venice from the thirteenth to the fifteenth century EXCEPT

- A. the construction of cisterns in other cities in Europe
- B. the establishment of programs to construct and repair cisterns
- C. the outbreak of bubonic plague
- D. the urbanization of an area at the edge of the city

Paragraph 6

In spite of the expansion of the cistern system, Venice continued to have problems with its water supply, especially during dry periods. Flotillas of boats had to be dispatched to the mouths of nearby rivers-first to the Bottenigo, then to the Brenta-to fetch fresh water. The fresh water was then sold by the bucket or

poured into the cisterns. The public authorities made efforts to take bolder action to **ensure** the supply of fresh water from **this parallel source** and a number of projects were suggested during the fourteenth and fifteenth centuries to channel river water and even to construct an aqueduct. However, the high cost of such initiatives precluded their execution.

10. The phrase "**this parallel source**" refers to

- A. flotillas of boat
- B. nearby rivers
- C. the cisterns
- D. an aqueduct

11. The word "**ensure**" in the passage is closest in meaning to

- A. improve
- B. increase
- C. control
- D. guarantee

12. According to paragraph 6, how did public authorities respond to problems with the water supply during dry periods?

- A. They sent boats to fetch fresh water from nearby rivers
- B. They channeled river water into the cisterns
- C. They constructed an aqueduct
- D. They sold water from the cisterns in buckets to the public

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Paragraph 4

Over a period of several hundred years, Venice developed an elaborate system of cisterns and gome-the gutters or pipes that carried rainwater to the cisterns and that, for a single cistern, might extend over an area of several streets. ■Wealthy households had their own cisterns. ■In less affluent areas of the city, cisterns were often owned and maintained by neighborhood groups. ■In crowded parts of the city where landlords offered small house for rent, one or two cisterns were provided for each street. ■A network of public cisterns paralleled these private and semiprivate arrangements. Every public square in the city had a cistern to serve the poorest venetians.

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

The complexity of the cistern system was social as well as physical.

Where would the sentence best fit?

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selected THREE answer choices that express the most important ideas in the passage. Some sentences do not belong in the summary express ideas that are not presented in the passage or are minor ideas in the passage. **This question is worth 2 points.**

The city of Venice experienced problems with its water supply for most of its history.

Answer Choices

- A. The water from the lagoon between Venice and the Mediterranean Sea could not be used for drinking because it was extremely polluted.
- B. From the ninth to the fifteenth century, Venice developed a system to collect and store rainwater in cisterns for use by the population
- C. Wealthy households were able to build their own cisterns, but everyone else had to use public cisterns located in the city's many squares.
- D. By the early fourteenth century, the water in Venice's canals was becoming too polluted for household use prompting the city council to prohibit the use of the canals by dyers and butchers.
- E. By the fifteenth century, cisterns supplied by rainwater proved to be inadequate, but the cost of the projects proposed for a permanent solution was too high for the projects to be undertaken.
- F. The expansion and repair of the cistern system was interrupted for much of the fourteenth century because of the bubonic plague, a situation that worsened the water supply problem.

The Early History of Motion Pictures

Motion pictures and television are possible because of two quirks of the human perceptual system: the phi phenomenon and persistence of vision. The phi phenomenon refers to what happens when a person sees one light source go out while another one close to the original is illuminated. To our eyes, it looks like the light moves from one place to another. In persistence of vision, our eyes continue to see an image for a split second after the image has disappeared from view. First observed by the ancient Greeks, persistence of vision became more widely known in 1824 when Peter Roget (who also developed the thesaurus) demonstrated that human beings retain an image of an object for about one-tenth of a second after the object is taken from view. Following Roget's pronouncement, a host of toys that depended on this principle sprang up in Europe. Bearing fanciful names (the Thaumatrope, the Praxinoscope), these devices made a series of hand-drawn pictures appear to move.

Before long, several people realized that a series of still photographs on celluloid film could be used instead of hand drawing. In 1878 a colorful Englishman later turned American, Edward Muybridge, attempted to settle a \$25,000 bet over whether the four feet of a galloping horse ever simultaneously left the ground. He arranged a series of 24 cameras alongside a racetrack to photograph a galloping horse. Rapidly viewing the series of pictures produced an effect much like that of a motion picture. Muybridge's technique not only settled the bet (the feet did leave the ground simultaneously at certain instances) but also photography. Instead of 24 cameras taking one picture in rapid order, it was Thomas Edison and his assistant, William Dickson, who finally developed what might have been the first practical motion-picture camera and viewing device. Edison was apparently trying to provide a visual counterpart to his recently invented phonograph. When his early efforts did not work out, he turned the project over to his assistant. Using flexible film, Dickson solved the vexing problem of how to move the film rapidly through the camera by perforating its edge with tiny holes and pulling it along by means of sprockets, projections on a wheel that fit into the holes of the film. In 1889 Dickson had perfected a machine called the Kinetoscope and even starred in a brief film demonstrating how it worked.

These early efforts in the Edison lab were not directed at projecting movies to large crowds. Still influenced by the success of his phonograph, Edison thought a similar device could make a money by showing brief films to one person at a time

for a penny a look. Edison built a special studio to produce films for his new invention, and by 1894, Kinetoscope parlors were spring up in major cities. The long-range commercial potential of his invention was lost on Edison. He reasoned that the real money would be made by selling his peep-show machine. If a large number of people were shown the film at the same time, fewer machines would be needed. Developments in Europe proved Edison wrong as inventors there devised large-screen projection devices. Faced with competition, Edison perfected the Vitascope and unveiled it in New York City in 1896.

Early monies were simple snippets of action—acrobats tumbling, horse running, jugglers juggling, and so on. Eventually, the novelty wore off and films became less of an attraction. Public interest was soon rekindled when early filmmakers discovered that movies could be used to tell story. In France, Alice Guy-Blachè produced *The Cabbage Fairy*, a one-minute film about a fairy who produces children in a Cabbage patch, and exhibited it at the Paris International Exhibition in 1896. Guy-Blachè went on to found her own studio in America. Better known is the work of a fellow French filmmaker and magician, Georges Méliès. In 1902 Méliès produced a science-fiction film that was the great-great-grandfather of *Star Wars* and *Star Trek*; it was called *A Trip to the Moon*.

Paragraph1

Motion pictures and television are possible because of two quirks of the human perceptual system: the phi phenomenon and persistence of vision. The phi phenomenon refers to what happens when a person sees one light sources go out while another one close to the original is illuminated. To our eyes, it looks like the light moves from one place to another. In persistence of vision, our eyes continue to see an image for a spit second after the image has disappeared from view. First observed by the ancient Greeks, persistence of vision became more widely known in 1824 when Peter Roget(who also 20 developed the thesaurus) demonstrated that human begins retain an image of an object for about one-tenth of a second after the object is taken from view. Following Roget's **pronouncement**, a host of toys that depended on this principle sprang up in Europe. Bearing fanciful manes (the Thaumatrope, the Praxinoscope), these devices made a series of hand-drawn pictures appear to move.

1. According to paragraph 1, what is the phi phenomenon?

- A. The appearance of movement that occurs when one light is turned off while another lights up nearby
- B. The tendency to see two lights placed close together as coming from a single light source

- C. The fact that the human eye sees a light source for a split second after it has disappeared
 - D. The impression that there are several light sources when there is actually only one
2. According to paragraph 1, which of the following statements does NOT correctly describe persistence of vision?
- A. It was originally noticed by the ancient Greeks
 - B. It refers to an image of an object seen by the human eye for one-tenth of a second after the object has disappeared
 - C. It is a scientific principle that was already widely accepted before Peter Roget demonstrated its validity
 - D. It provided the basis for a number of European toys, including the Thaumatrope and the Praxinoscope
3. The word "**pronouncement**" in the passage is closest in meaning to
- A. statement
 - B. advice
 - C. theory
 - D. Experiment

Paragraph2

Before long, several people realized that a series of still photographs on celluloid film could be used instead of hand drawing. In 1878 a colorful Englishman later turned American, Edward Muybridge, attempted to settle a \$25,000 bet over whether **the four feet of a galloping horse ever simultaneously left the ground**. He arranged a series of 24 cameras alongside a racetrack to photograph a galloping horse. Rapidly viewing the series of pictures produced an effect much like that of a motion picture. Muybridge's technique not only settled the bet (the feet did leave the ground simultaneously at certain instances) but also photography. Instead of 24 cameras taking one picture in rapid order, it was Thomas Edison and his assistant, William Dickson, who finally developed what might have been the first practical motion-picture camera and viewing device. Edison was apparently trying to provide a visual **counterpart** to his recently invented phonograph. When his early efforts did not work out, he turned the project over to his assistant. Using **flexible** film, Dickson solved the vexing problem of how to move the film rapidly through the camera by perforating its edge with tiny holes and pulling it along by means of sprockets, projections on

a wheel that fit into the holes of the film in 1889 Dickson had perfected a machine called the Kinetoscope and even starred in a brief film demonstrating how it worked.

4. In paragraph 2, why does the author mention the bet that Edward Muybridge tried to settle about whether “**the four feet of a galloping horse ever simultaneously left the ground**”?

- A. To introduce and explain a fundamental principle of motion-picture photography
- B. To demonstrate that still photographs produced a visual effect that surpassed that of hand-drawn pictures
- C. To emphasize that photographers had to be willing to take risks in order to portray their subjects
- D. To suggest the difficulty of trying to capture animal movement in motion-picture photography

5. The word “**counterpart**” in the passage is closest in meaning to

- A. addition
- B. invention
- C. component
- D. equivalent

6. The word “**flexible**” in the passage is closest in meaning to

- A. connected
- B. smooth
- C. bendable
- D. Delicate

7. According to paragraph 2, how did Muybridge contribute to the development of motion-picture technology?

- A. He invented the first motion-picture camera.
- B. He demonstrated the technique of taking a series of photographs and viewing them in rapid succession
- C. He asked Edison and Dickson to create a motion-picture camera that was both practical and economical
- D. He combined hand drawings and still photographs to create movie-like effects

8. Paragraph 2 suggests that Thomas Edison's early efforts to develop a motion-picture camera failed because he could not figure out how to

- A. display the camera's pictures to an audience
- B. move the film quickly through the camera
- C. line the edge of the film with holes that were small enough
- D. prevent the film from tearing

Paragraph 3

These early efforts in the Edison lab were not directed at projecting movies to large crowds. Still influenced by the success of his phonograph, Edison thought a similar device could make a money by showing brief films to one person at a time for a penny a look. Edison built a special studio to produce films for his new invention, and by 1894, Kinetoscope parlors were spring up in major cities. The long-range commercial potential of his invention was lost on Edison. He reasoned that the real money would be made by selling his peep-show machine. If a large number of people were shown the film at the same time, fewer machines would be needed. Developments in Europe proved Edison wrong as inventors there devised large-screen projection devices. Faced with competition, Edison perfected the Vitascope and unveiled it in New York City in 1896.

9. According to paragraph 3, what were Kinetoscope parlors?

- A. Places where people could pay a penny to view a short film by looking into a machine
- B. Places where people could gather in crowds to watch short films projected onto large screens
- C. Special studios where Edison produced films that would be shown by his newly invented machine
- D. Places where Edison sold his phonographs, peep-show machines, and other popular inventions

10. Which of the following can be inferred from paragraph 3 about the scope?

- A. It was widely used in Europe before being adopted in the United States
- B. It never made as much money as the equivalent European projection device
- C. It was a larger version of the original Kinetoscope

D. It was designed to show motion pictures to large groups of people

Paragraph 4

Early monies were simple snippets of action—acrobats tumbling, horse running, jugglers juggling, and so on. Eventually, the novelty wore off and films became less of an attraction. Public interest was soon **rekindled** when early filmmakers discovered that movies could be used to tell story. In France, Alice Guy-Blachè produced *The Cabbage Fairy*, a one-minute film about a fairy who produces children in a Cabbage patch, and exhibited it at the Paris International Exhibition in 1896. Guy-Blachè went on to found her own studio in America. Better known is the work of a fellow French filmmaker and magician, Georges Méliès. In 1902 Méliès produced a science-fiction film that was the great-great-grandfather of *Star Wars* and *Star Trek*; it was called *A Trip to the Moon*.

11. The word “**rekindled**” in the passage is closest in meaning to

- A. reported
- B. renewed
- C. reinforced
- D. Rewarded

12. In paragraph 4, the author describes the film *The Cabbage Fairy* in order to

- A. argue for the importance of continuous action to keep audiences interested
- B. suggest that early films were more popular than live performances were
- C. provide an example of one of the first films to tell a story
- D. emphasize how relatively short most early movies were

Paragraph 4

Early monies were simple snippets of action—acrobats tumbling, horse running, jugglers juggling, and so on. Eventually, the novelty wore off and films became less of an attraction. Public interest was soon rekindled when early filmmakers discovered that movies could be used to tell story. [A] In France, Alice Guy-Blachè produced *The Cabbage Fairy*, a one-minute film about a fairy who produces children in a Cabbage patch, and exhibited it at the Paris International Exhibition in 1896. [B] Guy-Blachè went on to found her own studio in America. [C] Better known is the work of a fellow French filmmaker and magician, Georges Méliès. [D] In 1902 Méliès produced a science-fiction film that was the great-great-

grandfather of *Star Wars* and *Star Trek*; it was called *A Trip to the Moon*.

13. Look at the four choices that indicate where the following sentence could be added to the passage.

Although she directed hundreds of short films and produced hundreds more over the course of her career, she has largely been forgotten.

Where would the sentence best fit?

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selected 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. **The phi phenomenon and persistence of vision are two characteristics of the human perceptual system that make motion pictures and television possible.**

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Answer Choices

- A. When the persistence of vision became widely known, it inspired the development of toys that made hand-drawn pictures appear to move
- B. The invention of the motion-picture camera led to the discovery that a horse's feet do not leave the ground while the horse is galloping.
- C. The primary competitors in early motion-picture technology were Edison's Kinetoscope and the European-designed and manufactured large-screen projection devices
- D. The motion-picture camera develop from the experiments in sequential photography that were originally done by Edward Muybridge
- E. Later developments in film included a focus on large-screens projection rather than individual viewing machines and narrative films rather than simple action sequences.
- F. French filmmakers Alice Guy-Blachè and Georges started the first two major movie studios in America and in France, respectively.

Early Theories of Continental Drift

Paleozoic 545 to 245 million years ago

Carboniferous 360 to 286 million years ago

Pennsylvanian 320 to 286 million years ago

Permian 286 to 245 million years ago

Mesozoic 245 to 66 million years ago

Jurassic 205 to 144 million years ago

The idea that the past geography of Earth was different from today is not new. The earliest maps showing the east coast of South America and the west coast of Africa probably provided people with the first evidence that continents may have once been joined together, then broken apart and moved to their present positions.

During the late nineteenth century, Austrian geologist Eduard Suess noted the similarities between the Late Paleozoic plant fossils of India, Australia, South Africa, and South America. The plant fossils comprise a unique group of plants that occurs in coal layers just above the glacial deposits on these southern continents. In this book *The Face of the Earth* (1885), he proposed the name “Gondwanaland” (called Gondwana here) for a supercontinent composed of the aforementioned southern landmasses. Suess thought these southern continents were connected by land bridges over which plants and animals migrated. Thus, in his view, the similarities of fossils on these continents were due to the appearance and disappearance of the connecting land bridges.

The American geologist Frank Taylor published a pamphlet in 1910 presenting his own theory of continental drift. He explained the formation of mountain ranges as a result of the lateral movements of continents. He also envisioned the present-day continents as parts of larger polar continents that eventually broke apart and migrated toward equator after Earth’s rotation was supposedly slowed by gigantic tidal forces. According to Taylor, these tidal forces were generated when Earth’s gravity captured the Moon about 100 73 million years ago. Although we know that

Taylor 's explanation of continental drift is incorrect, one of his most significant contributions was his suggestion that the Mid-Atlantic Ridge—an underwater mountain chain discovered by the 1872-1876 British *HMS Challenger* expeditions—might mark the site at which an ancient continent broke apart, forming the present –day Atlantic Ocean.

However, it is Alfred Wegener, a German meteorologist, who is generally credited with developing the hypothesis of continental drift. In his monumental book, *The Origin of Continents and Oceans* (1915), Wegener proposed that all landmasses were originally united into a single supercontinent that he named “Pangaea.” Wegner portrayed his grand concept of continental movement in a series of maps showing the breakup of Pangaea and the movement of various continents to their present-day locations. What evidence did Wegener use to support his hypothesis of continental drift? First, Wegener noted that the shorelines of continents fit together, forming a large supercontinent and that marine, nonmarine, and glacial rock sequences of Pennsylvanian to Jurassic ages are almost identical for all Gondwana continents, strongly indicating that they were joined together at one time. Furthermore, mountain ranges and glacial deposits seem to match up in such a way that suggests continents could have once been a single landmass. And last, many of the same extinct plant and animal groups are found today on widely separated continents, indicating that the continents must have been in proximity at one time. Wegener argued that this vast amount of evidence from a variety of sources surely indicated the continents must have been close together at one time in the past.

Alexander Du Toit, a South African geologist was one of Wegener's ardent supporters. He noted that fossils of the Permian freshwater reptile “Mesosaurus” occur in rocks of the same age in both Brazil and South Africa. Because the physiology of freshwater and marine animals is completely different, it is hard to imagine how a freshwater reptile could have swum across the Atlantic Ocean and then found a freshwater environment nearly identical to its former habitat. Furthermore, if Mesosaurus could have swum across the ocean, its fossil remains should occur in other localities besides Brazil and South Africa. It is more logical to assume that Mesosaurus lived in lakes in what are now adjacent areas of South

America and Africa but were then united in a single continent.

Despite what seemed to be overwhelming evidence presented by Wegener and later Du Toit and others, most geologists at the time refused to entertain the idea that the continents might have moved in the past.

Paragraph 2

During the late nineteenth century, Austrian geologist Eduard Suess noted the similarities between the Late Paleozoic plant fossils of India, Australia, South Africa, and South America. The plant fossils comprise a unique group of plants that occurs in coal layers just above the glacial deposits on these southern continents. In this book *The Face of the Earth* (1885), he proposed the name “Gondwanaland” (called Gondwana here) for a supercontinent composed of the aforementioned southern landmasses. Suess thought these southern continents were connected by land bridges over which plants and animals migrated. Thus, in his view, the similarities of fossils on these continents were due to the appearance and disappearance of the connecting land bridges.

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1. According to paragraph 2, Eduard Suess believed that similarities of plant and animal fossils on the southern continents were due to
 - A. living in the southern climate
 - B. crossing the land bridges
 - C. fossilization in the coal layers
 - D. movements of the supercontinent

Paragraph 3

The American geologist Frank Taylor published a pamphlet in 1910 presenting his own theory of continental drift. He explained the formation of mountain ranges as a result of the lateral movements of continents. He also envisioned the present-day continents as parts of larger polar continents that eventually broke apart and migrated toward equator after Earth’s rotation was supposedly slowed by gigantic tidal forces. According to Taylor, these tidal forces were **generated** when Earth’s gravity captured the Moon about 100 million years ago. Although we know that Taylor’s explanation of continental drift is incorrect, one of his most significant

contributions was his suggestion that the Mid-Atlantic Ridge—an underwater mountain chain discovered by the 1872-1876 British *HMS Challenger* expeditions—might mark the site at which an ancient continent broke apart, forming the present –day Atlantic Ocean.

2. According to paragraph 3, Frank Taylor believed that
 - A. present-day continents broke off from larger continents and drifted toward the poles due to tidal forces
 - B. the lateral shifting of continents caused the formation of mountain ranges
 - C. polar continents began to join together when Earth's gravity captured the Moon 100 million years ago
 - D. Earth's gravity and speed of rotation created large polar continents
3. Which of the following can be inferred from paragraph 3 about the Mid-Atlantic Ridge?
 - A. It was once above sea level.
 - B. It formed at the same time that Earth's gravity captured the Moon.
 - C. It was much more extensive when it was first formed than it is today.
 - D. It was unknown before the *HMS Challenger* voyages.
4. The word “**generated**” in the passage is closest in meaning to
 - A. strengthened
 - B. released
 - C. produced
 - D. present

Paragraph 4

However, it is Alfred Wegener, a German meteorologist, who is generally credited with developing the hypothesis of continental drift. In his **monumental** book, *The Origin of Continents and Oceans* (1915), Wegener proposed that all landmasses were originally united into a single supercontinent that he named “Pangaea.” Wegener **portrayed** his grand concept of continental movement in a

series of maps showing the breakup of Pangaea and the movement of various continents to their present-day locations. What evidence did Wegener use to support his hypothesis of continental drift? First, Wegener noted that the shorelines of continents fit together, forming a large supercontinent and that marine, nonmarine, and glacial rock sequences of Pennsylvanian to Jurassic ages are almost identical for all Gondwana continents, strongly indicating that they were joined together at one time. Furthermore, mountain ranges and glacial deposits seem to match up in such a way that suggests continents could have once been a single landmass. And last, many of the same extinct plant and animal groups are found today on widely separated continents, indicating that the continents must have been in proximity at one time. Wegener argued that this **vast** amount of evidence from a variety of sources surely indicated the continents must have been close together at one time in the past.

5. The word “**monumental**” in the passage is closest in meaning to

- A. final
- B. persuasive
- C. well-known
- D. great and significant

6. The word “**portrayed**” in the passage is closest in meaning to

- A. proved
- B. formed
- C. depicted
- D. defended

7. The word “**vast**” in the passage is closest in meaning to

- A. enormous
- B. significant
- C. convincing
- D. additional

8. According to paragraph 4, Wegener felt confident that his theory are correct in part because
- A. contemporary scientists were unable to successfully challenge his evidence
 - B. many different types of evidence seemed to support his theory
 - C. his theory accounted for phenomena that earlier theories could not explain
 - D. he had used the most advanced techniques available to gather his evidence
9. According to paragraph 4, Wegener pointed to all of the following in support of his theory of continental drift EXCEPT:
- A. Plants and animals now living on some continents appear to be descended from plants and animals that originated on other continents.
 - B. Rock sequences associated with the continents are extremely similar.
 - C. The coastlines of some continents seem to fit together.
 - D. Mountains on some continents would be adjacent to mountains on other continents if these continents were joined.

Paragraph 5

Alexander Du Toit, a South African geologist was one of Wegener's ardent supporters. He noted that fossils of the Permian freshwater reptile "Mesosaurus" occur in rocks of the same age in both Brazil and South Africa. Because **the physiology of freshwater and marine animals is completely different**, it is hard to imagine how a freshwater reptile could have swum across the Atlantic Ocean and then found a freshwater environment nearly identical to its former habitat. Furthermore, if Mesosaurus could have swum across the ocean, its fossil remains should occur in other localities besides Brazil and South Africa. It is more **logical** to assume that Mesosaurus lived in lakes in what are now adjacent areas of South America and Africa but were then united in a single continent.

10. Why does the author mention the fact that "**the physiology of freshwater and marine animals is completely different**"?
- A. To explain why Du Toit was able to determine that Mesosaurus was a freshwater reptile

- B. To explain why Du Toit concluded that certain fossils in rocks in Brazil and South Africa were those of the same animal
- C. To cast doubt on the idea that Mesosaurus could have swum from one landmass to another
- D. To show Du Toit determined which landmass Mesosaurus originated on

11. The word “**logical**” in the passage is closest in meaning to

- A. satisfactory
- B. modern
- C. reasonable
- D. popular

12. Which of the following can be inferred from paragraph 5 about the Permian Mesosaurus of Brazil and South Africa?

- A. It was the dominant animal in the habitats in which it lived
- B. It lived in similar environments in both places.
- C. It was a weak swimmer compared with other freshwater reptiles.
- D. Its physiology differed from that of modern freshwater reptiles.

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Paragraph 5

Alexander Du Toit, a South African geologist was one of Wegener’s ardent supporters. 【A】 He noted that fossils of the Permian freshwater reptile “Mesosaurus” occur in rocks of the same age in both Brazil and South Africa. 【B】 Because the physiology of freshwater and marine animals is completely different, it is hard to imagine how a freshwater reptile could have swum across the Atlantic Ocean and then found a freshwater environment nearly identical to its former habitat. 【C】 Furthermore, if Mesosaurus could have swum across the ocean, its fossil remains should occur in other localities besides Brazil and South Africa. 【D】 It is more logical to assume that Mesosaurus lived in lakes in what are now adjacent areas of South America and Africa but were then united in a single continent.

13. Look at the four choices that indicates where the following sentence could be

added to the passage.

In addition to supplying new geological evidence for continental drift, he crafted convincing arguments based on ancient life forms.

Where would the sentence best fit?

14. 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. Several theories involving the movement of continents were proposed in the nineteenth and early twentieth centuries

Answer Choices

- A. Early maps showing the coastlines of South America and Africa inspired Eduard Suess to search for fossil evidence that today's southern continents had once been joined in a single landmass.
- B. To Eduard Suess, continental drift accounted for the presence of the same types of fossils on different continents that had at times been connected by land bridges.
- C. Du Toit's study of the freshwater reptile Mesosaurus added to the already considerable body of evidence that Alfred Wegener had gathered in support of the idea of continental drift.
- D. Frank Taylor expanded on Eduard Suess's theory of continental drift by arguing that tidal forces 100 million years ago had broken continents apart and caused the rise of the Mid-Atlantic Ridge.
- E. Alfred Wegener, who first developed the theory of continental drift argued that all landmasses were originally part of a supercontinent that broke up into separate continents.
- F. Early theories of continental drift were not widely accepted at the time because they failed to explain why continents moved.

Bird Colonies

About 13 percent of bird species, including most seabirds, nest in colonies. Colonial nesting evolves in response to a combination of two environmental conditions: (1) a shortage of nesting sites that are safe from predators and (2) abundant or unpredictable food that is distant from safe nest sites. Colonial nesting has both advantages and disadvantages. First and foremost, individual birds are safer in colonies that are inaccessible to predators, as on small rocky islands. In addition, colonial birds detect predators more quickly than do small groups or pairs and can drive the predators from the vicinity of the nesting area. Because nests at the edges of breeding colonies are more vulnerable to predators than those in the centers, the preference for advantageous central sites promotes dense centralized packing of nests.

The yellow-rumped cacique, which nests in colonies in Amazonian Peru, demonstrates how colonial birds prevent predation. These tropical blackbirds defend their closed, pouchlike nests against predators in three ways. First, by nesting on islands and near wasp nests, caciques are safe from arboreal mammals such as primates. Second, caciques mob predators (work together as a group to attack predators). The effectiveness of mobbing as increases with group size, which increases with colony size. Third, caciques hide their nests from predators by mixing active nests with abandoned nests. Overall, nests in clusters on islands and near wasp nests suffer the least predation.

Coordinated social interactions tend to be weak when a colony is first forming, but true colonies provide extra benefits. Synchronized nesting, for example, produces abundance of eggs and chicks that exceeds the daily needs of local predators. Additionally, colonial neighbors can improve their foraging by watching others. This behavior is especially valuable when the offsite food supplies are restricted or variable in location, as are swarms of aerial insects harvested by swallows. The colonies American cliff swallows, for example, serve as information centers from which unsuccessful individual birds follow successful neighbors to good feeding sites. Cliff swallows that are unable to find food return to their colony, locate a neighbor that has been successful, and then follow that neighbor to its food source. All birds in the colony are equally likely to follow or to be followed and thus contribute to the sharing of information that helps to ensure their reproductive success. As a result of their enhanced foraging efficiency, parent swallows in large colonies return with food for their nestlings more often and

bring more food each trip than do parents in small colonies.

To support large congregations of birds, suitable colony sites must be near rich, clumped food supplies. Colonies of pinyon jays and red crossbills settle near seed-rich conifer forests, and wattled starlings nest in large colonies near locust outbreaks. The huge colonies of guanay cormorants and other seabirds that nest on the coast of Peru depend on the productive cold waters of the Humboldt Current. The combination of abundant food in the Humboldt Current and the vastness of oceanic habitat can support enormous populations of seabirds, which concentrate at the few available nesting locations. The populations crash when their food supplies decline during **El Niño** years.

Among the costs, colonial nesting leads to increased competition for nest sites and mates, the stealing of nest materials, and increased physical interference among other effects. In spite of food abundance, large colonies sometimes exhaust their local food supplies and abandon their nests. Large groups also attract predators, especially raptors, and facilitate the spread of parasites and diseases. The globular mud nests in large colonies of the American cliff swallow, for example, are more likely to be infested by fleas or other bloodsucking parasites than are nests in small colonies. Experiments in which some burrows were fumigated to kill the parasites showed that these parasites lowered survivorship by as much as 50 percent in large colonies but not significantly in small ones. The swallows inspect and then select parasite-free nests. In large colonies, they tend to build new nests rather than use old, infested ones. On balance, the advantages of colonial nesting clearly outweigh the disadvantages, given the many times at which colonial nesting has evolved independently among different groups of birds. Still lacking, however, is a general framework for testing different hypotheses for the evolution of coloniality.

Paragraph 1

About 13 percent of bird species, including most seabirds, nest in colonies. Colonial nesting evolves in response to a combination of two environmental conditions: (1) a shortage of nesting sites that are safe from predators and (2) abundant or unpredictable food that is distant from safe nest sites. Colonial nesting has both advantages and disadvantages. First and foremost, individual birds are safer in colonies that are inaccessible to predators, as on small rocky islands. In addition, colonial birds detect predators more quickly than do small groups or

pairs and can drive the predators from the **vicinity** of the nesting area. **Because nests at the edges of breeding colonies are more vulnerable to predators than those in the centers, the preference for advantageous central sites promotes dense centralized packing of nests.**

1. The word "**vicinity**" in the passage is closest in meaning to
 - A. protection
 - B. region
 - C. population
 - D. resources

2. 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. It is more advantageous for birds to choose central locations for their colonies rather than locations near the edges of their territory.
 - B. Compared to nests at the edges of colonies, centrally located nests are preferred for their safety from predators and therefore are more densely packed together.
 - C. Predators generally prefer the densely packed, central portion of nesting colonies, which can make this part of the colony more vulnerable to predators.
 - D. Birds nesting in colonies that are vulnerable to predators tend to prefer more densely packed nests to those less densely.

Paragraph 2

The yellow-rumped cacique, which nests in colonies in Amazonian Peru, demonstrates how colonial birds prevent predation. These tropical blackbirds defend their closed, pouchlike nests against predators in three ways. First, by nesting on islands and near wasp nests, caciques are safe from arboreal mammals such as primates. Second, caciques mob predators (work together as a group to attack predators). The effectiveness of mobbing as increases with group size, which increases with colony size. Third, caciques hide their nests from predators by mixing active nests with abandoned nests. Overall, nests in clusters on islands and near wasp nests suffer the least predation.

3. Paragraph 2 implies which of the following about yellow-rumped caciques?
- A. They are comparatively unlikely to be harmed by the wasps that attack their predators.
 - B. They are able to protect their nests without using colonies.
 - C. Mixing active nests with abandoned nests is the least useful way of defending their nests.
 - D. Most of their predators are members of other bird species.
4. Paragraph 2 claims that yellow-rumped cacique colonies defend themselves from predators in all of the following ways EXCEPT:
- A. They establish colonies in hard-to-reach places.
 - B. They physically attack invading predators.
 - C. They hide active nests among previously used ones.
 - D. They limit the size of their colonies so they are hard to find.

Paragraph 3

Coordinated social interactions tend to be weak when a colony is first forming, but true colonies provide extra benefits. Synchronized nesting, for example, produces abundance of eggs and chicks that exceeds the daily needs of local predators. Additionally, colonial neighbors can improve their foraging by watching others. This behavior is especially valuable when the offsite food supplies are restricted or variable in location, as are swarms of aerial insects harvested by swallows. The colonies of American cliff swallows, for example, serve as information centers from which unsuccessful individual birds follow successful neighbors to good feeding sites. Cliff swallows that are unable to find food return to their colony, locate a neighbor that has been successful, and then follow that neighbor to its food source. All birds in the colony are equally likely to follow or to be followed and thus **contribute to** the sharing of information that helps to ensure their reproductive success. As a result of their enhanced foraging efficiency, parent swallows in large colonies return with food for their nestlings more often and bring more food each trip than do parents in small colonies.

5. The phrase “**contribute to**” in the passage is closest in meaning to
- A. learn from
 - B. depend upon

- C. take advantage of
- D. add to

6. According to paragraph 3, what advantage do birds gain by hatching all the colony's eggs at the same time?

- A. They are able to time the hatching of their chicks for when predators are not likely to be around.
- B. Chicks hatch when food is abundant, which is generally only a few times a year.
- C. Even if predators eliminate some of the newly hatched birds, many others will survive.
- D. Weaker birds gain protection for their young by synchronizing their nesting behavior with that of the more dominant birds of the colony.

7. According to paragraph 3, cliff swallows closely observe other members of their colony in order to

- A. follow successful birds to safe nesting sites
- B. learn the location of local predators
- C. place their eggs near other birds in the colony
- D. find good source of food

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Paragraph 4

To support large congregations of birds, suitable colony sites must be near rich, clumped food supplies. Colonies of pinyon jays and red crossbills settle near seed-rich conifer forests, and wattled starlings nest in large colonies near locust outbreaks. The huge colonies of guanay cormorants and other seabirds that nest on the coast of Peru depend on the productive cold waters of the Humboldt Current. The combination of abundant food in the Humboldt Current and the vastness of oceanic habitat can support enormous populations of seabirds, which concentrate at the few available nesting locations. The populations crash when their food supplies decline during **El Niño** years.

8. Which of the following is a probable effect of the fact mentioned in paragraph 4 that there are few available nesting locations near the Humboldt Current?

- A. Seabirds compete with each other for a limited supply of food.
- B. The number of seabirds at any one site is extremely large.

- C. Some seabirds nest in conifer forests near locust outbreaks.
- D. Colonies near the Humboldt Current small numbers of seabirds.

Paragraph 5

Among the costs, colonial nesting leads to increased competition for nest sites and mates, the stealing of nest materials, and increased physical interference among other effects. In spite of food abundance, large colonies sometimes **exhaust** their local food supplies and abandon their nests. Large groups also attract predators, especially raptors, and facilitate the spread of parasites and diseases. The globular mud nests in large colonies of the American cliff swallow, for example, are more likely to be infested by fleas or other bloodsucking parasites than are nests in small colonies. Experiments in which some burrows were fumigated to kill the parasites showed that these parasites lowered survivorship by as much as 50 percent in large colonies but not significantly in small ones. The swallows inspect and then select parasite-free nests. In large colonies, they tend to build new nests rather than use old, infested ones. **On balance**, the advantages of colonial nesting clearly outweigh the disadvantages, given the many times at which colonial nesting has evolved independently among different groups of birds. Still lacking, however, is a general framework for testing different hypotheses for the evolution of coloniality.

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9. The word “**exhaust**” in the passage is closest in meaning to
- A. use up
 - B. leave
 - C. avoid
 - D. hide
10. The phrase “**On balance**” in the passage is closest in meaning to
- A. Nevertheless
 - B. Overall
 - C. Therefore
 - D. Periodically
11. In paragraph 5, why does the author discuss experiments in which some burrows were fumigated?

- A. To demonstrate that parasites have a very negative effect on large colonies
 - B. To show that attacks by predators are a worse problem than the spread of parasites
 - C. To explain how swallows inspect nests for parasites
 - D. To prove that the benefits of colonial nesting outweigh the disadvantages
12. Which of the following questions is answered by paragraph 5?

- A. What causes colonies to have problems with their food supplies?
- B. What are the disadvantages of colonial nesting?
- C. What percentage of cliff swallow nests are infected by parasites?
- D. How can one test the different hypotheses explaining the evolution of bird colonies?

Paragraph 3

Coordinated social interactions tend to be weak when a colony is first forming, but true colonies provide extra benefits. ■ Synchronized nesting, for example, produces abundance of eggs and chicks that exceeds the daily needs of local predators. ■ Additionally, colonial neighbors can improve their foraging by watching others. ■ This behavior is especially valuable when the offsite food supplies are restricted or variable in location, as are swarms of aerial insects harvested by swallows. ■ The colonies of American cliff swallows, for example, serve as information centers from which unsuccessful individual birds follow successful neighbors to good feeding sites. Cliff swallows that are unable to find food return to their colony, locate a neighbor that has been successful, and then follow that neighbor to its food source. All birds in the colony are equally likely to follow or to be followed and thus contribute to the sharing of information that helps to ensure their reproductive success. As a result of their enhanced foraging efficiency, parent swallows in large colonies return with food for their nestlings more often and bring more food each trip than do parents in small colonies.

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

The overall survival of the nest generation is thus enhanced.

Where would the sentence best fit?

14. Directions: An introductory sentence for a brief summary of the passage is

provides 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.

In response to environment pressure, many species of birds have developed the practice of nesting in colonies

Answer Choices

- A. The abundance of food on rocky islands makes them an attractive environment for bird species that nest in colonies, including the yellow-rumped cacique.
- B. Because they are not able to physically defend themselves from predators, yellow-rumped caciques rely on hiding their active nests among empty nests to confuse predators.
- C. The challenge of protecting nests and newborn chicks from predators is a major contributor to the evolution of large colonies.
- D. Colonial life provides birds with benefits besides protection from predators including help with finding food.
- E. There are some disadvantages associated with life in large colonies like the increased rate of infestation by parasites.
- F. The concentration of bird colonies along coasts makes their inhabitants especially vulnerable to food shortages and weather-related destruction.

Bioluminescence in Marine Creatures

At night along the sea's edge, the ocean sometimes seems to glow, as if lit from within. This glow is the result of bioluminescence, a phenomenon exhibited by many of the sea's zooplankton. Bioluminescence is the production of cold light through internal biological processes, as opposed to phosphorescence or fluorescence, both of which are re-emitted light that was initially absorbed from an external source.

Many of the sea's creatures, including squid, dinoflagellates, bacteria, worms, crustaceans, and fish, are known to produce light. The process that marine creatures use to create light is like that of the common firefly and similar to that which creates the luminous green color seen in plastic glow sticks, often used as children's toys or for illumination during nighttime events. When a glow stick is bent, two chemicals mix, react, and create a third substance that gives off light. Bioluminescent organisms do essentially the same thing; they have a substance, called luciferin, that reacts with oxygen in the presence of enzyme, luciferase. When the reaction is complete, a new molecule is formed that gives off light—glowing blue—green in the underwater world. This biologically driven chemical reaction occurs within the organism's special light-producing cells, called photocytes, or light-producing organs, called photophores. Probably one of the most complex light-producing systems is that of the squid. Some squid have both photophores and chromatophores (organs for changing color) with their skin, thus enabling them to control both the color and intensity of the light produced. Recent research has also revealed that in some squid and fish, bioluminescent light may be produced by bacteria that live in a mutually beneficial partnership inside the animal's light organs.

How and why bioluminescence occurs is not fully understood; however, in the undersea realm, it appears to be used in a variety of interesting and ingenious ways. The most commonly observed form of bioluminescence in the sea is the pinpoint sparking of light at night that can create cometlike trails behind moving objects. Almost always, this is the result of dinoflagellates reacting to water motion. The relatively short, momentary displays of light may have evolved to startle, distract, or frighten would-be predators. Collection nets brought up from the sea's depths at night frequently glow green at great distance. Slowly fading green blobs or pulses of light can be seen coming from the organisms within, often from gelatinous creatures. This type of light display may be used to stun, disorient, or

lure prey. Like a wide-eyed deer caught on a road and dazed by headlights, undersea creatures living within the ocean's darkness may be momentarily disoriented by short flashes of bioluminescent light. Another of the sea's light-producing organisms is a small copepod (a type of crustacean) named *Sapphirina iris*. In the water, *Sapphirina* creates short flashes of a remarkably rich, azure blue light. But its appearance under a microscope is even more spectacular, the living copepod appears as if constructed of delicately handcrafted, multicolored pieces of stained glass. Within the deep sea, some fish also have a dangling bioluminescent lure or a patch of luminescent skin near the mouth, which may be used to entice unsuspecting prey.

Other sea creatures have both light-sensing and light-producing organs. These creatures are thought to use bioluminescence as a form of communication or as a means of identifying an appropriate mate. In the lantern fish, the pattern of photophores distinguishes one species from another. In other fish, bioluminescence may help to differentiate males from females. The squid uses light as a means of camouflage. By producing light from the photophores on its underside, the squid can match light from above and become nearly invisible to predators looking up from below. Squid, as well as some of the gelatinous zooplankton, have also been known to release luminescent clouds or strands of organic material, possibly as a decoy to facilitate escape. And finally, because what they eat is often bioluminescent, many of the transparent deep-sea creatures have red or black stomachs to hide the potentially flashing contents of ingested bioluminescent creatures. Without such a blacked-out stomach, their digestive organs would flash like a neon sign that says, "Eat me, eat me!"

Paragraph 2

Many of the sea's creatures, including squid, dinoflagellates, bacteria, worms, crustaceans, and fish, are known to produce light. The process that marine creatures use to create light is like that of **the common firefly** and similar to that which creates the luminous green color seen in plastic glow sticks, often used as children's toys or for illumination during nighttime events. When a glow stick is bent, two chemicals mix, react, and create a third substance that gives off light. Bioluminescent organisms do essentially the same thing; they have a substance, called luciferin, that reacts with oxygen in the presence of enzyme, luciferase. When the reaction is complete, a new molecule is formed that gives off light—

glowing blue—green in the underwater world. This biologically driven chemical reaction occurs within the organism's special light-producing cells, called photocytes, or light-producing organs, called photophores. Probably one of the most complex light-producing systems is that of the squid. Some squid have both photophores and chromatophores (organs for changing color) with their skin, thus enabling them to control both the color and intensity of the light produced. Recent research has also revealed that in some squid and fish, bioluminescent light may be produced by bacteria that live in a **mutually beneficial** partnership inside the animal's light organs.

