**Challenges of Mesopotamian Agriculture**

■One of the world's first civilizations began in the area between the Tigris and Euphrates Rivers known as Mesopotamia (modern Iraq), where much of the fertile land was under cultivation by 4500 B.C. ■Sumer, in southern Mesopotamia, was dominated by eight major cities, including the city of Uruk, which had 50,000 inhabitants by 3000 B.C. ■But the irrigation that nourished Mesopotamian fields carried a hidden risk. Groundwater in semiaridcharacterized by low annual rainfall regions usually contains a lot of dissolved salt. ■Where the water table is near the ground surface, as it is in river valleys and deltas, groundwater is moved up into the soil where it evaporates, leaving the salt behind in the ground. When evaporation rates are high, sustained irrigation can generate enough salt to eventually poison crops. While irrigation dramatically increases agricultural output, turning sunbaked floodplains into lush fields can sacrifice long-term crop yields for short-term harvests.

Preventing the buildup of salt in semiarid soils requires either irrigating in moderation or periodically leaving fields fallow (unplanted). In Mesopotamia, centuries of high productivity from irrigated land led to increased population density, which fueled demand for more intensive irrigation. Eventually, enough salt crystallized in the soil that further increases in agricultural production were not enough to feed the growing population.

The key problem for Sumerian agriculture was that the timing of river runoff did not coincide with the growing season for crops. Flow in the Tigris and Euphrates peaked in the spring, when the rivers filled with snowmelt from the mountains to the north. Discharge was lowest in the late summer and early fall, when new crops needed water the most. Intensive agriculture required storing water through soaring summer temperatures. A lot of the water applied to the fields simply evaporated, pushing that much more salt into the soil.

Salinization was not the only hazard facing early agricultural societies. Keeping the irrigation ditches from becoming blocked by silt (mud) became a chief concern as extensive erosion from upland farming in the Armenian hills poured dirt into the Tigris and Euphrates Rivers. Conquered peoples were put to work pulling mud from the all-important ditches. Sacked invaded, robbed of valuables, and damaged or destroyed by an army and rebuilt repeatedly, Babylon was finally abandoned only when its fields became too difficult to water. Thousands of years later, piles of silt more than thirty feet high still line ancient irrigation ditches. On average, silt pouring out of the rivers into the Persian Gulf has created over a hundred feet of

new land a year since Sumerian time. The ruins of the city of Ur, a once thriving seaport, now stand a hundred and fifty miles inland.

As Sumer prospered, fields lay fallow for shorter periods because of the growing demand for food. By one estimate almost two-thirds of the thirty five thousand square miles of arable land (land suitable for farming) in Mesopotamia were irrigated when the population peaked at around twenty million. The combination of a high load of dissolved salt in irrigation

water, high temperatures during the irrigation season, and increasingly intensive cultivation pumped ever more salt into the soil.

Temple records from the Sumerian city-states inadvertently recorded agricultural deterioration as salt gradually poisoned the ground. Wheat, one of the major Sumerian crops, is quite sensitive to the concentration of salt in the soil. The earliest harvest records, dating from about 3000 B.C., report equal amounts of wheat and barley in the region. Over time, the proportion of wheat recorded in Sumerian harvests fell and the proportion of barley rose. Around 2500 B.C., wheat accounted for less than a fifth of the harvest. After another five hundred years, wheat no longer grew in southern Mesopotamia.

Wheat production ended not long after all the region's arable land came under production. Previously, Sumerians irrigated new land to offset shrinking harvests from salty fields. Once there was no new land to cultivate, Sumerian crop yields fell precipitously because increasing salinization meant that each year fewer crops could be grown on the shrinking amount of land that remained in production. By 2000 B.C., crop yields were down by half. Clay tablets tell of the earth turning white in places as the rising layer of salt reached the surface.

1. According to paragraph 1, all of the following can contribute to the poisoning of crops EXCEPT

1. the repeated use of irrigation
2. farming too close to a group of cities
3. groundwater with high levels of salt
4. water evaporating from the soil at high rates

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

1. permanently
2. regularly
3. partially
4. generally

3. According to paragraph 2, how did the rise in population density contribute to the region's agricultural problems?

1. As more of the population settled in cities, there were fewer people to work the fields and maintain the irrigation system.
2. As more land was taken up by houses and other buildings, there was less land available for growing crops.
3. The need to feed a lot of people made it more difficult to cut back on irrigation or let the fields remain unplanted.
4. Waste from the cities added other poisons to the soil in addition to the salt.

4. According to paragraph 3, what was the main problem with agriculture in Sumer?

1. The rate of flow from the Tigris and Euphrates Rivers was unpredictable.
2. Water was least readily available when the crops needed it most.
3. There was a short growing season in the region because of the hot summers.
4. It was difficult to move water from the mountains in the north to the fields where it was needed.

5. Why does the author mention that "piles of silt more than thirty feet high still line ancient irrigation ditches"?

1. To help explain why it was very difficult to maintain the irrigation ditches needed to water fields
2. To indicate that methods of irrigation that were used thousands of years ago are still in use today
3. To point out that a great deal of new land was created in the Persian Gulf by removing silt from irrigation ditches
4. To argue that some features of irrigation ditches were intended to defend cities from attack

6. According to paragraph 4, which of the following is true of the ruins of the city of Ur?

1. They indicate that the city was constructed on silt transported from irrigation ditches into the Persian Gulf.
2. They provide evidence that the city was destroyed in a war with Babylon.
3. They suggest that the city was abandoned when its fields became too difficult to water.
4. They are far from the sea, even though Ur was once a port city.

7. According to paragraph 5, all of the following contributed to the buildup of salt in the soil EXCEPT:

1. The fields were given less and less time to lie fallow.
2. Extended periods of water shortage required fields to be irrigated more than ever before.
3. The water used to irrigate the crops was salty.
4. The weather was very hot during the times that irrigation was used.

8. Which of the following can be inferred from paragraph 6 about why barley became more prevalent than wheat in Sumer?

1. Barley can be harvested earlier in the growing season than wheat.
2. Barely is easier to process than wheat.
3. Barley is able to grow in saltier soil than wheat.
4. Barley requires less water than wheat.

9. Look at the four squares that indicate where the following sentence could be added to the passage.

**Mesopotamia's two major rivers directly or indirectly supplied the water necessary to support these large populations.**

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

10. 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.

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

View Text.

Irrigation in Mesopotamia greatly increased agricultural output, but it also led to a buildup of salt in the soil, which ultimately decreased crop yields.

Answer Choices

1. The growing population made it increasingly difficult to prevent salinization of the soil by leaving fields uncultivated, and over time this led to a decrease in the productivity of fields.
2. Erosion was another major problem for Mesopotamian agriculture, with massive amounts of silt building up in the irrigation ditches, making it necessary to constantly clear them.
3. Sumerian cities such as Ur and Babylon lost a hundred feet of land each year to erosion, and the loss of this much-needed farmland contributed to the decline of southern Mesopotamia.
4. Temple records show that the Sumerians were aware of the problem of salinization and tried to solve it through various methods, including rotating crops and changing irrigation schedules.
5. Wheat required so much water that wheat fields were the first to become poisoned by salt, whereas barley removed salt from the soil and so came to replace wheat as the dominant crop.
6. Rising levels of salt in the soil increasingly influenced what could be grown in Mesopotamia, where crop production declined steadily once there was no new land to cultivate.