1. Why does the author mention **the common firefly** in the passage?
 - A. To relate the light production of marine creature to that of a familiar light-producing species
 - B. To compare the light production of an insect with the more complex light production of marine creatures
 - C. To provide an example of a species that does not use a chemical reaction to produce light
 - D. To support the point that bioluminescence usually occurs at night
2. Which of the following statements about the chemical reaction that produces bioluminescence is NOT true, according to paragraph 2?
 - A. It occurs when luciferin reacts with oxygen.
 - B. It produces a glowing blue-green light.
 - C. It is much like the process by which children's toys are illuminated.
 - D. It requires organs called chromatophores.
3. Paragraph 2 demonstrates the complexity of certain squid by stating that
 - A. the squid employs its bioluminescent light to prevent bacteria from entering its organs
 - B. the squid controls both the color and intensity of the light it produces
 - C. the squid's light has greater intensity than that of fish
 - D. the squid produces the enzyme luciferase when it produces light
4. The phrase "**mutually beneficial**" in the passage is closest in meaning to
 - A. helpful to one another
 - B. generally practical

- C. efficiently balanced
- D. temporary by design

5. Which of the following statements about bioluminescent creatures is implied by paragraph 2?

- A. Bioluminescent creatures cannot produce light if bacteria enter their light organs.
- B. Not all bioluminescent creatures have both photophores and chromatophores.
- C. Most bioluminescent organisms do not need the enzyme luciferase in order to produce light.
- D. Creatures with light-producing organs are much more common than those that have only light producing cells.

Paragraph 3

How and why bioluminescence occurs is not fully understood; however, in the undersea realm, it appears to be used in a variety of interesting and **ingenious** ways. The most commonly observed form of bioluminescence in the sea is the pinpoint sparking of light at night that can create cometlike trails behind moving objects. Almost always, this is the result of dinoflagellates reacting to water motion. The relatively short, momentary displays of light may have evolved to startle, distract, or frighten would-be predators. Collection nets brought up from the sea's depths at night frequently glow green at great distance. Slowly fading green blobs or pulses of light can be seen coming from the organisms within, often from gelatinous creatures. This type of light display may be used to stun disorient, or lure prey. Like a wide-eyed deer caught on a road and dazed by headlights, undersea creatures living within the ocean's darkness may be momentarily disoriented by short flashes of bioluminescent light. Another of the sea's light-producing organisms is a small copepod (a type of crustacean) named *Sapphirina iris*. In the water, *Sapphirina* creates short flashes of a remarkably rich, azure blue light. But its appearance under a microscope is even more spectacular, the living copepod appears as if constructed of **delicately** handcrafted, multicolored pieces of stained glass. Within the deep sea, some fish also have a dangling bioluminescent lure or a patch of luminescent skin near the mouth, which may be used to entice unsuspecting prey.

6. The word “**ingenious**” in the passage is closest in meaning to
- A. inventive
 - B. important
 - C. unusual
 - D. specialized
7. According to paragraph 3, when do dinoflagellates produce pinpoint sparkling displays of light?
- A. When they are caught in collection nets
 - B. When they are hunting food
 - C. When there is a sudden movement of the water around them
 - D. When they are stunned or disoriented
8. According to paragraph 3, what is notable when looking at *Sapphirina iris* under a microscope?
- A. It produces brief flashes of light.
 - B. Its body is a rich azure blue color.
 - C. It has luminescent skin on its mouth.
 - D. It looks as if it is made of glass of many colors.
9. Which of the following is NOT mentioned in paragraph 3 as a possible reason for the use of bioluminescence ?
- A. To provide a means of lighting the dark marine waters
 - B. To momentarily disorient other creatures
 - C. To frighten away potential predators
 - D. To attract prey
10. The word “**delicately**” in the passage is closest in meaning to
- A. individually
 - B. brilliantly
 - C. unusually
 - D. finely

Paragraph 4

Other sea creatures have both light-sensing and light-producing organs. These

creatures are thought to use bioluminescence as a form of communication or as a means of identifying an appropriate mate. In the lantern fish, the pattern of photophores distinguishes one species from another. In other fish, bioluminescence may help to differentiate males from females. The squid uses light as a means of camouflage. By producing light from the photophores on its underside, the squid can match light from above and become nearly invisible to predators looking up from below. Squid, as well as some of the gelatinous zooplankton, have also been known to release luminescent clouds or strands of organic material, possibly as a decoy to facilitate escape. And finally, because what they eat is often bioluminescent, many of the transparent deep-sea creatures have red or black stomachs to hide the potentially flashing contents of **ingested** bioluminescent creatures. Without such a blacked-out stomach, their digestive organs would flash like a neon sign that says, "Eat me, eat me!"

11. According to paragraph 4, squid use bioluminescence to

- A. communicate with other squid
- B. locate mates
- C. tell males and females apart
- D. hide from predators

12. The word "**ingested**" in the passage is closest in meaning to

- A. remaining
- B. eaten
- C. living
- D. nutritious

Paragraph 4

Other sea creatures have both light-sensing and light-producing organs. These creatures are thought to use bioluminescence as a form of communication or as a means of identifying an appropriate mate. 【A】 In the lantern fish, the pattern of photophores distinguishes one species from another. 【B】 In other fish, bioluminescence may help to differentiate males from females. 【C】 The squid uses light as a means of camouflage. 【D】 By producing light from the photophores on its underside, the squid can match light from above and become nearly invisible to predators looking up from below. Squid, as well as some of the gelatinous

zooplankton, have also been known to release luminescent clouds or strands of organic material, possibly as a decoy to facilitate escape. And finally, because what they eat is often bioluminescent, many of the transparent deep-sea creatures have red or black stomachs to hide the potentially flashing contents of ingested bioluminescent creatures. Without such a blacked-out stomach, their digestive organs would flash like a neon sign that says, "Eat me, eat me!"

13. Look at the four choices that indicate where the following sentence could be added to the passage

Yet, certain species use bioluminescence for exactly the opposite purpose—to blend in with surroundings and become less identifiable.

Where would the sentence best fit?

14. 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.

Many of the sea's creatures produce light through bioluminescence.

Answer Choices

- A. Bioluminescent creatures use a substance called luciferin and an enzyme to produce light in a biologically driven chemical reaction.
- B. Bioluminescence can be used to achieve various and sometimes seemingly opposite goals such as frightening away predators or luring prey.
- C. Bioluminescence can be used by some sea creatures as a form of communication or as a means of identifying an appropriate mate.
- D. The majority of bioluminescent creatures are gelatinous in nature, allowing them to produce light.
- E. The same bioluminescent creature cannot have both light-sensing and light-producing organs.
- F. Sea creatures that eat bioluminescent material possess special chemicals that keep their stomach contents from flashing.

Egypt Circa 3100 B.C.

The city of Memphis, located on the Nile near the modern city of Cairo, was founded around 3100 B.C., as the first capital of a recently united Egypt. The choice of Memphis by Egypt's first kings reflects the site's strategic importance. First, and most obvious, the apex of the Nile River delta was a politically opportune location for the state's administrative center, standing between the united lands of Upper and Lower Egypt and offering ready access to both parts of the country. The older predynastic (pre- 3100 B.C.) centers of power. This and Hierakonpolis, were too remote from the vast expanse of the delta, which had been incorporated into the unified state. Only a city within easy reach of both the Nile valley to the south and the more spread out, difficult terrain to the north could provide the necessary political control that the rulers of early dynastic Egypt (roughly 3000-2600 B.C.) required.

The region of Memphis must have also served as an important node for transport and communications, even before the unification of Egypt. The region probably acted as a conduit for much, if not all, of the river-based trade between northern and southern Egypt. Moreover, commodities (such as wine, precious oils, and metals) imported from the Near East by the royal courts of predynastic Upper Egypt would have been channeled through the Memphis region on their way south. In short, therefore, the site Memphis offered the rulers of the Early Dynastic Period an ideal location for controlling internal trade within their realm, an essential requirement for a state-directed economy that depended on the movement of goods.

Equally important for the national administration was the ability to control communications within Egypt. The Nile provided the easiest and quickest artery of communication, and the national capital was, again, ideally located in this respect. Recent geological surveys of the Memphis region have revealed much about its topography in ancient times. It appears that the location of Memphis may have been even more advantageous for controlling trade, transport, and communications than was previously appreciated. Surveys and drill cores have shown that the level of the Nile floodplain has steadily risen over the last five

millenniums. When the floodplain was much lower, as it would have been in predynastic and early dynastic times, the outwash fans (fan-shaped deposits of sediments) of various wadis (stream-beds or channels) that carry water only during rainy periods) would have been much more prominent features on the east bank. The fan associated with the Wadi Hof extended a significant way into the Nile floodplain, forming a constriction in the vicinity of Memphis. The valley may have narrowed at this point to a mere three kilometers, making it the ideal place for controlling river traffic.

Furthermore, the Memphis region seems to have been favorably located for the control not only of river-based trade but also of desert trade routes. The two outwash fans in the area gave access to the extensive wadi systems of the eastern desert. In predynastic times, the Wadi Digla may have served as a trade route between the Memphis region and the Near East, to judge from the unusual concentration of foreign artifacts found in the predynastic settlement of Maadi. Access to, and control of, trade routes between Egypt and the Near East seems to have been a preoccupation of Egypt's rulers during the period of state formation. The desire to monopolize foreign trade may have been one of the primary factors behind the political unification of Egypt. The foundation of the national capital at the junction of an important trade route with the Nile valley is not likely to have been accidental. Moreover, the Wadis Hof and Digla provided the Memphis region with accessible desert pasturage. As was the case with the cities of Hierakonpolis and Elkab, the combination within the same area of both desert pasturage and alluvial arable land (land suitable for growing crops) was a particularly attractive one for early settlement, this combination no doubt contributed to the prosperity of the Memphis region from early predynastic times.

Paragraph 1

The city of Memphis, located on the Nile near the modern city of Cairo, was founded around 3100 B.C., as the first capital of a recently united Egypt. The choice of Memphis by Egypt's first kings reflects the site's strategic importance. First, and most obvious, the apex of the Nile River delta was a politically opportune location

for the state's administrative center, standing between the united lands of Upper and Lower Egypt and offering ready access to both parts of the country. The older predynastic (pre- 3100 B.C.) centers of power. This and Hierakonpolis, were too remote from the **vast** expanse of the delta, which had been incorporated into the unified state. Only a city within easy reach of both the Nile valley to the south and the more spread out, difficult terrain to the north could provide the necessary political control that the rulers of early dynastic Egypt (roughly 3000-2600 B.C.) required.

1. The word "**vast**" in the passage is closet in meaning to
 - A. fertile
 - B. huge
 - C. unique
 - D. irregular
2. According to paragraph 1, why was Memphis a better choice for the capital of a united Egypt than either This or Hierakonpolis?
 - A. Memphis was in a better location for maintaining administrative control.
 - B. Memphis had long been a regional administrative center by the time Egypt was united.
 - C. This and Hierakonpolis had never actually been incorporated into the unified state.
 - D. Egyptian rulers had failed to keep political control over this and Hierakonpolis in predynastic times.
3. It can be inferred from paragraph 1 that one consequence of the unification of Egypt was
 - A. the reduction of the strategic importance of older centers of power
 - B. the opportunity for the recently united Egypt to become economically self-sufficient
 - C. the increase in political tensions between the rulers of Upper and Lower Egypt
 - D. the reduction of Egypt's dependence upon the Nile for trade and

communications

4. Which of the following best describes how paragraph 1 is organized?
- A. Two simultaneous developments are described, as well as the reasons why neither one would have occurred without the other.
 - B. A hypothesis is presented, and then points in favor of that hypothesis as well as points against it are discussed.
 - C. A major event is described, and then the most obvious effects of that event are presented.
 - D. A decision is described, and then one likely motivation for that decision is presented.

Paragraph 2

The region of Memphis must have also served as an important node for transport and communications, even before the unification of Egypt. The region probably acted as a conduit for much, if not all, of the river-based trade between northern and southern Egypt. Moreover, commodities (such as wine, precious oils, and metals) imported from the Near East by the royal courts of predynastic Upper Egypt would have been channeled through the Memphis region on their way south. In short, therefore, the site Memphis offered the rulers of the Early Dynastic Period an ideal location for controlling internal trade within their realm, an essential requirement for a state-directed economy that depended on the movement of goods.

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5. According to paragraph 2, when did Egypt import goods from the Near East?
- A. Once internal trade was fully controlled from Memphis
 - B. Not until early dynastic Egypt established its state-directed economy
 - C. As early as predynastic times
 - D. Only when local supplies of those goods had been completely used up
6. 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. Thus in Memphis, the rulers of the Early Dynastic Period were ideally placed

- to control internal trade, which they had to do in order to run their economy.
- B. Therefore the rulers of the Early Dynastic Period thought Memphis was the ideal location for trade with nearby countries.
 - C. In short, a state-directed economy like that of the Early Dynastic Period requires choosing a single location to which goods can be moved-Memphis, in this case.
 - D. In sum, then, a state-directed economy first developed during Egypt's Early Dynastic Period because Memphis was an ideal location for controlling trade.

Paragraph 3

Equally important for the national administration was the ability to control communications within Egypt. The Nile provided the easiest and quickest artery of communication, and the national capital was, again, ideally located in this respect. Recent geological surveys of the Memphis region have revealed much about its topography in ancient times. It appears that the location of Memphis may have been even more advantageous for controlling trade, transport, and communications than was previously **appreciated**. Surveys and drill cores have shown that the level of the Nile floodplain has steadily risen over the last five millennia. When the floodplain was much lower, as it would have been in predynastic and early dynastic times, the outwash fans (fan-shaped deposits of sediments) of various wadis (stream-beds or channels) that carry water only during rainy periods) would have been much more prominent features on the east bank. The fan associated with the Wadi Hof extended a significant way into the Nile floodplain, forming a constriction in the **vicinity** of Memphis. The valley may have narrowed at this point to a mere three kilometers, making it the ideal place for controlling river traffic.

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7. The word "**appreciated**" in the passage is closest in meaning to
- A. proposed
 - B. understood
 - C. approved
 - D. expected
8. According to paragraph 3, recent research into the topography of the Memphis region in ancient times suggests which of the following?
- A. The level of the Nile floodplains was much higher in predynastic and dynastic

- times than in later times.
- B. The sediment deposits of wadis were not as noticeable in predynastic and dynastic times than in later times.
 - C. The Nile valley at the point of Memphis was narrower in predynastic and dynastic times than it was in later times
 - D. Frequent rainy periods may have caused a significant reduction of trade traffic during the predynastic and dynastic times.
9. The word “**vicinity**” in the passage is closest in meaning to
- A. center
 - B. fields
 - C. city
 - D. surrounding area

Paragraph 4

Furthermore, the Memphis region seems to have been favorably located for the control not only of river-based trade but also of desert trade routes. The two outwash fans in the area gave access to the extensive wadi systems of the eastern desert. In predynastic times, the Wadi Digla may have served as a trade route between the Memphis region and the Near East, to judge from the unusual concentration of foreign artifacts found in the predynastic settlement of Maadi. Access to, and control of, trade routes between Egypt and the Near East seems to have been a preoccupation of Egypt’s rulers during the period of state formation. The desire to monopolize foreign trade may have been one of the primary factors behind the political unification of Egypt. The foundation of the national capital at the junction of an important trade route with the Nile valley is not likely **to have been accidental**. Moreover, the Wadis Hof and Digla provided the Memphis region with accessible desert pasturage. As was the case with the cities of Hierakonpolis and Elkab, the combination within the same area of both desert pasturage and alluvial arable land (land suitable for growing crops) was a particularly attractive one for early settlement, this combination no doubt contributed to the prosperity of the Memphis region from early predynastic times.

10. According to paragraph 4, which of the following is NOT a reason Memphis was chosen as the capital of a united Egypt?

- A. It was at the junction of a major trade route with the Nile valley.

- B. It was near land that could be used for animal grazing and for growing crops.
- C. The nearby outwash fans led into wadis that could be used as desert trade routes.
- D. Since foreign traders had settled in nearby Maadi, trade between the two cities could be established.

11. The phrase **“to have been accidental”** in the passage is closest in

- A. to have gone wrong
- B. to have been helpful
- C. to have occurred by chance
- D. to have made a difference

12. In paragraph 4, why does the author mention the cities of Hierakonpolis and Elkab?

- A. To give an indication of the level of prosperity that Memphis is thought to have enjoyed from its earliest days.
- B. To compare the Memphis region to them in terms of their similar combinations of characteristics providing advantages for early settlement.
- C. To identify the models that the founders of Memphis followed in laying out the national capital.
- D. To suggest that the combination of desert pasturage and alluvial arable land in the same area was very common

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Paragraph 2

【A】 The region of Memphis must have also served as an important node for transport and communications, even before the unification of Egypt. 【B】 The region probably acted as a conduit for much, if not all, of the river-based trade between northern and southern Egypt. 【C】 Moreover, commodities (such as wine, precious oils, and metals) imported from the Near East by the royal courts of predynastic Upper Egypt would have been channeled through the Memphis region on their way south. 【D】 In short, therefore, the site Memphis offered the rulers of the Early Dynastic Period an ideal location for controlling internal trade within their realm, an essential requirement for a state-directed economy that depended on the movement of goods.

13. Look at the four choices that indicate where the following sentence could be

added to the passage.

While considerations of political power and ease of administration were decisive in choosing the location of the new capital, the site clearly had other advantages.

Where would the sentence best fit?

14. 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.**

Around 3100 B.C. Memphis was chosen for its strategic importance to be the first capital of a recently united Egypt.

Answer Choices

- A. River-based trade from northern Egypt and imported goods going south all passed through the Memphis region, making Memphis an ideal location for controlling trade.
- B. Recent geological surveys suggest that the topographical features of the Memphis region made it particularly well-suited for controlling communications and trade.
- C. The rulers of unified Egypt enjoyed a monopoly over foreign trade because all such trade was required to go through the Wadi Digla, to which the rulers controlled all access.
- D. After Memphis became the capital city, river-based trade along the Nile gained in importance, while land-based desert trade declined in importance.
- E. The Nile, despite a constriction of its valley near Memphis, was the most advantageous route for communication and travel once the floodplain had begun to rise.
- F. While the location of Memphis was agriculturally favorable, it was particularly attractive because it enabled Egypt's rulers to control trade moving through the desert from the Near East.

Costs of Quitting a Job

Economic theory predicts that when the costs of quitting one's job are relatively low, mobility is more likely. This observation underlines the analysis of the rise in quit rates during periods of prosperity, and the effects of mobility costs can be seen when looking at residential location and job turnover. Industries with high concentrations of employment in urban areas, where a worker's change of employer does not necessarily require investing in a change of residence, appear to have higher rates of job turnover than industries concentrated in nonmetropolitan areas do.

Beyond the costs that can be associated with such measurable characteristics as age and residential location are those that are psychic in nature. These latter costs, though unobservable to the researcher, are very likely to differ widely across individuals. Some people adapt more quickly to new surroundings than others do, for example. Recent studies have found considerable heterogeneity among workers in their propensity to change jobs, with one study reporting that almost half of all permanent separations that took place over a three-year period involved a small number (13 percent) of workers who had three or more separations during the period (in contrast, 31 percent of workers had no separations at all during the period).

It is also possible that the costs of job changing by employees vary internationally. Data suggest that workers in the United States may well be more likely to change employers than workers elsewhere may be. Indeed, data confirm that, on average, American workers have been with their current employers fewer years than workers in most other developed countries, particularly workers in Europe and Japan, have been with theirs. It is not known why Americans are more mobile than most others are, but one possibility relates to the lower levels of company training received by American workers. Another possibility, however, is that the costs of mobility are lower in the United States (despite the fact that Japan and Europe are more densely populated and hence more urban). What would create these lower costs?

One hypothesis that has received at least some investigation is that housing policies in Europe and Japan increase the costs of residential, and therefore job, mobility. Germany, the United Kingdom, and Japan, for example, have controls on the rent increases that proprietors can charge to existing renters while tending to allow proprietors the freedom to negotiate any mutually agreeable rent on their

initial lease with the renter. Thus, it is argued that renters who move typically face very large rent increases in these countries. Similarly, subsidized housing is much more common in these countries than in the United States, but since it is limited relative to the demand for it, those British, German, or Japanese workers fortunate enough to live in subsidized units are reluctant (it is argued) to give them up. The empirical evidence on the implications of housing policy for job mobility, however, is both limited and mixed.

It could also be hypothesized that the United States, Australia, and Canada, all of which exhibit shorter job tenures than do most European countries or Japan, are large, sparsely populated countries that historically have attracted people willing to emigrate from abroad or resettle internally over long distances. In a country of “movers,” moving may not be seen by either worker or employer as an unusual or especially traumatic event.

While questions remain about the causes of different job mobility rates across countries, the social desirability of job mobility can also be debated. On one hand, mobility can be seen as socially useful because it promotes both individual well-being and the quality of job matches. Moreover, the greater the number of workers and employers “in the market” at any given time, the more flexibility an economy has in making job matches that best adapt to a changing environment. Indeed, when focusing on this aspect of job mobility, economists have long worried whether economies have enough mobility. On the other hand, lower mobility costs (and therefore greater mobility) among workers may well serve to reduce the incentives of their employers to provide job training. Whether the presence of job changing costs is a social boon or bane, these costs and the mobility associated with them are factors with which all employers must contend.

Paragraph 1

Economic theory predicts that when the costs of quitting one’s job are relatively low, mobility is more likely. This observation underlines the analysis of the rise in quit rates during periods of prosperity, and the effects of mobility costs can be seen when looking at residential location and job turnover. Industries with high concentrations of employment in urban areas, where a worker’s change of employer does not necessarily require investing in a change of residence, appear to have higher rates of job turnover than industries concentrated in nonmetropolitan areas do.

1. According to paragraph 1, people are more likely to quit their jobs in which **TWO** of the following situations? To receive credit, you must select **TWO** answers.

- A. They are living in good economic times.
- B. They are moving from urban areas to non-urban areas.
- C. They are living in urban areas.
- D. They do not like their employers.

2. 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. Workers in urban areas change jobs less frequently than do those in nonmetropolitan areas because the costs associated with a change of residence are higher in urban areas.
- B. Industries located in urban areas experience higher rates of job turnover than do those in nonmetropolitan areas because workers can often change employers without having to change where they live.
- C. Industries located in urban areas tend to have lower rates of job turnover than do those in nonmetropolitan areas because they are more likely to invest in residences for workers.
- D. Workers in urban industries are likely to change jobs more frequently than are those in nonmetropolitan industries because it is less costly for workers to change residences in urban than in nonmetropolitan areas.

Paragraph 2

Beyond the costs that can be associated with such measurable characteristics as age and residential location are those that are psychic in nature. These latter costs, though unobservable to the researcher, are very likely to differ widely across individuals. **Some people adapt more quickly to new surroundings than others do,** for example. Recent studies have found considerable heterogeneity among workers in their propensity to change jobs, with one study reporting that almost half of all permanent separations that took place over a three-year period involved a small number (13 percent) of workers who had three or more separations during the period (in contrast, 31 percent of workers had no separations at all during the period).

3. Why does the author note that **“Some people adapt more quickly to new surroundings than others do”**?

- A. To argue that some people experience little psychic cost when they change jobs
- B. To support the claim that the psychic cost of changing jobs is likely to differ widely between individuals
- C. To illustrate why some psychic costs are unobservable to researchers
- D. To argue that psychic costs alone cannot fully explain changes in mobility rates

4. According to paragraph 2, what do students reveal about the tendency for workers to change jobs?

- A. It relates more to economic costs than to psychic costs.
- B. It decreases with age.
- C. It vanes greatly.
- D. It increases over time.

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Paragraph 3

It is also possible that the costs of job changing by employees vary internationally. Data suggest that workers in the United States may well be more likely to change employers than workers elsewhere may be. Indeed, data confirm that, on average, American workers have been with their current employers fewer years than workers in most other developed countries, particularly workers in Europe and Japan, have been with theirs. It is not known why Americans are more mobile than most others are, but one possibility relates to the lower levels of company training received by American workers. Another possibility, however, is that the costs of mobility are lower in the United States (despite the fact that Japan and Europe are more densely populated and hence more urban). What would create these lower costs?

5. According to paragraph 3, what is one possible explanation for why American workers change jobs more frequently than workers elsewhere do?

- A. The relatively small percentage of American workers who live in urban areas
- B. The tendency of American employers to provide less training for workers

- C. The recent decrease in mobility costs in the United States
- D. The lower average population density in the United States

Paragraph 4

One hypothesis that has received at least some investigation is that housing policies in Europe and Japan increase the costs of residential, and therefore job, mobility. Germany, the United Kingdom, and Japan, for example, have controls on the rent increases that proprietors can charge to existing renters while tending to allow proprietors the freedom to negotiate any mutually agreeable rent on their initial lease with the renter. Thus, it is argued that renters who move typically face very large rent increases in these countries. Similarly, subsidized housing is much more common in these countries than in the United States, but since it is limited relative to the demand for it, those British, German, or Japanese workers fortunate enough to live in subsidized units are reluctant (**it is argued**) to give them up. The empirical evidence on the implications of housing policy for job mobility, however, is both limited and mixed.

6. According to paragraph 4, what may contribute to high mobility costs in Germany, the United Kingdom, and Japan?

- A. Rent control does not apply to a renter's first lease on a property.
- B. Governments have significantly reduced housing subsidies.
- C. There is little control on the rent increases that can be charged after the initial agreement.
- D. When a renter leaves a housing unit that has been subsidized, the unit will not be subsidized for the next renter.

7. What is the author's purpose in using the parenthetical phrases "**it is argued**"?

- A. To indicate that the view that workers are reluctant to leave subsidized housing is widely accepted
- B. To suggest that the view that workers are reluctant to leave subsidized housing has not been proved true
- C. To emphasize that the view that workers are reluctant to leave subsidized housing was based on careful reasoning
- D. To oppose the view that workers are reluctant to leave subsidized housing

Paragraph 5

It could also be hypothesized that the United States, Australia, and Canada, all of which exhibit shorter job tenures than do most European countries or Japan, are large, **sparsely** populated countries that historically have attracted people willing to emigrate from abroad or resettle internally over long distances. In a country of “movers,” moving may not be seen by either worker or employer as an unusual or especially **traumatic** event.

8. By indicating that the United States , Australia, and Canada are “**sparsely**” populated, the author means that the population of these countries

- A. is widely scattered
- B. has increased rapidly
- C. is very large
- D. has remained stable over the years

9. Paragraph 5 supports which of the following ideas about mobility costs for American workers compared with mobility costs for workers in most European countries?

- A. Mobility costs are higher for American workers because they have shorter job tenures.
- B. American workers get more help from employers in covering the costs of moving to a new job.
- C. The psychic costs of resulting internally to take a job are lower for American workers
- D. The economic costs of emigrating to take a job are higher for American workers

10. The word “**traumatic**” in the passage is closest in meaning to

- A. Important
- B. Unreasonable
- C. Expensive
- D. Upsetting

Paragraph 6

While questions remain about the causes of different job mobility rates across countries, the social desirability of job mobility can also be debated. On one hand, mobility can be seen as socially useful because it promotes both individual well-being and the quality of job matches. Moreover, the greater the number of workers and employers “in the market” at any given time, the more flexibility an economy has in making job matches that best adapt to a changing environment. Indeed, when focusing on this aspect of job mobility, economists have long worried whether economies have enough mobility. On the other hand, lower mobility costs (and therefore greater mobility) among workers may well serve to reduce the **incentives** of their employers to provide job training. Whether the presence of job changing costs is a social boon or bane, these costs and the mobility associated with them are factors with which all employers must contend.

11. According to paragraph 6, high job mobility rates may benefit an economy by
- A. making it more likely that the economic environment will change significantly
 - B. encouraging employers to increase the sizes of their workforces
 - C. making it more likely that jobs will be filled by people who are suited to them
 - D. encouraging workers to improve their skills
12. The word “**incentives**” in the passage is closest in meaning to
- A. authority
 - B. obligation
 - C. ability
 - D. motivation

Paragraph 6

While questions remain about the causes of different job mobility rates across countries, the social desirability of job mobility can also be debated. On one hand, mobility can be seen as socially useful because it promotes both individual well-being and the quality of job matches. ■Moreover, the greater the number of workers and employers “in the market” at any given time, the more flexibility an economy has in making job matches that best adapt to a changing environment. ■Indeed, when focusing on this aspect of job mobility, economists have long worried whether economies have enough mobility. ■On the other hand, lower

mobility costs (and therefore greater mobility) among workers may well serve to reduce the incentives of their employers to provide job training. ■ Whether the presence of job changing costs is a social boon or bane, these costs and the mobility associated with them are factors with which all employers must contend.

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

According to this view, greater mobility could result in a less skilled workforce.

Where would the sentence best fit?

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selected 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.**

According to economic theory, workers are more likely to change jobs when the associated costs are low.

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Answer Choices

- A. Since job changes by a minority of workers can radically alter overall job mobility rates, job mobility rates tell us little about the mobility costs facing the average worker
- B. Presidential location and individual psychic factors could account for some differences in job mobility among workers
- C. Economists argue strongly for job mobility despite the social and economic costs associated with it.
- D. Outside of the United States, subsidized housing and controls on rent increases explain why there is less job mobility in urban areas than in nonmetropolitan areas.
- E. Possibly due to housing and other differences, mobility costs may be lower in the United States than in most other developing nations which could help account for differences in job mobility.
- F. High job mobility arguably has both benefits, in terms of individual well-being and economic flexibility, and economic costs.

Stone Tools and Pottery Fragments

Aside from ancient buildings, in sheer bulk the largest part of the archaeological record is made up of stone tools and pottery fragments (shards). Stone tools are the earliest known artifacts, having been first used more than two million years ago, and they have remained in use to the present day. When a chunk of fine-grain stone is struck with sufficient force at the proper angle with another rock or with a wood or bone baton, a shock wave will pass through the stone and detach a flake of the desired size and shape. In analyzing ancient stone tools, many archaeologists have mastered the skills needed to make stone tools themselves. Few things are sharper than a fragment struck from fine-grain flint or from obsidian (volcanic glass). Obsidian is so fine grained that flakes of it can have edges only about twenty molecules thick-hundreds of times thinner than steel tools.

Through experimentation, some archaeologists are able to produce copies of almost every stone tool type used in antiquity. A common research strategy is to make flint tools, use them to cut up meat, saw wood, clean hides, bore holes, etc, and then compare the resulting wear traces with the marks found on ancient artifacts. Sometimes electron-scanning microscopes are used to study minute variations in these use marks. Some rough correspondence can be found between the types of uses and the characteristics of wear marks, but there are many ambiguities.

Ethnographic data from people who still use these tools, like one study of how the !Kung hunter-gatherers use different styles of stone spear points to identify their different social groupings, indicate that even crude-looking stone tools may reflect a great deal of the social and economic structure.

Ceramics were in use much later than the first stone tools (appearing in quantity in many places about 10,000 years ago), but they were used in such massive quantities in antiquity that, for many archaeologists, work life consists mainly of the slow sorting and analyzing of pottery fragments. Ceramic pots were first made by hand and dried in the sun or in low temperature kilns, a process that did not produce a very durable material. But in many areas of Africa, Asia and Europe high-temperature kilns produced pottery that is nearly a form of glass, and fragments of these pots survive even when the pottery is broken.

Ceramics form such a large part of archaeologists' lives because ceramics express so much about the people who made them. Pots are direct indicators of function in that they show how diets and economies changed over time.

Archaeologists have documented how pottery in the American Southwest changed in prehistoric times as a diet developed that included boiled seeds of various native plants, and pottery was developed to withstand the heat and mechanical stresses of the boiling process.

Ceramics are almost always analyzed on the basis of their style. This idea of style is hard to define, but changing styles are the basis on which archaeologists date much of the archaeological record. But for many archaeologists, ceramic styles are more than just convenient devices of dating. For many archaeologists, stylistic decoration of artifacts is the primary means by which one can enter the cognitive world of the ancients. Societies throughout history have invested their objects with styles that have profound and complex meanings and effects. In the case of the Maya and every other early civilization, rulers used particular symbols and styles as mechanisms through which they portrayed, communicated, and implemented their power. In all societies, styles fix social meaning and are powerful ways in which social groups define and construct their culture. Styles of objects, language, and personal behavior identify people in terms of gender, age group, ethnic group, socioeconomic class, and in many other important ways. Some researchers, for example, have argued that a particular kind of pottery, called Ramey incised (which is incised with figures of eyes, fish, arrows, and abstract objects and was used by the people in the area of present-day Missouri and Illinois at about A.D. 900), was primarily used to distribute food but was also used to communicate the idea that the society's elite, for whom the pots were made, were mediators of cosmic forces.

Paragraph 1

Aside from ancient buildings, in sheer bulk the largest part of the archaeological record is made up of stone tools and pottery fragments (shards). Stone tools are the earliest known artifacts, having been first used more than two million years ago, and they have remained in use to the present day. When a chunk of fine-grain stone is struck with sufficient force at the proper angle with another rock or with a wood or bone baton, a shock wave will pass through the stone and **detach** a flake of the desired size and shape. In analyzing ancient stone tools, many archaeologists have mastered the skills needed to make stone tools themselves. Few things are sharper than a fragment struck from fine-grain flint or from obsidian (volcanic glass). Obsidian is so fine grained that flakes of it can

have edges only about twenty molecules thick-hundreds of times thinner than steel tools.

1. The word “**detach**” in the passage is closest in meaning to
 - A. separate
 - B. sharpen
 - C. loosen
 - D. produce
2. According to paragraph 1, each of the following is true of stone tools EXCEPT
 - A. They were first produced more than two million years ago.
 - B. They are still being used today.
 - C. They are made of fine-grained stones such as flint or obsidian.
 - D. Their edges are never as thin or as sharp as those of steel tools.

Paragraph 2

Through experimentation, some archaeologists are able to produce copies of almost every stone tool type used in antiquity. A common research strategy is to make flint tools, use them to cut up meat, saw wood, clean hides, bore holes, etc, and then compare the resulting wear traces with the marks found on ancient artifacts. Sometimes electron-scanning microscopes are used to study **minute** variations in these use marks. Some rough correspondence can be found between the types of uses and the characteristics of wear marks, but there are many **ambiguities**.

3. The word “**minute**” in the passage is closest in meaning to
 - A. unusual
 - B. important
 - C. hidden
 - D. tiny
4. The word “**ambiguities**” in the passage describes things that
 - A. do not make any sense
 - B. are not well documented
 - C. can be interpreted in more than one way

D. do not fit with the available data

5. According to paragraph 2, archaeologists make and use their own stone tools in order to

- A. find out how strong different types of stone tools are
- B. find out what kinds of tasks such tools were used for in ancient times
- C. study the copies under electron microscopes and to avoid damaging the originals
- D. show that ancient multipurpose tools were practical and easy to use

Paragraph 3

Ethnographic data from people who still use these tools, like one study of how the IKung hunter-gatherers use different styles of stone spear points to identify their different social groupings, indicate that even crude-looking stone tools may reflect a great deal of the social and economic structure.

6. Which of the following questions about the IKung is answered in paragraph 3?

- A. Are the IKung rare among today's hunter-gatherers in using stone tools?
- B. Is the social structure of the IKung more complex than that of most hunter-gatherer societies?
- C. Does the IKung's use of several styles of stone tools have a social function?
- D. Do the IKung use stone tools other than spear points?

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Paragraph 4

Ceramics were in use much later than the first stone tools (appearing in quantity in many places about 10,000 years ago), but they were used in such massive quantities in antiquity that, for many archaeologists, work life consists mainly of the slow sorting and analyzing of pottery fragments. Ceramic pots were first made by hand and dried in the sun or in low temperature kilns, a process that did not produce a very durable material. But in many areas of Africa, Asia and Europe high-temperature kilns produced pottery that is nearly a form of glass, and fragments of these pots survive even when the pottery is broken.

7. According to paragraph 4, which of the following is true of the earliest ceramics?

- A. They were in use before the earliest stone tools.
- B. They were used in only a few places 10,000 years ago.
- C. They appeared in many places about 10,000 years ago.
- D. They were all baked in low-temperature kilns.

8. Paragraph 4 suggests sun-dried pots

- A. interest archaeologists less than stone tools because they are not as old.
- B. account for comparatively few of the pottery fragments that archaeologists study.
- C. are more common in Africa, Asia, or Europe than other parts of the world.
- D. are easier to sort and analyze than pottery made in high-temperature kilns.

Paragraph 5

Ceramics form such a large part of archaeologists' lives because ceramics express so much about the people who made them. Pots are direct indicators of function in that they show how diets and economies changed over time. Archaeologists have documented how pottery in the American Southwest changed in prehistoric times as a diet developed that included boiled seeds of various native plants, and pottery was developed to withstand the heat and mechanical stresses of the boiling process.

9. In paragraph 5, the author discusses pottery in the American Southwest in order to

- A. emphasize that ceramics are usually the only means of reconstructing the diet and economic activity of prehistoric peoples.
- B. argue that changes in the style of pottery are usually a result of changes in food preparation.
- C. explain why certain types of prehistoric pottery have been able to survive better than others.
- D. support the claim that ceramics provide important dining and economical information about their users.

Paragraph 6

Ceramics are almost always analyzed on the basis of their style. This idea of

style is hard to define, but changing styles are the basis on which archaeologists date much of the archaeological record. But for many archaeologists, ceramic styles are more than just convenient devices of dating. For many archaeologists, stylistic decoration of artifacts is the primary means by which one can enter the cognitive world of the ancients. Societies throughout history have invested their objects with styles that have profound and complex meanings and effects. In the case of the Maya and every other early civilization, rulers used particular symbols and styles as mechanisms through which they **portrayed**, communicated, and implemented their power. In all societies, styles fix social meaning and are powerful ways in which social groups define and construct their culture. Styles of objects, language, and personal behavior identify people in terms of gender, age group, ethnic group, socioeconomic class, and in many other important ways. Some researchers, for example, have argued that a particular kind of pottery, called Ramey incised (which is incised with figures of eyes, fish, arrows, and abstract objects and was used by the people in the area of present-day Missouri and Illinois at about A.D. 900), was primarily used to distribute food but was also used to communicate the idea that the society's elite, for whom the pots were made, were mediators of cosmic forces.

10. The word "**portrayed**", in the passage is closest in meaning to
- A. claimed
 - B. represented
 - C. defended
 - D. established
11. According to paragraph 6, decorating artifacts in particular styles served each of the following functions in ancient societies EXCEPT
- A. to maintain the power of the societies' rulers
 - B. to mark socially relevant distinctions between groups
 - C. to establish the superiority of a society's artistic values
 - D. to define important aspects of the society's culture
12. 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. Some researchers argue that pottery of the Ramey Incises style was used not

only to distribute food but also to communicate that the society's elite were mediators of cosmic forces.

- B. Some researchers argue that the figures of eyes, fish, arrows and abstract objects were incised on Ramey Incised pottery to communicate that those who provided the pots were members of the elite.
- C. Some researchers argue that the primary function of Ramey Incised pottery was food distribution rather than a way of communicating the status of the society's elite.
- D. Some researchers argue that, based on the kinds of symbols incised on pottery, that pottery was sometimes used to mediate cosmic forces.

Ceramics are almost always analyzed on the basis of their style. This idea of style is hard to define, but changing styles are the basis on which archaeologists date much of the archaeological record. But for many archaeologists, ceramic styles are more than just convenient devices of dating. For many archaeologists, stylistic decoration of artifacts is the primary means by which one can enter the cognitive world of the ancients. Societies throughout history have invested their objects with styles that have profound and complex meanings and effects. ■In the case of the Maya and every other early civilization, rulers used particular symbols and styles as mechanisms through which they portrayed, communicated, and implemented their power. ■In all societies, styles fix social meaning and are powerful ways in which social groups define and construct their culture. ■Styles of objects, language, and personal behavior identify people in terms of gender, age group, ethnic group, socioeconomic class, and in many other important ways. ■Some researchers, for example, have argued that a particular kind of pottery, called Ramey incised (which is incised with figures of eyes, fish, arrows, and abstract objects and was used by the people in the area of present-day Missouri and Illinois at about A.D 900), was primarily used to distribute food but was also used to communicate the idea that the society's elite, for whom the pots were made, were mediators of cosmic forces.

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

Maya rulers, for example, used symbols on their war banners to communicate that they had great power because of the support of

patron gods.

14. Direction: 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 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.**

Stone tools and pottery fragments are two of the most common kinds of archaeological finds.

Answer Choices

- A. Stone tools are the oldest known artifacts, predating the development of ceramics by about two million years.
- B. The styles of stone tools produced by prehistoric peoples are more reliable indicators of their society's social and economic structure than the styles of their ceramics.
- C. Some researchers believe that the figures and symbols found on pottery may have multiple meanings, but this has not yet been fully established.
- D. Archaeologists know how stone tools were made and can produce copies themselves, but it is often difficult to determine how any particular ancient tool was used.
- E. The earliest evidence of ceramic production comes from Africa, Asia, and Europe, where the development of specialized technologies made pots nearly indestructible.
- F. Because pottery had both practical and symbolic uses, it can tell researchers a lot about the diet, economy, and social structure of ancient societies.

The Role of the Ocean in Controlling Climate

To predict what the climate will be like in the future, scientists must rely on sophisticated computer models. These models use mathematical equations to represent physical processes and interactions in the atmosphere, ocean, and on land. A starting point is usually based on current measurements or estimates of past conditions. Then, using a spherical grid laid out over the entire globe, thousands of calculations are performed at grid intersections to represent and assess how conditions in the air, in the sea, and on land will change over time. Because of their complexity and size, supercomputers are used to run full-scale climate models. Much of the uncertainty in their outputs comes from the way that various aspects of the climate are represented by different models, and even more so, because there are aspects of climate that are not well understood—one of which is how the ocean impacts climate.

The ocean's role in global warming stems principally from its huge capacity to absorb carbon dioxide and to store and transport heat. In the sea, photosynthesis by marine plants and algae, especially phytoplankton, removes great quantities of carbon dioxide from the atmosphere. Hence, the greater the growth (productivity) of phytoplankton in the sea, the greater the removal of carbon dioxide. But what controls the ocean's productivity? There are several limiting factors, but results from a recent experiment suggest that in areas of the ocean where other nutrients are plentiful, iron may be one of the most important and, until recently, unrecognized variables controlling phytoplankton production. Some have proposed a radical, highly controversial and uncertain means to counteract global warming—adding iron to the oceans to induce phytoplankton blooms. Perhaps increased phytoplankton growth would use up a significant amount of carbon dioxide in the atmosphere, but perhaps not, and there might well be side effects that could be detrimental to the ocean ecosystem.

Within the ocean, the production of limestone, in the form of calcium carbonate skeletons or shells, also reduces atmospheric carbon dioxide. However, when deposits of limestone become exposed and weathered on land or are recycled in the sea, carbon dioxide is released back into the atmosphere. What is not well understood is how much carbon dioxide resides in the sea and at what rate it is taken up and recycled. Relatively new research has also discovered beneath the sea a new and potentially significant threat to skyrocketing Earth temperature: gas hydrates. Gas hydrates are a solid, crystalline form of water, like ice, except that

they contain additional gas, typically methane, and are often found stored in ocean sediments. Increased ocean temperatures could cause gas hydrates to dissociate, releasing massive amounts of methane gas into the atmosphere and cause undersea landslides in the process. Consequently, hydrates may, if released, significantly increase global warming as well as create a geologic hazard to offshore drilling operations.

The ocean is also a great reservoir and transporter of heat. Heat from the ocean warms the atmosphere and fuels tropical storms. Heat is transported by currents from the equator to the poles. Ocean circulation is strongly controlled by wind and by the sea's balance of salt and heat. Scientists think that climate warming may slow down circulation, while cooling may speed it up, but these responses are not well understood. Evaporation from the ocean also supplies the precipitation that creates fields of snow and ice at high latitudes. Snow and ice coverage change the reflectivity Earth's surface and are an important influence on how much incoming radiation is either absorbed or reflected. Furthermore, clouds and water vapor in the atmosphere come mainly from the sea and strongly influence climate. Surprisingly, clouds are one of the least understood and most poorly modeled parts of the climate change equation. Most climate modeling grids fail to take into account common-sized cloud formations. Aerosols, tiny particles of soot, dust, and other materials, are thought to seed cloud formation scatter incoming radiation and promote cooling, but this effect, which would counteract warming, is also only superficially understood. Computer models of climate change must take into account all of the processes within the ocean, over land, and in the sky that potentially influence warming. No wonder there is such uncertainty.

Paragraph 1

To predict what the climate will be like in the future, scientists must rely on sophisticated computer models. These models use mathematical equations to represent physical processes and interactions in the atmosphere, ocean, and on land. A starting point is usually based on current measurements or estimates of past conditions. Then, using a spherical grid laid out over the entire globe, thousands of calculations are performed at grid intersections to represent and assess how conditions in the air, in the sea, and on land will change over time. Because of their complexity and size, supercomputers are used to run full-scale climate models. Much of the uncertainty in their outputs comes from the way

that various aspects of the climate are represented by different models, and even more so, because there are aspects of climate that are not well understood—one of which is how the ocean impacts climate.

1. According to paragraph 1, the results of full-scale climate models are questionable in part because
 - A. the supercomputers used for such modeling are large and complex
 - B. thousands of calculations have to be performed to assess conditions
 - C. past conditions cannot always be estimated accurately
 - D. there are multiple ways to represent the same aspect of climate

Paragraph 2

The ocean's role in global warming stems principally from its huge capacity to absorb carbon dioxide and to store and transport heat. In the sea, photosynthesis by marine plants and algae, especially phytoplankton, removes great quantities of carbon dioxide from the atmosphere. Hence, the greater the growth (productivity) of phytoplankton in the sea, the greater the removal of carbon dioxide. But what controls the ocean's productivity? There are several limiting factors, but results from a recent experiment suggest that in areas of the ocean where other nutrients are plentiful, iron may be one of the most important and, until recently, unrecognized variables controlling phytoplankton production. Some have proposed a radical, highly controversial and uncertain means to counteract global warming—adding iron to the oceans to induce phytoplankton blooms. Perhaps increased phytoplankton growth would use up a significant amount of carbon dioxide in the atmosphere, but perhaps not, and there might well be side effects that could be detrimental to the ocean ecosystem.

2. The word “principally” in the passage is closest in meaning to
 - A. obviously
 - B. apparently
 - C. mainly
 - D. originally
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. Iron may be one of the most important factors in controlling phytoplankton production in ocean waters that are rich in other nutrients.
- B. Results from a recent experiment suggest that several factors limiting phytoplankton production in ocean waters have gone unrecognized.
- C. Although it was not recognized until recently, nutrients are plentiful in areas of the ocean where iron controls phytoplankton production.
- D. Until recently, the importance of iron was not taken into account in experiments concerning phytoplankton production.

4. The word “controversial” in the passage is closest in meaning to

- A. experimental
- B. fascinating
- C. producing disagreement
- D. demonstrating poor judgment

5. The word “induce” in the passage is closest in meaning to

- A. supply nutrients to
- B. cause the formation of
- C. expand
- D. strengthen

6. According to paragraph 2, how might increasing phytoplankton growth help lower global temperatures?

- A. By cooling the oceans
- B. By decreasing carbon dioxide levels in the ocean
- C. By reducing the amount of carbon dioxide in the atmosphere
- D. By transporting heat from the ocean’s surface to deeper levels

Paragraph 3

Within the ocean, the production of limestone, in the form of calcium carbonate skeletons or shells, also reduces atmospheric carbon dioxide. However, when deposits of limestone become exposed and weathered on land or are recycled in the sea, carbon dioxide is released back into the atmosphere. What is not well understood is how much carbon dioxide resides in the sea and at what rate it is taken up and recycled. Relatively new research has also discovered beneath the sea

a new and potentially significant threat to skyrocketing Earth temperature: gas hydrates. Gas hydrates are a solid, crystalline form of water, like ice, except that they contain additional gas, typically methane, and are often found stored in ocean sediments. Increased ocean temperatures could cause gas hydrates to dissociate, releasing massive amounts of methane gas into the atmosphere and cause undersea landslides in the process. Consequently, hydrates may, if released, significantly increase global warming as well as create a geologic hazard to offshore drilling operations.

7. According to paragraph 3, which of the following reduces atmospheric carbon dioxide?

- A. The weathering of limestone
- B. The production of limestone
- C. The recycling of carbon dioxide
- D. The presence of methane in gas hydrates

8. According to paragraph 3, why are gas hydrates a possible threat to the global climate?

- A. If disturbed by offshore drilling, they can destroy limestone deposits.
- B. They can replace regular ice at certain locations.
- C. If melted, they may release a lot of carbon dioxide into the atmosphere.
- D. They contain a lot of methane, which may be released as the ocean warms

Paragraph 4

The ocean is also a great reservoir and transporter of heat. Heat from the ocean warms the atmosphere and fuels tropical storms. Heat is transported by currents from the equator to the poles. Ocean circulation is strongly controlled by wind and by the sea's balance of salt and heat. Scientists think that climate warming may slow down circulation, while cooling may speed it up, but these responses are not well understood. Evaporation from the ocean also supplies the precipitation that creates fields of snow and ice at high latitudes. Snow and ice coverage change the reflectivity Earth's surface and are an important influence on how much incoming radiation is either absorbed or reflected. Furthermore, clouds and water vapor in the atmosphere come mainly from the sea and strongly influence climate. Surprisingly, clouds are one of the least understood and most

poorly modeled parts of the climate change equation. Most climate modeling grids fail to take into account common-sized cloud formations. Aerosols, tiny particles of soot, dust, and other materials, are thought to seed cloud formation scatter incoming radiation and promote cooling, but this effect, which would counteract warming, is also only superficially understood. Computer models of climate change must take into account all of the processes within the ocean, over land, and in the sky that potentially influence warming. No wonder there is such uncertainty.

9. The word “fuels” in the passage is closest in meaning to
- A. provides energy for
 - B. determines the route of
 - C. carries
 - D. breaks up
10. Which of the following is NOT mentioned in paragraph 4 as a way in which the ocean affects the climate?
- A. It stores heat
 - B. It moves heat from the equator toward the poles.
 - C. It speeds up wind circulation.
 - D. It warms up the atmosphere.
11. Paragraph 4 suggests that a significant decrease in snow and ice fields at high latitudes would have what effect?
- A. More clouds and water vapor would be produced in the atmosphere.
 - B. More of the Sun’s radiation would be absorbed by Earth.
 - C. The oceans would cool more quickly.
 - D. More precipitation would occur at low latitudes.
12. Why does the author mention that “Most climate modeling grids fail to take into account common-sized cloud formations”?
- A. To suggest why the influence of clouds on climate change is still undetermined
 - B. To explain why research on climate change does not focus on clouds
 - C. To help explain why it is unclear whether aerosols have the effect of counteracting warming
 - D. To explain in part why scientists are uncertain how much incoming radiation

is absorbed or reflected

Paragraph 3

Within the ocean, the production of limestone, in the form of calcium carbonate skeletons or shells, also reduces atmospheric carbon dioxide. ■However, when deposits of limestone become exposed and weathered on land or are recycled in the sea, carbon dioxide is released back into the atmosphere. ■What is not well understood is how much carbon dioxide resides in the sea and at what rate it is taken up and recycled. ■Relatively new research has also discovered beneath the sea a new and potentially significant threat to skyrocketing Earth temperature: gas hydrates. ■Gas hydrates are a solid, crystalline form of water, like ice, except that they contain additional gas, typically methane, and are often found stored in ocean sediments. Increased ocean temperatures could cause gas hydrates to dissociate, releasing massive amounts of methane gas into the atmosphere and cause undersea landslides in the process. Consequently, hydrates may, if released, significantly increase global warming as well as create a geologic hazard to offshore drilling operations.

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

Nor is carbon dioxide the only gaseous substance in the ocean that may affect climate.

Where would the sentence best fit?

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selected 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.

The oceans affect the climate in numerous ways, some of which are poorly understood and therefore cannot be accurately modeled in computer climate programs.

Answer Choices

- A. Estimates of future conditions are entered into supercomputers to calculate climate possibilities at various places on earth.

- B. Oceans absorb a great deal of carbon dioxide from the air through limestone production and photosynthesis or phytoplankton.
- C. Gases are stored in the sea in the form of shells and hydrates, but gases stored in these ways can be recycled to the atmosphere where they may cause warming.
- D. The ocean's capacity to absorb carbon dioxide remains great despite recent reduction of marine plant nutrients such as iron.
- E. Ocean circulation is strongly controlled by wind and by the sea's balance or salt and heat.
- F. The ocean holds and moves a great deal of heat, and as water evaporates, it produces clouds, snow, and ice, which all affect global temperatures.

Animal Behavior

By the early 1900s the field of animal behavior had split into two major branches. One branch, ethology, developed primarily in Europe. To ethologists, what is striking about animal behaviors is that they are fixed and seemingly unchangeable? For example, kittens and puppies play in characteristic but different ways. Present a kitten with a ball of yarn and invariably it draws back its head and bats the yarn with claws extended. Kittens are generally silent as they play, and their tails twitch. Puppies, by contrast, are most likely to pounce flat-footed on a ball of yarn. They bit and bark and their tails wag. Ethologists came to believe that ultimately even the most complex animal behaviors could be broken down into a series of unchangeable stimulus/response reactions. They became convinced that the details of these patterns were as distinctive of a particular group of animals as were anatomical characteristics. For well over half a century, their search for and description of innate patterns of animal behavior continued.

Meanwhile, mainly in North America, the study of animal behavior took a different tack, developing into comparative behavior. Of interest to comparative behaviorists was where a particular came from, that is, its evolutionary history, how the nervous system controlled it, and the extent to which it could be modified. In 1894, C. Lloyd Morgan, an early comparative behaviorist, insisted that animal behavior be explained as simply as possible without reference to emotions or motivations since these could not be observed or measured. In Morgan's research, animals were put in simple situations, presented with an easily described stimulus, and their resultant behavior described.

The extension to animals of behaviorism—the idea that the study of behavior should be restricted to only those elements that can be directly observed—was an important development in comparative behavior. Studies of stimulus/response and the importance of simple rewards to enforce and modify animal behavior were stressed. Not surprisingly, comparative behaviorists worked most comfortably in the laboratory. Comparative behaviorists stressed the idea that animal behavior could be modified, while their ethologist colleagues thought it was innate and unchangeable. Inevitably, the two approaches led to major disagreements.

To early ethologists, the major driving force in behavior was instinct, behaviors that are inherited and unchangeable. Moths move towards light because they inherit the mechanism to so respond to light. Although dogs have more

options available to them, they bark at strangers for much the same reasons. The comparative behaviorists disagreed: learning and rewards are more important factors than instinct in animal behavior. Geese are not born with the ability to retrieve lost eggs when they roll out the nest, they learn to do so. If their behavior seems sometimes silly to humans because it fails to take new conditions into account, that is because the animal's ability to learn is limited. There were too many examples of behaviors modified by experience for comparative behaviorists to put their faith in instincts.

The arguments came to a peak in the 1950s and became known as the nature or nurture controversy. Consider how differently an ethologist and a comparative behaviorist would interpret the begging behavior of a hatchling bird. The first time a hatchling bird is approached by its parent, it begs for food. All baby birds of a particular species beg in exactly the same way. Obviously, said the ethologists, they inherited the ability and the tendency to beg. Baby birds did not have to learn the behavior, they were born with it—a clear example of innate, unchanging behavior. Not so, countered the comparative behaviorists. Parent birds teach their young to beg by stuffing food in their open mouths. Later experiments showed that before hatching, birds make and respond to noises of their nest mates and adults. Is it not possible that young birds could learn to beg prenatally?

It was hard for ethologists to accept that innate behaviors could be modified by learning. It was equally difficult for comparative behaviorists to accept that genetic factors could dominate learning experiences. The controversy raged for over a decade. Eventually, however, the distinctions between the two fields narrowed. The current view is that both natural endowments and environmental factors work together to shape behavior.

Paragraph 1

By the early 1900s the field of animal behavior had split into two major branches. One branch, ethology, developed primarily in Europe. To ethologists, what is striking about animal behaviors is that they are fixed and seemingly unchangeable? For example, kittens and puppies play in characteristic but different ways. Present a kitten with a ball of yarn and invariably it draws back its head and bats the yarn with claws extended. Kittens are generally silent as they play, and their tails twitch. Puppies, by contrast, are most likely to pounce flat-footed on a ball of yarn. They bit and bark and their tails wag. Ethologists came

to believe that **ultimately** even the most complex animal behaviors could be broken down into a series of unchangeable stimulus/response reactions. They became convinced that the details of these patterns were as distinctive of a particular group of animals as were anatomical characteristics. For well over half a century, their search for and description of innate patterns of animal behavior continued.

1. The word “**ultimately**” in the passage is closest in the meaning to
 - A. noticeably
 - B. importantly
 - C. some of the time
 - D. in the end
2. According to paragraph 1, what do ethologists think is the most notable characteristic of animal behavior?
 - A. Animal responses in most situations are predictable and do not vary
 - B. In similar situations, different animal species often behave in similar ways.
 - C. Even in ordinary situations, animal behavior can be unusually complex.
 - D. Animal behavior may sometimes include stimulus/response reactions.

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Paragraph 2

Meanwhile, mainly in North America, the study of animal behavior took a different tack, developing into comparative behavior. Of interest to comparative behaviorists was where a particular came from, that is, its evolutionary history, how the nervous system controlled it, and the extent to which it could be modified. In 1894, C. Lloyd Morgan, an early comparative behaviorist, insisted that animal behavior be explained as simply as possible without reference to emotions or motivations since these could not be observed or measured. In Morgan’s research, animals were put in simple situations, presented with an easily described stimulus, and their resultant behavior described.

3. According to paragraph 2, C. Lloyd Morgan agreed with which of the following statements about animal behavior?
 - A. Only those elements of animal behavior that could be observed and measured should be used to explain it.

- B. Any study of animal behavior should include an explanation of emotions and motivations.
 - C. Emotions and motivations can be measured indirectly using simple experimental situations.
 - D. Experimental situations are less than ideal if researchers want to develop a comprehensive explanation of animal behavior.
4. According to paragraph 2, comparative behaviorists were interested in finding answers to all of the following questions EXCEPT
- A. How has animal behavior changed over time?
 - B. How can emotions causing a specific behavior in one animal species help explain behavior in other animal species?
 - C. To what degree can animal behavior be changed?
 - D. How does the nervous system regulate animal behavior?

Paragraph 3

The extension to animals of behaviorism—the idea that the study of behavior should be restricted to only those elements that can be directly observed—was an important development in comparative behavior. Studies of stimulus/response and the importance of simple rewards to enforce and modify animal behavior were stressed. Not surprisingly, comparative behaviorists worked most comfortably in the laboratory. Comparative behaviorists stressed the idea that animal behavior could be modified, while their ethologist colleagues thought it was innate and unchangeable. Inevitably, the two approaches led to major disagreements.

5. Paragraph 3 suggests that comparative behaviorists' conclusions concerning animal behavior were based
- A. on the observation that rewards do not affect inherited animal behavior
 - B. on the application of stress to modify animal behavior
 - C. most often on the results of laboratory experiments
 - D. more on stimulus/response reactions than on simple rewards

Paragraph 4

To early ethologists, the major driving force in behavior was instinct,

behaviors that are inherited and unchangeable. Moths move towards light because they inherit the mechanism to so respond to light. Although dogs have more options available to them, they bark at strangers for much the same reasons. The comparative behaviorists disagreed: learning and rewards are more important factors than instinct in animal behavior. Geese are not born with the ability to **retrieve** lost eggs when they roll out the nest, they learn to do so. If their behavior seems sometimes silly to humans because it fails to take new conditions into account, that is because the animal's ability to learn is limited. There were too many examples of behaviors modified by experience for comparative behaviorists to put their faith in instincts.

6. The word “**retrieve**” in the passage is closest in meaning to

- A. find
- B. recover
- C. remember
- D. hatch

7. According to paragraph 4, why did comparative behaviorists believe that their view of instinct in animal behavior was correct?

- A. They had observed that animals can respond to the same stimulus in different ways.
- B. They had demonstrated that animals could use learned behaviors in new conditions.
- C. They had acquired sufficient evidence that instincts vary from one animal to another.
- D. They had shown that the behavior of many different animals had been changed by learning.

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Paragraph 5

The arguments came to a peak in the 1950s and became known as the nature or nurture controversy. Consider how differently an ethologist and a comparative behaviorist would interpret the begging behavior of a hatchling bird. The first time a hatchling bird is approached by its parent, it begs for food. All baby birds of a particular species beg in exactly the same way. **Obviously**, said the ethologists, they inherited the ability and the tendency to beg. Baby birds did not have to

learn the behavior, they were born with it—a clear example of innate, unchanging behavior. Not so, **countered** the comparative behaviorists. Parent birds teach their young to beg by stuffing food in their open mouths. Later experiments showed that before hatching, birds make and respond to noises of their nest mates and adults. Is it not possible that young birds could learn to beg prenatally?

8. The word “**Obviously**” in the passage is closest in meaning to

- A. Originally
- B. Clearly
- C. Similarly
- D. Consequently

9. The word “**countered**” in the passage is closest in meaning to

- A. learned
- B. argued back
- C. assumed
- D. predicted

10. In paragraph 5, why does the author discuss the begging behavior of a hatchling bird?

- A. To support the view that instinct explains animal behavior better than learning does
- B. To demonstrate that ethologists are correct about the limited ability of animals to learn
- C. To contrast an ethologist’s explanation of a particular animal behavior with that of a comparative behaviorist
- D. To question whether the discussion about the roles of nature and nurture was a valid one

Paragraph 6

It was hard for ethologists to accept that innate behaviors could be modified by learning. It was equally difficult for comparative behaviorists to accept that genetic factors could dominate learning experiences. The controversy raged for over a decade. Eventually, however, the distinctions between the two fields

narrowed. The **current** view is that both natural endowments and environmental factors work together to shape behavior.

11. The word “**current**” in the passage is closest in meaning to

- A. ideal
- B. basic
- C. alternative
- D. present

Paragraph 4

To early ethologists, the major driving force in behavior was instinct, behaviors that are inherited and unchangeable. ■ Moths move towards light because they inherit the mechanism to so respond to light. ■ Although dogs have more options available to them, they bark at strangers for much the same reasons. ■ The comparative behaviorists disagreed: learning and rewards are more important factors than instinct in animal behavior. ■ Geese are not born with the ability to retrieve lost eggs when they roll out the nest, they learn to do so. If their behavior seems sometimes silly to humans because it fails to take new conditions into account, that is because the animal's ability to learn is limited. There were too many examples of behaviors modified by experience for comparative behaviorists to put their faith in instincts.

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12. Look at the four squares [■] that indicate where the following sentence could be added to the passage. Where would the sentence best fit?

This view is supported by the behavior of insects as well as animals.

13. Directions: Select from the seven phrases below the phrases that correctly characterize ethologists and the phrases that correctly characterize comparative behaviorists. Drag each phrase you select into the phrases will NOT be used. This question is worth 3 points.

Ethologists

-
-

Comparative Behaviorists

-

-
-

Answer Choices

- A. Worked primarily in North America
- B. Argued that animal behavior is passed on from one generation to another without change over time
- C. Maintained from the start that behaviors that are inherited could be influenced by learning
- D. Believed that stimulus-response reactions serve to distinguish one animal from another just as their physical features do
- E. Studied stimulus-response reactions and emphasized the importance of rewards for enforcing and changing behavior
- F. Conducted more experiments with birds than with any other species
- G. Studied primarily how physical characteristics often determine behavior.

Grain in Colonial North America

Although the colonists of seventeenth- and early-eighteenth-century British North America consumed most of the grain produced in the colonial economy, few households were self-sufficient. Instead, they traded with their neighbors for what they did not produce themselves. In any given year, farmers who produced more grain than they needed would exchange their surpluses locally with other farmers who had different surpluses, with local laborers who supported themselves by selling their labor, or with the local storekeeper, who might also be the miller (trade person who ground grain into flour). Satisfying the domestic demand for breadstuff, then, depended on trade between neighbors. The colonists recorded these myriad transactions as credits and debts in their individual account books. Debts and credits could remain outstanding for years before being settled. Trading based on book credit gave more value to maintaining equilibrium between local supply and demand and to preserving a cooperative spirit among neighbors than to expanding production beyond the immediate needs of the locality.

Colonists also traded grain surpluses long-distance, responding to impersonal demand beyond the community. Some of the long-distance trade catered to regional and urban domestic demand. As the urban areas matured, they increasingly relied on producers in distant areas for grain and other agricultural supplies. In the early 1750s, the most densely populated towns of eastern and southern New England had begun importing substantial quantities of flour and rice from the middle and southern colonies to compensate for grain deficits that developed in their region. Other urban areas followed their example, though their greater proximity to grain regions enabled them to tap supplies closer to home. Assuming that in the early 1770s at least half of the demand for grain from farmers with surpluses was satisfied through long-distance channels, the proportion of grain produced for consumption beyond the local market probably accounted for about a quarter of total grain production consumed by humans.

The colonists organized the long-distance grain economy differently from their local economy. New mechanisms enabled the long-distance economy to respond sensitively to variations in demand, and these in turn gave it greater dynamism than the community-centered, local economy possessed. The contrast between the local and long-distance grain trade is best illustrated by looking at the flour-milling industry.

Nearly every area of colonial settlement had a local gristmill to which farmers brought grain to be custom ground. The limited capital value of most custom mills, the need to process rye and corn as well as wheat, together with seasonal factors affecting the water supply, restricted the volume of wheat flour that could be produced. The production of flour for long-distance exchange and particularly for export usually took place in merchant mills that were larger, had more capital, and were increasingly specialized.

The difference between a merchant mill and a custom mill was one of degree as much as kind. Most merchant mills had started as custom mills, and the colonial and state governments often compelled merchant mills to set aside certain days for custom work. Mills that acquired the designation “merchant” did so because they catered to the demand of merchants in the principal ports. These merchants enabled certain millers to specialize in wheat flour by placing orders for large parcels of it and paying in cash. That in turn allowed the millers to offer cash to the primary producers and grain brokers who delivered wheat to their mills. Cash was the economic motivator of this export-oriented economy for the simple reason that farmers would prepare and haul their grain to landings and mills and even increase their wheat acreage to obtain this commodity.

Cash gave farmers choices they did not enjoy when they traded with neighbors alone. Beyond opening up access to a range of products that could not be produced locally, it freed them from the web of mutual indebtedness and allowed more choices in the selection of trading partners. In other words, the cash economy allowed producers to seek the best bargains in that wider, impersonal market of which the export of agricultural surpluses formed the principal part. Of course, few in this age would have welcomed total release from the support and obligations that local trade conferred.

Paragraph 1

Although the colonists of seventeenth- and early-eighteenth-century British North America consumed most of the grain produced in the colonial economy, few households were self-sufficient. Instead, they traded with their neighbors for what they did not produce themselves. In any given year, farmers who produced more grain than they needed would exchange their surpluses locally with other farmers who had different surpluses, with local laborers who supported themselves by selling their labor, or with the local storekeeper, who might also be the miller (trade

person who ground grain into flour). Satisfying the domestic demand for breadstuff, then, depended on trade between neighbors. The colonists recorded these myriad transactions as credits and debts in their individual account books. Debts and credits could remain outstanding for years before being settled. Trading based on book credit gave more value to maintaining equilibrium between local supply and demand and to **preserving** a cooperative spirit among neighbors than to expanding production beyond the immediate needs of the locality.

1. According to paragraph 1, why did North American colonists trade with their neighbors?

- A. They preferred not to accept cash for goods they had to trade.
- B. They were not able to produce everything that they needed.
- C. They had difficulty establishing book credit with the local storekeepers.
- D. They wanted to balance the credits and debts in their account books.

2. The word “**preserving**” in the passage is closest in meaning to

- A. limiting
- B. revealing
- C. maintaining
- D. creating

Paragraph 2

Colonists also traded grain surpluses long-distance, responding to impersonal demand beyond the community. Some of the long-distance trade catered to regional and urban domestic demand. As the urban areas matured, they increasingly relied on producers in distant areas for grain and other agricultural supplies. In the early 1750s, the most densely populated towns of eastern and southern New England had begun importing **substantial** quantities of flour and rice from the middle and southern colonies to compensate for grain deficits that developed in their region. Other urban areas followed their example, though their greater proximity to grain regions enabled them to tap supplies closer to home. Assuming that in the early 1770s at least half of the demand for grain from farmers with surpluses was satisfied through long-distance channels, the proportion of grain produced for consumption beyond the local market probably accounted for

about a quarter of total grain production consumed by humans.

3. According to paragraph 2, what happened as urban areas matured?

- A. Urban areas became increasingly dependent on grain produced in distant areas.
- B. Urban areas began to rely on their own stored surpluses of wheat flour.
- C. Urban consumers were forced to reduce their consumption of grain by one fourth.
- D. Urban areas relied more on rice and less on wheat.

4. The word “**substantial**” in the passage is closest in meaning to

- A. modest
- B. sufficient
- C. necessary
- D. large

Paragraph 3

The colonists organized the long-distance grain economy differently from their local economy. New mechanisms enabled the long-distance economy to respond sensitively to variations in demand, and these in turn gave it greater dynamism than the community-centered, local economy possessed. The contrast between the local and long-distance grain trade is best illustrated by looking at the **flour-milling industry**.

5. What is the purpose of the discussion of the “**flour-milling industry**”?

- A. To contrast the organization of the grain trade with the organization of the flour-milling industry.
- B. To explain how the economic organization of the long-distance trade in grain differed from that of the local economy.
- C. To illustrate how the local flour-milling industry differed from the long-distance flour-milling industry.
- D. To argue that the flour-milling industry made the long-distance grain trade more dynamic than the local grain trade.

Paragraph 4

Nearly every area of colonial settlement had a local gristmill to which farmers brought grain to be custom ground. The limited capital value of most custom mills, the need to process rye and corn as well as wheat, together with seasonal factors affecting the water supply, restricted the volume of wheat flour that could be produced. The production of flour for long-distance exchange and particularly for export usually took place in merchant mills that were larger, had more capital, and were increasingly specialized.

6. According to paragraph 4, all of the following limited the milling capacity of local gristmills to produce wheat flour EXCEPT
- A. limitations on their capital value
 - B. seasonal shortages of water
 - C. the lack of trained mill workers
 - D. the need to process several types of grain

Paragraph 5

The difference between a merchant mill and a custom mill was one of degree as much as kind. Most merchant mills had started as custom mills, and the colonial and state governments often **compelled** merchant mills to set aside certain days for custom work. Mills that acquired the designation “merchant” did so because they catered to the demand of merchants in the principal ports. These merchants enabled certain millers to specialize in wheat flour by placing orders for large parcels of it and paying in cash. That in turn allowed the millers to offer cash to the primary producers and grain brokers who delivered wheat to their mills. Cash was the economic motivator of this export-oriented economy for the simple reason that farmers would prepare and haul their grain to landings and mills and even increase their wheat acreage to obtain this commodity.

7. The word “**compelled**” in the passage is closest in meaning to
- A. required
 - B. advised
 - C. selected
 - D. helped

8. According to paragraph 5, a custom mill became a merchant mill by

- A. agreeing to sell grain to the state government at a reduced price
- B. providing goods to fulfill the demand of traders in the main port cities
- C. limiting the amount of work a mill would do for individual farmers to only a few days a week
- D. hiring specialized millers to produce each type of flour

9. According to paragraph 5, why could merchant mills specialize in producing wheat flour?

- A. Grain farmers would accept cash from merchant mills for wheat, but not for other grains.
- B. Merchant mills were not required by colonial and state government to mill grains other than wheat.
- C. Millers who specialized in producing wheat flour for merchants were paid in advance.
- D. Merchants ordered large amounts of wheat flour from the mills they dealt with

10. Paragraph 5 implies which of the following about the export trade in grain?

- A. The growth of the export trade caused most custom mills to go out of business.
- B. The export trade did not have a significant economic impact beyond the large port cities.
- C. The export trade's use of cash for payments led farmers to produce surpluses for this market.
- D. In the export trade, most of the profits were made by the primary products and grain brokers

Paragraph 6

Cash gave farmers choices they did not enjoy when they traded with neighbors alone. Beyond opening up access to a range of products that could not be produced locally, it freed them from the web of mutual indebtedness and allowed more choices in the selection of trading partners. In other words, the cash economy allowed producers to seek the best bargains in that wider, impersonal market of which the export of agricultural surpluses formed the principal part. Of course, few in this age would have welcomed total release from the support and **obligations** that local trade conferred.

11. The word “**obligations**” in the passage is closest in meaning to
- A. trust
 - B. safety
 - C. responsibilities
 - D. advantages
12. Which of the following can be inferred from paragraph 6 about the result of the expanding export economy?
- A. Some commercial relationships became less local and more impersonal.
 - B. Farmers had a greater choice in the variety of crops to grow.
 - C. The demand for agricultural surpluses was greater than the supply.
 - D. The prices of local products decreased.

Paragraph 6

Cash gave farmers choices they did not enjoy when they traded with neighbors alone. ■Beyond opening up access to a range of products that could not be produced locally, it freed them from the web of mutual indebtedness and allowed more choices in the selection of trading partners. ■In other words, the cash economy allowed producers to seek the best bargains in that wider, impersonal market of which the export of agricultural surpluses formed the principal part.■Of course, few in this age would have welcomed total release from the support and obligations that local trade conferred.■

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

Consequently, most farmers who participated in the long distance cash economy continued to deal with local merchants through the system of trade credit.

Where would the sentence best fit?

14. Direction: 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 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.**

Grain played an important role in the economy of colonial North America.

Answer Choices

- A. Trade between neighbors was necessary to satisfy the local demand for grain and other products.
- B. Large amounts of grain from the countryside were brought to cities and ports, both for the residents' use and for the export trade.
- C. Merchant mills required large economic investments that were not available locally.
- D. Long-distance trade eventually replaced the need for local trade.
- E. Wheat farmers were attracted to the export trade because it allowed them to find the best price and because the cash it provided could be used for goods not available locally.
- F. After some time, cash replaced the trade system and individual account books disappeared.

Impacts and Mass Extinctions

Meteorites and impact craters bear witness to the fact that large impacts occasionally occur on Earth. Meteor Crater in the northern Arizona desert of the United States formed about 50,000 years ago when a metallic impactor roughly 50 meters across crashed to Earth with the explosive power of a 20-megaton hydrogen bomb. Although the crater is only slightly more than one kilometer across, an area covering hundreds of square kilometers was probably battered by the blast and ejecta—the debris ejected or displaced during the formation of an impact crater. Far bigger impacts have occurred, sometimes with catastrophic consequences for life on Earth.

While collecting geological samples in Italy in 1978, the father-son team of Luis and Walter Alvarez discovered a thin layer of dark sediment that had apparently been deposited 65 million years ago—at about the same time that the dinosaurs and many other organisms suddenly became extinct. Subsequent studies found similar sediment deposited at the same time at many sites around the world. Careful analysis showed this worldwide sediment layer to be rich in iridium, an element that is rare on Earth's surface. But iridium is common in primitive meteorites, which led the Alverezes to a stunning conclusion: the extinction of the dinosaurs was caused by the impact of an asteroid or comet. This conclusion was not immediately accepted and still generates some controversy, but it now seems clear that a major impact coincided with the death of the dinosaurs. While the dinosaurs were the most famous victims of this mass extinction, it seems that up to 99 percent of all living things were killed and that 75 percent of all species living on Earth were wiped out at that time.

How could an impact lead to mass extinction? The amount of iridium deposited worldwide suggests that the impactor must have been about 10 kilometers across. After a decade-long search, scientists identified what appears to be the impact crater from the event. Located off the coast of Mexico's Yucatan peninsula, it is 200 kilometers across, which is close to what one would expect for a 10-kilometer impactor, and dates to 65 million years ago. Further evidence that the Yucatan crater is the right one comes from the distribution of small glassy spheres that formed when the molten impact ejecta solidified as it rained back to Earth. More of these glassy spheres are found in regions near the crater, and careful study of their distribution suggests that the impactor crashed to Earth at a slight angle. These pieces of once molten rock are evidence of an explosion powerful enough to instantly melt bedrock and propel it far from its origin. The impact almost immediately sent a shower of debris raining across much of North and South America and generated huge waves that may have sloshed more than 1,000 kilometers inland. Many North American species thus may have been wiped out shortly after impact. For the rest of the world, death may have come more

slowly. Heat from the impact and returning ejecta probably ignited wildfires in forests around the world. Evidence of wildfires is found in the large amount of soot (a black powdery form of carbon produced when coal, wood, or oil is burned) that is also present in the indium-rich sediment from 65 million years ago. The impact also sent huge quantities of dust high into the stratosphere, where it remained for several years, blocking out sunlight, cooling the surface, and affecting atmospheric chemistry. Plants died for lack of sunlight, and effects propagated throughout the food chain.

Perhaps the most astonishing fact is not that 75 percent of all species died, but that 25 percent survived. Among the survivors were a few small, rodent-like mammals. These mammals may have survived because they lived in underground burrows and managed to store enough food to outlast the long spell of cold, dark days. Small mammals had first arisen at about the same time as the dinosaurs, more than 100 million years earlier. But the sudden disappearance of the dominant dinosaurs made these mammals dominant.

Paragraph 1

Meteorites and impact craters bear witness to the fact that large impacts occasionally occur on Earth. Meteor Crater in the northern Arizona desert of the United States formed about 50,000 years ago when a metallic impactor roughly 50 meters across crashed to Earth with the explosive power of a 20-megaton hydrogen bomb. Although the crater is only slightly more than one kilometer across, an area covering hundreds of square kilometers was probably battered by the blast and ejecta—the debris ejected or displaced during the formation of an impact crater. Far bigger impacts have occurred, sometimes with catastrophic consequences for life on Earth.

1. The word “catastrophic” in the passage is closest in meaning to

- A. widespread
- B. disastrous
- C. important
- D. immediate

Paragraph 2

While collecting geological samples in Italy in 1978, the father-son team of Luis and Walter Alvarez discovered a thin layer of dark sediment that had apparently been deposited 65 million years ago—at about the same time that the dinosaurs and many other organisms suddenly became extinct. Subsequent studies found similar sediment deposited at the same time at many sites around the world. Careful analysis showed this worldwide sediment layer to be rich in iridium, an element that is rare on Earth’s surface. But iridium is common in primitive

meteorites, which led the Alvarezes to a stunning conclusion: the extinction of the dinosaurs was caused by the impact of an asteroid or comet. This conclusion was not immediately accepted and still generates some controversy, but it now seems clear that a major impact coincided with the death of the dinosaurs. While the dinosaurs were the most famous victims of this mass extinction, it seems that up to 99 percent of all living things were killed and that 75 percent of all species living on Earth were wiped out at that time.

2. The word “Subsequent” in the passage is closet in meaning to

- A. Detailed
- B. Later
- C. Recent
- D. Additional

3. The phrase “coincided with” in the passage is closet in meaning to

- A. occurred before
- B. happened at the same time as
- C. speeded up
- D. caused

4. In paragraph 2, the author discusses the presence of iridium in the sediment layer discovered by the Alvarezes because

- A. it supported their claim that toxic levels of iridium could have killed the dinosaurs
- B. it led some scientists to question the validity of the Alvarezes’ study
- C. it led the Alvarezes to conclude that a space impactor killed the dinosaurs
- D. it showed that new discoveries were still being made about the extinction of the dinosaurs

5. Which of the following statements about scientists’ theories on the extinction of the dinosaurs can be inferred from paragraph 2?

- A. Some scientists do not believe that an asteroid or comet impact killed the dinosaurs.
- B. Some scientists think that iridium was abundant on Earth before the extinction of the dinosaurs.
- C. Some scientists doubt that all of the dinosaurs died out 65 million years ago.
- D. Some scientists believe that the dinosaurs became extinct only after the plants and animals they ate disappeared.

6. 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 large percentage of Earth's living things were killed along with the dinosaurs.

B. Seventy-five percent of all species, including 75 percent of dinosaur species, were victims of a single mass extinction.

C. In the extinction that eliminated the dinosaurs, up to 99 percent of all living things and 75 percent of all species were wiped out.

D. Dinosaurs were the most famous victims of a mass extinction, but there have also been mass extinctions that wiped out most of Earth's other species.

Paragraph 3

How could an impact lead to mass extinction? The amount of iridium deposited worldwide suggests that the impactor must have been about 10 kilometers across. After a decade-long search, scientists identified what appears to be the impact crater from the event. Located off the coast of Mexico's Yucatan peninsula, it is 200 kilometers across, which is close to what one would expect for a 10-kilometer impactor, and dates to 65 million years ago. Further evidence that the Yucatan crater is the right one comes from the distribution of small glassy spheres that formed when the molten impact ejecta solidified as it rained back to Earth. More of these glassy spheres are found in regions near the crater, and careful study of their distribution suggests that the impactor crashed to Earth at a slight angle. These pieces of once molten rock are evidence of an explosion powerful enough to instantly melt bedrock and propel it far from its origin. The impact almost immediately sent a shower of debris raining across much of North and South America and generated huge waves that may have sloshed more than 1,000 kilometers inland. Many North American species thus may have been wiped out shortly after impact. For the rest of the world, death may have come more slowly. Heat from the impact and returning ejecta probably ignited wildfires in forests around the world. Evidence of wildfires is found in the large amount of soot (a black powdery form of carbon produced when coal, wood, or oil is burned) that is also present in the iridium-rich sediment from 65 million years ago. The impact also sent huge quantities of dust high into the stratosphere, where it remained for several years, blocking out sunlight, cooling the surface, and affecting atmospheric chemistry. Plants died for lack of sunlight, and effects propagated throughout the food chain.

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7. According to paragraph 3, what information did scientists use to predict the size of the impactor that they believed struck Earth 65 million years ago?

A. The size of the debris found in geological samples from that time

B. The distance inland that traces of tidal waves were found

- C. The amount of iridium found in sediment from that time
- D. The number of species that became extinct at that time

8. According to paragraph 3, the shower of debris created by the impact suggests that the impactor

- A. was 200 kilometers across
- B. landed about 1,000 kilometers inland
- C. had a molten core that solidified immediately as the impactor hit Earth
- D. was probably responsible for the immediate extinction of many North American species

9. In paragraph 3, why does the author include the information that a large amount of soot is found in sediment from 65 million years ago?

- A. To identify the largest component of the dust sent into the atmosphere by the impactor's crash
- B. To support the idea that the impactor's crash probably caused widespread wildfires
- C. To emphasize the large variety of substances found in the sediment
- D. To cast doubt on the claim that the impact affected only the area near the crash site

10. Which of the following is NOT mentioned in paragraph 3 as an effect of the dust raised by the impact 65 million years ago?

- A. It cooled the surface of Earth.
- B. It released toxic chemicals into the stratosphere.
- C. It caused changes in the chemical composition of the atmosphere.
- D. It prevented sunlight from reaching the surface of Earth.

11. The word “propagated” in the passage is closest in meaning to

- A. were seen
- B. occurred
- C. caused harm
- D. spread

Paragraph 4

Perhaps the most astonishing fact is not that 75 percent of all species died, but that 25 percent survived. Among the survivors were a few small, rodent-like mammals. These mammals may have survived because they lived in underground burrows and managed to store enough food to outlast the long spell of cold, dark days. Small mammals had first arisen at about the same time as the dinosaurs, more than 100 million years earlier. But the sudden disappearance of the dominant

dinosaurs made these mammals dominant.

12. According to paragraph 4, all of the following are true of the animals that survived the impact EXCEPT:

- A. They probably had a lot of food stored up.
- B. Many lived underground.
- C. Most were relatively new species.
- D. They tended to be small.

Paragraph 3

How could an impact lead to mass extinction? The amount of iridium deposited worldwide suggests that the impactor must have been about 10 kilometers across. After a decade-long search, scientists identified what appears to be the impact crater from the event. Located off the coast of Mexico's Yucatan peninsula, it is 200 kilometers across, which is close to what one would expect for a 10-kilometer impactor, and dates to 65 million years ago. Further evidence that the Yucatan crater is the right one comes from the distribution of small glassy spheres that formed when the molten impact ejecta solidified as it rained back to Earth. [A] More of these glassy spheres are found in regions near the crater, and careful study of their distribution suggests that the impactor crashed to Earth at a slight angle. [B] These pieces of once molten rock are evidence of an explosion powerful enough to instantly melt bedrock and propel it far from its origin. [C] The impact almost immediately sent a shower of debris raining across much of North and South America and generated huge waves that may have sloshed more than 1,000 kilometers inland. [D] Many North American species thus may have been wiped out shortly after impact. For the rest of the world, death may have come more slowly. Heat from the impact and returning ejecta probably ignited wildfires in forests around the world. Evidence of wildfires is found in the large amount of soot (a black powdery form of carbon produced when coal, wood, or oil is burned) that is also present in the indium-rich sediment from 65 million years ago. The impact also sent huge quantities of dust high into the stratosphere, where it remained for several years, blocking out sunlight, cooling the surface, and affecting atmospheric chemistry. Plants died for lack of sunlight, and effects propagated throughout the food chain.

13. Look at the four choices that indicate where the following sentence could be added to the passage.

As a result, molten material was pushed out toward the north with small glass spheres found more than 2,500 kilometers to the northwest.

Where would the sentence best fit? Click on a choice to add the sentence to the passage.

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

Drag your choices to the spaces where they belong. To review the passage, click on View Text.

Asteroids and other large bodies from space have occasionally struck Earth, causing mass destruction and extinction.

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Answer Choices

- A. The large impactor that crashed in what is now the Arizona desert exploded with the force of a 20-megaton hydrogen bomb.
- B. Although the crash of a large impactor would have killed all living things near the site of impact, most animals living farther away adapted to changes in the environment.
- C. Scientists believe the reason the impactor that struck Earth 65 million years ago was so deadly was because it contained many toxic compounds, such as iridium.
- D. A worldwide sediment layer of iridium suggests that an asteroid or comet impacted Earth 65 million years ago, possibly causing the extinction of the dinosaurs.
- E. The large impact that caused the Yucatan crater probably produced both immediate natural disasters and a long-lasting layer of dust in the atmosphere.
- F. Despite the destructive effects of the large impact 65 million years ago, around 25 percent of Earth's species survived and mammals came to be dominant.

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Sea Turtle Hatchling Strategies for Navigation

Sea turtles' eggs are laid at night to minimize the likelihood of their discovery by predators, and the offspring, when ready to emerge from their eggshells and dig their way out of the sand, hatch at night for the same reason. Since the offspring are especially vulnerable immediately after hatching, it is vital for them to get to the sea as soon as possible. Turtle hatchlings use a number of cues to tell them where the sea is.

The most important cue seems to be light. The night sky is usually brightest over the sea. Cover a turtle hatchling's eyes, and it cannot find the sea even if there is other information available, such as a downward slope of the sand toward the water's edge. The hatchlings respond to light cues covering a vertical range of only about 30° above the horizon or, depending on the species, even less. Responding only to lights that are close to the horizon decreases the risk that hatchlings will become confused. They seem less attracted to yellow light than to other colors—loggerhead turtles show an aversion to yellow light—and this preference may keep them from becoming disoriented by the rising Sun.

It is usually safest to have more than one internal compass, and hatchlings seem to be guided by more than light alone. They steer away from sand dunes and vegetation. Possibly these objects merely block light behind them that might mislead turtle hatchlings about where the sea is, but it is also possible that turtles are sensitive to the shape of such objects and process these shapes as signals that the sea is located in some other direction. Such reinforcing cues, however, are not enough to guide hatchlings away from the artificial lights that now burn on many a beach environment. Artificial lighting is often strong enough to completely overcome the signals a hatchling sea turtle is programmed to recognize. Artificial light, if it is bright enough, becomes a stimulus so powerful that the hatchlings respond to nothing else, crawling toward it from hundreds of meters away.

If all goes well and the hatchlings scramble over the sand in the right direction, avoid their enemies, and reach the surf, a new set of orienting mechanisms takes over. As soon as they are afloat, the hatchlings begin to swim at something over 1.5 kilometers per hour. They dive into the path of the wave undertow, where the receding waters sweep them outward, away from the beach. When they surface again, the head for open sea. This time, they are guided not by sight but apparently exclusively by the direction of the incoming waves. Experiments with loggerheads,

greens, and leatherbacks have shown that hatchlings swim toward approaching waves; but if the sea is calm, they swim randomly or in circles. Under experimental conditions, hatchlings will swim into the waves even if doing so sends them back to the beach again.

The farther a hatchling gets from shore, the less reliable wave direction becomes as a pointer to the open sea. Researchers have shown that hatchling green sea turtles released from a hatchery in Borneo, East Malaysia, are able to navigate around small islands and keep swimming offshore, even when there are few waves to guide them. They may be relying on yet another internal compass this time oriented to Earth's magnetic field. Recent experiments suggest that leatherback and olive ridley hatchlings "switch on" their geomagnetic compass almost as soon as they are out of the nest. Though the hatchlings position themselves geomagnetically as soon as they leave the nest and appear to be able to use that position as a reference point, they will not follow it automatically if other cues, such as light and sound, are available. Hatchlings find their geomagnetic compass useful only after they have already been able to determine the direction they should swim. A simple directional compass—one that always sent the turtles westward, for instance—would be useless if the open sea lay in some other direction. Therefore, a magnetic compass does not so much tell a hatchling turtle which way to go as keep it on course once it has determined the direction it should swim from some other cue.

Paragraph 1

Sea turtles' eggs are laid at night to minimize the likelihood of their discovery by predators, and the offspring, when ready to emerge from their eggshells and dig their way out of the sand, hatch at night for the same reason. Since the offspring are especially vulnerable immediately after hatching, it is vital for them to get to the sea as soon as possible. Turtle hatchlings use a number of cues to tell them where the sea is.

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

- A. Sea turtle eggs are laid at night and hatch at night for the same reason.
- B. To minimize the likelihood of their discovery by predators, sea turtle

hatchlings dig their way out of the sand at night.

- C. To minimize the likelihood of discovery by predators, sea turtle eggs are laid and hatch at night.
- D. Eggs that laid at night and offspring that emerge from the eggs at night are less likely to be discovered by predators

Paragraph 2

The most important cue seems to be light. The night sky is usually brightest over the sea. Cover a turtle hatchling's eyes, and it cannot find the sea even if there is other information available, such as a downward slope of the sand toward the water's edge. The hatchlings respond to light cues covering a vertical range of only about 30° above the horizon or, depending on the species, even less. Responding only to lights that are close to the horizon decreases the risk that hatchlings will become confused. They seem less attracted to yellow light than to other colors—loggerhead turtles show an aversion to yellow light—and this preference may keep them from becoming disoriented by the rising Sun.

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2. In paragraph 2, why does the author provide the information that sea turtle hatchlings cannot find the sea when their eyes are covered?

- A. To identify a major reason that such turtles might not reach the sea
- B. To support the claim that light is an important directional cue for such turtles
- C. To point out the effect of yellow light on the attempts of such turtles to reach the sea
- D. To provide evidence showing that such turtles easily lose their sense of direction

3. According to paragraph 2, which of the following is true of turtle hatchlings that are trying to make their way to the sea?

- A. They are unable to distinguish the light of the rising Sun from other types of light.
- B. They require the presence of yellow light in order to reach the water's edge.
- C. They have trouble crossing downward slopes near the water's edge.
- D. They respond to light only when it is close to the horizon.

Paragraph 3

It is usually safest to have more than one internal compass, and hatchlings seem to be guided by more than light alone. They steer away from sand dunes and vegetation. Possibly these objects merely block light behind them that might mislead turtle hatchlings about where the sea is, but it is also possible that turtles are sensitive to the shape of such objects and process these shapes as signals that the sea is located in some other direction. Such **reinforcing** cues, however, are not enough to guide hatchlings away from the artificial lights that now burn on many a beach environment. Artificial lighting is often strong enough to completely overcome the signals a hatchling sea turtle is programmed to recognize. Artificial light, if it is bright enough, becomes a stimulus so powerful that the hatchlings respond to nothing else, crawling toward it from hundreds of meters away.

4. The word “**reinforcing**” in the passage is closest in meaning to
- A. guiding
 - B. supporting
 - C. indirect
 - D. valuable
5. Which of the following is offered in paragraph 3 as a possible explanation for sea turtle hatchlings’ behavior of avoiding sand dunes and vegetation?
- A. Sand dunes and vegetation may provide hiding places for animals that attack hatchlings.
 - B. Sand dunes and vegetation may block the pathway between hatchlings and the water’s edge.
 - C. The shapes of sand dunes and vegetation may indicate the wrong direction to travel in.
 - D. The shapes of sand dunes and vegetation may resemble the shapes of some hatchling predators
6. Paragraph 3 supports which of the following statements about the artificial lights now found on many beaches?
- A. The lights have sometimes helped sea turtle hatchlings find their way to the sea.
 - B. The lights can be bright enough to affect sea turtle hatchlings within hundreds

of meters of them.

- C. The lights are commonly turned off during periods when sea turtle offspring are hatching.
- D. The lights tend to affect the behavior of sea turtle hatchlings less than other programming signals do.

Paragraph 4

If all goes well and the hatchlings scramble over the sand in the right direction, avoid their enemies, and reach the surf, a new set of orienting mechanisms takes over. As soon as they are afloat, the hatchlings begin to swim at something over 1.5 kilometers per hour. They dive into the path of the wave undertow, where the receding waters sweep them outward, away from the beach. When they surface again, the head for open sea. This time, they are guided not by sight but apparently **exclusively** by the direction of the incoming waves. Experiments with loggerheads, greens, and leatherbacks have shown that hatchlings swim toward approaching waves; but if the sea is calm, they swim randomly or in circles. Under **experimental** conditions, hatchlings will swim into the waves even if doing so sends them back to the beach again.

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7. The word “**exclusively**” in the passage is closest in meaning to

- A. with great accuracy
- B. strongly
- C. in part
- D. only

8. Based on paragraph 4, sea turtle hatchlings are most likely to lose their sense of where the open sea is located when they

- A. swim in calm seas
- B. face incoming waves
- C. collide with other objects floating in the water
- D. swim in fast-moving, outgoing waters

9. The word “**experimental**” in the passage is closest in meaning to

- A. favorable
- B. trial

- C. certain
- D. Difficult

Paragraph 5

The farther a hatchling gets from shore, the less reliable wave direction becomes as a pointer to the open sea. Researchers have shown that hatchling green sea turtles released from a hatchery in Borneo, East Malaysia, are able to navigate around small islands and keep swimming offshore, even when there are few waves to guide them. They may be relying on yet another internal compass this time oriented to Earth's magnetic field. Recent experiments suggest that leatherback and olive ridley hatchlings "**switch on**" their geomagnetic compass almost as soon as they are out of the nest. Though the hatchlings position themselves geomagnetically as soon as they leave the nest and appear to be able to use that position as a reference point, they will not follow it automatically if other cues, such as light and sound, are available. Hatchlings find their geomagnetic compass useful only after they have already been able to determine the direction they should swim. A simple directional compass—one that always sent the turtles westward, for instance—would be useless if the open sea lay in some other direction. Therefore, a magnetic compass does not so much tell a hatchling turtle which way to go as keep it on course once it has determined the direction it should swim from some other cue.

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10. In paragraph 5, why does the author provide the information that hatchling green sea turtles can navigate around small islands and keep swimming offshore even when few waves are present?

- A. To point out a benefit of the fact that hatchlings use their geomagnetic compasses almost as soon as they leave the nest
- B. To provide evidence that green sea turtles use different navigational techniques than leatherbacks and olive ridley turtles do
- C. To provide a reason for considering the possibility that sea turtles navigate by detecting Earth's magnetic field
- D. To provide evidence showing that hatchling do not automatically follow their geomagnetic compass if other cues are available

11. The word "**switch on**" in the passage is closest in meaning to

- A. follow
- B. change
- C. control
- D. activate

12. According to paragraph 5, all the following claims about the geomagnetic compass of sea turtle hatchlings are true EXCEPT

- A. In some species it is switched on almost as soon as a turtle hatches.
- B. It helps keep the hatchlings heading in a direction that it is initially determined by some cue such as light or sound.
- C. Its direction is followed automatically to swim toward open water
- D. It can be used to navigate around islands when the waves stop indicating the direction of the open sea.

Paragraph 5

The farther a hatchling gets from shore, the less reliable wave direction becomes as a pointer to the open sea. Researchers have shown that hatchling green sea turtles released from a hatchery in Borneo, East Malaysia, are able to navigate around small islands and keep swimming offshore, even when there are few waves to guide them. They may be relying on yet another internal compass this time oriented to Earth's magnetic field. Recent experiments suggest that leatherback and olive ridley hatchlings "switch on" their geomagnetic compass almost as soon as they are out of the nest. Though the hatchlings position themselves geomagnetically as soon as they leave the nest and appear to be able to use that position as a reference point, they will not follow it automatically if other cues, such as light and sound, are available. ■ Hatchlings find their geomagnetic compass useful only after they have already been able to determine the direction they should swim. ■ A simple directional compass—one that always sent the turtles westward, for instance—would be useless if the open sea lay in some other direction. ■ Therefore, a magnetic compass does not so much tell a hatchling turtle which way to go as keep it on course once it has determined the direction it should swim from some other cue. ■

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

This preference for other cues points to the special role of the geomagnetic compass in hatchling navigation.

Where would the sentence best fit?

14. 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.

To minimize attacks from predators, turtle hatchlings must quickly find their way to the water's edge.

Answer Choices

- A. When light cues are absent, hatchlings use other navigational strategies, such as following the downward slope of the beach to find the water's edge.
- B. If the incoming waves are too strong to allow hatchlings to reach the open sea, they are carried back to the beach where they wait for calmer waters
- C. Once hatchlings reach the open sea, they begin to use their geomagnetic compasses as simple directional compasses.
- D. Hatchlings use light and cues such as shapes to help them locate the sea, though strong artificial light on land may lead them in the wrong direction.
- E. After they reach the water, hatchlings rely on incoming waves to indicate the direction in which the open sea is located.
- F. Hatchlings' geomagnetic compasses can help keep hatchlings on course toward the open sea, once other cues have been used to get them headed in the right direction.

Controversy about Causing Emotion

The fact that we react to certain experiences with “Emotion” is obvious. For example, the feeling of embarrassment, which triggers a physiological response that may cause blushing, is caused by a foolish act committed in the company of friends. Although this description of an embarrassed reaction seems logical, the American psychologist William James, in 1884, believed that the course of an emotional experience follows another sequence of events.

Following the argument of James, what subjective experience tells us is completely opposite that the sequence of events in an emotional experience. First, he insisted that both physiological excitement and physical reaction are generated by an incident. Only then does the individual perceive or interpret the physical response as an emotion. That is, we associate blushing that caused by physical reaction with embarrassment, such as saying something silly may cause us to blush. In 1890, James went on to claim that “people feel sorry because they cry, furious because they strike, afraid because they shudder.” Simultaneously with James’ proposition, Carl Lange, a Danish physiologist and psychologist, independently formulated virtually similar theory. The James-Lange theory of emotion (Lange and James, 1922) suggests that different patterns of arousal in the autonomic nervous system create the different emotions people feel, and that physiological arousal occurs prior to the emotion is perceived.

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In 1927, another early theory of emotion that challenged the James-Lange theory was proposed by Walter Cannon. He claimed that physical changes caused by the diverse emotions are not sufficiently distinct to allow people to distinguish one emotion from another. After Cannon stated his original theory, in 1934, it was further developed by physiologist Philip Bard. The Cannon-Bard theory suggests that the following chain of events takes place when an emotion is felt. Stimuli which trigger emotion are received by the senses and then are relayed simultaneously to the cerebral cortex, which imparts the conscious mental experience of the emotion, and to the sympathetic nervous system, which generates the physiological state of arousal. In other words, the feeling of emotion occurs roughly the same time when the physiological arousal is experienced. One does not cause the other.

In 1962, Schachter and Singer proposed a two-factor theory. Stanley Schachter thought that the early theories of emotion excluded a critical component that the subjective cognitive interpretation of why a state of arousal has occurred. According to this theory, two things must happen in order for a person to feel an emotion. At first, the person must experience physiological arousal. Then, for the person can label it as specific emotion, there must be a cognitive interpretation or explanation. Thus, Schachter delivered the conclusion that a true emotion can

appear only if a person is physically aroused and can find the reason for it. When people are in a state of physiological arousal but do not know why they are aroused, they tend to label the state as an emotion that is appropriate to their situation at the time. There were several attempts to replicate the findings of this theory, but they have not been successful.

Richard Lazarus, in the 1990, proposed the emotion theory that most heavily emphasizes the cognitive aspect. According to his theory, the first step in an emotional response is cognitive appraisal, and all other aspects of emotion, including physiological arousal, rely on the cognitive appraisal. This theory is most compatible with the subjective experience of an emotion's sequence of events-the sequence that William James reversed long ago. People first appraise a stimulus, or an event, when they encounter it. This cognitive appraisal determines whether the person will have an emotional response, and, if so, what type of response. From this appraisal, the physiological arousal and all other aspects of the emotion arise. In brief, Lazarus contends that emotions are roused when cognitive appraisals of events or circumstances are positive or negative-but not neutral.

Some critics criticize the Lazarus theory by saying that some emotional reactions are instantaneous, which means they occur too rapidly to pass through a cognitive appraisal. In respond to the criticisms, Lazarus remarks that some mental processing occurs without conscious awareness, meaning that a person should not know what he or she is responding to or what emotion to feel, or else, some form of cognitive realization must manifest but brief.

Passage 1

The fact that we react to certain experiences with "Emotion" is obvious. For example, the feeling of embarrassment, which triggers a physiological response that may cause blushing, is caused by a foolish act committed in the company of friends. Although this description of an embarrassed reaction seems logical, the American psychologist William James, in 1884, believed that the course of an emotional experience follows another sequence of events.

1. The author mentions a foolish act committed in the company of friends in order to

- A. give an idea that most people easily get embarrassed in a social environment
- B. show that most experiences activate a physiological reaction
- C. insist that an embarrassed reaction is usually unwarranted
- D. provide an example of an experience that generates emotion

Passage 2

Following the argument of James, what subjective experience tells us is completely opposite that the sequence of events in an emotional experience. First, he insisted that both physiological excitement and physical reaction are generated by an incident. Only then does the individual perceive or interpret the physical response as an emotion. That is, we associate blushing that caused by physical reaction with embarrassment, such as saying something silly may cause us to blush. In 1890, James went on to claim that "people feel sorry because they cry, furious because they strike, afraid because they shudder." Simultaneously with James' proposition, Carl Lange, a Danish physiologist and psychologist, independently formulated virtually similar theory. The James-Lange theory of emotion (Lange and James, 1922) suggests that different patterns of arousal in the autonomic nervous system create the different emotions people feel, and that physiological arousal occurs prior to the emotion is perceived.

2. According to paragraph 2, which of the following is true of what James believed about an emotional experience?

- A. Emotions can be caused only when there is a specific response occurs in the body.
- B. The sequence of events is not always the same for every emotional experience.
- C. We are able to figure out the right sequence of events in an emotional experience through subjective experience.
- D. Both a physical reaction and physiological arousal are triggered by the feeling of an emotion.

3. The word "formulated" in paragraph 2 is closest in meaning to

- A. published
- B. developed
- C. revealed
- D. duplicated

Passage 3

In 1927, another early theory of emotion that challenged the James-Lange theory was proposed by Walter Cannon. He claimed that physical changes caused by the diverse emotions are not sufficiently distinct to allow people to distinguish one emotion from another. After Cannon stated his original theory, in 1934, it was further developed by physiologist Philip Bard. The Cannon-Bard theory suggests that the following chain of events takes place when an emotion is felt. Stimuli which trigger emotion are received by the senses and then are relayed simultaneously to the cerebral cortex, which imparts the conscious mental

experience of the emotion, and to the sympathetic nervous system, which generates the physiological state of arousal. In other words, the feeling of emotion occurs roughly the same time when the physiological arousal is experienced. One does not cause the other.

4. According to paragraph 3, Walter Cannon claimed that the James-Lange theory of emotion is not convincing for which of the following reasons?

- A. The body can be affected by different emotions in similar ways.
- B. It is often not easy for people to distinguish one emotion from another.
- C. It is not significant enough for bodily changes to be perceived.
- D. It is often not obvious that bodily changes are caused by emotions or other factors.

5. According to the Canon-Bard theory arguments in paragraph 3, which of the following is the direct cause of mental experience of emotion?

- A. the cerebral cortex
- B. emotion-rousing stimuli
- C. aroused physiological state
- D. the sympathetic nervous system

Passage 4

In 1962, Schachter and Singer proposed a two-factor theory. Stanley Schachter thought that the early theories of emotion excluded a critical **component** that the subjective cognitive interpretation of why a state of arousal has occurred. According to this theory, two things must happen in order for a person to feel an emotion. At first, the person must experience physiological arousal. Then, for the person can label it as specific emotion, there must be a cognitive interpretation or explanation. Thus, Schachter delivered the conclusion that a true emotion can appear only if a person is physically aroused and can find the reason for it. When people are in a state of physiological arousal but do not know why they are aroused, they tend to label the state as an emotion that is appropriate to their situation at the time. There were several attempts to **replicate** the findings of this theory, but they have not been successful.

6. The word “**component**” in paragraph 4 is closest in meaning to

- A. procedure
- B. explanation
- C. argument
- D. element

7. According to paragraph 4, the Schachter-Singer theory is different from earlier theories of emotion in which of the following ways?

- A. It suggests that there are several steps in an emotional experience.
- B. It shows the reason that people do not understand why they are physiologically aroused.
- C. It says that the first step of an emotional experience is physiological arousal.
- D. It explains that people must decide why they are aroused to experience emotion.

8. According to paragraph 4, what can be inferred about an emotion suggested by Schachter-Singer theory?

- A. It should be occurred just before a person physiologically aroused.
- B. It happens regardless of the fact that people know the reason why they are aroused.
- C. It has to be passed through a stimulation and clarification process, or people can't experience it.
- D. It People can experience several emotions at once.

9. The word “replicate” in paragraph 4 is closest in meaning to

- A. interpret
- B. reproduce
- C. revise
- D. defend

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Passage 5

Richard Lazarus, in the 1990, proposed the emotion theory that most heavily emphasizes the cognitive aspect. According to his theory, the first step in an emotional response is cognitive appraisal, and all other aspects of emotion, including physiological arousal, rely on the cognitive appraisal. This theory is most compatible with the subjective experience of an emotion's sequence of events-the sequence that William James reversed long ago. People first appraise a stimulus, or an event, when they encounter it. This cognitive appraisal determines whether the person will have an emotional response, and, if so, what type of response. From this appraisal, the physiological arousal and all other aspects of the emotion arise. In brief, Lazarus contends that emotions are roused when cognitive appraisals of events or circumstances are positive or negative-but not neutral.

10. According to paragraph 5, which of the following is NOT true of the Lazarus' theory

- A. Interpretation of experience is more emphasized than any other theory.
- B. It indicates that a person first evaluate an event in order to have an emotion.
- C. It explains almost identical sequence of events to that of the subjective experience of an emotion.
- D. The theory of emotion proposed by William James is generally similar to this theory.

11. The word “contends” in paragraph 5 is closest in meaning to

- A. doubts
- B. argues
- C. proves
- D. reports

12. Which of the following best describes the organization of this passage?

- A. The author draws a comparison among different theories of emotion and claims that the last one is correct.
- B. The author chronologically introduces theories of emotion and identifies criticisms of each theory.
- C. The author verifies several theories of emotion and argues that each theory is not accurate enough.
- D. The author develops his own theory summarizing different theories of an emotional experience.

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Passage 3

In 1927, another early theory of emotion that challenged the James-Lange theory was proposed by Walter Cannon. He claimed that physical changes caused by the diverse emotions are not sufficiently distinct to allow people to distinguish one emotion from another. 【A】 After Cannon stated his original theory, in 1934, it was further developed by physiologist Philip Bard. 【B】 The Cannon-Bard theory suggests that the following chain of events takes place when an emotion is felt. 【C】 Stimuli which trigger emotion are received by the senses and then are relayed simultaneously to the cerebral cortex, which imparts the conscious mental experience of the emotion, and to the sympathetic nervous system, which generates the physiological state of arousal. 【D】 In other words, the feeling of emotion occurs roughly the same time when the physiological arousal is experienced. One does not cause the other.

13. Look at the four choices that indicate where the following sentence could be added to the passage.

The emotions of rage and fear, for instance, both include a rapid heartbeat, perspiration, and increased energy supplied to the muscles.

Where would the sentence best fit?

14. Summary

There has been a controversy among researchers about the sequence of events in an emotional experience.

Answer Choices

A. Cognitive appraisal probably does not play a large role in an emotional experience, evidenced by the very brief span of time between an event and an emotional reaction.

B. Two early theory of emotion both assert that that different emotions result from distinct changes in the body that correspond to particular emotions.

C. There is a disagreement among researchers who emphasize the cognitive aspect of an emotion about whether cognitive interpretation comes before or after physiological arousal.

D. Theories in disagreement with each other about the sequence of events in emotional experience concentrate on the extent to which cognition and interpretation are involved in an emotional experience.

E. Some theories claim that physiological arousal comes either before or at the same time as the feeling of an emotion, and contradict the subjective experience of emotion.

F. The Lazarus theory emphasized that an emotion comes from a positive or negative appraisal of a physiological arousal.

Three Theories about Origin of Life

Oxygen and nitrogen are major components of our current atmosphere. But the kinds of hydrogen reactions with other gases that are required to transform simple organic molecules into complex ones are interrupted by oxygen, which combines with hydrogen atoms from other compounds. Therefore, life on Earth must have originated when there was very little oxygen in Earth's atmosphere. The modern scientific theory of life's origin was first formulated in the 1920s by Russian scientist Aleksandr Oparin and independently by British scientist J. B. S. Haldane. The assumption that life sprang up from chemical reactions that were initiated in the early atmosphere (oxygen-poor/hydrogen-rich) and came to completion in the early oceans was posited by the Oparin-Haldane hypothesis, as it came to be called. Oparin and Haldane suggested that the hydrogen-containing gases caused to react with each other to form organic compounds by energy sources such as sunlight and lightning.

With regard to the view that these complex organic compounds could have begun to shape in Earth's oceans, some researchers remain skeptical. The probability that the fundamental building blocks of life, formaldehyde (H_2CO) and hydrogen cyanide (HCN), even though they were probably available, would have been concentrated sufficiently to allow further reactions to occur was likely small. And the more complex organic compounds that might have formed in this way would not have lasted long in the surface-ocean environment, because photochemical and thermal reactions would have destroyed them. Therefore, researchers have sought alternative explanations for how complex organic compounds formed.

There is one possibility that the relevant organic compounds were created in space, and asteroids or comets brought them to Earth, probably as tiny dust particles. Recovered from the stratosphere (an upper region of Earth's atmosphere), interplanetary dust particles (IDPs) is tiny particles that are known to be extraterrestrial origin. From various researches, we know that organic compounds, including amino acids, exist in IDPs as well as in some meteorite. Now, we actually have identified the fact that amino acids and many other complex organic compounds in interstellar dust clouds. It is believed that they form from reactions between charged particles and neutral molecules. Those atoms appear in interstellar dust clouds at very low temperatures-on the order of 200 or more degrees below zero on the Celsius scale. It may seem surprising that organic chemistry could occur in the interstellar environment, but it is precisely the extremely low temperatures involved that allow complex organic molecules to exist because temperatures are too cold to allow them to decompose.

[A] It is thought that some of the molecules created in the interstellar

environment have survived the collapse of the gas and dust cloud that formed our solar nebula and Sun. 【B】 They would have been incorporated into solid materials that condensed out of the nebula and formed asteroids and comets. 【C】 Such materials might have been delivered to Earth in great quantities during the heavy bombardment period of solar system history, between 4.5 and 3.8 billion years ago. 【D】

The hypothesis that life took place in or around hydrothermal vents (hot springs), where new seafloor is being created along mid-ocean ridges (underwater mountain chains) at the ocean's bottom is the third theory of life's origin. By seawater that flows a kilometer or more down through crevices in the rock, is heated, and then rises rapidly back to the surface, the ridges are cooled. During the process, the water gathers substances such as hydrogen, hydrogen sulfide, and dissolved ferrous iron. When it meets the cold water, the extremely hot (350°C) vent water generates a dark plume comprised mostly of iron sulfide, a compound produced by the reaction between ferrous iron and hydrogen sulfide.

Still, the explanation that submarine hydrothermal vents a likely place for life to have originated is controversial. In vent systems, there are various types of materials from which organic molecules can be synthesized. However, complex organic molecules are not stable at the high temperatures observed in vents positioned directly on the axis of a ridge. If life did originate at the mid-ocean ridges, it probably did so in cooler, off-axis vents. Some researchers claim that perfect place for life to have begun would be in some near-freezing surface environment because even the off-axis vents are too warm. The dispute as to whether life originated in a hot or cold environment is unlikely to stop.

Passage 1

Oxygen and nitrogen are major components of our current atmosphere. But the kinds of hydrogen reactions with other gases that are required to transform simple organic molecules into complex ones are interrupted by oxygen, which combines with hydrogen atoms from other compounds. Therefore, life on Earth must have originated when there was very little oxygen in Earth's atmosphere. The modern scientific theory of life's origin was first formulated in the 1920s by Russian scientist Aleksandr Oparin and independently by British scientist J. B. S. Haldane. The assumption that life sprang up from chemical reactions that were initiated in the early atmosphere (oxygen-poor/hydrogen-rich) and came to completion in the early oceans was posited by the Oparin-Haldane hypothesis, as it came to be called. Oparin and Haldane suggested that the hydrogen-containing gases caused to react with each other to form organic compounds by energy sources

such as sunlight and lightning.

1. By suggesting that the theory of life's origin was first formulated by Oparin and independently by Haldane, the author means that

- A. Haldane planned the theory in greater detail than Oparin
- B. Oparin devised the theory in cooperation with Haldane
- C. Haldane formulated the theory separately from Oparin
- D. Oparin developed the theory much earlier than Haldane

Passage 2

With regard to the view that these complex organic compounds could have begun to shape in Earth's oceans, some researchers remain **skeptical**. The probability that the fundamental building blocks of life, formaldehyde (H_2CO) and hydrogen cyanide (HCN), even though they were probably available, would have been concentrated **sufficiently** to allow further reactions to occur was likely small. And the more complex organic compounds that might have formed in this way would not have lasted long in the surface-ocean environment, because photochemical and thermal reactions would have destroyed them. Therefore, researchers have **sought** alternative explanations for how complex organic compounds formed.

2. The word "**skeptical**" in the paragraph 2 is closest in meaning to

- A. doubtful
- B. confident
- C. hopeful
- D. puzzled

3. According to paragraph 2, what is a problem for the explanation that life began in the oceans?

- A. Some life-forms would have been killed by high concentrations of H_2CO and HCN in the early Earth's oceans.
- B. If complex organic compounds formed in Earth's oceans, they have been broken down by photochemical and thermal reaction.
- C. The essential elements for complex organic compounds did not exist on the early Earth.
- D. The creation of complex organic compounds on Earth's oceans was influenced by the photochemical and thermal reactions.

4. The word "**sufficiently**" in the paragraph 2 is closest in meaning to

- A. quickly
- B. repeatedly

- C. initially
- D. adequately

5. The word “sought” in the paragraph 2 is closest in meaning to

- A. accepted
- B. proposed
- C. challenged
- D. looked for

6. Which of the following most accurately describes the relationship of paragraph 2 to paragraph 1?

- A. Paragraph 2 accounts for the reason why some scientists doubt the theory presented in paragraph 1.
- B. Paragraph 2 give information about the way that some scientists strengthened the theory introduced in paragraph 1.
- C. Paragraph 2 exhibits another theory to the one mentioned in paragraph 1.
- D. Paragraph 2 provides information that reinforces the theory introduced in paragraph 1.

Passage 3

There is one possibility that the relevant organic compounds were created in space, and asteroids or comets brought them to Earth, probably as tiny dust particles. Recovered from the stratosphere (an upper region of Earth's atmosphere), interplanetary dust particles (IDPs) is tiny particles that are known to be extraterrestrial origin. From various researches, we know that organic compounds, including amino acids, exist in IDPs as well as in some meteorite. Now, we actually have identified the fact that amino acids and many other complex organic compounds in interstellar dust clouds. It is believed that they form from reactions between charged particles and neutral molecules. Those atoms appear in interstellar dust clouds at very low temperatures-on the order of 200 or more degrees below zero on the Celsius scale. It may seem surprising that organic chemistry could occur in the interstellar environment, but it is precisely the extremely low temperatures involved that allow complex organic molecules to exist because temperatures are too cold to allow them to decompose.

Passage 4

It is thought that some of the molecules created in the interstellar environment have survived the collapse of the gas and dust cloud that formed our solar nebula and Sun. They would have been incorporated into solid materials that condensed out of the nebula and formed asteroids and comets. Such materials might have been delivered to Earth in great quantities during the heavy bombardment period

of solar system history, between 4.5 and 3.8 billion years ago.

7. 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. In consideration of the extreme cold, decomposition of complex organic molecules in the interstellar environment is astonishing.

B. Extremely cold temperatures prevent organic molecules from decomposing, making organic chemistry possible in the interstellar environment.

C. Although the extreme cold makes complex organic molecules exist, organic chemistry rarely occurs in the interstellar environment.

D. Since one would expect the extreme cold to prevent the formation of complex organic molecules, organic chemistry in the interstellar environment is not understandable.

8. In paragraph 3, all of the following are evidences that the organic compounds relevant to the formation of life may have formed in space EXCEPT

A. Organic compounds are present in interplanetary dust particles and some meteorites.

B. The severe cold conditions of interstellar dust clouds keep organic molecules preserved.

C. Interplanetary dust particles have been discovered in the stratosphere of Earth.

D. Organic compounds created by molecules on Earth react with charged particles found in comets.

9. According to paragraphs 3 and 4, complex organic compounds probably have first appeared on Earth by the way that

A. they might have been transformed from comets and asteroids.

B. they might have arrived to Earth as our solar system passed through an interstellar nebula.

C. they might have created when the newly appeared Sun led solid materials of the solar nebula to decompose.

D. they might have come from reactions inside the solid materials that made up the early Earth.

10. The phrase been incorporated into in the paragraph 4 is closest in meaning to

A. been attracted by

B. been changed into

C. formed around

- D. become part of

Passage 5

The hypothesis that life took place in or around hydrothermal vents (hot springs), where new seafloor is being created along mid-ocean ridges (underwater mountain chains) at the ocean's bottom is the third theory of life's origin. By seawater that flows a kilometer or more down through crevices in the rock, is heated, and then rises rapidly back to the surface, the ridges are cooled. During the process, the water gathers substances such as hydrogen, hydrogen sulfide, and dissolved ferrous iron. When it meets the cold water, the extremely hot (350°C) vent water generates a dark plume comprised mostly of iron sulfide, a compound produced by the reaction between ferrous iron and hydrogen sulfide.

11. According to paragraph 5, all of the following are true of the water emitted by undersea hydrothermal vents EXCEPT
- A. It has very high temperature.
 - B. It includes a dissolved form of iron.
 - C. It releases hydrogen as it rises to the surface at low rate.
 - D. It creates iron sulfide when it hits the surrounding ocean.

Passage 6

Still, the explanation that submarine hydrothermal vents a likely place for life to have originated is controversial. In vent systems, there are various types of materials from which organic molecules can be synthesized. However, complex organic molecules are not stable at the high temperatures observed in vents positioned directly on the axis of a ridge. If life did originate at the mid-ocean ridges, it probably did so in cooler, off-axis vents. Some researchers claim that perfect place for life to have begun would be in some near-freezing surface environment because even the off-axis vents are too warm. The dispute as to whether life originated in a hot or cold environment is unlikely to stop.

12. According to paragraph 6, what evidence supports the theory that undersea hydrothermal vents are a possible location for the origin of life?
- A. Undersea hydrothermal vents probably were much colder during the period of the early Earth than they are observed to be today.
 - B. The fact that materials with the kind of chemical composition from which organic molecules can be produced are in undersea hydrothermal vents.
 - C. Located on the ridge axis, complex organic materials are more stable.
 - D. They are located directly on the ridge axis, near-freezing surface

environments.

Passage 4

【A】 It is thought that some of the molecules created in the interstellar environment have survived the collapse of the gas and dust cloud that formed our solar nebula and Sun. 【B】 They would have been incorporated into solid materials that condensed out of the nebula and formed asteroids and comets. 【C】 Such materials might have been delivered to Earth in great quantities during the heavy bombardment period of solar system history, between 4.5 and 3.8 billion years ago. 【D】

13. Look at the four choices that indicate where the following sentence can be added to the passage.

As the modern study of a meteorite that crashed in western Canada has revealed, even today, organic compounds continuously arrive on Earth in this way.

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Where would the sentence best fit?

14. Summary

The origin of life on Earth has been the subject of scientific study, and several theories developed to clarify it.

Answer Choices

A. The Oparin-Haldane hypothesis about the origin of life explained the relationship between early atmosphere and chemical reactions but it has been abandoned by modern scientists.

B. All of the hypotheses about the origin of life have been disproved, and it seems impossible to devise better hypotheses.

C. Organic compounds can occur and remain stable in interstellar space and these chemicals may have led to the origin of life after they reached Earth.

D. One theory assumed that organic molecules formed at hydrothermal vents are responsible for the origin of life, and the high temperatures in some vents make such molecules unstable.

E. One theory argues that molecules in the cold interstellar environment reacted in the heat of hydrothermal vents, creating the stable organic molecules

which are essential for life.

F. Modern hypothesis suggested life may come from chemical reactions in Earth's ocean, but some scientists still doubt that the chemical products would have concentrated or long lasting enough.

Pest Control

Many pest species that are native to North America, such as white-footed mice and ground moles, are more nuisance pests and are usually regulated by native predators and parasites. This situation is not true for nonindigenous pests in North America, such as brown rats and cockroaches. After centuries, it is evident that these pests cannot be eradicated. The best that can be done is to introduce pest control measures that will control their numbers.

And ancient and popular means of pest control is chemical. For example, the Sumerians used sulfur to combat crop pests, and by the early 1800s such chemicals as arsenic were used to combat insect and fungal pests.

However, chemical control has its dark side. Chemical pesticides have many unintended consequences through their effects not just on the target species but on a wide array of no target species as well, often eliminating them and thereby upsetting the existing food webs, especially through the suppression of native predator species. The surviving pests then rebound in greater numbers than ever.

Perhaps more insidious is that a pesticide loses its effectiveness because the target species evolves resistance to it. As one pesticide replaces another, the pests acquire a resistance to them all. Some species, notably certain mosquitoes, have overcome the toxic effects of every pesticide to which they have been exposed. Insect pests need not only about five years to evolve pesticide resistance, their predators do so much more slowly. So after the pest develops resistance, pest outbreaks become even more disastrous.

Farmer long ago observed that enemies of pests act as controls. As early as 300 C.E., the Chinese were introducing predatory ants into their citrus orchards to control leaf-eating caterpillars. Insect pests have their own array of enemies in their native habitats. When an animal or plant is introduced, intentionally or unintentionally, into a new habitat outside of its natural range, it may adapt to the new environment and leave its enemies behind. Freed from predation and finding and abundance of resources, the species quickly becomes a pest or a weed. This fact had led to the search for natural enemies to introduce into populations of pests to reduce their populations.

Because the serious pest is usually a nonnative species, biological control involves the introduction of a nonindigenous predator or parasite to control the pest. The introduction of the cactus-eating moth, a native of Argentina, into Australia effectively reduced and controlled the rapidly spreading prickly pear, which had been introduced into Australia in 1901.

But biological control, like chemical control, can backfire. The success of the cactus-feeding moth in controlling prickly pear in Australia encouraged its introduction to several West Indies islands to control prickly pear there. In time the moth made its way to Florida, where it now threatens the existence of several

native prickly pear species. The moral is that although using nonindigenous predators as biological controls can be effective, these species possess their own inherent dangers that must be assessed before they are released. They, too, can become alien invaders.

Because chemical, biological, and other methods used individually are obviously not the solution to pest control, entomologists have developed a holistic approach to pest control, called integrated pest management (IPM). IPM considers the biological, ecological, economic, social, and even aesthetic aspects of pest control and employs a variety of techniques. The objective of IPM is to control the pest not at the time a major outbreak but at an earlier time, when the size of the population is easier to control. The approach is to rely first on natural mortality caused by weather and natural enemies, with as little disruption of the natural system as possible, and to use other methods only if they are needed to hold the pest below the economic injury level.

Successful IPM requires the knowledge of the population ecology of each pest and its associated species and the dynamics of the host species. It involves considerable field work monitoring the pest species and its natural enemies by such techniques as egg counts and the trapping of adults to acquire information to determine the necessity, timing, and intensity of control measures. These control measures must be adjusted to the situation, which may vary from one location to another. The intensity of control or no control is based on the degree of pest damage that can be tolerated, the costs of control, and the benefits to be derived.

Paragraph 1

Many pest species that are native to North America, such as white-footed mice and ground moles, are more nuisance pests and are usually regulated by native predators and parasites. This situation is not true for nonindigenous pests in North America, such as brown rats and cockroaches. After centuries, it is **evident** that these pests cannot be eradicated. The best that can be done is to introduce pest control measures that will control their numbers.

1. The word “**evident**” in the passage is closest in meaning to
 - A. surprising
 - B. obvious
 - C. believed
 - D. frustrating
2. What can be inferred from paragraph 1 about nonindigenous pests such as brown rats and cockroaches?
 - A. Attempts limit the size of their populations have been unsuccessful.
 - B. They have inhabited North America longer than white-footed mice and

ground moles.

C. Their numbers cannot usually be controlled by native predators and parasites.

D. They do not pose as many problems for humans as do white-footed mice and ground moles.

Paragraph 3

However, chemical control has its dark side. Chemical pesticides have many unintended consequences through their effects not just on the target species but on a wide array of no target species as well, often eliminating them and thereby upsetting the existing food webs, especially through the suppression of native predator species. The surviving pests then rebound in greater numbers than ever.

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. Chemical pesticides often eliminate species other than the intended target and thereby upset food webs, especially by suppressing native predator species.

B. Native predator species are often eliminated by chemical pesticides that are intended to have consequences for other pests.

C. Chemical pesticides upset existing food webs by eliminating native species and by increasing the number of nonnative predators.

D. The effects of chemical pesticides on a wide array of food webs and native predators are often unintended.

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Paragraph 5

Farmer long ago observed that enemies of pests act as controls. As early as 300 C.E., the Chinese were introducing predatory ants into their citrus orchards to control leaf-eating caterpillars. Insect pests have their own array of enemies in their native habitats. When an animal or plant is introduced, intentionally or unintentionally, into a new habitat outside of its natural range, it may adapt to the new environment and leave its enemies behind. Freed from predation and finding and abundance of resources, the species quickly becomes a pest or a weed. This fact had led to the search for natural enemies to introduce into populations of pests to reduce their populations.

4. In paragraph 5, the author mentions the Chinese use of predatory ants to control pests in order to

A. support the claim that using pests' natural enemies is a pest control technique that has been known for a long time

B. show that pests' enemies introduced unintentionally have proved more

dangerous than those introduced intentionally

C. help explain that when pests' enemies find enough resources, they can become pests themselves

D. argue that a pest insect in its native habitat always has a predator in that habitat

5. According to paragraph 5, why is a species likely to become a pest when it is introduced into a new habitat?

A. The species becomes more effective at escaping from its enemies.

B. The species has no natural predators in its new habitat.

C. The species adapts to habitats outside its natural range.

D. The species does not have to compete for resources with other plants and animals.

Paragraph 7

But biological control, like chemical control, can backfire. The success of the cactus-feeding moth in controlling prickly pear in Australia encouraged its introduction to several West Indies islands to control prickly pear there. In time the moth made its way to Florida, where it now threatens the existence of several native prickly pear species. The **moral** is that although using nonindigenous predators as biological controls can be effective, these species possess their own inherent dangers that must be **assessed** before they are released. They, too, can become alien invaders.

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6. The word "**assessed**" in the passage is closest in meaning to

A. minimized

B. identified

C. evaluated

D. dealt with

7. The word "**moral**" in the passage is closest in meaning to

A. situation

B. argument

C. fact

D. lesson

Paragraph 6

Because the serious pest is usually a nonnative species, biological control involves the introduction of a nonindigenous predator or parasite to control the pest. The introduction of the cactus-eating moth, a native of Argentina, into Australia effectively reduced and controlled the rapidly spreading prickly pear,

which had been introduced into Australia in 1901.

8. In paragraph 6, the discussion of the cactus-eating moth and the prickly pear in Australia illustrates which of the following about biological control?

- A. Nonnative pests cannot be controlled through biological means once they have begun to spread rapidly.
- B. A nonnative pest can sometimes be controlled by the introduction of a nonnative predator.
- C. A nonindigenous pest can be controlled only by a predator that comes from the same original habitat as the pest.
- D. A native pest can be controlled by either a native or a nonnative predator.

Paragraphs 7

But biological control, like chemical control, can backfire. The success of the cactus-feeding moth in controlling prickly pear in Australia encouraged its introduction to several West Indies islands to control prickly pear there. In time the moth made its way to Florida, where it now threatens the existence of several native prickly pear species. The moral is that although using nonindigenous predators as biological controls can be effective, these species possess their own inherent dangers that must be assessed before they are released. They, too, can become alien invaders.

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9. The author discusses the cactus-feeding moth in Florida in order to

- A. explain why the prickly pear species that are native to Florida have no indigenous predators
- B. show how a predator spreads more rapidly in alien environments than it does in its native environment
- C. indicate that a single nonindigenous predator species can be effective against a wide array of nonindigenous pest species
- D. argue that controlling pests with nonindigenous predators can have unintended consequences

Paragraphs 8

Because chemical, biological, and other methods used individually are obviously not the solution to pest control, entomologists have developed a holistic approach to pest control, called integrated pest management (IPM). IPM considers the biological, ecological, economic, social, and even aesthetic aspects of pest control and employs a variety of techniques. The objective of IPM is to control the pest not at the time a major outbreak but at an earlier time, when the size of the population is easier to control. The approach is to rely first on natural mortality caused by weather and natural enemies, with as little disruption of the natural

system as possible, and to use other methods only if they are needed to hold the pest below the economic injury level.

10. According to paragraph 8, each of the following is a principle of integrated pest management EXCEPT

- A. to control pest populations before a major outbreak occurs
- B. to first determine if weather and natural enemies are able to control a pest
- C. to increase the populations of the pest's natural enemies during certain seasons of the year
- D. to use artificial methods of pest control only when pests begin to cause economic injury

Paragraphs 9

Successful IPM requires the knowledge of the population ecology of each pest and its associated species and the dynamics of the host species. It involves considerable field work monitoring the pest species and its natural enemies by such techniques as egg counts and the trapping of adults to acquire information to determine the necessity, timing, and intensity of control measures. These control measures must be adjusted to the situation, which may vary from one location to another. The intensity of control or no control is based on the degree of pest damage that can be tolerated, the costs of control, and the benefits to be derived.

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11. The word “considerable” in the passage is closest in meaning to

- A. tiring
- B. a large amount of
- C. complicated
- D. carefully planned

12. According to paragraph 9, each of the following helps to determine how intensely to apply pest control measures EXCEPT

- A. how much pest damage can be tolerated
- B. the cost of pest control measures
- C. what can be gained through pest control measures
- D. whether pest control measures have been used before

Paragraphs 4

Perhaps more insidious is that a pesticide loses its effectiveness because the target species evolves resistance to it. As one pesticide replaces another, the pests acquire a resistance to them all. [A] Some species, notably certain mosquitoes,

have overcome the toxic effects of every pesticide to which they have been exposed.

【B】 Insect pests need not only about five years to evolve pesticide resistance, their predators do so much more slowly. 【C】 So after the pest develops resistance, pest outbreaks become even more disastrous. 【D】

13. Look at the four choices that indicate where the following sentence could be added to the passage.

And the damage will continue until a new pesticide is developed, at which time the cycle will begin anew.

Where would the sentence best fit? Click on a choice to add the sentence to the passage.

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

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Drag your choices to the spaces where they belong. To review the passage, click on View Text.

Pest control measures vary in their approach and overall degree of success.

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-
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Answer Choices

- A. Biological methods of pest control were introduced by the ancient Sumerians, and chemical control was first used in ancient China.
- B. Biological control, for example, the use of natural enemies of pests, has been effective at regulating nonnative pests, though it can also threaten the existence of native species.
- C. Integrated pest management is a holistic approach that has been successful at controlling major pest outbreaks in locations where chemical and

biological control have already failed.

- D. Pesticides are limited in their usefulness because pests quickly become resistant to them, and because they can harm species for which they were not intended.
- E. The success of biological and chemical approaches to pest control has been difficult to measure because situations vary significantly from one location to another.

Integrated pest management, an approach that consider biological, ecological, economic, and aesthetic aspects of pest control, uses a variety of techniques adjusted to specific situations.

The Sentinel Behavior of Meerkats

A species of small mongooses in Africa called meerkats share sentinel (guard) duties to warn other group members by repeating alarm calls if a predator is seen. This is an important job, because when meerkats are foraging, their heads are in the ground seeking prey, and they cannot see a predator coming.

The question is, why do group members take turns acting as sentinels? Kin selection, that is, being able to save the lives of family members can be one hypothesis for this type of sentinel behavior. Family members share copies of a meerkat's genes. Kin selection is achieved by helping a meerkat's own offspring as well as non descendant kin, including sibling, nieces, nephews, aunts, and uncles. Therefore, if members of a certain group are closely related, a sentinel ensures that copies of its genes can be passed on to future generations by saving the majority of family members by alerting others, even at the expense of its own life.

Assuming this hypothesis is true, we can predict that group members have close genetic ties. Otherwise, kin selection would not work. But this prediction does hold true. A dominant, breeding female is mother to 75 percent of all the litters in a group, and one dominant male fathers 75 percent of all the pups born. Even though a typical meerkat group includes a few immigrants, most subordinate adults are siblings or half siblings. Therefore, it is likely that subordinate adults share 25 or 50 percent of their genes.

On account of most meerkat group members being family, it is possible that kin selection has favored sentinel behavior. Nonetheless, by itself, a close inherent relationship is not enough evidence to conclude that kin selection has played a role. Thus, we need further evidence, and must improve the prediction.

Based on the same hypothesis, a more specific prediction is that each mongoose should increase the frequency of sentinel behavior when they are guarding family members. This new prediction needed testing, so the group was observed to determine which members stand guard and when. The immigrants without any kin relations to other group members acted as sentinels just as much as the individuals with many relatives nearby. Therefore, the result of this test does not support the kin-selection hypothesis.

Another hypothesis that is often suggested to explain such cooperative behavior is that it results from reciprocal altruism each individual takes turns standing guard to benefit the rest of the group, rather than itself. The reciprocal altruism theory can work only when those who cheat by avoiding guard duty can be identified and punished by the rest of the group. This hypothesis produces the prediction that there should be a regular rotation of sentry duty within the group and that the ones who neglect this duty should be chastised. However, this is not observed. In fact, the group members do take turns on sentry duty, but there is no predetermined order for this. In addition, when some members shorten their shift,

other group members increase their contributions to compensate. The predictions and observations of the reciprocal-altruism hypothesis do not coincide with each other.

Yet another hypothesis for the evolution of meerkat sentinel behavior is that it results from selfish antipredator behavior. This idea stems from the fact that the meerkat watching for predators increases its personal safety, and warning others does not harbor any disadvantage. So, when a meerkat has had enough to eat, it should watch for predators. The sentinel on duty can then return to foraging. This hypothesis produces a prediction that sentinel duty is not dangerous or risky in any way. This does seem to be true. Over the course of 2,000 hours of observation, no sentinels were attacked or killed by predators. They may actually be safer because they are the first to sense the predator. Moreover, they generally stand guard within 5 meters of a burrow, and are the first underground when a predator comes close.

If a meerkat's personal safety is increased with serving as a sentinel, it would be possible to predict that an individual would spend a proportion of its time guarding, whether it was solitary or part of a group. As predicted, individual meerkats spend about the same time on guard duty as members of large groups. Groups with more members suffer less predation because there is a sentinel for a longer portion of foraging time than in small groups.

1. 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.(未找到高亮句)

- A. A sentinel attempts to save as many closely related family members as possible, even if it dies while doing so.
- B. The group will not be able to pass their genes to future generations if a sentinel dies before alerting other family members.
- C. The genes of all members of the group will be passed to future generations even if a sentinel alerts only its close family members.
- D. Although a sentinel dies while alerting family members, it ensures that its genes will survive in future generations.

Paragraph 3

Assuming this hypothesis is true, we can predict that group members have close genetic ties. Otherwise, kin selection would not work. But this prediction does hold true. A dominant, breeding female is mother to 75 percent of all the litters in a group, and one dominant male fathers 75 percent of all the pups born. Even though a typical meerkat group includes a few immigrants, most subordinate adults are siblings or half siblings. Therefore, it is likely that subordinate adults

share 25 or 50 percent of their genes.

2. According to paragraph 3, the theory that meerkats' sentinel behavior is the result of kin selection is supported by the fact that

- A. sentinels warn the dominant males and females of the meerkat group first
- B. most members of a meerkat group are hereditarily related to each other
- C. immigrant members of the meerkat group will benefit from the sentinels' warnings
- D. only a small portion of a meerkat group serves as sentinels

3. The word **includes** in the passage is closest in meaning to

- A. contains
- B. attracts
- C. allows
- D. brings

Paragraph 4

On account of most meerkat group members being family, it is possible that kin selection has favored sentinel behavior. Nonetheless, by itself, a close inherent relationship is not enough evidence to conclude that kin selection has played a role. Thus, we need further evidence, and must **improve** the prediction.

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4. What role does paragraph 4 play in the passage?

- A. It explains the difficulties in collecting evidence about kinship relationships.
- B. It introduces a new hypothesis to replace the one presented in paragraph 2.
- C. It explains the relationship between hypotheses, prediction, and evidence.
- D. It introduces another observation test of the hypothesis presented in paragraph 2.

5. The word **improve** in the passage is closest in meaning to

- A. reject
- B. clarify
- C. refine
- D. discard

Paragraph 5

Based on the same hypothesis, a more specific prediction is that each mongoose should increase the frequency of sentinel behavior when they are guarding family members. This new prediction needed testing, so the group was observed to determine which members stand guard and when. The immigrants without any kin relations to other group members acted as sentinels just as much

as the individuals with many relatives nearby. Therefore, the result of this test does not support the kin-selection hypothesis.

6. Paragraph 5 suggests that before the more specific prediction based on the kin-selection hypothesis is tested, researchers involved in the testing should know

- A. the minimum number of members needed as guards
- B. which group members were related to each other
- C. which group members were more skilled at standing guard
- D. how well group members were protected by the sentinels

Paragraph 6

Another hypothesis that is often suggested to explain such cooperative behavior is that it results from reciprocal altruism each individual takes turns standing guard to benefit the rest of the group, rather than itself. The reciprocal altruism theory can work only when those who cheat by avoiding guard duty can be identified and punished by the rest of the group. This hypothesis produces the prediction that there should be a regular rotation of sentry duty within the group and that the ones who neglect this duty should be chastised. However, this is not observed. In fact, the group members do take turns on sentry duty, but there is no predetermined order for this. In addition, when some members shorten their shift, other group members increase their contributions to compensate. The predictions and observations of the reciprocal-altruism hypothesis do not coincide with each other.

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7. The phrase **In addition** in the passage is closest in meaning to

- A. Over time
- B. Astonishingly
- C. Furthermore
- D. Ultimately

8. According to paragraph 6, what observation was made that weakened the reciprocal-altruism hypothesis?

- A. Some group members never spent any time guarding.
- B. There were some moments when no sentinel was present.
- C. No established order of guard duty existed.
- D. Some group members were less severely punished than others.

Paragraph 7

Yet another hypothesis for the evolution of meerkat sentinel behavior is that it results from selfish antipredator behavior. This idea stems from the fact that the meerkat watching for predators increases its personal safety, and warning others

does not harbor any disadvantage. So, when a meerkat has had enough to eat, it should watch for predators. The sentinel on duty can then return to foraging. This hypothesis produces a prediction that sentinel duty is not dangerous or risky in any way. This does seem to be true. Over the course of 2,000 hours of observation, no sentinels were attacked or killed by predators. They may actually be safer because they are the first to sense the predator. Moreover, they generally stand guard within 5 meters of a burrow, and are the first underground when a predator comes close.

9. According to the hypothesis discussed in paragraph 7, why would a meerkat choose to stand guard once it has eaten?

- A. To look for new foraging grounds as well as predators
- B. To protect itself from being attacked by a predator
- C. To improve its position within the group
- D. To warn others in its group of any predator attacks, even at great risk to itself

10. According to paragraph 7, the fact that during the 2,000 hours of observation no sentinels were attacked by predators may show that

- A. sentinels are extremely effective in warning members of their group about dangers
- B. it is safer for an individual to stand guard than to be guarded from predation
- C. it is hard to determine how hard guard duty is even from 2,000 hours of observation
- D. sentinels can ensure that foraging group members stay within 5 meters of a burrow

11. The phrase comes close in the passage is closest in meaning to

- A. approaches
- B. move about
- C. assaults
- D. assails

Paragraph 8

If a meerkat's personal safety is increased with serving as a sentinel, it would be possible to predict that an individual would spend a proportion of its time guarding, whether it was solitary or part of a group. As predicted, individual meerkats spend about the same time on guard duty as members of large groups. Groups with more members suffer less predation because there is a sentinel for a longer portion of foraging time than in small groups.

12. According to paragraph 8, which of the following statements is supported by studies of individual meerkats' guarding behavior?

- A. Solitary meerkats spend more time on foraging than ones belonging to a group, but they also watch for predators some of the time.
- B. Individual animals in large groups tend to spend more time on guard duty than ones in small groups.
- C. The time spent watching for predators increases a meerkat's personal safety even when the animal is solitary.
- D. Sentinels prefer to spend their guarding time as solitary individuals rather than as members of a large group.

Paragraph 7 and 8

Yet another hypothesis for the evolution of meerkat sentinel behavior is that it results from selfish antipredator behavior. This idea stems from the fact that the meerkat watching for predators increases its personal safety, and warning others does not harbor any disadvantage. So, when a meerkat has had enough to eat, it should watch for predators. The sentinel on duty can then return to foraging. This hypothesis produces a prediction that sentinel duty is not dangerous or risky in any way. This does seem to be true. Over the course of 2,000 hours of observation, no sentinels were attacked or killed by predators. They may actually be safer because they are the first to sense the predator. Moreover, they generally stand guard within 5 meters of a burrow, and are the first underground when a predator comes close. 【A】 If a meerkat's personal safety is increased with serving as a sentinel, it would be possible to predict that an individual would spend a proportion of its time guarding, whether it was solitary or part of a group. 【B】 As predicted, individual meerkats spend about the same time on guard duty as members of large groups. 【C】 Groups with more members suffer less predation because there is a sentinel for a longer portion of foraging time than in small groups. 【D】

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13. Look at the four choice that indicate where the following sentence could be added to the passage.

This results in meerkats gaining an advantage in survival by gathering in large groups rather than small ones.

Where would the sentence best fit?

14. 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.

Many hypotheses have been suggested to explain why meerkats take turns acting as sentinels, warning other group members of any threats from predators.

Answer Choices

- A. Kin selection is thought to explain sentinel behavior, but this hypothesis does not fully explain how unrelated immigrants can be part of a group.
- B. Even though sentinel behavior can be explained with reciprocal altruism, there is lack of evidence that group members are ever held responsible for not taking their turn to guard.
- C. Guard duty increases the personal safety of every group member, but the increase is at its least for the member who actually stands guard.
- D. The proposed theory that sentinel behavior increases the safety of only family members is contradicted by the sentinel behavior of immigrant group members.
- E. A plausible reason for sentinel behavior may be to allow other meerkats a chance to forage for food in groups rather than as individuals.
- F. Sentinel behavior is most likely the result of self-protection by individuals and only secondarily a means to protect the group.

Portraits as Art

According to the Oxford English Dictionary, portraiture is, "a representation or delineation of a person, especially of the face, made by life, by drawing, painting, photography, engraving... a likeness. " However, this simplistic definition disregards the complexities of portraiture. Portraits are works of art that engage with ideas of identity as they are perceived, represented, and understood in different times and places, rather than simply aim to represent a likeness. These concepts of identity can encompass social hierarchy, gender, age, profession, and the character of the subject, among other things. Rather than being fixed, these features are expressive of the expectations and circumstances of the time when the portrait was made. It is impossible to reproduce the aspects of identity; it is only possible to evoke or suggest them. Consequently, even though portraits represent individuals, it is generally conventional or typical - rather than unique - qualities of subject that are stressed by the artist. Portrait art has also undergone significant shifts in artistic convention and practice. Despite the fact that the majority of portraits portray the subject matter in some amount of verisimilitude, (an appearance of being true or real), they are still the outcome of prevailing artistic fashions and favored styles, techniques, and media. Therefore, portrait art is a vast art category which provides a wide range of engagements with social, psychological, and artistic practices and expectations.

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Since portraits are distinct from other genres or art categories in the ways they are produced, the nature of what they represent, and how they function as objects of use and display, they are worthy of separate study. First, during their production, portraits require the presence of a specific person, or an image of the individual to be represented, in almost all cases. In the majority of instances, the production of portraiture has necessitated sittings, which result in interaction between the subject(s) and artist throughout the creation of the work. If the sitter is of high social standing or is occupied and unavailable to sit in the studio regularly, portraitists could use photographs or sketches of their subject. In Europe, during the seventeenth and eighteenth century, the sitting time was sometimes decreased by focusing solely on the head and using professional drapery painters to finish the painting. For instance, Sir Peter Lily, the English artist, had a collection of poses in a pattern book that enabled him to focus on the head and require fewer sittings from his aristocratic patrons. Portrait painters could be asked to present the likeness of individuals who were deceased. In this sort of instance, photographs or prints of the subject could be reproduced. Theoretically, portraitists could work from impressions or memories when creating a painting, but this is a rare occurrence according to documented records. Nonetheless, whether the work is

based on model sittings, copying a photograph or sketch, or using memory, the process of painting a portrait is closely linked with the implicit or explicit attendance of the model.

Furthermore, portrait painting can be differentiated from other artistic genres like landscape, still life, and history by its connection with appearance, or likeness. As such, the art of portrait painting got a reputation for imitation, or copying, instead of for artistic innovation or creativity; consequently it is sometimes viewed as being of a lower status than the other genres. According to Renaissance art theory, (which prevailed until the start of the nineteenth century) fine art was supposed to represent idealized images, as well as to be original and creative instead of to copy other works. Portraiture, in comparison, became linked with the level of a mechanical exercise as opposed to a fine art. Michelangelo's well known protest that he would not paint portraits because there were not enough ideally beautiful models is only one example of the dismissive attitude to portraiture that persisted among professional artist - even those who, ironically, made their living from portraiture. In the time of modernism, during the nineteenth and twentieth centuries, the attitude towards portraiture was critical. Even so, artists from around the globe persisted painting portraits in spite of their theoretical objections. Picasso, for instance, became renowned for cubist still-life painting early in his career, but some of his most effective early experiments in this new style were his portraits of art dealers.

Paragraph 1

According to the Oxford English Dictionary, portraiture is, "a representation or delineation of a person, especially of the face, made by life, by drawing, painting, photography, engraving... a likeness. " However, this simplistic definition disregards the complexities of portraiture. Portraits are works of art that engage with ideas of identity as they are perceived, represented, and understood in different times and places, rather than simply aim to represent a likeness. These concepts of identity can encompass social hierarchy, gender, age, profession, and the character of the subject, among other things. Rather than being fixed, these features are expressive of the expectations and circumstances of the time when the portrait was made. It is impossible to reproduce the aspects of identity; it is only possible to evoke or suggest them. Consequently, even though portraits represent individuals, it is generally conventional or typical - rather than unique - qualities of subject that are stressed by the artist. Portrait art has also undergone significant shifts in artistic convention and practice. Despite the fact that the majority of portraits portray the subject matter in some amount of verisimilitude, (an appearance of being true or real), they are still the outcome of prevailing artistic fashions and favored styles, techniques, and media. Therefore, portrait art is a vast

art category which provides a wide range of engagements with social, psychological, and artistic practices and expectations.

1. The word **engage** in the passage is closest in meaning to

- A. construct
- B. are pleased
- C. are altered
- D. are involved in

2. According to paragraph 1, which of the following gives support of portrait painting's complexity?

- A. Portraits representing faces are more true to life than portraits that portray a whole figure
- B. Portrait art comes in many varieties, which include painting, photography, and drawing
- C. Portraiture tries to portray the most uncommon attributes of a given subject
- D. Portraiture is an interpretation of a subject rather than a copy of it

3. The word **prevailing** in the passage is closest in meaning to

- A. apparent
- B. distinct
- C. steady
- D. current

4. According to paragraph 1, which of the following best illustrates the development of portrait painting as an art form?

- A. It started as a minor art form, but became progressively more popular
- B. It is a comparatively stable art form due to its fixed subject matter
- C. It has been subjected to consistent and major style shifts
- D. It was the first art form concerned with the identity of the subject

Paragraph 2

Since portraits are distinct from other genres or art categories in the ways they are produced, the nature of what they represent, and how they function as objects of use and display, they are worthy of separate study. First, during their production, portraits require the presence of a specific person, or an image of the individual to be represented, in almost all cases. In the majority of instances, the production of portraiture has necessitated sittings, which result in interaction between the

subject(s) and artist throughout the creation of the work. If the sitter is of high social standing or is occupied and unavailable to sit in the studio regularly, portraitists could use photographs or sketches of their subject. In Europe, during the seventeenth and eighteenth century, the sitting time was sometimes decreased by focusing solely on the head and using professional drapery painters to finish the painting. For instance, Sir Peter Lily, the English artist, had a collection of poses in a pattern book that enabled him to focus on the head and require fewer sittings from his aristocratic patrons. Portrait painters could be asked to present the likeness of individuals who were deceased. In this sort of instance, photographs or prints of the subject could be reproduced. Theoretically, portraitists could work from impressions or memories when creating a painting, but this is a rare occurrence according to documented records. Nonetheless, whether the work is based on model sittings, copying a photograph or sketch, or using memory, the process of painting a portrait is closely linked with the implicit or explicit attendance of the model.

5. Paragraph 2 suggests which of the following differences between portraiture and other types of art?

- A. Portraits portray the subject matter in a more accurate manner than other forms of art
- B. Portraits typically take less time to produce than other art forms
- C. Portraits typically necessitate an increased level of personal interaction between the subject matter and artist than other art forms
- D. In opposition to other art forms, portraiture usually necessitates collaboration among several artists

6. In the passage, the word solely is closest in meaning to

- A. only
- B. primarily
- C. particularly
- D. directly

7. The author discusses the “Sir Peter Lily, the English artist”, to provide an example of an artist who

- A. invented a method to reduce the necessary number of sittings for his rich patrons
- B. employed professional drapery painters to help him finish his portraits
- C. concentrated on painting different parts of the subject body at each sitting
- D. had an uncommon range of patrons as subjects

8. All of the following are mentioned in paragraph 2 as techniques employed by artists to create portraits **EXCEPT**

- A. combining facial traits from different subjects
- B. observing the subjects directly during painting
- C. copying a photograph
- D. recalling what the subject looked like from memory

Paragraph 3

Furthermore, portrait painting can be differentiated from other artistic genres like landscape, still life, and history by its connection with appearance, or likeness. As such, the art of portrait painting got a reputation for imitation, or copying, instead of for artistic innovation or creativity; consequently it is sometimes viewed as being of a lower status than the other genres. According to Renaissance art theory, (which prevailed until the start of the nineteenth century) fine art was supposed to represent idealized images, as well as to be original and creative instead of to copy other works. Portraiture, in comparison, became linked with the level of a mechanical exercise as opposed to a fine art. Michelangelo's well known protest that he would not paint portraits because there were not enough ideally beautiful models is only one example of the dismissive attitude to portraiture that persisted among professional artist - even those who, ironically, made their living from portraiture. In the time of modernism, during the nineteenth and twentieth centuries, the attitude towards portraiture was **critical**. Even so, artists from around the globe persisted painting portraits in spite of their theoretical objections. Picasso, for instance, became renowned for cubist still-life painting early in his career, but some of his most effective early experiments in this new style were his portraits of art dealers.

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9. According to paragraph 3, portraiture grew to be regarded as a mechanical practice due to its association with which of the following?

- A. innovation
- B. imitation
- C. perfectionism
- D. creativity

10. What can be inferred from paragraph 3 regarding Michelangelo's view of portraiture?

- A. He felt that imitating and copying were prerequisites of achieving creative portraits.
- B. He thought that portrait artists ought to select subjects from long ago rather than present day.

- C. He felt that portrait art should be viewed as a form of fine art.
- D. He felt that portraits should only portray idealized beauty.

11. The word **critical** in the passage is closest in meaning to

- A. misunderstanding
- B. fault-finding
- C. ignorant
- D. insignificant

12. In paragraph 3, the author talks about Picasso as an example of an artist who

- A. altered the way other artists felt about portrait art
- B. relied on portrait art to establish a high reputation
- C. had fewer theoretical objections to portraiture than most modern artists
- D. created portraits in spite of his doubts about portraiture as a fine art form

Paragraph 3

Since portraits are distinct from other genres or art categories in the ways they are produced, the nature of what they represent, and how they function as objects of use and display, they are worthy of separate study. 【A】 First, during their production, portraits require the presence of a specific person, or an image of the individual to be represented, in almost all cases. 【B】 In the majority of instances the production of portraiture has necessitated sittings, which result in interaction between the subject(s) and artist throughout the creation of the work. 【C】 If the sitter is of high social standing or is occupied and unavailable to sit in the studio regularly, portraitists could use photographs or sketches of their subject. 【D】 In Europe, during the seventeenth and eighteenth century, the sitting time was sometimes decreased by focusing solely on the head and using professional drapery painters to finish the painting. For instance, Sir Peter Lily, the English artist, had a collection of poses in a pattern book that enabled him to focus on the head and require fewer sittings from his aristocratic patrons. Portrait painters could be asked to present the likeness of individuals who were deceased. In this sort of instance, photographs or prints of the subject could be reproduced. Theoretically, portraitists could work from impressions or memories when creating a painting, but this is a rare occurrence according to documented records. Nonetheless, whether the work is based on model sittings, copying a photograph or sketch, or using memory, the process of painting a portrait is closely linked with the implicit or explicit attendance of the model.

13. Look at the four choice that indicate where the following sentence could be added to the passage

In certain instances, portrait artists depended on a combination of direct and indirect involvement with their subjects.

Where would the sentence best fit?

14. 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.

Portraiture as an art form is more complex than is suggested by its definition.

Answer Choices

- A. The definitions of portrait art in the dictionary have regularly transformed throughout the years to reflect shifting attitudes regarding the genre.
- B. Portrait art should be considered as a distinct artistic genre due to its intense occupation with the subject and the way in which it was produced.
- C. Beginning in the Renaissance and continuing into the start of the nineteenth century, portrait art was idealized to a greater degree than it is in today.
- D. Portraits generally mirror the conventions of the time rather than the unique qualities of the individual.
- E. Throughout history, the majority of professional artists avoided portrait art since they regarded it as a mechanical art form, and not as fine art.
- F. Portrait art was at times viewed in a negative light since it was considered as simple copying void of artistic innovation.

Agriculture in Medieval Japan

A rapid population of Japan occurred during its medieval times. Japan's population was around 7 million but it rose keenly to 12 million from year 1200 to 1600. In this period, numerous hamlets formed throughout the country. They were mostly formed in the lands listed as “unsettled” or as a “wasteland” before 1300.

There were many facets in increase in number of new hamlets, but by far the most significant characteristic of newly formed hamlets were that they were much bigger in terms of size compared to that of the hamlets built before 1300. There are many factors for forming of such large towns that contributed to increase in population mass. Some factors that can be considered are people's demand for local authority, voluntarily, to defend themselves against outside threats or to form religious communities. Whatever the impetus, such formation of large villages was due to improvements in the agricultural technologies. Some improvements in technologies involved turning over of fields, irrigation methods, and usage of waterwheels, iron tools and diversification of crop output.

Among many improvements in agriculture, field leveling was the most basic practice used to optimize the land for farming. The farmers would create flat land for farming by leveling a field. They then would use the surfeit soil from the field to level the slightly slanted field. As a result, two fields of difference in altitude would be formed. Such difference in elevation allowed farmers to use the lower for rice paddy and the higher for dry crops. Practice of field leveling allowed a paddy culture to settle and allowed vast variety in dry crops to be produced due to the formation of drop crop field. Though the labor involved in formation of fields was enormous, the field preparation enabled marshlands alongside the rivers to be used for husbandry even if the rivers were uncontrolled.

Rice crops require ample water for growth and it takes much time until they are ready to be harvested. So farmers naturally worked by places where they had access to ample supply of water, such as riverbanks, streams and ponds. However, natural water supply was inefficient for the growth of rice, especially in sweltering summers. This led to the usage and development of ditches and dikes. Development in drawing the water from the distant locations led number of dams to increase and directed them to wherever they needed them. This was most evident in Yamato Basin where famers built permanent dams. The water detained in the pools was kept for times when they needed water for farming in droughty seasons. Such development led to keen proliferation of crop output as the heated water metabolized the germination of crops and caused crops to mature even faster.

By mid 1500s, one quarter of all paddy land were used to double crop. The farmers not only used fields to grow two crops in a year, but they even grew three

in a single annual cycle. An envoy from Korea stated that Japanese farmers from Hyogo region would grow barley and sow in winter and harvest them in summer. Followed by rice cropping in summer and fall, buckwheat was harvested in winter. As time went on agriculture advanced, such technique progressed from generation to generation. Farming became more consistent and the crop output became even greater. A greater sense of discipline in land tilling and wide range of crops being planted in the same piece of land broadened the understanding of agriculture in farmers.

Crops harvested were used for farmers themselves. In many cases, one hectare of decent land was enough to sustain their entire family. They would only plow enough land for food to cater families for several reasons. Much of the medieval Japanese reclamation of land was due to the search for enough arable land to meet the food needed for just a single household. In case a farmer having enough fields for crop output required for his family, he would expand his fields so that one had to put into farming for his crops to grow. This was further compounded by the scarcity of land for farming as well as limiting capacity for water and fertilizer supplies, not to mention the likelihood of antagonizing neighbors. Taking these variable factors into consideration, farmers of this period persisted with single hectare or less of arable land, just enough to sustain their families.

Paragraph 1

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A rapid population of Japan occurred during its medieval times. Japan's population was around 7 million but it rose keenly to 12 million from year 1200 to 1600. In this period, numerous hamlets formed throughout the country. They were mostly formed in the lands listed as "unsettled" or as a "wasteland" before 1300. There were many facets in increase in number of new hamlets, but by far the most significant characteristic of newly formed hamlets were that they were much bigger in terms of size compared to that of the hamlets built before 1300. There are many factors for forming of such large towns that contributed to increase in population mass. Some factors that can be considered are people's demand for local authority, voluntarily, to defend themselves against outside threats or to form religious communities. Whatever the **impetus**, such formation of large villages was due to improvements in the agricultural technologies. Some improvements in technologies involved turning over of fields, irrigation methods, and usage of waterwheels, iron tools and diversification of crop output.

1. What can be inferred about the reason for the consolidation of population in medieval Japan?

A. Whether from the orders of local government or due to a voluntary nature,

the goal was to avoid danger.

B. A list of possible catalysts is known but the exact combination of reasons is unclear.

C. The desire to settle previously undeveloped land allured people, whatever their particular situation.

D. Population boomed because there were more lands given out to people by the authority.

2. What was the significance of villages that appeared after 1300?

A. They exemplified advancing capacity of food output that could support the increasing masses.

B. They had been settled in areas that had been previously described as “unsettled” or as “wastelands”.

C. They tended to gain greater area per person than the cities built before 1300.

D. The population had grown by 5 million in a very short amount of time which forced villages to appear.

3. Why does the author mention various agronomical techniques?

A. To explain the types of prowess needed to be learned in order for villages to prosper

B. To begin a discussion on the relevance of these techniques in increasing productivity of fields

C. To isolate the practices that facilitated the increased population size of the villages

D. To point out the different jobs that had to be performed on a successful field

4. The word **impetus** in the passage is closest in meaning to

A. situation

B. purpose

C. motivation

D. outcome

5. Which of the following is **NOT** true about field leveling?

A. Extra soil was used to level the neighboring field.

B. It was not a very arduous process.

C. It resulted in two different growing platforms.

D. It didn't involve a high degree of apparatuses.

Paragraph 2

Among many improvements in agriculture, field leveling was the most basic practice used to optimize the land for farming. The farmers would create flat land for farming by leveling a field. They then would use the surfeit soil from the field to level the slightly slanted field. As a result, two fields of difference in altitude would be formed. Such difference in elevation allowed farmers to use the lower for rice paddy and the higher for dry crops. Practice of field leveling allowed a paddy culture to settle and allowed vast variety in dry crops to be produced due to the formation of drop crop field. Though the labor involved in formation of fields was enormous, the field preparation enabled marshlands alongside the rivers to be used for husbandry even if the rivers were uncontrolled.

6. The word **optimize** in the passage is closest in meaning to

- A. harness
- B. take advantage of
- C. enhance
- D. make the best use of

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

- A. The innovation of this technique facilitated the utilized water from uncontrolled rivers.
- B. This allowed for the swampy marshlands near rivers to be uncontrolled by the rivers themselves.
- C. Farmers were now able to invest labor resources into the development of marshlands from rivers.
- D. Field leveling was a technique that allowed farmers to exploit the natural layout of their terrain.

8. What TWO benefits did the shallow holding pools in the Yamato Basin provide?

- A. A faster harvesting process for the annual yield
- B. An additional source of water
- C. The reduced need of relying on ditches and dikes
- D. A source of heat for the water

Paragraph 3

Rice crops require ample water for growth and it takes much time until they are ready to be harvested. So farmers naturally worked by places where they had access to ample supply of water, such as riverbanks, streams and ponds. However, natural water supply was inefficient for the growth of rice, especially in sweltering

summers. This led to the usage and development of ditches and dikes. Development in drawing the water from the distant locations led number of dams to increase and directed them to wherever they needed them. This was most evident in Yamato Basin where famers built permanent dams. The water detained in the pools was kept for times when they needed water for farming in droughty seasons. Such development led to keen proliferation of crop output as the heated water metabolized the germination of crops and caused crops to mature even faster.

9. The word “ample” in the passage is closest in meaning to

- A. constant
- B. reliable
- C. plenty
- D. nearby

10. Why does the author mention farmers in the Hyogo region?

- A. To point out the immense amount of work required in triple cropping
- B. To express veneration for work carried out by farmers in Japan's medieval

period

- C. To introduce a topic and explain its reasoning in the next paragraph
- D. To illustrate an example of year long utilization of a field

11. What can be inferred about the desire for land during the medieval reclamation?

- A. People tried to secure only enough land to look after their rations.
- B. Land use was limited by the fact that Japan was not a very large country.
- C. The existence of several physical barriers prevented the desire for any superfluity of lands.
- D. Most of the land was undeveloped and owned by landlords.

Paragraph 5

Crops harvested were used for farmers themselves. In many cases, one hectare of decent land was enough to sustain their entire family. They would only plow enough land for food to cater families for several reasons. Much of the medieval Japanese reclamation of land was due to the search for enough arable land to meet the food needed for just a single household. In case a farmer having enough fields for crop output required for his family, he would expand his fields no that one had to put into farming for his crops to grow. This was further compounded by the scarcity of land for fanning as well as limiting capacity for water and fertilizer supplies, not to mention the likelihood of antagonizing neighbors. Taking these variable factors into consideration, farmers of this period persisted with single

hectare or less of arable land, just enough to sustain their families.

12. The word **antagonizing** in the passage is closest in meaning to

- A. altering
- B. belittling
- C. alienating
- D. angering

Paragraph 4

By mid 1500s, one quarter of all paddy land were used to double crop. The farmers not only used fields to grow two crops in a year, but they even grew three in a single annual cycle. 【A】 An envoy from Korea stated that Japanese farmers from Hyogo region would grow barley and sow in winter and harvest them in summer. 【B】 Followed by rice cropping in summer and fall, buckwheat was harvested in winter. 【C】 As time went on agriculture advanced, such technique progressed from generation to generation. 【D】 Farming became more consistent and the crop output became even greater. A greater sense of discipline in land tilling and wide range of crops being planted in the same piece of land broadened the understanding of agriculture in farmers.

13. Look at the four choices that indicate where the following sentence can be added to the passage.

The potential benefit of this was not the amounts of crop output.

What would the sentence best fit?

14. 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.

The drastic increase in Japan's population during its medieval period signified the ability of the country to create enough fields close to a population to be able to support a denser population.

Answer Choice

- A. The reason for the consolidation of citizens lied in a number of different

factors, such as the formation of religious communities or simply voluntarily.

B. Field leveling was a practice that allowed the cultivation of two entirely different types of crops with very efficient use of land.

C. Farmers now had access to the marshlands of Japan close to rivers that were, as yet, not controlled by humans.

D. Numerous advancements in land utilization, such as dams and dikes, as well as the practice of double cropping allowed farmers to maximize the possible output from a single patch of land.

E. Koreans noted that farmers in the Hyogo region of Japan had accomplished a smooth triple cropping annual cycle that used the land during the entire year.

F. The aspiration for land above that required to achieve fulfillment of food needs was curbed by the existence of several factors, such as limited land resources.

Removing Dams

For nearly a century, two United States governmental agencies, the United States Army Corps of Engineers and the Bureau of Reclamation, have constructed dams to store water and to generate electricity. Building these dams provided cheap electricity, created jobs for workers, stimulated regional economic development, and allowed farming on lands that would otherwise be too dry. But not everyone agrees that big dam projects are entirely beneficial. Their storage reservoirs stop the flow of rivers and often submerge towns, farms, and historic sites. They prevent fish migrations and change aquatic habitats essential for native species.

The tide may have turned, in fact, against dam building. In 1998 the Army Corps announced that it would no longer be building large dams. In the few remaining sites where dams might be built, public opposition is so great that getting approval for projects is unlikely. Instead, the new focus may be on removing existing dams and restoring natural habitats. In 1999 Bruce Babbitt, then the United States interior secretary, said, "Of the 75,000 large dams in the United States, most were built a long time ago and are now obsolete, expensive, and unsafe. They were built with no consideration of the environmental costs. As operating licenses come up for renewal, dam removal and habitat restoration to original stream flows will be among the options considered."

The first active hydroelectric dam in the United States to be removed against the wishes of its owners was the 162-year-old Edwards Dam, on the Kennebec River in Augusta, Maine. For many years, the United States Fish and Wildlife Service had advocated the removal of this dam, which prevented migration of salmon, shad, sturgeon, and other fish species up the river. In a precedent-setting decision, the Federal Energy Regulatory Commission ordered the dam removed after concluding that the environmental and economic benefits of a free-flowing river outweighed the electricity generated by the dam. In July 1999 the dam was removed and restoration work began on wetlands and stream banks long underwater.

The next dams likely to be taken down are the Elwha and Glines Dams on the Elwha River in Olympic National Park in the state of Washington. Built nearly a century ago to provide power to lumber and paper mills in the town of Port Angeles, these dams blocked access to upstream spawning beds for six species of salmon on what once was one of the most productive salmon rivers in the world. Simply removing the dams will not restore the salmon, however. Where 50-kilogram king salmon once fought their way up waterfalls to lay their eggs in gravel beds, there now are only concrete walls holding back still water and deep beds of muddy deposits. Removing the mud, uncovering gravel beds where fish spawn, and finding suitable salmon types to rebuild the population is a daunting task.

Congress will have to appropriate somewhere around \$300 to \$400 million to remove these two relatively small dams and rehabilitate the area.

Environmental groups, encouraged by these examples, have begun to talk about much more ambitious projects. Four giant dams on the Snake River in Washington State, for example, might be removed to restore salmon and steelhead fish runs to the headwaters of the Columbia River. The Hetch Hetchy Dam in Yosemite National Park might be taken down to reveal what John Muir, the founder of the prestigious environmental organization Sierra Club, called a valley “just as beautiful and worthy of preservation as the majestic Yosemite.” Some groups have even suggested removing the Glen Canyon Dam on the Colorado River. In each of these cases, powerful interests stand in opposition. These dams generate low-cost electricity and store water that is needed for agriculture and industry. Local economies, domestic water supplies, and certain types of recreation all would be severely impacted by destruction of these dams.

How does one weigh the many different economic, cultural, and aesthetic considerations for removing or not removing these dams? Do certain interests, such as the rights of native people or the continued existence of native species of fish or wildlife, take precedence over economic factors, or should this be a utilitarian calculation of the greatest good for the greatest number? And does that number include only humans or do other species count as well?

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Paragraph 1

For nearly a century, two United States governmental agencies, the United States Army Corps of Engineers and the Bureau of Reclamation, have constructed dams to store water and to generate electricity. Building these dams provided cheap electricity, created jobs for workers, stimulated regional economic development, and allowed farming on lands that would otherwise be too dry. But not everyone agrees that big dam projects are entirely beneficial. Their storage reservoirs stop the flow of rivers and often submerge towns, farms, and historic sites. They prevent fish migrations and change aquatic habitats essential for native species.

1. According to paragraph 1, building dams was beneficial in each of the following ways EXCEPT

- A. increasing the amount of land that could be used for farming
- B. strengthening local economies
- C. increasing the availability of low-cost electricity
- D. expanding the aquatic habitats of native species

Paragraph 2

The tide may have turned, in fact, against dam building. In 1998 the Army

Corps announced that it would no longer be building large dams. In the few remaining sites where dams might be built, public opposition is so great that getting approval for projects is unlikely. Instead, the new focus may be on removing existing dams and restoring natural habitats. In 1999 Bruce Babbitt, then the United States interior secretary, said, "Of the 75,000 large dams in the United States, most were built a long time ago and are now **obsolete**, expensive, and unsafe. They were built with no consideration of the environmental costs. As operating licenses come up for renewal, dam removal and habitat restoration to original stream flows will be among the options considered."

2. According to paragraph 2, the likelihood that new dams will be built has decreased because

- A. construction costs have increased enormously
- B. safety standards have become much higher
- C. public opposition to dam construction has increased
- D. at most suitable sites an existing dam would have to be removed first

3. The word "**obsolete**" in the passage is closest in meaning to

- A. unpopular
- B. inefficient
- C. out of date
- D. unnecessary

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4. Paragraph 2 supports which of the following ideas about operating licenses for large dams?

- A. Since 1999 licenses have been renewed only for small dams.
- B. Before 1999, owners applying for a license renewal were more likely to have their applications than they were after that date.
- C. Strong public opposition to their renewal was common even before 1999, but it was based on safety considerations, not on environmental ones.
- D. The environmental cost of dams has been a minor consideration in license renewal applications since 1999.

Paragraph 3

The first active hydroelectric dam in the United States to be removed against the wishes of its owners was the 162-year-old Edwards Dam, on the Kennebec River in Augusta, Maine. For many years, the United States Fish and Wildlife Service had advocated the removal of this dam, which prevented migration of salmon, shad, sturgeon, and other fish species up the river. In a precedent-setting decision, the Federal Energy Regulatory Commission ordered the dam removed after concluding that the environmental and economic benefits of a free-flowing

river outweighed the electricity generated by the dam. In July 1999 the dam was removed and restoration work began on wetlands and stream banks long underwater.

5. According to paragraph 3, why did the United States Fish and Wildlife Service want the Edwards Dam removed?

- A. Because the age of the dam made it unsafe
- B. Because the dam was negatively affecting various species of fish
- C. Because the dam had caused wetlands to form
- D. Because the dam no longer provided economic benefits

6. Paragraph 3 suggests that one main consideration for keeping the Edwards Dam was

- A. the electricity it generated
- B. the length of time it had been in operation
- C. the high cost of removing it
- D. the fact that removing it would set a bad example

Paragraph 4

The next dams likely to be taken down are the Elwha and Glines Dams on the Elwha River in Olympic National Park in the state of Washington. Built nearly a century ago to provide power to lumber and paper mills in the town of Port Angeles, these dams blocked access to upstream spawning beds for six species of salmon on what once was one of the most productive salmon rivers in the world. Simply removing the dams will not restore the salmon, however. Where 50-kilogram king salmon once fought their way up waterfalls to lay their eggs in gravel beds, there now are only concrete walls holding back still water and deep beds of muddy deposits. Removing the mud, uncovering gravel beds where fish spawn, and finding **suitable** salmon types to rebuild the population is a daunting task. Congress will have to appropriate somewhere around \$300 to \$400 million to remove these two relatively small dams and rehabilitate the area.

7. According to paragraph 4, why would removing the Elwha and Glines dams not be enough to restore salmon to the Elwha River?

- A. They are not the only dams on the Elwha River.
- B. The lumber and paper mills in Port Angeles also block access to upstream spawning beds.
- C. Too many species of salmon are competing for survival in one river.
- D. The dams have left the river's spawning beds in an unusable condition.

8. The word "**suitable**" in the passage is closest in meaning to

- A. new
- B. healthy
- C. appropriate
- D. similar

Paragraph 5

Environmental groups, encouraged by these examples, have begun to talk about much more **ambitious** projects. Four giant dams on the Snake River in Washington State, for example, might be removed to restore salmon and steelhead fish runs to the headwaters of the Columbia River. The Hetch Hetchy Dam in Yosemite National Park might be taken down to reveal what John Muir, the founder of the prestigious environmental organization Sierra Club, called a valley “just as beautiful and worthy of preservation as the majestic Yosemite.” Some groups have even suggested removing the Glen Canyon Dam on the Colorado River. In each of these cases, powerful interests stand in opposition. These dams generate low-cost electricity and store water that is needed for agriculture and industry. Local economies, domestic water supplies, and certain types of recreation all would be severely impacted by destruction of these dams.

9. The word “**ambitious**” in the passage is closest in meaning to
- A. impressive but difficult to achieve
 - B. dangerous and require considerable planning
 - C. complex and unlikely to be complete
 - D. greatly needed

10. According to paragraph 5, why do environmental groups want the Hetch Hetchy Dam removed?

- A. To restore salmon and steelhead runs to the Snake River
- B. To allow access to the headwaters of the Columbia River
- C. To increase the size of Yosemite National Park
- D. To restore a valley to its original beauty

Paragraph 6

How does one weigh the many different economic, cultural, and aesthetic considerations for removing or not removing these dams? Do certain interests, such as the rights of native people or the continued existence of native species of fish or wildlife, **take precedence over** economic factors, or should this be a utilitarian calculation of the greatest good for the greatest number? And does that number include only humans or do other species count as well?

11. The phrase “**take precedence over**” in the passage is closest in meaning to

- A. affect
- B. have greater importance than
- C. get included among
- D. minimize

12. What is the role of paragraph 6 in the passage?

- A. To propose a method for deciding whether a given dam should be removed
- B. To emphasize the complexity of the issues involved in deciding what should be done about dams
- C. To suggest that the recent tendency not to build new dams may be wrong
- D. To sum up the points made earlier in the passage about the advantages and disadvantages of removing dams

Paragraph 4

The next dams likely to be taken down are the Elwha and Glines Dams on the Elwha River in Olympic National Park in the state of Washington. Built nearly a century ago to provide power to lumber and paper mills in the town of Port Angeles, these dams blocked access to upstream spawning beds for six species of salmon on what once was one of the most productive salmon rivers in the world. Simply removing the dams will not restore the salmon, however. [A] Where 50-kilogram king salmon once fought their way up waterfalls to lay their eggs in gravel beds, there now are only concrete walls holding back still water and deep beds of muddy deposits. [B] Removing the mud, uncovering gravel beds where fish spawn, and finding suitable salmon types to rebuild the population is a daunting task. [C] Congress will have to appropriate somewhere around \$300 to \$400 million to remove these two relatively small dams and rehabilitate the area. [D]

13. Look at the four choices that indicate where the following sentence could be added to the passage.

But aside from the technical challenges, the project will also pose a serious financial challenge.

Where would the sentence best fit? Click on a choice to add the sentence to the passage.

14. Directions: An introductory sentence for a brief summary of the passage is

provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

Drag your choices to the spaces where they belong. To review the passage, click on View Text.

Many dams were built in the United States during the last century, and they provided a broad range of economic benefits.

-
-
-

Answer Choices

- A. Until recently, the emphasis in dam building was on the economic benefits of low-cost energy and water that dams provided, but more attention is now being paid to the damage they cause.
- B. Environmental groups now have a very good chance of forcing the removal of two major dams, the Glen Canyon Dam on the Colorado and the Hetch Hetchy Dam in Yosemite.
- C. The removal of dams remains controversial because of high restoration costs, loss of low-cost electricity, and the loss of water storage facilities.
- D. Since the late 1990s, the government has stopped building large dams, instead focusing on removing existing dams and restoring natural habitats.
- E. Until recently, the main reason for removing dams was to restore salmon runs, but it is now recognized that a more important reason to remove dams is that they are no longer safe.

Although the U. S. government originally planned to remove the Elwha and Glines Dams in Washington, the enormous expense of removal has resulted in a postponement of this effort.

Grassland Environment

As opposed to forests, grasslands receive markedly less precipitation. This is one of the reasons why trees, which usually require a significant amount of moisture, are spaced relatively sparsely in grasslands. Due to the facts that most grasslands are situated in the center of continental landmasses, and that costal mountain ranges can block west-to-east winds as is the case with the Great Plains in North America, air masses from the north and south are highly influential on grasslands. The Great Plains receive cold Arctic air in winter and hot tropical air in summer. A typical grassland climate includes hot summers with long periods of desiccation and cold winters with erratic snow cover. Consequently, plants in these grassland areas experience low soil moisture and, additionally, are exposed to fix sun, strong dry winds, and extreme summer heat and winter cold. Grassland plants must adapt to these conditions.

To support research on various types of ecosystems, during the 1970s, The National Science Foundation started what is known as the Long-Term Ecological Research (LTER) program. With the LTER program, scientists working at far-away sites can share data and collaborate to identify and understand large scale ecological patterns. At one LTER site in the Flint Hills of Northeastern Kansas, scientists made an important discovery about the influence of precipitation on plant productivity, the fuel on which ecosystems run. It was found that grasslands respond more strongly to pulses in rainfall than any other ecosystem. Dramatic bursts of plant growth and significant increases in primary productivity result from intermittent rainfall in grasslands. This pattern indicates that grasslands have a high underlying growth potential that surfaces when enough water is suddenly available. Because of these findings, LTER scientists have proposed that grassland annual primary productivity can be a useful indicator of global climate change. Similar to the canaries that miners used to carry into mines to warn of poisonous gases, grasslands may be able to serve as a warning of climate change and how it is affecting plants and humans.

When maintaining grasslands, fire plays an essential role. In the summer, dry grasses and their dead remains which have accumulated over previous years on the upper layer of soil (known as mulch) make a highly combustible fuel for fires started by people or lightning. When there is an absence of rain, dry lightning is a common occurrence in grassland areas, as is the accidental escape of campfires or other human-related fires. These fires in grasslands can bum for many kilometers before being stopped by rain or wet areas. Studying charcoal buried in soil layers have suggested that under natural (pre-European settlement) conditions, at least a hectare of North American prairie may have burned once every 5 to 30 years.

Plants in the grasslands are adapted to survive fire in many ways, but, just as importantly, fire is an essential component of grassland ecosystems. The invasion

of both fire-sensitive plants and most trees are prevented by fire, and fire clears away dead plant material, thereby releasing necessary nutrients that facilitate new growth. Since the development of new grass was favored by Native Americans' horses and was also attractive to the buffalo they hunted, they often set grassland fires to stimulate it. These fires on grasslands was also helpful in increasing productivity of the Native Americans' wild food plants, improving visibility (which brings security), and helping control pests such as ticks. Nowadays, people use fire as an important tool in restoring and preserving grasslands.

Eaters create a disturbance to which grassland plants are adapted in many ways. In grasslands, grazing is more significant than in other types of ecological communities. Up to 60 percent of energy and grassland materials flows through primary and other consumers. In other terrestrial ecosystems, on the other hand, less than 5 percent of the ecosystem's material and energy usually flows through consumer food webs. This difference coordinates with the relatively large herbivore populations that grasslands support.

Benefits brought about from grazing include helping lower-growing plants by preventing shading by tall species, and providing a rich source of nutrients from grazer excrement. Grazing and fire both prevent just a few plants from dominating grasslands and help maintain the high natural plant diversity. Researchers at the University of Minnesota have found that high plant diversity has been pivotal in establishing and maintaining the high fertility in natural grassland soils.

Paragraph 1

As opposed to forests, grasslands receive markedly less precipitation. This is one of the reasons why trees, which usually require a significant amount of moisture, are spaced relatively sparsely in grasslands. Due to the facts that most grasslands are situated in the center of continental landmasses, and that costal mountain ranges can block west-to-east winds as is the case with the Great Plains in North America, air masses from the north and south are highly influential on grasslands. The Great Plains receive cold Arctic air in winter and hot tropical air in summer. A typical grassland climate includes hot summers with long periods of desiccation and cold winters with erratic snow cover. Consequently, plants in these grassland areas experience low soil moisture and, additionally, are exposed to fix sun, strong dry winds, and extreme summer heat and winter cold. Grassland plants must adapt to these conditions.

1. According to paragraph 1, grassland regions have extreme summer heat and winter cold as a result of those areas being
 - A. affected primarily by air masses that move from east to west
 - B. surrounded by mountains on all sides
 - C. in the middle area from both the tropics and the Arctic

D. isolated from west-to-east air movements

Paragraph 2

To support research on various types of ecosystems, during the 1970s, The National Science Foundation started what is known as the Long-Term Ecological Research (LTER) program. With the LTER program, scientists working at far-away sites can share data and collaborate to identify and understand large scale ecological patterns. At one LTER site in the Flint Hills of Northeastern Kansas, scientists made an important discovery about the influence of precipitation on plant productivity, the fuel on which ecosystems run. It was found that grasslands respond more strongly to pulses in rainfall than any other ecosystem. Dramatic bursts of plant growth and significant increases in primary productivity result from intermittent rainfall in grasslands. This pattern indicates that grasslands have a high underlying growth potential that surfaces when enough water is suddenly available. Because of these findings, LTER scientists have proposed that grassland annual primary productivity can be a useful indicator of global climate change. Similar to the canaries that miners used to carry into mines to warn of poisonous gases, grasslands may be able to serve as a warning of climate change and how it is affecting plants and humans.

2. The word collaborate in the passage is closest in meaning to
- A. work together
 - B. make an attempt
 - C. compare outcomes
 - D. acquire evidence
3. Why does the author use the phrase the fuel on which ecosystems run?
- A. To explain why grasslands are a difficult ecological pattern to study
 - B. To illustrate what discovery scientists made at the LTER site in the Flint Hills of northeastern Kansas
 - C. To point out that research run by the LTER program can lead to practical results
 - D. To emphasize the fundamental importance of precipitation on ecosystems
4. The word intermittent in the passage is closest in meaning to
- A. strong
 - B. regular
 - C. occasional
 - D. unusual
5. According to paragraph 2, what indicates the strong growth potential

underlying in grasslands?

- A. The frequency with which they occur geographically
- B. The average rate in which they reproduce
- C. The way they respond to rainfall
- D. The speed with which they respond to global climate changes

6. Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? (没找到高亮句) Incorrect choices change the meaning in important ways or leave out essential information.

- A. Dead and dry grasses that form on the soil surface in grasslands are called mulch.
- B. In summer, people use dry grasses and their dead remains to fuel fires in grasslands.
- C. In grasslands, summer fires started either by lightning or by people are fueled by dry grasses and their dead remains at the soil surface.
- D. It is always easy to find fuel to use for fires in grasslands because dry grasses and mulch accumulate at the soil surface during summers

Paragraph 3

When maintaining grasslands, fire plays an **essential** role. In the summer, dry grasses and their dead remains which have accumulated over previous years on the upper layer of soil (known as mulch) make a highly combustible fuel for fires started by people or lightning. When there is an absence of rain, dry lightning is a common occurrence in grassland areas, as is the accidental escape of campfires or other human-related fires. These fires in grasslands can burn for many kilometers before being stopped by rain or wet areas. Studying charcoal buried in soil layers have suggested that under natural (pre-European settlement) conditions, at least a hectare of North American prairie may have burned once every 5 to 30 years.

7. According to paragraph 3, which of the following is true about lightning in grasslands?

- A. Only in the dry months of summer do storms with lightnings occur in grasslands.
- B. Only during the most dry months of summer do storms with lightning occur.
- C. Almost all the severe storms that have happened in grasslands involve a great deal of lightning.
- D. Lightning at the absence of rain is a common phenomenon in grasslands.

8. The word **essential** in the passage is closest in meaning to

- A. integral
- B. busy
- C. likely
- D. known

Paragraph 4

Plants in the grasslands are adapted to survive fire in many ways, but, just as importantly, fire is an essential component of grassland ecosystems. The invasion of both fire-sensitive plants and most trees are prevented by fire, and fire clears away dead plant material, thereby releasing necessary nutrients that facilitate new growth. Since the development of new grass was favored by Native Americans' horses and was also attractive to the buffalo they hunted, they often set grassland fires to stimulate it. These fires on grasslands was also helpful in increasing productivity of the Native Americans' wild food plants, improving visibility (which brings security), and helping control pests such as ticks. Nowadays, people use fire as an important tool in restoring and preserving grasslands.

9. According to paragraphs 3 and 4, what is one way in which fire helps maintain the character of grasslands?

- A. It prevents trees from becoming permanently established.
- B. It helps new plants grow.
- C. It causes charcoal to deposit in layers on grassland soils.
- D. It kicks out the wild grazing animals that can quickly consume too many of the grassland plants.

10. According to paragraph 4, each of the following is a benefit that Native Americans gained from grassland fires **EXCEPT**

- A. increased height of new plants in which to hide
- B. decrease of insect pest populations
- C. enhanced productivity of wild food plants
- D. raised availability of the food their horses preferred

Paragraph 5

Eaters create a disturbance to which grassland plants are adapted in many ways. In grasslands, grazing is more significant than in other types of ecological communities. Up to 60 percent of energy and grassland materials flows through primary and other consumers. In other terrestrial ecosystems, on the other hand, less than 5 percent of the ecosystem's material and energy usually flows through consumer food webs. This difference coordinates with the relatively large

herbivore populations that grasslands support.

11. According to paragraph 5, what indicates that grazing is more essential in grasslands than in other ecological communities?

A. The animals that graze on grasslands include more natural herbivores than livestock, which is usually not true of other ecological communities.

B. Adaptation to the disturbance of grazing causes grassland plants to grow more slowly than plants in other ecological communities.

C. In grasslands herbivores consume a higher percentage of the plant material than they do in other ecological communities.

D. Grazing is a harmful disturbance in grasslands but not in other ecological communities.

Paragraph 6

Benefits brought about from grazing include helping lower-growing plants by preventing shading by tall species, and providing a rich source of nutrients from grazer excrement. Grazing and fire both prevent just a few plants from dominating grasslands and help maintain the high natural plant diversity. Researchers at the University of Minnesota have found that high plant diversity has been pivotal in establishing and maintaining the high fertility in natural grassland soils.

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12. According to paragraph 6, one way grazing contributes to maintaining high natural plant diversity of grasslands is by

A. controlling how fast nutrients leave the soil

B. guaranteeing that enough sunlight is given to low-growing plants

C. allowing tall plant species to compete for space

D. improving the distribution of the plants with the highest productivity throughout grassland areas

Paragraph 1

As opposed to forests, grasslands receive markedly less precipitation. 【A】 This is one of the reasons why trees, which usually require a significant amount of moisture, are spaced relatively sparsely in grasslands. 【B】 Due to the facts that most grasslands are situated in the center of continental landmasses, and that costal mountain ranges can block west-to-east winds as is the case with the Great Plains in North America, air masses from the north and south are highly influential on grasslands. 【C】 The Great Plains receive cold Arctic air in winter and hot tropical air in summer. 【D】 A typical grassland climate includes hot summers with long periods of desiccation and cold winters with erratic snow cover.

Consequently, plants in these grassland areas experience low soil moisture and, additionally, are exposed to full sun, strong dry winds, and extreme summer heat and winter cold. Grassland plants must adapt to these conditions.

13. Look at the four choice that indicate where the following sentence could be added to the passage.

A typical grassland area averages only 25 to 100 centimeters per year.

Where would the sentence best fit?

14. 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.

Grassland plants must be able to cope with low moisture levels and extreme climates.

Answer Choices

A. Before being stopped by wet areas or rain, fires started by humans have resulted in grasslands, being burned over many square kilometers.

B. Grassland plants are not only well adapted to survive grazing, but grazing actually helps maintain high plant diversity.

C. Recurring grassland fire serves an essential part in maintaining grasslands, characteristic vegetation.

D. Grassland ecosystems have been preserved with the help of Native Americans hunting herbivores such as buffalo and horses.

E. Despite grasslands having hot dry summers, plant growth dramatically increases in response to some rainfall.

F. Grassland summers are dry, so grassland plant productivity relies largely on the amount of snowfall that accumulates throughout winter.

The British Economy Under the Roman Empire

Following the Roman Empire conquering the area in the first century A.D., there is a great deal of archaeological evidence for the economic growth of the British Isles. Prior to this event, the economy of the British Isles, which was based on manufacturing, was centered mainly on the household and on craft skills, and where the best quality and greatest range of goods were largely a monopoly of the tribal aristocracies. This was the nature of the economy which lasted in regions of Britain that were unconquered by the Roman Empire, even though some Roman products were utilized in such areas. The majority of these Roman artifacts were glass vessels, pots, as well as small metal objects that were dispersed over a vast region. They perhaps held a symbolic value and were not necessarily used for their originally designed purposes. The spread of Roman objects beyond Roman Britain does not seem to have happened on an enormous scale. In areas where artifacts are more numerous, it is likely due to gift giving during close interactions between the Roman government and the tribes.

In regions that experienced direct economic control under the Romans, however, economic growth is clearly notable. There was an enormous increase in the number and variety of goods in circulation and the range of settlements in which they were found. This is clearly true in the overwhelming majority of excavated sites in Roman Britain, with the only exceptions being some rural regions that continued the pre-Roman, Iron Age pattern. The majority of sites resulted in the discovery of an abundance of iron, glass, and pottery, and good quantities of copper alloys, lead, tin, silver, and occasionally gold. For example, the humble iron nail is found in numbers not repeated until the Industrial Revolution.

The technology levels and range of the manufacturing of these objects also developed alongside the sheer increase in their quantity. During the Iron Age, the typical household objects were usually manufactured using a low technology of craft manufacture. Later, this changed to more specialized and larger-scale production methods. During this time, specialized workers could utilize equipment manufactured through time and resource investments. In these regions, small-scale workshops used by specialized craftsmen betoken full-time employment in this work. Regardless of the large increase in the scale of manufacturing, there is little evidence of major growth in the size of productive units. We are left with the impression of an economy still based on small-scale craft production.

Where we do see an important change is in the removal of any exclusive association between the best traditional craftsmen and the governing elite. The powerful could show off their status in new ways, particularly by using Roman architecture and domestic decoration, but the traditional classes of decorative metalwork manufacture no longer seem to have been under the control of the tribal leaders. Rich objects from a wide range of archaeological sites imply the

deterioration of this monopoly. There are a number of contributing factors. The control of precious metals moved to the imperial government immediately after the conquest, and gold and silver were also removed from circulation when captured as booty during the invasion. Similarly, changes in taste and the fashions of wealth and status display were stimulated by the arrival of new things like Roman dress, architecture, and sculpture.

These changes in manufacture were accompanied by increased distances over which many goods were transported to their consumers. The bulk of pottery and other items originated locally, during the Iron Age; but after the Roman invasion, these objects had been produced over a far greater range of distances. In this way, vast regions of the Roman province were incorporated into a society where there was wide access to material wealth. New changes in manufacturing production were coupled with huge increase in the importation of goods from elsewhere in the empire. These commodities, which included Mediterranean foodstuffs such as olive oil as well as comparatively low-value objects such as decorated pottery, also achieved a wide distribution and are found in many different types of site.

Paragraph 1

Following the Roman Empire conquering the area in the first century A.D., there is a great deal of archaeological evidence for the economic growth of the British Isles. Prior to this event, the economy of the British Isles, which was based on manufacturing, was centered mainly on the household and on craft skills, and where the best quality and greatest range of goods were largely a monopoly of the tribal aristocracies. This was the nature of the economy which **lasted** in regions of Britain that were unconquered by the Roman Empire, even though some Roman products were utilized in such areas. The majority of these Roman artifacts were glass vessels, pots, as well as small metal objects that were **dispersed** over a vast region. They perhaps held a symbolic value and were not necessarily used for their originally designed purposes. The spread of Roman objects beyond Roman Britain does not seem to have happened on an enormous scale. In areas where artifacts are more numerous, it is likely due to gift giving during close interactions between the Roman government and the tribes.

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1. 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. (高亮句子没找到)

A. Prior to the Roman conquest, the majority of manufacturing was focused on supplying the aristocratic tribal households.

B. Before the first century A.D., the manufacturing economy was not as developed as it would become under the Roman Empire, but there was a vast range

of articles available to the aristocracy.

C. Before the Roman conquest, the majority of manufacturing in the British Isles was mostly devoted to household product! With the highest quality products monopolized by the tribal aristocracies.

D. The pre-Roman British society was ruled by tribal aristocracies and evolved with a focus on high-quality craftsmanship of household goods.

2. The word **lasted** in the passage is closest in meaning to

- A. endured
- B. spread
- C. was copied
- D. was presented

3. The word **dispersed** in the passage is closest in meaning to

- A. found
- B. spread
- C. amassed
- D. manufactured

4. According to paragraph 1, the presence of a multitude of Roman products in the regions of Britain that were not under Roman was caused by

- A. the trade of goods between traveling Roman craftspeople through Britain and local inhabitants
- B. gifts Roman government officials provided to local tribes due to close relationships with the tribes and their officials
- C. trade between centers of manufacturing in Roman Britain and in centers in other regions of the Roman Empire
- D. the settlement of a high number of Roman people in regions around the Roman Britain province

Paragraph 2

In regions that experienced direct economic control under the Romans, however, economic growth is clearly notable. There was an enormous increase in the number and variety of goods in circulation and the range of settlements in which they were found. This is clearly true in the overwhelming majority of excavated sites in Roman Britain, with the only exceptions being some rural regions that continued the pre-Roman, Iron Age pattern. The majority of sites resulted in the discovery of an abundance of iron, glass, and pottery, and good quantities of copper alloys, lead, tin, silver, and occasionally gold. For example, the humble iron nail is found in numbers not repeated until the Industrial Revolution.

5. Paragraph 2 mentions all of the following as evidence of Roman Britain's economic development EXCEPT

- A. a rise in the variety of products available
- B. a growth in the quantity of settlements where products became available
- C. an increase in the diversity of materials uncovered at archaeological sites
- D. a rise in the rural population

6. In paragraph 2, the author talks about the iron nail in order to

- A. imply that most products manufactured were considered to be practical or useful
- B. illustrate that iron was a key player in Britain's economy before the Roman invasion
- C. give support for the statement that there was much economic activity in Britain following the Roman conquest
- D. prove that archaeologists have underestimated the degree of the Roman conquest on the British economy

Paragraph 3

The technology levels and range of the manufacturing of these objects also developed alongside the sheer increase in their quantity. During the Iron Age, the typical household objects were usually manufactured using a low technology of craft manufacture. Later, this changed to more specialized and larger-scale production methods. During this time, specialized workers could utilize equipment manufactured through time and resource investments. In these regions, small-scale workshops used by specialized craftsmen betoken full-time employment in this work. Regardless of the large increase in the scale of manufacturing, there is little evidence of major growth in the size of productive units. We are left with the impression of an economy still based on small-scale craft production.

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7. According to paragraph 3, manufacturing in the period of Roman economic control over the British was characterized by

- A. specialized production techniques
- B. a growth in the productive units' size
- C. the creation of workshops that hired a large number of staff
- D. the utilization of simple equipment for the making of household items

8. Paragraph 3 suggests which of the following statements about craft manufacture in Roman Britain?

- A. Workers did not have to invest much resources and time in the

production of crafts.

- B. A number of domestic products was increasingly being made using iron.
- C. Workshops remained small despite the rise in production.
- D. Production thrived although craftspeople continued to use old-fashion production techniques.

Paragraph 4

Where we do see an important change is in the removal of any exclusive association between the best traditional craftsmen and the governing elite. The powerful could show off their status in new ways, particularly by using Roman architecture and domestic decoration, but the traditional classes of decorative metalwork manufacture no longer seem to have been under the control of the tribal leaders. Rich objects from a wide range of archaeological sites imply the deterioration of this monopoly. There are a number of contributing factors. The control of precious metals moved to the imperial government immediately after the conquest, and gold and silver were also removed from circulation when captured as booty during the invasion. Similarly, changes in taste and the fashions of wealth and status display were stimulated by the arrival of new things like Roman dress, architecture, and sculpture.

9. The word **Similarly** in the passage is closest in meaning to

- A. Although
- B. Unavoidably
- C. Shockingly
- D. Likewise

10. Paragraph 4 discusses all of the following as reasons for the breakdown of the tribal leaders' monopoly in decorative metalwork manufacture EXCEPT

- A. the tribal leaders' reduced influence within their communities
- B. the effect of Roman culture on the elite's display of wealth and status
- C. the removal of gold and silver from circulation
- D. the Roman government, s control of precious metals

Paragraph 5

These changes in manufacture were accompanied by increased distances over which many goods were transported to their consumers. The bulk of pottery and other items originated locally, during the Iron Age; but after the Roman invasion, these objects had been produced over a far greater range of distances. In this way, vast regions of the Roman province were incorporated into a society where there was wide access to material wealth. New changes in manufacturing production

were coupled with huge increase in the importation of goods from elsewhere in the empire. These commodities, which included Mediterranean foodstuffs such as olive oil as well as comparatively low-value objects such as decorated pottery, also achieved a wide distribution and are found in many different types of site.

11. The word **huge** in the passage is closest in meaning to

- A. instant
- B. vast
- C. steady
- D. quick

12. The author mentions olive oil and decorated pottery to support the claim that

- A. the inhabitants of Roman Britain had access to daily and specialty products
- B. the rise in product manufacture caused a notable increase in waste material
- C. a number of commodities were manufactured in Britain prior to the Roman conquest
- D. imported goods had become a common feature of Roman Britain's economy

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Paragraph 5

These changes in manufacture were accompanied by increased distances over which many goods were transported to their consumers. 【A】 The bulk of pottery and other items originated locally, during the Iron Age; but after the Roman invasion, these objects had been produced over a far greater range of distances.

【B】 In this way, vast regions of the Roman province were incorporated into a society where there was wide access to material wealth. 【C】 New changes in manufacturing production were coupled with huge increase in the importation of goods from elsewhere in the empire. 【D】 These commodities, which included Mediterranean foodstuffs such as olive oil as well as comparatively low-value objects such as decorated pottery, also achieved a wide distribution and are found in many different types of site.

13. Look at the four choices that indicate where the following sentence could be added to the passage.

Furthermore, this provincial society was itself economically integrated with markets beyond its borders.

Where would the sentence best fit? Click on a choice to add the sentence to the passage.

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

Drag your choices to the spaces where they belong. To review the passage, click on View Text.

The British Isles' economy experienced significant changes after the Roman conquest. Answer Choice

-
-
-

Answer Choices

- A. British craftspeople slowly stopped producing items that generally were of little practical value in favor of the manufacturing of household products.
- B. Manufacturers invested an increased amount of resources and time towards developing specialty equipment.
- C. The production of goods still remained small scale, but the exclusive relationship between the governing elite and the best craftsmen broke down.
- D. Trade goods manufactured in Roman Britain were spread throughout the Roman Empire.
- E. The number and variety of goods found at sites in Roman Britain as well as the development of sophisticated manufacturing processes are evidence of economic development under the Romans.
- F. Roman Britain experienced a rise in product imports from elsewhere in the empire.

Coral Reef Communities

Coral reefs are massive underwater structures made from the hard limestone exoskeletons of thousands of tiny living organisms (coral polyps) produced one on top of another in warm, clear, shallow ocean waters. Living polyps extend upward and outward from the coral colony center and live on top of the old dead exoskeletons. Coral reef communities are crowded with other animals representing virtually every major animal phylum. Space is at a premium on reefs, corals, seaweeds (various forms of algae), sponges, or other organisms cover virtually every surface. Because both corals and algae require light to survive, access to light, like space, is also a resource subject to competition.

Fast-growing, branching corals can grow over slower-growing, encrusting, or massive corals and deny them light. In response, the slower-growing forms can extend stinging filaments from their digestive cavity and kill their competitor's polyps. Undamaged polyps on the faster-growing, branching coral, however, may grow very long sweeper tentacles, containing powerful nematocysts (stingers) that kill polyps on the slower-growing form. The faster-growing form repairs the damage and continues to overgrow its competitor. In addition to sweeper tentacles and stinging filaments, corals have several other mechanisms available for attack or defense.

In general, slower-growing corals are more aggressive than fast-growing species. In cases where a competitor cannot be overcome, however, corals may survive by taking advantage of differences in local habitats. Massive corals are generally more shade tolerant and able to survive at greater depths. Therefore, on many reefs it is the fast-growing, branching corals that ultimately dominate at the upper, shallower portion of the reef, whereas more massive forms dominate in deeper areas.

Corals also must compete with other reef organisms, each with its own strategies for survival. Sponges, soft corals, and seaweeds (algae) can overgrow stony corals and smother them. Algae are competitively superior to corals in shallow water but less so at depth. Survival of coral in shallow water, therefore, may depend on grazing by plant-eating echinoderms (starfish and sea urchins) and fishes. In Jamaica, overfishing removed most of the plant-eating fish from coral reefs. Initially, algal growth was kept in check by grazing sea urchins, but in 1982, a pathogen reduced the population by 99 percent. Without grazers, the algae were able to completely overgrow the coral.

Competition may occur among other reef communities. Grazing by urchins and fishes is important in preventing seaweeds from overgrowing the reef. The dominant algae on a healthy reef are usually fast-growing filamentous forms or coralline algae, well protected by calcification (hardening) and the production of noxious chemicals. These algae are inferior competitors to larger, fleshier

seaweeds, so grazing by urchins and fishes on the larger seaweeds allows these algae to persist. Grazing on plants is greatest in the shallow reef areas but decreases with depth, where lower temperatures and light reduce algal growth. The reef is, therefore, a mosaic of microhabitats with different levels of grazing and different algal communities.

An additional complexity arises from the activity of damselfish. Because they are territorial, many damselfish species exclude grazers and other species from certain areas of the reef. Algae grow rapidly in these territories, providing habitat for many small invertebrates but overgrowing the corals. Branching corals tend to dominate in damselfish territories because they are upright and faster growing than the more massive or encrusting forms.

Although less studied than on rocky shores, predation almost certainly has a significant influence on the community structure of coral reefs. Fish and other predators may preferentially prey on such competitors of corals as sponges and gorgonians, giving competitively inferior reef corals an advantage in securing space. Many species of fish, mollusks, and crustaceans also feed directly on coral polyps. Several surgeonfish and parrotfish may actually pass coral skeletons through their digestive tracts and add sediment to the reef. Both fish and invertebrate corallivores (coral-feeding organisms) seem to attack faster-growing, branching species preferentially, perhaps preventing slower-growing forms from being overgrown. Corallivores, however, rarely ever completely destroy a coral colony except in cases where tropical storms or humans have already done severe damage. The fact that almost all small invertebrates on reefs are so well hidden or highly camouflaged is another indicator of how prevalent predation is on reefs and its importance in determining reef structure.

Paragraph 1

Coral reefs are massive underwater structures made from the hard limestone exoskeletons of thousands of tiny living organisms (coral polyps) produced one on top of another in warm, clear, shallow ocean waters. Living polyps extend upward and outward from the coral colony center and live on top of the old dead exoskeletons. Coral reef communities are crowded with other animals representing virtually every major animal phylum. Space is at a premium on reefs, corals, seaweeds (various forms of algae), sponges, or other organisms cover virtually every surface. Because both corals and algae require light to survive, access to light, like space, is also a resource subject to competition.

1. According to paragraph 1, all of the following are true of coral reefs EXCEPT:
 - A. Coral reefs grow biggest in the deepest waters of the ocean.
 - B. The organisms living around coral reefs compete for limited resources.
 - C. There are many different organisms in coral reef communities.

- D. Coral reefs consist of the outer skeletons of small living organisms.

Paragraph 2

Fast-growing, branching corals can grow over slower-growing, encrusting, or massive corals and deny them light. In response, the slower-growing forms can extend stinging filaments from their digestive cavity and kill their competitor's polyps. Undamaged polyps on the faster-growing, branching coral, however, may grow very long sweeper tentacles, containing powerful nematocysts (stingers) that kill polyps on the slower-growing form. The faster-growing form repairs the damage and continues to overgrow its competitor. In addition to sweeper tentacles and stinging filaments, corals have several other mechanisms available for attack or defense.

2. According to paragraph 2, how do fast-growing branching corals defend themselves from attacks by slower-growing corals?

- A. By producing stinging sweeper tentacles
- B. By growing on top of the slower-growing corals
- C. By blocking the light to the slower-growing corals
- D. By destroying the stinging filament of the slower-growing corals

3. The word "mechanisms" in the passage is closest in meaning to

- A. adaptations
- B. weapons
- C. parts
- D. means

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Paragraph 3

In general, slower-growing corals are more aggressive than fast-growing species. In cases where a competitor cannot be overcome, however, corals may survive by taking advantage of differences in local habitats. Massive corals are generally more shade tolerant and able to survive at greater depths. Therefore, on many reefs it is the fast-growing, branching corals that ultimately dominate at the upper, shallower portion of the reef, whereas more massive forms dominate in deeper areas.

4. The word "ultimately" in the passage is closest in meaning to

- A. naturally
- B. eventually
- C. quickly
- D. clearly

Paragraph 4

Corals also must compete with other reef organisms, each with its own strategies for survival. Sponges, soft corals, and seaweeds (algae) can overgrow stony corals and smother them. Algae are competitively superior to corals in shallow water but less so at depth. Survival of coral in shallow water, therefore, may depend on grazing by plant-eating echinoderms (starfish and sea urchins) and fishes. In Jamaica, overfishing removed most of the plant-eating fish from coral reefs. Initially, algal growth was kept in check by grazing sea urchins, but in 1982, a pathogen reduced the population by 99 percent. Without grazers, the algae were able to completely overgrow the coral.

5. The phrase "kept in check" in the passage is closest in meaning to

- A. limited
- B. prevented
- C. allowed
- D. stimulated

6. In paragraph 4, why does the author discuss the effects of removing plant-eating fish and sea urchins from coral reefs?

- A. To identify a situation that contributes to the dominance of corals in shallow waters
- B. To demonstrate the importance of grazing on seaweeds for the survival of some corals
- C. To provide evidence that seaweeds are better competitors than coral at depth
- D. To argue that sea urchin pathogens also attack corals

7. According to paragraph 4, all of these pairs of organisms are in competition EXCEPT

- A. corals and sponges
- B. algae and corals
- C. echinoderms and corals
- D. sea urchins and algae

Paragraph 5

Competition may occur among other reef communities. Grazing by urchins and fishes is important in preventing seaweeds from overgrowing the reef. The dominant algae on a healthy reef are usually fast-growing filamentous forms or coralline algae, well protected by calcification (hardening) and the production of noxious chemicals. These algae are inferior competitors to larger, fleshier seaweeds, so grazing by urchins and fishes on the larger seaweeds allows these

algae to persist. Grazing on plants is greatest in the shallow reef areas but decreases with depth, where lower temperatures and light reduce algal growth. The reef is, therefore, a mosaic of microhabitats with different levels of grazing and different algal communities.

8. According to paragraph 5, fast-growing filamentous or coralline algae are usually the dominant algae on healthy coral reefs in part because they

- A. are not affected by noxious chemicals produced by other organisms
- B. are less attractive as food for sea urchins and fishes than bigger seaweeds are
- C. occupy the areas of coral reefs that have lower temperatures and less light
- D. can live in a wider variety of microhabitats than their competitors can

Paragraph 6

An additional complexity arises from the activity of damselfish. Because they are territorial, many damselfish species exclude grazers and other species from certain areas of the reef. Algae grow rapidly in these territories, providing habitat for many small invertebrates but overgrowing the corals. Branching corals tend to dominate in damselfish territories because they are upright and faster growing than the more massive or encrusting forms.

9. According to paragraph 6, which of the following is an effect of the activity of damselfish on the reef environment?

- A. Encrusting corals dominate in damselfish territories.
- B. The damselfish attract many species of grazers.
- C. Algae grow rapidly.
- D. Algal diversity is greater than in other parts of the reef.

Paragraph 7

Although less studied than on rocky shores, predation almost certainly has a significant influence on the community structure of coral reefs. Fish and other predators may preferentially prey on such competitors of corals as sponges and gorgonians, giving competitively inferior reef corals an advantage in securing space. Many species of fish, mollusks, and crustaceans also feed directly on coral polyps. Several surgeonfish and parrotfish may actually pass coral skeletons through their digestive tracts and add sediment to the reef. Both fish and invertebrate corallivores (coral-feeding organisms) seem to attack faster-growing, branching species preferentially, perhaps preventing slower-growing forms from being overgrown. Corallivores, however, rarely ever completely destroy a coral colony except in cases where tropical storms or humans have already done severe damage. The fact that almost all small invertebrates on reefs are so well hidden or

highly camouflaged is another indicator of how prevalent predation is on reefs and its importance in determining reef structure.

10. The word "securing" in the passage is closest in meaning to

- A. looking for
- B. getting
- C. maximizing
- D. sharing

11. 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 presence of only very small invertebrates on a reef is an indication of widespread predation.
- B. Most reefs are structured in a way which allows small invertebrates to remain hidden or camouflaged.
- C. Almost all small invertebrates are hidden or camouflaged, indicating the extent and importance of predation to reef structure.
- D. Almost all of the small invertebrates on reefs are difficult to find because they are so highly camouflaged.

12. Paragraph 7 mentions all of the following as effects of predation on the community structure of coral reefs EXCEPT:

- A. Corals are advantaged when predators prefer to attack competitors or corals.
- B. Faster-growing corals are prevented from overgrowing slower-growing corals when faster-growing species are preferred by competitors.
- C. Predation contributes to the sediment deposit of the reef.
- D. Small invertebrates are exposed to competitively superior organisms.

Paragraph 3

In general, slower-growing corals are more aggressive than fast-growing species. [A] In cases where a competitor cannot be overcome, however, corals may survive by taking advantage of differences in local habitats. [B] Massive corals are generally more shade tolerant and able to survive at greater depths. [C] Therefore, on many reefs it is the fast-growing, branching corals that ultimately dominate at the upper, shallower portion of the reef, whereas more massive forms dominate in deeper areas. [D]

13. Look at the four choices that indicate where the following sentence could be added to the passage.

For example, different species of corals have different needs for light.

Where would the sentence best fit? Click on a choice to add the sentence to the passage.

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

Drag your choices to the spaces where they belong. To review the passage, click on View Text.

Coral reef communities include many different organisms that must compete for resources such as space and light.

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Answer Choices

- A. In order to keep from being overgrown, the different species of coral kill each other's polyps, or live in different local habitats within the reef community.
- B. Competition among the different species of corals is more intense than that between corals and other coral reef inhabitants.
- C. Predation shapes reef structure by getting rid of competitors of corals, but coral polyps themselves are also eaten, as are many reef inhabitants.
- D. Coral reefs are divided into a shallow upper portion and a deeper lower portion with branching corals dominating in the lower portion.
- E. Grazing by fishes and urchins prevents algae and seaweeds from overgrowing the corals, although damselfish exclude grazers from some areas.

Fish and invertebrate corallivores are the most common cause of coral colony destruction, followed by tropical storms and damage by humans.

The Origin of Earth's Atmosphere

In order to understand the origin of Earth's atmosphere, we must go back to the earliest days of the solar system, before the planets themselves were formed from a disk of rocky material spinning around the young Sun. This material gradually coalesced into lumps called planetesimals as gravity and chance smashed smaller pieces together, a chaotic and violent process that became more so as planetesimals grew in size and gravitational pull. Within each orbit, collisions between planetesimals generated immense heat and energy. How violent these processes were suggested by the odd tilt and spin of many of the planets, which indicate that each of the planets was, like a billiard ball, struck at some stage by another large body of some kind. Visual evidence of these processes can be seen by looking at the Moon. Because the Moon has no atmosphere, its surface is not subject to erosion, so it retains the marks of its early history. Its face is deeply scarred by millions of meteoric impacts, as you can see on a clear night with a pair of binoculars. The early Earth did not have much of an atmosphere. Before it grew to full size, its gravitational pull was insufficient to prevent gases from drifting off into space, while the solar wind (the great stream of atomic particles emitted from the Sun) had already driven away much of the gaseous material from the inner orbits of the solar system. So we must imagine the early Earth as a mixture of rocky materials, metals, and trapped gases, subject to constant bombardment by smaller planetesimals and without much of an atmosphere.

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As it began to reach full size, Earth heated up, partly because of collisions with other planetesimals and partly because of increasing internal pressures as it grew in size. In addition, the early Earth contained abundant radioactive materials, also a source of heat. As Earth heated up, its interior melted. Within the molten interior, under the influence of gravity, different elements were sorted out by density. By about 40 million years after the formation of the solar system, most of the heavier metallic elements in the early Earth, such as iron and nickel, had sunk through the hot sludge to the center, giving Earth a core dominated by iron. This metallic core gives Earth its characteristic magnetic field, which has played an extremely important role in the history of our planet.

As heavy materials headed for the center of Earth, lighter silicates (such as the mineral quartz) drifted upward. The denser silicates formed Earth's mantle, a region almost 3,000 kilometers thick between the core and the crust. With the help of bombardment by comets, whose many impacts scarred and heated Earth's surface, the lightest silicates rose to Earth's surface, where they cooled more rapidly than the better-insulated materials in Earth's interior.

These lighter materials, such as the rocks we call granites, formed a layer of continental crust about 35 kilometers thick. Relative to Earth as a whole, this is as thin as an eggshell. Seafloor crust is even thinner, at about 7 kilometers; thus, even

continental crust reaches only about 1/200th of the way to Earth's core. Much of the early continental crust has remained on Earth's surface to the present day.

The lightest materials of all, including gases such as hydrogen and helium, bubbled through Earth's interior to the surface. So we can imagine the surface of the early Earth as a massive volcanic field. And we can judge pretty well what gases bubbled up to that surface by analyzing the mixture of gases emitted by volcanoes. These include hydrogen, helium, methane, water vapor, nitrogen, ammonia, and hydrogen sulfide. Other materials, including large amounts of water vapor, were brought in by cometary bombardments. Much of the hydrogen and helium escaped; but once Earth was fully formed, it was large enough for its gravitational field to hold most of the remaining gases, and these formed Earth's first stable atmosphere.

Paragraph 1

In order to understand the origin of Earth's atmosphere, we must go back to the earliest days of the solar system, before the planets themselves were formed from a disk of rocky material spinning around the young Sun. This material gradually coalesced into lumps called planetesimals as gravity and chance smashed smaller pieces together, a chaotic and violent process that became more so as planetesimals grew in size and gravitational pull. Within each orbit, collisions between planetesimals generated immense heat and energy. How violent these processes were is suggested by the odd tilt and spin of many of the planets, which indicate that each of the planets was, like a billiard ball, struck at some stage by another large body of some kind. Visual evidence of these processes can be seen by looking at the Moon. Because the Moon has no atmosphere, its surface is not subject to erosion, so it retains the marks of its early history. Its face is deeply scarred by millions of meteoric impacts, as you can see on a clear night with a pair of binoculars. The early Earth did not have much of an atmosphere. Before it grew to full size, its gravitational pull was insufficient to prevent gases from drifting off into space, while the solar wind (the great stream of atomic particles emitted from the Sun) had already driven away much of the gaseous material from the inner orbits of the solar system. So we must imagine the early Earth as a mixture of rocky materials, metals, and trapped gases, subject to constant bombardment by smaller planetesimals and without much of an atmosphere.

1. The word “chaotic” in the passage is closest in meaning to
 - A. rapid
 - B. disorganized
 - C. intense
 - D. long-lasting
2. All of the following are true of the planetesimals mentioned in paragraph

1 EXCEPT:

- A. They were formed of rocky material spinning around the early Sun.
- B. They collided violently with each other.
- C. They gradually grew in size.
- D. They lost their atmospheres as they were hit by larger bodies.

3. The word “retains” in the passage is closest in meaning to

- A. reveals
- B. acquires
- C. hides
- D. preserves

4. The author discusses “the Moon” in paragraph 1 in order to

A. help explain why Earth had fewer meteoric impacts than other planets in the solar system

B. show why it is difficult to understand how the first planetary atmospheres developed

C. help explain the processes that took place in the formation of large planetary bodies in the solar system

D. illustrate why the Moon's spin and tilt are unique among other planetary bodies in the solar System

5. The word “constant” in the passage is closest in meaning to

- A. considerable
- B. unpredictable
- C. continual
- D. violent

6. The word “coalesced” in the passage is closest in meaning to

- A. collided
- B. joined
- C. changed
- D. shrank

Paragraph 3

As heavy materials headed for the center of Earth, lighter silicates (such as the mineral quartz) drifted upward. The denser silicates formed Earth's mantle, a region almost 3,000 kilometers thick between the core and the crust. With the help of bombardment by comets, whose many impacts scarred and heated Earth's surface, the lightest silicates rose to Earth's surface, where they cooled more rapidly than the better-insulated materials in Earth's interior.

7. Paragraph 3 answers which of the following questions about early Earth
- A. What caused materials on Earth to become radioactive
 - B. What percentage of Earth's core was nickel
 - C. What internal pressures caused Earth to heat up as it grew in size
 - D. What caused Earth's magnetic field

Paragraph 4

These lighter materials, such as the rocks we call granites, formed a layer of continental crust about 35 kilometers thick. Relative to Earth as a whole, this is as thin as an eggshell. Seafloor crust is even thinner, at about 7 kilometers; thus, even continental crust reaches only about 1/200th of the way to Earth's core. Much of the early continental crust has remained on Earth's surface to the present day.

8. According to paragraph 4, "Earth's core" is mostly iron because, compared to most other elements on early Earth, iron

- A. was denser
- B. melted more easily
- C. was more radioactive
- D. was more plentiful

9. Select the TWO answer choices that, according to paragraph 4, indicate true statements about Earth's formation. To obtain credit, you must select TWO answer choices.

- A. Comets hitting Earth helped the lightest silicates to reach Earth's surface.
- B. Silicates such as mineral quartz drifted downward and mixed with denser materials as they reached Earth's core.
- C. When Earth's mantle became approximately 3,000 kilometers thick, the heaviest materials in it began to cool.
- D. Lighter materials reaching Earth's surface formed Earth's continental crust.

10. According to paragraph 4, Earth's continental crust

- A. has changed significantly in composition over time
- B. was as thick as Earth's mantle in its early stages
- C. is very thin relative to Earth's size
- D. caused the temperatures of Earth's early core and mantle to gradually increase

Paragraph 5

The lightest materials of all, including gases such as hydrogen and helium, bubbled through Earth's interior to the surface. So we can imagine the surface of the early Earth as a massive volcanic field. And we can judge pretty well what gases bubbled up to that surface by analyzing the mixture of gases **emitted** by volcanoes. These include hydrogen, helium, methane, water vapor, nitrogen, ammonia, and hydrogen sulfide. Other materials, including large amounts of water vapor, were brought in by cometary bombardments. Much of the hydrogen and helium escaped; but once Earth was fully formed, it was large enough for its gravitational field to hold most of the remaining gases, and these formed **Earth's first stable** atmosphere.

11. The word “**emitted**” in the passage is closest in meaning to
- A. released
 - B. consumed
 - C. contained
 - D. heated
12. What can be inferred from paragraph 5 about “**Earth's first stable atmosphere**”
- A. It existed before Earth was yet fully formed.
 - B. It contained very little hydrogen and helium.
 - C. It contained only materials that had bubbled up through Earth's surface.
 - D. It lacked water vapor.
13. Look at the four choices that indicate where the following sentence could be added to the passage. (空)

Even some of its oldest portions as old as 3.8 billion years can still be found in parts of Canada, Australia, South Africa, and Greenland.

Where would the sentence best fit? Click on a choice to add the sentence to the passage.

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the **THREE** answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

Drag your choices to the spaces where they belong. To review the passage, click on View Text.

(空)

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-
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Answer Choices

- A. Early Earth's lack of an atmosphere explains why it was bombarded with much more frequency and violence than other planetesimals.
- B. Continued bombardments and internal pressures made the growing Earth hotter, causing its interior to melt and the heavier elements to sink and form Earth's core.
- C. Lighter elements from Earth's interior rose and formed the mantle, a denser layer of silicates around the core, and the crust, a thinner layer of silicates at Earth's surface.
- D. The formation of Earth's crust protected the inner layers of Earth from the high-energy particles in space, reducing the temperatures of the mantle and the core.
- E. Once Earth had gone through the final stages of its formation, gases bubbled to the surface and were held by Earth's gravitational field to form the atmosphere.
- F. Volcanoes today are the result of gases that were trapped in Earth's interior during the planet's early stages of formation.

Historical Trends in European Urban Design

European city planning and design have a long history. Most Greek and Roman settlements were deliberately laid out on the grid system, within which the siting of key buildings was carefully thought out. The roots of modern Western urban planning and design can be traced to the Renaissance and Baroque periods (between the fifteenth and seventeenth centuries) in Europe, when artists and intellectuals dreamed of ideal cities, and rich and powerful regimes used urban design to produce extravagant symbolizations of wealth, power, and destiny. Inspired by the classical art forms of ancient Greece and Rome, Renaissance urban design sought to recast cities in a deliberate attempt to show off the power and the glory of the state and church.

Spreading slowly from its origins in Italy at the beginning of the fifteenth century, Renaissance design successfully diffused to most of the larger cities of Europe. Dramatic advances in weaponry brought a surge of planned redevelopment that featured impressive geometric-shaped fortifications and an extensive sloping, clear zone of fire. Inside new walls, cities were recast according to a new aesthetic of grand design fancy palaces, geometrical plans, streetscapes, and gardens that emphasized views of dramatic perspectives. These developments were often so extensive and so interconnected with each other that they effectively fixed the layout of cities well into the eighteenth, and even into the nineteenth, century, when walls and/or open spaces eventually made way for urban redevelopment in the form of parks, railway lines, or beltways.

As societies and economies became more complex with the transition to industrial capitalism, national rulers and city leaders looked to urban design to impose order, safety, and efficiency, as well as to symbolize the new seats of power and authority. The most important early precedent was set in Paris by Napoleon III, who presided over a comprehensive program of urban redevelopment and monumental urban design. The work was carried out by Baron Georges-Eugene Haussmann between 1853 and 1870. Haussmann demolished large sections of old Paris to make way for broad, new, tree-lined avenues, with numerous public open spaces and monuments. In doing so, he made the city not only more efficient (wide boulevards meant better flows of traffic) and a better place to live (parks and gardens allowed more fresh air and sunlight in a crowded city and were held to be a civilizing influence) but also safer from revolutionary politics (wide boulevards were hard to barricade; monuments and statues helped to instill a sense of pride and identity).

The preferred architectural style for these new designs was the Beaux Arts style. In this school, architects were trained to draw on Classical, Renaissance, and Baroque styles, synthesizing them in designs for new buildings for the Industrial Age. The idea was that the new buildings would blend artfully with the older

palaces, cathedrals, and civic buildings that dominated European city centers. Haussmann's ideas were widely influential and extensively copied.

Early in the twentieth century there emerged a different intellectual and artistic reaction to the pressures of industrialization and urbanization. This was the Modern movement, which was based on the idea that buildings and cities should be designed and run like machines. Equally important to the Modernists was that urban design should not simply reflect dominant social and cultural values but, rather, help to create a new moral and social order. The movement's best-known advocate was Le Corbusier, a Paris-based Swiss who provided the inspiration for technocratic urban design. Modernist buildings sought to dramatize technology, exploit industrial production techniques, and use modern materials and unembellished, functional design. Le Corbusier's ideal city featured linear clusters of high-density, medium-rise apartment blocks, elevated on stilts and segregated from industrial districts; high-rise tower office blocks; and transportation routes all separated by broad expanses of public open space.

After 1945 this concept of urban design became pervasive, part of what became known as the International Style: boxlike steel-frame buildings with concrete-and-glass facades. The International Style was avant-garde yet respectable and, above all, comparatively inexpensive to build. This tradition of urban design, more than anything else, has imposed a measure of uniformity on cities around the world.

Paragraph 1

European city planning and design have a long history. Most Greek and Roman settlements were deliberately laid out on the grid system, within which the siting of key buildings was carefully thought out. The roots of modern Western urban planning and design can be traced to the Renaissance and Baroque periods (between the fifteenth and seventeenth centuries) in Europe, when artists and intellectuals dreamed of ideal cities, and rich and powerful regimes used urban design to produce extravagant symbolizations of wealth, power, and destiny. Inspired by the classical art forms of ancient Greece and Rome, Renaissance urban design sought to recast cities in a deliberate attempt to show off the power and the glory of the state and church.

1. In paragraph 1, why does the author mention that “most Greek and Roman settlements were laid out on the grid system”
 - A. To show how they resembled one another in terms of their layout
 - B. To support the claim that city planning had a long history in Europe
 - C. To help explain why cities of Renaissance and Baroque design were typically laid out in the form of a grid
 - D. To contrast the sophistication of Greek and Roman urban design with the simplicity of the urban design of the Renaissance and Baroque periods

2. The word “regimes” in the passage is closest in meaning to
- A. cities
 - B. builders
 - C. governments
 - D. planners
3. According to paragraph 1, an important goal of “Renaissance urban design” was to
- A. serve as an expression of the wealth and power of the ruling class
 - B. improve the classical forms of ancient Greek and Roman cities
 - C. show that the state rather than the church was the most powerful institution in a city
 - D. restore the religious and civic buildings of a city to their previous glory

Paragraph 2

Spreading slowly from its origins in Italy at the beginning of the fifteenth century, Renaissance design successfully diffused to most of the larger cities of Europe. Dramatic advances in weaponry brought a surge of planned redevelopment that featured impressive geometric-shaped fortifications and an extensive sloping, clear zone of fire. Inside new walls, cities were recast according to a new aesthetic of grand design fancy palaces, geometrical plans, streetscapes, and gardens that emphasized views of dramatic perspectives. These developments were often so extensive and so interconnected with each other that they effectively fixed the layout of cities well into the eighteenth, and even into the nineteenth, century, when walls and/or open spaces eventually made way for urban redevelopment in the form of parks, railway lines, or beltways.

4. Paragraph 2 supports the idea that important features typical of Renaissance “urban design” resulted from
- A. Renaissance designers' improved understanding of geometry
 - B. the characteristics of new weaponry
 - C. an increased interest in highly productive gardens
 - D. the need to reduce the likelihood of fires
5. The phrase “a surge of” is closest in meaning to
- A. a combination of
 - B. an altered approach to
 - C. a sudden increase in
 - D. a return to

Paragraph 3

As societies and economies became more complex with the transition to industrial capitalism, national rulers and city leaders looked to urban design to impose order, safety, and efficiency, as well as to symbolize the new seats of power and authority. The most important early precedent was set in Paris by Napoleon III, who presided over a comprehensive program of urban redevelopment and monumental urban design. The work was carried out by Baron Georges-Eugene Haussmann between 1853 and 1870. Haussmann demolished large sections of old Paris to make way for broad, new, tree-lined avenues, with numerous public open spaces and monuments. In doing so, he made the city not only more efficient (wide boulevards meant better flows of traffic) and a better place to live (parks and gardens allowed more fresh air and sunlight in a crowded city and were held to be a civilizing influence) but also safer from revolutionary politics (wide boulevards were hard to barricade; monuments and statues helped to instill a sense of pride and identity).

6. Paragraph 3 mentions each of the following as an accomplishment of Haussmann's redevelopment of Paris EXCEPT

- A. improving the flow of traffic
- B. making it harder for revolutionaries to be effective
- C. improving housing in large sections of old Paris
- D. bringing more fresh air and sunlight into the city

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Paragraph 4

The preferred architectural style for these new designs was the Beaux Arts style. In this school, architects were trained to draw on Classical, Renaissance, and Baroque styles, synthesizing them in designs for new buildings for the Industrial Age. The idea was that the new buildings would blend artfully with the older palaces, cathedrals, and civic buildings that dominated European city centers. Haussmann's ideas were widely influential and extensively copied.

7. The word “synthesizing” in the passage is closest in meaning to

- A. combining
- B. simplifying
- C. using
- D. copying

8. According to paragraph 4, what was an advantage of the Beaux Arts style

- A. It was especially well suited for industrial buildings.
- B. It fit in well with important older buildings in European cities.
- C. It could be easily copied by builders everywhere.

- D. It allowed new buildings to be constructed much more efficiently

Paragraph 5

Early in the twentieth century there emerged a different intellectual and artistic reaction to the pressures of industrialization and urbanization. This was the Modern movement, which was based on the idea that buildings and cities should be designed and run like machines. Equally important to the Modernists was that urban design should not simply reflect dominant social and cultural values but, rather, help to create a new moral and social order. The movement's best-known advocate was Le Corbusier, a Paris-based Swiss who provided the inspiration for technocratic urban design. Modernist buildings sought to dramatize technology, exploit industrial production techniques, and use modern materials and unembellished, functional design. Le Corbusier's ideal city featured linear clusters of high-density, medium-rise apartment blocks, elevated on stilts and segregated from industrial districts; high-rise tower office blocks; and transportation routes all separated by broad expanses of public open space.

9. According to paragraph 5, Modernist urban design differed from previous urban design styles in that it

- A. meant to contribute to a new moral and social order
- B. was heavily influenced by the work of one urban planner
- C. was a reaction to social and economic changes
- D. was intended to make cities more beautiful

10. The word “elevated” in the passage is closest in meaning to

- A. raised
- B. imagined
- C. separated
- D. designed

11. Paragraph 5 supports the idea that Le Corbusier held which of the following views

- A. Industrial production techniques should be used only for buildings in industrial districts.
- B. Different types of activities that go on in a city should be kept physically separated from each other.
- C. All the buildings in a city should be about the same height and of similar design.
- D. Major transportation routes should be kept at a significant distance from cities.

Paragraph 6

After 1945 this concept of urban design became pervasive, part of what became known as the International Style: boxlike steel-frame buildings with concrete-and-glass facades. The International Style was avant-garde yet respectable and, above all, comparatively inexpensive to build. This tradition of urban design, more than anything else, has imposed a measure of uniformity on cities around the world.

12. According to paragraph 6, the “International Style” became widespread partly because

- A. it was a style that combined many traditional national styles
- B. it was a style that emerged independently in city after city
- C. building in that style tended to produce uniform results
- D. building in that style tended to cost less

13. Look at the four choices that indicate where the following sentence could be added to the passage.

This mechanical analogy was a significant departure from earlier attitudes that emphasized the civilizing influence of cities and their buildings. (空)

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Where would the sentence best fit? Click on a choice to add the sentence to the passage.

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

Drag your choices to the spaces where they belong. To review the passage, click on View Text.

(空)

●

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Answer Choices

- A. Beginning in fifteenth-century Italy, advances in weaponry led to the redesign of cities, and a new aesthetic of grand design inspired by classical art forms took hold.
- B. The walls and open spaces typical of Renaissance urban design were re-discovered in the early twentieth century and became a major component of the Modern movement.
- C. The social changes brought about by the transition to industrial capitalism placed new demands on urban planners that could only be met by adopting new design styles.
- D. The redevelopment of Paris in the mid-1800s displayed a new idea of urban design to make cities orderly, efficient, and healthier and to positively reflect the new social and economic order.
- E. The goal of Beaux Arts style architects was to replace the older palaces, cathedrals, and civic buildings that dominated European cities with modern buildings.
- F. The twentieth-century International Style's boxlike steel, glass, and concrete buildings arose from the Modernist view that buildings and cities should be designed and run like machines.

Origins of the Megaliths

Since the days of the earliest antiquarians, scholars have been puzzled by the many Neolithic (~ 4000 B.C. ~ 2200 B.C.) communal tombs known as megaliths along Europe's Atlantic seaboard. Although considerable variations are found in the architectural form of these impressive monuments, there is a general overriding similarity in design and, particularly, in the use of massive stones.

The construction of such large and architecturally complex tombs by European barbarians struck early prehistorians as unlikely. The Bronze Age seafaring civilizations that lived in the region of the Aegean Sea (~ 3000 B.C. ~ 1000 B.C.), among whom collective burial and a diversity of stone-built tombs were known, seemed a probable source of inspiration. It was suggested that Aegean people had visited Iberia in southwestern Europe in search of metal ores and had introduced the idea of collective burial in massive tombs, which then spread northward to Brittany, Britain, North Germany, and Scandinavia.

Radiocarbon dates for a fortified settlement of megalith builders at Los Millares in Spain appeared to confirm this picture, though dates for megaliths in Brittany seemed too early. When calibrated, however, it became clear that radiocarbon dates were universally too early to support a Bronze Age Aegean origin. It is now clear that the megaliths are a western and northern European invention, not an introduced idea. Even so, they are still a subject of speculation and inquiry. What induced their builders to invest massive efforts in erecting such monumental tombs? How was the necessary labor force assembled? What underlies their striking similarities?

One answer to the last question was proposed by Professor Grahame Clark, one of Britain's greatest prehistorians. Investigating the megaliths of southern Sweden, he noted that one group was concentrated in coastal locations from which deep-sea fish such as cod, haddock, and ling could have been caught in winter. Historically, much of the Atlantic was linked by the travels of people who fished, and this could well have provided a mechanism by which the megalith idea and fashions in the style of tomb architecture spread between coastal Iberia, Brittany, Ireland, western England and Scotland, and Scandinavia. The high concentrations of megaliths on coasts and the surprising number of megaliths found on small islands may support a connection with fishing.

Professor Colin Renfrew of the University of Cambridge, England, however, views the similarities as similar responses to similar needs. At the structural level, the passage that forms a major element of many graves could have been devised independently in different areas to meet the need for repeated access to the interior of these communal tombs. Other structural resemblances could be due to similarities in the raw materials available. In answer to the question of why the idea of building monumental tombs should arise independently in a number of

areas, he cites the similarities in their backgrounds.

Most megaliths occur in areas inhabited in the postglacial period by Mesolithic hunter-gatherers (~8500 B.C. ~C 4000 B.C.). Their adoption of agriculture through contact with Neolithic farmers, Renfrew argues, led to a population explosion in the region and consequent competition for farmland between neighboring groups. In the face of potential conflict, the groups may have found it desirable to define their territories and emphasize their boundaries. The construction of megaliths could have arisen in response to this need.

Renfrew has studied two circumscribed areas, the Scottish islands of Arran and Rousay, to examine this hypothesis more closely. He found that a division of the arable land into territories, each containing one megalith, results in units that correspond in size to the individual farming communities of recent times in the same area. Each unit supported between 10 and 50 people. The labor needed to put up a megalith would probably be beyond the capabilities of a community this size. But Renfrew argues that the cooperation of other communities could be secured by some form of recognized social incentive perhaps a period of feasting at which communal building was one of several activities.

Most megaliths contain collective burials. Different tombs used different arrangements, but there seems to have been an underlying theme: people placed in these tombs were representative of their society, but their identity as individuals was not important. The tombs belonged to the ancestors, through whom the living society laid claim to their land. This interpretation reinforces Renfrew's view of the megaliths as territorial markers.

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Paragraph 2

The construction of such large and architecturally complex tombs by European barbarians struck early prehistorians as unlikely. The Bronze Age seafaring civilizations that lived in the region of the Aegean Sea (~ 3000 B.C. ~C1000 B.C.), among whom **collective** burial and a diversity of stone-built tombs were known, seemed a probable source of inspiration. It was suggested that Aegean people had visited Iberia in southwestern Europe in search of metal ores and had introduced the idea of collective burial in massive tombs, which then spread northward to Brittany, Britain, North Germany, and Scandinavia.

1. The word “**collective**” in the passage is closest in meaning to

- A. aboveground
- B. public
- C. elaborate
- D. group

2. According to paragraph 2, early prehistorians thought the Aegean people of

the Bronze Age might have influenced megalith building along the Atlantic seaboard because they

- A. had established commercial routes along the Atlantic seaboard
- B. had been in Iberia, where they introduced the idea of burial in very large tombs
- C. were thought to have found megaliths in Iberia when searching for metals
- D. were thought to have passed along the concept of burial in monumental tombs as they explored Brittany, Britain, North Germany, and Scandinavia

Paragraph 3

Radiocarbon dates for a fortified settlement of megalith builders at Los Millares in Spain appeared to confirm this picture, though dates for megaliths in Brittany seemed too early. When calibrated, however, it became clear that radiocarbon dates were universally too early to support a Bronze Age Aegean origin. It is now clear that the megaliths are a western and northern European invention, not an introduced idea. Even so, they are still a subject of speculation and inquiry. What induced their builders to invest massive efforts in **erecting** such monumental tombs? How was the necessary labor force assembled? What underlies their striking similarities?

3. In paragraph 3, why does the author discuss the results of “**radiocarbon dates**”?

- A. To support the idea that megaliths spread rapidly during the Bronze Age
- B. To question the idea that megaliths have a religious origin
- C. To provide evidence against the theory that Bronze Age Aegeans inspired the megaliths
- D. To argue that the megaliths in Brittany are older than the megaliths in Los Millares

4. The word “**erecting**” in the passage is closest in meaning to

- A. designing
- B. constructing
- C. protecting
- D. decorating

Paragraph 4

One answer to the last question was proposed by Professor Grahame Clark, one of Britain's greatest prehistorians. Investigating the megaliths of southern Sweden, he noted that one group was concentrated in coastal locations from which deep-sea fish such as cod, haddock, and ling could have been caught in winter. Historically, much of the Atlantic was linked by the travels of people who fished,

and this could well have provided a mechanism by which the megalith idea and fashions in the style of tomb architecture spread between coastal Iberia, Brittany, Ireland, western England and Scotland, and Scandinavia. The high concentrations of megaliths on coasts and the surprising number of megaliths found on small islands may support a connection with fishing.

5. According to paragraph 4, what did Professor Clark propose as a result of studying the megaliths of southern Sweden?

- A. Swedish megaliths are nearly identical to megaliths elsewhere.
- B. People who traveled for fishing may have been responsible for the spread of megaliths in Europe.
- C. Swedish megaliths were probably built after other European megaliths were built.
- D. Megaliths in Europe were usually located near sites for deep-sea fishing in winter.

Paragraph 5

Professor Colin Renfrew of the University of Cambridge, England, however, views the similarities as similar responses to similar needs. At the structural level, the passage that forms a major element of many graves could have been devised independently in different areas to meet the need for repeated access to the interior of these communal tombs. Other structural resemblances could be due to similarities in the raw materials available. In answer to the question of why the idea of building monumental tombs should arise independently in a number of areas, he cites the similarities in their backgrounds.

6. What is the purpose of discussing the passage that forms a major element of many graves?

- A. To provide an example of a commonly occurring feature of megaliths that might be related to a similar need
- B. To argue that similarities in raw materials were responsible for the similarity of passages
- C. To explain how repeated access to the interior of the communal tombs was possible
- D. To provide evidence that the builders of the megaliths had similar backgrounds

Paragraph 6

Most megaliths occur in areas inhabited in the postglacial period by Mesolithic hunter-gatherers (~8500 B.C. ~C 4000 B.C.). Their adoption of agriculture through contact with Neolithic farmers, Renfrew argues, led to a population

explosion in the region and consequent competition for farmland between neighboring groups. In the face of potential conflict, the groups may have found it desirable to define their territories and emphasize their boundaries. The construction of megaliths could have arisen in response to this need.

7. The word “consequent” in the passage is closest in meaning to

- A. intense
- B. increasing
- C. resulting
- D. continual

8. According to paragraph 6, Professor Renfrew has argued that one factor leading to the rise of megaliths in Europe was

- A. the adoption of farming by Mesolithic hunter-gatherers
- B. the transition from a glacial to a postglacial climate
- C. the relocation of Mesolithic populations from one region to another
- D. the conflict over whether areas inhabited by Mesolithic peoples would be used for farming

Paragraph 7

Renfrew has studied two circumscribed areas, the Scottish islands of Arran and Rousay, to examine this hypothesis more closely. He found that a division of the arable land into territories, each containing one megalith, results in units that correspond in size to the individual farming communities of recent times in the same area. Each unit supported between 10 and 50 people. The labor needed to put up a megalith would probably be beyond the capabilities of a community this size. But Renfrew argues that the cooperation of other communities could be secured by some form of recognized social incentive perhaps a period of feasting at which communal building was one of several activities.

9. The phrase “this hypothesis” in the passage refers to the idea that

- A. there was competition for territory between Mesolithic hunter-gathers and invading Neolithic farmers
- B. a population explosion brought about a division of the region's Neolithic farmers into neighboring groups
- C. the need of neighboring groups to define their territories led to the construction of megaliths
- D. the construction of megaliths was a way of competing for farmland

10. According to paragraph 7, what did Renfrew conclude about the megaliths of Arran and Rousay?

- A. Each megalith was associated with a specific agricultural community.
- B. Each megalith was built by between 10 and 50 people.
- C. Some megaliths were built using stones quarried at other places.
- D. Some megaliths were built gradually over time rather than all at once.

Paragraph 8

Most megaliths contain collective burials. Different tombs used different arrangements, but there seems to have been an underlying theme: people placed in these tombs were representative of their society, but their identity as individuals was not important. The tombs belonged to the ancestors, through whom the living society laid claim to their land. This interpretation **reinforces** Renfrew's view of the megaliths as territorial markers.

11. The word “**reinforces**” in the passage is closest in meaning to
- A. represents
 - B. differs from
 - C. expands on
 - D. supports
12. According to the passage, all of the following were true of the megaliths along the Atlantic seaboard EXCEPT:
- A. They often had a main passageway.
 - B. They identified the individuals buried within them.
 - C. They were built before the Aegean Bronze Age.
 - D. They differed somewhat in style from region to region.

13. Look at the four choices that indicate where the following sentence could be added to the passage. (无坑)

So it might seem that megaliths could not have been used by an individual community to mark its land.

Where would the sentence best fit? Click on a choice to add the sentence to the passage.

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

Drag your choices to the spaces where they belong. To review the passage, click on View Text.

(无句子)

-
-
-

Answer Choices

- A. The Bronze Age Aegeans most probably built some of the tombs in Iberia.
- B. Scientific evidence supports the idea that the megaliths were a western and northern European invention.
- C. Most megaliths are found in coastal regions, suggesting that people fishing may have used them to guide their travels.
- D. Archeologists have found enough indicators to believe that the layout of tombs in the landscape reflects each community's social organization.
- E. The high proportion of coastal megaliths has given rise to the idea that megalith building was related to fishing.
- F. It has been suggested that megaliths arose in response to the spread of agriculture and competition for farmland.

Reconstructing Ancient Environments

A stage that is imperative in any archaeological process is the reconstruction of the physical environments in which a particular segment of the archaeological record was formed. Climates and the world's geomorphology the shape and constituents of land surface have changed greatly over the past several million years of human history, and each archaeological analysis begins with an effort to reconstruct the physical world of the culture being analyzed.

Ancient climates can often be reconstructed from floral and faunal remains. The study of animal remains, or faunal analysis, is a complex field in which, in most cases, the archaeologist is trying to reconstruct human diet and local environments. Faunal analysts usually count the numbers and kinds of animals represented by the remains they find, and then use statistical methods to estimate the food values, ages, and sexes of the animals being exploited. The prehistoric record of the meat-eating habits of early humans is far from clear about the prevalence of scavenging. One faction of prehistorians argues there is evidence that early humans were primarily scavengers who found the remains of animals killed by lions and other carnivores, and butchered them. Another faction disagrees and proposes that early humans hunted for their own meat. Marks left by humans cutting up animals with stone tools are now being analyzed to help distinguish between cases in which people butchered animals they had killed themselves and those in which they butchered animals they scavenged from kills of other animals.

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Throughout human history, plants have been our main source of food, and so floral analyses studies of the remains of plants are an extremely important part of archaeology, particularly in studies of how domesticated plants and animals and agricultural economies evolved. Carbon is chemically quite stable, so charred plants (plants converted to charcoal or carbon) and seeds preserve well. Carbonized plant remains can be retrieved by flotation: excavated sediments are mixed with water or some other fluid and the charred plant fragments rise to the surface, where they can be skimmed off and identified. The importance of such analyses lies in the fact that these plants indicate much about the climates and vegetation of the periods in which the animals lived. For example, there are debates about when and where various animals were domesticated. If phytoliths (tiny mineral particles formed inside plants) of domesticated grains are found on the teeth of these animals, the probability is high that they were part of an agricultural economy.

Human bodies are also valuable sources of information for archaeologists, particularly if the bodies are well preserved. For example, eleven naturally mummified bodies were found in beach sand in northern Chile and date to about 1000 B.C. When they were analyzed, it was found that one of them was a coca leaf chewer (the earliest known), while other bodies showed the changes of the bones

of the inner ear that are characteristic of people who spend a lot of time diving in cold water. In addition, they had the kinds of dental problems and missing teeth associated with the sticky starches of an agricultural diet although about 40 percent of their diet came from marine resources.

A rapidly growing technical specialty within archaeology is geoarchaeology, which combines archaeological and geological analyses. Geology and archaeology form a natural marriage in many obvious ways because both disciplines are concerned with the alteration of natural landscapes. Glaciers, changing rainfall patterns, and many other natural forces cause changes to landscapes, and of course, so do people. Geologists are broadly concerned with ancient physical environments, and archaeologists require knowledge of these environments to interpret their finds.

Geoarchaeological analyses involve many different kinds of questions and techniques. In the Egyptian Delta region, for example, many of the earliest communities were built on large sand-and-gravel mounds created by the Nile River as it deposited the sediments it carried. But many of these communities have been buried under many meters of sediments from numerous ancient floods since that time and by other factors as well. Moreover, the streams feeding into the Nile River in the delta have changed course many times, leaving a maze of crisscrossed buried river channels. Finding these buried sand-and-gravel mounds and the archaeological sites on them often requires complex geological analyses involving special digging, satellite image analysis, and many other techniques.

350

Paragraph 1

A stage that is imperative in any archaeological process is the reconstruction of the physical environments in which a particular segment of the archaeological record was formed. Climates and the world's geomorphology the shape and constituents of land surface have changed greatly over the past several million years of human history, and each archaeological analysis begins with an effort to reconstruct the physical world of the culture being analyzed.

1. The word “constituents” in the passage is closest in meaning to
 - A. components
 - B. locations
 - C. size
 - D. temperatures

Paragraph 2

Ancient climates can often be reconstructed from floral and faunal remains. The study of animal remains, or faunal analysis, is a complex field in which, in most cases, the archaeologist is trying to reconstruct human diet and local environments.

Faunal analysts usually count the numbers and kinds of animals represented by the remains they find, and then use statistical methods to estimate the food values, ages, and sexes of the animals being exploited. The prehistoric record of the meat-eating habits of early humans is far from clear about the prevalence of scavenging. One faction of **prehistorians** argues there is evidence that early humans were primarily scavengers who found the remains of animals killed by lions and other carnivores, and butchered them. Another faction disagrees and proposes that early humans hunted for their own meat. **Marks left by humans cutting up animals with stone tools are now being analyzed to help distinguish between cases in which people butchered animals they had killed themselves and those in which they butchered animals they scavenged from kills of other animals.**

2. According to paragraph 2, prehistorians disagree about which of the following

- A. Whether humans hunted animals themselves or ate meat from animals killed by other carnivores
- B. The number and kinds of animals humans ate
- C. Whether lions and other carnivores were hunted by humans
- D. Whether or not humans butchered animals to eat

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. Humans using stone tools to butcher animals left marks on the bones of the animals they killed and the animals they scavenged.
- B. Humans scavenged animals killed by other animals and butchered them using stone tools.
- C. Tool marks on butchered animal bones are analyzed to help determine whether humans killed or merely scavenged the animals.
- D. Analysis of the stone tools used by humans to butcher scavenged animals is now being carried out.

Paragraph 3

Throughout human history, plants have been our main source of food, and so floral analyses studies of the remains of plants are an extremely important part of archaeology, particularly in studies of how domesticated plants and animals and agricultural economies evolved. Carbon is chemically quite stable, so charred plants (plants converted to charcoal or carbon) and seeds preserve well. **Carbonized plant remains** can be retrieved by **flotation**: **excavated** sediments are mixed with water or some other fluid and the charred plant fragments rise to the surface, where they can be skimmed off and identified. The importance of such

analyses lies in the fact that these plants indicate much about the climates and vegetation of the periods in which the animals lived. For example, there are debates about when and where various animals were domesticated. If phytoliths (tiny mineral particles formed inside plants) of domesticated grains are found on the teeth of these animals, the probability is high that they were part of an agricultural economy.

4. The word “excavated” in the passage is closest in meaning to

- A. dug from the ground
- B. concentrated in solid form
- C. deposited
- D. dried

5. According to paragraph 3, what is one reason that scientists use “flotation”

- A. To estimate the fluid content of ancient plants and seeds
- B. To identify the sediments in which ancient plants grew
- C. To learn about the climate of places where ancient plants grew
- D. To determine whether the remains of ancient plants and seeds have carbonized

6. According to paragraph 3, which of the following is true about carbonized plant remains

- A. Each fragment of carbonized plant remains contains sediments of a wide variety of plants.
- B. Carbonized plant remains are usually found near the remains of domesticated animals.
- C. Carbonized plant remains can be recovered by mixing sediments with fluid.
- D. Carbonized plant remains from an area are used to settle debates about the age of animal remains located in the same area.

7. According to paragraph 3, which of the following do archaeologists consider to be a strong indicator that an agricultural economy existed in a particular site

- A. An unusually high number of animal remains near the surface of the site
- B. Remains of domesticated plants in the teeth of animals
- C. High numbers of mineral particles inside carbonized plants
- D. Evidence of little vegetation change for long periods of time

Paragraph 4

Human bodies are also valuable sources of information for archaeologists, particularly if the bodies are well preserved. For example, eleven naturally mummified bodies were found in beach sand in northern Chile and date to about

1000 B.C. When they were analyzed, it was found that one of them was a coca leaf chewer (the earliest known), while other bodies showed the changes of the bones of the inner ear that are **characteristic** of people who spend a lot of time diving in cold water. In addition, they had the kinds of dental problems and missing teeth associated with the sticky starches of an agricultural diet although about 40 percent of their diet came from marine resources.

8. According to paragraph 4, all of the following were true of some people in northern Chile around 1000 B.C. EXCEPT:

- A. They were divers.
- B. They chewed coca leaves.
- C. They had dental problems caused by eating food from marine resources.
- D. They ate plants grown on land.

9. The word **characteristic** in the passage is closest in meaning to

- A. expected
- B. typical
- C. suggestive
- D. destructive

Paragraph 5

A rapidly growing technical specialty within archaeology is geoarchaeology, which combines archaeological and geological analyses. Geology and archaeology form a natural marriage in many obvious ways because both disciplines are concerned with the **alteration** of natural landscapes. Glaciers, changing rainfall patterns, and many other natural forces cause changes to landscapes, and of course, so do people. Geologists are broadly concerned with ancient physical environments, and archaeologists require knowledge of these environments to interpret their finds.

10. The word “**alteration**” in the passage is closest in meaning to

- A. destruction
- B. preservation
- C. authenticity
- D. modification

Paragraph 6

Geoarchaeological analyses involve many different kinds of questions and techniques. In the Egyptian Delta region, for example, many of the earliest communities were built on large sand-and-gravel mounds created by the Nile River as it deposited the sediments it carried. But many of these communities have been

buried under many meters of sediments from numerous ancient floods since that time and by other factors as well. Moreover, the streams feeding into the Nile River in the delta have changed course many times, leaving a maze of crisscrossed buried river channels. Finding these buried sand-and-gravel mounds and the archaeological sites on them often requires complex geological analyses involving special digging, satellite image analysis, and many other techniques.

11. The purpose of paragraph 6 is to
- A. answer questions about the equipment and techniques used in the Egyptian Delta area
 - B. describe the earliest communities built on large, sand-and-gravel mounds
 - C. explain how streams feeding the Nile River in the delta change course over time
 - D. provide an example of a situation where complex geoarchaeological analyses and techniques are necessary
12. According to paragraph 6, what is one reason that complex geological analyses are needed for locating many of the earliest Nile River communities
- A. Flood waters can carry evidence of human habitation far from its place of origin.
 - B. The streams associated with early communities have changed course over time.
 - C. More recent communities have been built on top of ancient communities.
 - D. The types of sediments carried by Nile floods have changed since ancient times.

13. Look at the four choices that indicate where the following sentence could be added to the passage. (无坑)

Such a variety of methods are especially important at sites that are no longer visible on the surface.

Where would the sentence best fit? Click on a choice to add the sentence to the passage.

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

Drag your choices to the spaces where they belong. To review the passage, click on View Text.

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Answer Choices

- A. Studying plant and animal remains can reveal details of ancient climates, food sources, and agricultural activities.
- B. Faunal analysis deals mainly with analyzing the tools ancient humans used for hunting and killing animals.
- C. Once identified, carbonized plant remains can help modern agriculturalists determine the most stable varieties of plants to grow.
- D. An examination of human remains can tell archaeologists about such things as the individual's diet and habits.
- E. To help understand the physical world of ancient communities, archaeologists may work with geologists and employ complex new techniques.
- F. Geoarchaeology, a growing field within archaeology, has proved to be more effective in explaining the alterations made to natural landscapes than in explaining how members of ancient communities lived.

Vocalization in Frogs

The t²ngara frog is a small terrestrial vertebrate that is found in Central America. T²ngara frogs breed in small pools, and breeding groups range from a single male to choruses of several hundred males. The advertisement call of a male t²ngara frog is a strange noise, a whine that starts at a frequency of 900 hertz and sweeps downward to 400 hertz in about 400 milliseconds. The whine may be produced by itself, or it may be followed by one or several chucks or clucking sounds. When a male t²ngara frog is calling alone in a pond, it usually gives only the whine portion of the call, but as additional males join a chorus, more and more of the frogs produce calls that include chucks. Scientists noted that male t²ngara frogs calling in a breeding pond added chucks to their calls when they heard the recorded calls of other males played back. That observation suggested that it was the presence of other calling males that incited frogs to make their calls more complex by adding chucks to the end of the whine.

What advantage would a male frog in a chorus gain from using a whine-chuck call instead of a whine. Perhaps the complex call is more attractive to female frogs than the simple call. Michael Ryan and Stanley Rand tested that hypothesis by placing female t²ngara frogs in a test arena with a speaker at each side. One speaker broadcast a pre-recorded whine call, and the second speaker broadcast a whine-chuck. When female frogs were released individually in the center of the arena, fourteen of the fifteen frogs tested moved toward the speaker broadcasting the whine-chuck call.

If female frogs are attracted to whine-chuck calls in preference to whine calls, why do male frogs give whine-chuck calls only when other males are present? Why not always give the most attractive call possible. One possibility is that whine-chuck calls require more energy than whines, and males save energy by only using whine-chucks when competition with other males makes the energy expenditure necessary. However, measurements of the energy expenditure of calling male t²ngara frogs showed that energy cost was not related to the number of chucks. Another possibility is that male frogs giving whine-chuck calls are more vulnerable to predators than frogs giving only whine calls. T²ngara frogs in breeding choruses are preyed upon by a species of frog-eating bats, *Trachops cirrhosus*, and it was demonstrated that the bats locate the frogs by homing on their vocalizations.

In a series of playback experiments, Michael Ryan and Merlin Tuttle placed pairs of speakers in the forest and broadcast vocalizations of t²ngara frogs. One speaker played a recording of a whine and the other a recording of a whine-chuck. The bats responded as if the speakers were frogs: they flew toward the speakers and even landed on them. In five experiments at different sites, the bats approached speakers broadcasting whine-chuck calls twice as frequently as those playing simple whines (168 approaches versus 81). Thus, female frogs are not alone

in finding whine-chuck calls more attractive than simple whines an important predator of frogs also responds more strongly to the complex calls.

Ryan and his colleagues measured the rates of predation in t²ngara frog choruses of different sizes. Large choruses of frogs did not attract more bats than small choruses, and consequently the risk of predation for an individual frog was less in a large chorus than in a small one. Predation was an astonishing 19 percent of the frogs per night in the smallest chorus and a substantial 1.5 percent per night even in the largest chorus. When a male frog shifts from a simple whine to a whine-chuck call, it increases its chances of attracting a female, but it simultaneously increases its risk of attracting a predator. In small choruses, the competition from other males for females is relatively small, and the risk of predation is relatively large. Under these conditions it is apparently advantageous for a male t²ngara frog to give simple whines. However, as chorus size increases, competition with other males also increases while the risk of predation falls. In that situation, the advantage of giving a complex call apparently outweighs the risks.

Paragraph 1

The t²ngara frog is a small terrestrial vertebrate that is found in Central America. T²ngara frogs breed in small pools, and breeding groups range from a single male to choruses of several hundred males. The advertisement call of a male t²ngara frog is a strange noise, a whine that starts at a frequency of 900 hertz and sweeps downward to 400 hertz in about 400 milliseconds. The whine may be produced by itself, or it may be followed by one or several chucks or clucking sounds. When a male t²ngara frog is calling alone in a pond, it usually gives only the whine portion of the call, but as additional males join a chorus, more and more of the frogs produce calls that include chucks. Scientists noted that male t²ngara frogs calling in a breeding pond added chucks to their calls when they heard the recorded calls of other males played back. That observation suggested that it was the presence of other calling males that **incited** frogs to make their calls more complex by adding chucks to the end of the whine.

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1. The word “**incited**” in the passage is closest in meaning to

- A. allowed
- B. stimulated
- C. forced
- D. helped

2. According to paragraph 1, male t²ngara frogs add chucks to the whine they produce when

- A. potential mates are unable to hear the frequency of their whine sounds
- B. other males produce louder whine sounds than they do

- C. the frogs breed in large pools rather than small ones
- D. other males are present in their breeding pool

Paragraph 2

What advantage would a male frog in a chorus gain from using a whine-chuck call instead of a whine. Perhaps the complex call is more attractive to female frogs than the simple call. **Michael Ryan and Stanley Rand** tested that hypothesis by placing female t²ngara frogs in a test arena with a speaker at each side. One speaker broadcast a pre-recorded whine call, and the second speaker broadcast a whine-chuck. When female frogs were released individually in the center of the arena, fourteen of the fifteen frogs tested moved toward the speaker broadcasting the whine-chuck call.

3. What is the relationship of paragraph 2 in the passage to paragraph 1
- A. Paragraph 2 provides additional support for a scientific hypothesis discussed in paragraph 1.
 - B. Paragraph 2 questions the accuracy of a scientific observation discussed in paragraph 1.
 - C. Paragraph 2 provides a possible explanation for a scientific observation discussed in paragraph 1.
 - D. Paragraph 2 identifies some strengths and weaknesses of a scientific hypothesis discussed in paragraph 1.

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4. According to paragraph 2, **Ryan and Rand** conducted an experiment to find out whether which of the following theories was true
- A. Male frogs in a chorus use a whine-chuck call in place of a whine call.
 - B. Female frogs prefer a whine-chuck call to a simple whine call.
 - C. Male frogs tend to produce more whine-chuck calls than whine calls.
 - D. Female frogs respond differently to live calls from males than they do to recorded calls.

5. To be attracted to whine-chuck calls in preference to whine calls means
- A. to like whine-chuck calls instead of whine calls
 - B. to like whine-chuck calls in addition to whine calls
 - C. to like whine-chuck calls followed by whine calls
 - D. to like whine-chuck calls more than whine calls

6. 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. (未找到高亮句)

- A. Males may save energy when competing for mates by using only whine-chuck calls rather than both whines and whine-chucks.
- B. Males expend as much of their energy on whine-chuck calls as on whine calls when competing with other males.
- C. Males save energy by using whine-chuck calls only when competing with other males.
- D. Males that save energy by using only whines are less able to compete with other males.

Paragraph 4

In a series of playback experiments, Michael Ryan and Merlin Tuttle placed pairs of speakers in the forest and broadcast vocalizations of t̃̃ngara frogs. One speaker played a recording of a whine and the other a recording of a whine-chuck. The bats responded as if the speakers were frogs: they flew toward the speakers and even landed on them. In five experiments at different sites, the bats approached speakers broadcasting whine-chuck calls twice as frequently as those playing simple whines (168 approaches versus 81). Thus, female frogs are not alone in finding whine-chuck calls more attractive than simple whines; an important predator of frogs also responds more strongly to the complex calls.

7. According to paragraph 4, all of the following are true of the playback experiments EXCEPT:

- A. Female frogs and predator bats approached the broadcasting speakers.
- B. The bats responded more strongly to the whine-chuck calls than they responded to the whine calls.
- C. Each speaker played a different kind of male frog call.
- D. The same experiment was repeated at different locations.

8. According to paragraph 4, the playback experiments of Ryan and Tuttle demonstrated which of the following

- A. T̃̃ngara frogs use both whines and whine-chucks in their vocalizations.
- B. Female t̃̃ngara frogs are attracted to both whine and whine-chuck vocalizations.
- C. Female t̃̃ngara frogs and predators of t̃̃ngara frogs are attracted to different types of vocalizations.
- D. Frog-eating bats are attracted to whine-chuck calls more than to whines alone.

Paragraph 5

Ryan and his colleagues measured the rates of predation in t̃̃ngara frog choruses of different sizes. Large choruses of frogs did not attract more bats than

small choruses, and consequently the risk of predation for an individual frog was less in a large chorus than in a small one. Predation was an astonishing 19 percent of the frogs per night in the smallest chorus and a **substantial** 1.5 percent per night even in the largest chorus. When a male frog shifts from a simple whine to a whine-chuck call, it increases its chances of attracting a female, but it simultaneously increases its risk of attracting a predator. In small choruses, the competition from other males for females is relatively small, and the risk of predation is relatively large. Under these conditions it is apparently advantageous for a male t²ngara frog to give simple whines. However, as chorus size increases, competition with other males also increases while the risk of predation falls. In that situation, the advantage of giving a complex call apparently **outweighs** the risks.

9. The word “**substantial**” in the passage is closest in meaning to

- A. average
- B. smaller
- C. considerable
- D. surprising

10. The word “**outweighs**” in the passage is closest in meaning to

- A. exceeds
- B. ignores
- C. minimizes
- D. disguises

11. According to paragraph 5, all of the following are true about t²ngara frog vocalizations EXCEPT:

- A. The larger the frog chorus, the smaller the chance there is of a particular frog being eaten by a predatory bat.
- B. The larger the frog chorus, the louder each individual frog calls.
- C. The smaller the frog chorus, the easier it is for a frog to attract a female.
- D. The smaller the frog chorus, the more likely it becomes that a frog using the whine-chuck vocalization will be attacked by a bat.

12. Which of the following can be inferred from paragraph 5 about the behavior of male t²ngara frogs

- A. When in small choruses they use less effective mating calls to decrease their risk of predation.
- B. They avoid joining a large chorus in a breeding pool because it increases the risk of predation.
- C. They avoid the use of the whine-chuck call whenever there is the risk of predators.

D. They attempt to avoid predation by making their calls at night.

13. Look at the four choices that indicate where the following sentence could be added to the passage. (无坑)

Predation, therefore, is a risk in choruses of all sizes, but the risk varies depending on the type of call used.

Where would the sentence best fit? Click on a choice to add the sentence to the passage.

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

Drag your choices to the spaces where they belong. To review the passage, click on View Text.

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(无句子)

Answer Choices

- A. T²ngara frogs generally use simple calls when they wish to attract a mate, and complex calls when they wish to avoid predation.
- B. Two hypotheses have been put forward about why females and frog-eating bats are more attracted to males using whine-chuck calls.
- C. The hypothesis that whine calls are used to save energy when males are not in immediate competition with each other has been disproved by showing that chuck calls do not require more energy.
- D. T²ngara females overwhelmingly favor the whine-chuck call used by the males, but so do certain bats that prey upon t²ngara frogs.
- E. Most males gather in groups of several hundreds when calling because the rate of predation from bats is so high in small groups.
- F. Male t²ngara frogs use the whine-chuck call in large groups, where their risk of predation is lower, and the whine call in small groups, where their risk is higher.

Sociality in Animals

Social insects represent the high point of invertebrate evolution. Some species live in communities of millions, coordinating their building and foraging, their reproduction, and their offspring care. Yet sociality is found in only a few species of insects, and is rare among vertebrates as well: wildebeest (large antelope) and lions are the exception rather than the rule. Nearly all fish, amphibians, reptiles, birds, and mammals are solitary, except when courting and mating. Birds and mammals usually rear their young, but year-round family groups are almost unknown, though they are intensely studied where they do exist. The same is true for insects.

We know, or think we know, that social groups are good. Wolves are better predators when they hunt in packs, and pigeons escape from falcons far more often when feeding in flocks. Group building projects—the dams beavers build to block a body of water that provides them with relative safety from predators and the lodges they build for shelter, for instance—can provide a high level of protection and comfort. Why, then, are social species so very rare? In fact, living socially presents inevitable problems that transcend habitat needs so that only when these costs are offset by corresponding benefits is group living a plus.

The most obvious cost is competition. All the members of a species share the same habitat; when they live together, they are trying to eat the same food and occupy the same nesting sites. In general, there is far less competition away from a group, and selection should favor any individual who (all things being equal) sets off on its own, leaving the members of its group behind to compete among themselves for limited resources. Another difficulty is that concentrations of individuals facilitate disease and parasite transmission. On the whole, social animals carry more parasites and species-specific diseases than do solitary animals. Parasites and diseases diminish the strength and limit the growth of animals, and among highly social creatures, epidemics can devastate whole populations. Distemper (a viral disease) has been known to wipe out entire colonies of seals, for instance. So the penalty of social life is potentially huge.

But in some instances, the payoffs can be even greater. Two have already been mentioned: cooperative hunting and defensive groups. Social hunting is likely to evolve where prey is too large to be taken by individuals operating alone. To capture wildebeest some members of a group of lions follow their prey and herd them toward others lying in ambush. In other species, individuals forage or hunt simultaneously and share the food. Vampire bats that have had a bad day, for instance, are fed by more successful members of the community, but they are expected to return the favor in the future. Cooperation can even involve sharing information about the location of food. Some colonial birds, such as bank swallows, use the departure direction of a successful forager (food hunter) to locate

concentrations of prey. Information transfer can be unintentional though some species make use of special assembly calls or behavior.

Cooperation in group defense, such as we see in circles of musk oxen or elephants, is quite rare among vertebrates but is prevalent among the social insects. The strategy of employing many eyes to watch for danger, on the other hand, is widespread in birds and mammals. A herd of gazelles (small antelope) is far more likely to spot a lurking lion or a concealed cheetah than is a lone individual, and at a greater distance. In fact, a group enters into a kind of time-sharing arrangement in which individual antelope alternate biting off a mouthful of grass with a period of erect and watchful chewing. A larger group can afford more bites per individual per minute, there being more eyes to scan for danger. For a small antelope living in a forest where visibility is limited, however, remaining hidden is probably a better bet than assembling into noisy herds.

Among the millions of species of insects, only a few thousand are social. Those rarities are generally confined to termites and Hymenoptera. All termites are social: their diet (cellulose) requires that each generation feed a special kind of bacteria or fungi to the next generation to aid in its digestion. Of the numerous hymenopterans, some are social—including all ants and a few bees and wasps—but many are solitary.

Paragraph 1

Social insects represent the high point of invertebrate evolution. Some species live in communities of millions, coordinating their building and foraging, their reproduction, and their offspring care. Yet sociality is found in only a few species of insects, and is rare among vertebrates as well: wildebeest (large antelope) and lions are the exception rather than the rule. Nearly all fish, amphibians, reptiles, birds, and mammals are solitary, except when courting and mating. Birds and mammals usually rear their young, but year-round family groups are almost unknown, though they are intensely studied where they do exist. The same is true for insects.

1. According to paragraph 1, which of the following is true of sociality among animal species?

- A. Sociality is much more common among invertebrates than among vertebrates.
- B. Very few animals are considered social because most spend the majority of their lives alone.
- C. An animal group must contain more than one family unit for the species to be considered social.
- D. All animals that rear their young are considered to be social.

Paragraph 2

We know, or think we know, that social groups are good. Wolves are better predators when they hunt in packs, and pigeons escape from falcons far more often when feeding in flocks. Group building projects—the dams beavers build to block a body of water that provides them with relative safety from predators and the lodges they build for shelter, for instance—can provide a high level of protection and comfort. Why, then, are social species so very rare? In fact, living socially presents inevitable problems that transcend habitat needs so that only when these costs are offset by corresponding benefits is group living a plus.

2. 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. Group living allows some animals to transcend problems of habitat.
- B. Group living is only advantageous when benefits outweigh inevitable problems.
- C. Problems resulting from living socially extend beyond the habitat.
- D. It is difficult to determine whether the benefits of social living offset its costs.

Paragraph 3

The most obvious cost is competition. All the members of a species share the same habitat; when they live together, they are trying to eat the same food and occupy the same nesting sites. In general, there is far less competition away from a group, and selection should favor any individual who (all things being equal) sets off on its own, leaving the members of its group behind to compete among themselves for limited resources. Another difficulty is that concentrations of individuals facilitate disease and parasite transmission. On the whole, social animals carry more parasites and species-specific diseases than do solitary animals. Parasites and diseases diminish the strength and limit the growth of animals, and among highly social creatures, epidemics can devastate whole populations. Distemper (a viral disease) has been known to wipe out entire colonies of seals, for instance. So the penalty of social life is potentially huge.

3. What does paragraph 3 say about the relationship between natural selection and animals that live apart from other members of their species?

- A. Natural selection does not favor living apart because individuals are unable to obtain resources equal to those of group members.
- B. Natural selection does not favor living apart because of the intense competition for resources among individuals apart from a group.
- C. Natural selection favors living apart because individuals are unlikely to

attract the attention of predators.

D. Natural selection favors living apart because group living increases competition for limited resources of food and nesting sites.

4. The word "devastate" in the passage is closest in meaning to

- A. alter
- B. spread to
- C. destroy
- D. involve

5. In paragraph 3, why does the author mention distemper and its effect on seals?

- A. To explain why sociality is now relatively rare in seals
- B. To prove that parasites prevent animals from growing healthy and strong
- C. To show how easily social animals transmit potentially deadly diseases
- D. To provide an example of a species-specific disease that affects solitary animals

Paragraph 4

But in some instances, the payoffs can be even greater. Two have already been mentioned: cooperative hunting and defensive groups. Social hunting is likely to evolve where prey is too large to be taken by individuals operating alone. To capture wildebeest some members of a group of lions follow their prey and herd them toward others lying in ambush. In other species, individuals forage or hunt **simultaneously** and share the food. Vampire bats that have had a bad day, for instance, are fed by more successful members of the community, but they are expected to return the favor in the future. Cooperation can even involve sharing information about the location of food. Some colonial birds, such as bank swallows, use the departure direction of a successful forager (food hunter) to locate concentrations of prey. Information transfer can be **unintentional** though some species make use of special assembly calls or behavior.

6. The word "simultaneously" in the passage is closest in meaning to

- A. at the same time
- B. in the same way
- C. for the same reason
- D. on the same scale

7. The word "unintentional" in the passage is closest in meaning to

- A. unsuccessful
- B. unplanned

- C. inaccurate
- D. impractical

8. According to paragraph 4, how do lions increase their chances of successfully hunting wildebeest?

- A. They work together as a team to chase and capture the animals.
- B. They wait until groups of the animals come close to their hiding place.
- C. They follow and catch the animals that are operating alone.
- D. They focus on the smallest members of the species.

9. Which of the following can be inferred from paragraph 4 about how bank swallows find food cooperatively?

- A. They give special favors to members of their community that have been successful foragers.
- B. They use special calls and signals to indicate to other swallows where food is located.
- C. They observe the direction a successful forager took to locate prey.
- D. They locate concentrations of prey by setting off in different directions.

Paragraph 5

Cooperation in group defense, such as we see in circles of musk oxen or elephants, is quite rare among vertebrates but is prevalent among the social insects. The strategy of employing many eyes to watch for danger, on the other hand, is widespread in birds and mammals. A herd of gazelles (small antelope) is far more likely to spot a lurking lion or a concealed cheetah than is a lone individual, and at a greater distance. In fact, a group enters into a kind of time-sharing arrangement in which individual antelope **alternate** biting off a mouthful of grass with a period of erect and watchful chewing. A larger group can afford more bites per individual per minute, there being more eyes to scan for danger. For a small antelope living in a forest where visibility is limited, however, remaining hidden is probably a better bet than assembling into noisy herds.

10. The word "**alternate**" in the passage is closest in meaning to

- A. make a habit of
- B. have conflicts over
- C. show a preference for
- D. take turns at

11. According to paragraph 5, how does cooperation help gazelles avoid predation?

- A. The herd forms a defensive circle around the weakest members of the

group.

- B. Because they share food, all of the animals are well nourished and ready to run.
- C. The herd makes a lot of noise, which scares off predators.
- D. Some animals watch for danger while others concentrate on feeding.

Paragraph 6

Among the millions of species of insects, only a few thousand are social. Those rarities are generally confined to termites and Hymenoptera. All termites are social: their diet (cellulose) requires that each generation feed a special kind of bacteria or fungi to the next generation to aid in its digestion. Of the numerous hymenopterans, some are social—including all ants and a few bees and wasps—but many are solitary.

12. Which of the following can be inferred from paragraph 6 about termites?

- A. They are the only insect species whose members are all social.
- B. They have smaller communities than hymenopterans.
- C. They are more independent than hymenopterans.
- D. They have to live together to pass on digestive bacteria to their young.

Paragraph 2

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We know, or think we know, that social groups are good. [A] Wolves are better predators when they hunt in packs, and pigeons escape from falcons far more often when feeding in flocks. [B] Group building projects—the dams beavers build to block a body of water that provides them with relative safety from predators and the lodges they build for shelter, for instance—can provide a high level of protection and comfort. [C] Why, then, are social species so very rare? [D] In fact, living socially presents inevitable problems that transcend habitat needs so that only when these costs are offset by corresponding benefits is group living a plus.

13. Look at the four choices that indicate where the following sentence could be added to the passage.

The engineering of structures of such size and complexity is unknown among solitary animals.

Where would the sentence best fit? Click on a choice to add the sentence to the

passage.

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

Drag your choices to the spaces where they belong. To review the passage, click on View Text.

Some animal species demonstrate sociability, but solitary behaviors are far more typical among animals.

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Answer Choices

- A. Because birds and mammals engage in courting, mating, and establishing year-round family groups to rear young, they are most likely to be social species.
- B. Some social animals obtain food through cooperation and share food and information about food sources with each other.
- C. Social animals help each other watch for danger more effectively, and some species work together to combat predators.
- D. Living in communities presents disadvantages, such as the competition for resources and the easy transmission of diseases.
- E. Some entire species of social animals have become extinct because of disease epidemics.

Although some species of ants, bees, and wasps are famous for their sociality, most social insects are not hymenopterans.

The Geographical Distribution of Gliding Animals

Southeast Asia has a unique abundance and diversity of gliding animals flying squirrels, flying frogs, and flying lizards with wings of skin that enable them to glide through the tropical forest. What could be the explanation for the great diversity in this region and the scarcity of such animals in other tropical forests? Gliding has generally been viewed as either a means of escaping predators, by allowing animals to move between trees without descending to the ground, or as an energetically efficient way of traveling long distances between scattered resources. But what is special about Southeast Asian rain forests.

Scientists have proposed various theories to explain the diversity of gliding animals in Southeast Asia. The first theory might be called the tall-trees hypothesis. The forests of Southeast Asia are taller than forests elsewhere due to the domination of the dipterocarp family: a family of tall, tropical hardwood trees. Taller trees could allow for longer glides and the opportunity to build up speed in a dive before gliding. The lower wind speeds in tall-tree forests might also contribute by providing a more advantageous situation for gliding between trees. This argument has several flaws, however. First, gliding animals are found throughout the Southeast Asian region, even in relatively short-stature forests found in the northern range of the rain forest in China, Vietnam, and Thailand. Some gliders also thrive in low secondary forests, plantations, and even city parks. Clearly, gliding animals do not require tall trees for their activities. In addition, many gliding animals begin their glides from the middle of tree trunks, not even ascending to the tops of trees to take off.

A second theory, which we might call the broken-forest hypothesis, speculates that the top layer of the forest the tree canopy has fewer woody vines connecting tree crowns in Southeast Asian forests than in New World and African forests. As a result, animals must risk descending to the ground or glide to move between trees. In addition, the tree canopy is presumed to be more uneven in height in Asian forests, due to the presence of the tall dipterocarp trees with lower trees between them, again favoring gliding animals. Yet ecologists who work in different regions of the world observe tremendous local variation in tree height, canopy structure, and abundance of vines, depending on the site conditions of soil, climate, slope elevation, and local disturbance. One can find many locations in Southeast Asia where there are abundant woody vines and numerous connections between trees and similarly many Amazonian forests with few woody vines.

A final theory differs from the others in suggesting that it is the presence of dipterocarp trees themselves that is driving the evolution of gliding species. According to this view, dipterocarp forests can be food-deserts for the animals that live in them. The animals living in dipterocarp forests that have evolved gliding consist of two main feeding groups: leaf eaters and carnivores that eat small prey

such as insects and small vertebrates. For leaf-eating gliders the problem is not the absence of any leaves but the desert-like absence of edible leaves. Dipterocarp trees often account for 50 percent or more of the total number of canopy trees in a forest and over 95 percent of the large trees, yet dipterocarp leaves are unavailable to most vertebrate plant eaters because of the high concentration of toxic chemicals in their leaves. Many species of gliding animals avoid eating dipterocarp leaves and so must travel widely through the forest, bypassing the dipterocarp trees, to find the leaves they need to eat. And gliding is a more efficient manner of traveling between trees than descending to the ground and walking or else jumping between trees.

Many carnivorous animals also may need to search more widely for food due to the lower abundance of insects and other prey. This is caused by dipterocarps' irregular flowering and fruiting cycles of two- to seven-year intervals, causing a scarcity of the flowers, fruits, seeds, and seedlings that are the starting point of so many food chains. The lower abundance of prey in dipterocarp forests forces animals such as lizards and geckos to move between tree crowns in search of food, with gliding being the most efficient means.

Paragraph 1

Southeast Asia has a unique abundance and diversity of gliding animals flying squirrels, flying frogs, and flying lizards with wings of skin that enable them to glide through the tropical forest. What could be the explanation for the great diversity in this region and the scarcity of such animals in other tropical forests? Gliding has generally been viewed as either a means of escaping predators, by allowing animals to move between trees without descending to the ground, or as an energetically efficient way of traveling long distances between scattered resources. But what is special about Southeast Asian rain forests.

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1. According to paragraph 1, what question about gliding species are researchers trying to answer?

A. Why it took millions of years for gliding animals to evolve in the tropical forests of Southeast Asia

B. Why gliding animals, though rare in most tropical forests, have evolved in so many different families in Southeast Asia

C. Why gliding animals evolved in many tropical forests in Southeast Asia before they evolved in any of the tropical forests elsewhere in the world

D. Why gliding animals evolved only in tropical rain forests

2. According to paragraph 1, it is generally thought that the ability to glide is useful to forest-dwelling species because gliding

A. allows them to adapt to a wide variety of forest conditions

- B. eliminates the need to travel long distances in search of food
- C. provides a rapid, energy-efficient way of descending from the top of a tree to the ground
- D. enables them to move through the forest without being exposed to predators on the ground

3. The word “scattered” in the passage is closest in meaning to

- A. hard to find
- B. seasonally available
- C. widely separated
- D. highly varied

Paragraph 2

Scientists have proposed various theories to explain the diversity of gliding animals in Southeast Asia. The first theory might be called the tall-trees hypothesis. The forests of Southeast Asia are taller than forests elsewhere due to the domination of the dipterocarp family: a family of tall, tropical hardwood trees. Taller trees could allow for longer glides and the opportunity to build up speed in a dive before gliding. The lower wind speeds in tall-tree forests might also contribute by providing a more advantageous situation for gliding between trees. This argument has several flaws, however. First, gliding animals are found throughout the Southeast Asian region, even in relatively short-stature forests found in the northern range of the rain forest in China, Vietnam, and Thailand. Some gliders also thrive in low secondary forests, plantations, and even city parks. Clearly, gliding animals do not require tall trees for their activities. In addition, many gliding animals begin their glides from the middle of tree trunks, not even ascending to the tops of trees to take off.

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4. All of the following are mentioned in paragraph 2 in support of the tall-trees hypothesis EXCEPT:

- A. Tall trees make longer glides possible.
- B. Tall trees make building up speed in a dive possible.
- C. Tall trees make gliding from the middle of tree trunks possible.
- D. Tall-tree forests have lower wind speeds.

5. Select the TWO answer choices that point to flaws in the tall-trees hypothesis, according to paragraph 2. To receive credit, you must select TWO answers.

- A. Many gliding animals are unable to ascend to the tops of tall trees.
- B. Gliding animals are not evenly distributed throughout the forests of the Southeast Asian region.
- C. In Southeast Asia, many gliding animals are found in places where trees

tend to be relatively short.

D. Many gliding animals begin their glides from positions midway up the trunks of trees.

Paragraph 3

A second theory, which we might call the broken-forest hypothesis, **speculates** that the top layer of the forest the tree canopy has fewer woody vines connecting tree crowns in Southeast Asian forests than in New World and African forests. As a result, animals must risk descending to the ground or glide to move between trees. In addition, the tree canopy is presumed to be more uneven in height in Asian forests, due to the presence of the tall dipterocarp trees with lower trees between them, again favoring gliding animals. Yet ecologists who work in different regions of the world observe tremendous local variation in tree height, canopy structure, and abundance of vines, depending on the site conditions of soil, climate, slope elevation, and local disturbance. One can find many locations in Southeast Asia where there are abundant woody vines and numerous connections between trees and similarly many Amazonian forests with few woody vines.

6. The word “**speculates**” in the passage is closest in meaning to

- A. concludes from evidence
- B. recognizes
- C. puts forward as a possibility
- D. claims

7. Paragraph 3 implies which of the following ideas about forests in which there are abundant woody vines connecting tree crowns

- A. The tree canopy is more even than it is in other forests.
- B. In such forests, animals can move between trees by traveling on vines.
- C. Such forests generally contain a wider diversity of animals than other forests do.
- D. There are likely to be fewer predators on the ground in such forests than in other forests.

8. The word tremendous in the passage is closest in meaning to

- A. seasonal
- B. endless
- C. unexpected
- D. enormous

9. Paragraph 3 supports the idea that one problem with the broken-forest hypothesis is that

A. ecologists have found gliding animals in areas of Southeast Asia where trees are connected by vines and not found them in Amazonian forests where trees are not connected by vines

B. in Southeast Asia, the forests with the fewest woody vines connecting the tops of trees turn out to have the most gliding animals

C. according to ecologists in different regions of the world, gliding animals are as abundant and varied in some forests of Africa and the New World as they are in Southeast Asian forests

D. gliding is no easier in broken forests with an uneven canopy structure than it is in forests where the trees are all about the same height

Paragraph 4

A final theory differs from the others in suggesting that it is the presence of dipterocarp trees themselves that is driving the evolution of gliding species. According to this view, dipterocarp forests can be food-deserts for the animals that live in them. The animals living in dipterocarp forests that have evolved gliding consist of two main feeding groups: leaf eaters and carnivores that eat small prey such as insects and small vertebrates. For leaf-eating gliders the problem is not the absence of any leaves but the desert-like absence of edible leaves. Dipterocarp trees often account for 50 percent or more of the total number of canopy trees in a forest and over 95 percent of the large trees, yet dipterocarp leaves are unavailable to most vertebrate plant eaters because of the high concentration of toxic chemicals in their leaves. Many species of gliding animals avoid eating dipterocarp leaves and so must travel widely through the forest, bypassing the dipterocarp trees, to find the leaves they need to eat. And gliding is a more efficient manner of traveling between trees than descending to the ground and walking or else jumping between trees.

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10. According to paragraph 4, what special difficulty do leaf-eating animals face in a dipterocarp forest

A. Dipterocarp trees are less leafy than other canopy trees.

B. There is no efficient method of getting from one tree to another.

C. Most trees are very tall with leaves that are difficult to reach.

D. There is a large distance between trees that have edible leaves.

Paragraph 5

Many carnivorous animals also may need to search more widely for food due to the lower abundance of insects and other prey. This is caused by dipterocarps' irregular flowering and fruiting cycles of two- to seven-year intervals, causing a scarcity of the flowers, fruits, seeds, and seedlings that are the starting point of so many food chains. The lower abundance of prey in dipterocarp forests forces

animals such as lizards and geckos to move between tree crowns in search of food, with gliding being the most efficient means.

11. How does paragraph 5 relate to paragraph 4

A. Paragraph 5 shows that the food-desert theory introduced in paragraph 4 can account for only part of what needs to be explained.

B. Paragraph 5 explains why the author calls the theory set out in paragraph 4 the food-desert theory.

C. Paragraph 5 completes the account of the food-desert theory begun in paragraph 4.

D. Paragraph 5 outlines an alternative to the food-desert theory described in paragraph 4.

12. According to paragraph 5, what is responsible for the relative scarcity of insects and other prey in dipterocarp forests

A. The inability of insects and other prey to eat the toxic seeds, flowers, and fruits of dipterocarp trees

B. The efficiency with which lizards and geckos hunt their prey

C. The abundance of carnivorous animals in dipterocarp forests

D. Dipterocarps' irregular flowering and fruiting cycles

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13. Look at the four choices that indicate where the following sentence could be added to the passage. (无坑)

For each group, a dipterocarp forest is like a desert in that food resources are few and far apart.

Where would the sentence best fit? Click on a choice to add the sentence to the passage.

14. Directions: An introductory sentence for a brief summary of the passage is provided below. Complete the summary by selecting the THREE answer choices that express the most important ideas in the passage. Some answer choices do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. This question is worth 2 points.

Drag your choices to the spaces where they belong. To review the passage, click on View Text.

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Answer Choices

- A. One theory is that so many gliding species evolved in Southeast Asia because the forests are exceptionally tall, but there is evidence that calls that theory into question.
- B. The fact that gliding animals are most abundant in the short-stature forests of China, Vietnam, and Thailand shows that gliding did not evolve as an adaptation to an environment of tall trees.
- C. Ecologists have shown that the abundance of gliding animals in different regions of the world corresponds to variations in tree height, canopy structure, and abundance of vines.
- D. The hypothesis that gliding evolved to compensate for a scarcity of vines linking tree canopies overlooks problematic evidence from both Southeast Asian and Amazonian forests.
- E. In forests that are dominated by tall trees, jumping from tree to tree or descending to the ground may be a more efficient way of traveling through the forest than gliding.
- F. Dipterocarp trees create an environment in which many species must travel widely to find food, and gliding may have evolved as a rapid and efficient way of moving between tree crowns.