**Cave Artists**

The earliest surviving cave and rock art was created in the Paleolithic period (40,000-10,000 years ago) in locations that were not sites of human habitation. Some Paleolithic artwork was

ephemeral--only six examples of open-air engravings survive--but the fine-art engravings and paintings that decorate caves were made to last and did last, in some cases for hundreds and even thousands of years, during which they were available for delight and use. Big cave galleries thus contained work done over a long period, available for comparison to people who had some notion of historical time and were developing a sense of their ancestry. The best Paleolithic art, especially the polychrome paintings, was the work of professionals.

We can say this with some confidence, for cave art at its best was difficult and expensive to produce. In the first place, it required lighting. Some 85 certain and 31 probable examples of Paleolithic lamps have survived, but less than one-third of them were found inside caves. The

conjecture, therefore, is that artists usually worked by torchlight. Both lamps and torches consume animal fats in large quantities. Second, while it is true that some of the best cave paintings, especially at Altamira in Spain, were painted by artists standing up or in some cases lying down or squatting, others required elaborate scaffolding, no different in principle from that used by Renaissance artist Michelangelo when he painted the ceiling of the Sistine Chapel. Some of the paintings were done on a gigantic scale or at heights many feet above the cave floor. The sheer scale of the art is daunting. The big cave vault at Lascaux, known as the Picture Gallery, is over 100 feet long and 35 feet wide. Caves were especially chosen for their size as well as for their security. Niaux in the Pyrenees Mountains in Europe is over half a mile in length, and this is by no means unusual. The big cave at Rouffignac runs over 6 miles (more than 9 kilometers) into the mountain, and some of its huge collection of drawing-engravings are nearly 7 feet (over 2 meters) long.

Professional cave artists, then, needed not only platforms and scaffolding, whose existence at Lascaux, for instance, is betrayed by sockets cut into the walls, but assistants. ■ They mixed the paints, some of which had to be used quickly before they dried; filled the lamps or held the torches; put up and secured the scaffolding; and made the brushes from twigs, feathers, leaves, and animal hairs, to the satisfaction of the master. ■ These assistants probably graduated into masters themselves. ■ It is not going too far to speak of a studio system as the basis of Paleolithic cave art. ■After all, there is positive evidence that art studios, where important works were fabricated and artists trained, existed in Egypt at least as far back as 3000 B.C. That still leaves a gap of 7,000 years from the end of the Paleolithic period, but the quality and consistency of the best painted work in caves, and the evidence of the time, expense, and skill required to produce them, does suggest that artists needed the collective support of something very like a studio. The probability is that the leading cave artists were important persons.

This brings us to quality. To modern eyes, accustomed to 5,000 years of continuous development in the depiction of living forms, the best of the Paleolithic paintings are magnificent. Indeed, seen in depth and in the total silence of the caves, the images are awesome. Human forms are rare and often quite unsophisticated, but the variety of animal forms is impressive. In the eight galleries of the great cave at Les Eyzies, there are multiple examples of mammoths, reindeer, horses, stags, bison, and wolves, as well as humanoids and abstractions or signs. These interlocking galleries, unfolding one by one, are meant to impress and they do. The art is both detailed and monumental, oscillating designedly between simplification and elaboration, between stasis and extreme dynamism. Some Paleolithic artists clearly understood both the anatomy of the animals they depicted and their principles of motion, the result of intense observation over many years and of a self-discipline in rendering that suggests a long apprenticeship and extensive study.

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.

1. Some of the best cave paintings, such as those found at Altamira in Spain, are equal to those produced by the great Renaissance artist Michelangelo.
2. Second, some of the best cave paintings at Altamira in Spain were created by artists standing, squatting, or lying down on elaborate scaffolding.
3. Whether standing, squatting, or lying down, cave artists used principles that were no different from those used by later artists.
4. In the second place, much like the painting on the Sistine Chapel ceiling, some great cave art appears on surfaces that could have been reached only by using complicated scaffolding.

2. Why does the author mention that "Both lamps and torches consume animal fats in large quantities"?

1. To explain how ancient artists were able to make lamps and torches
2. To support the idea that cave art was expensive to produce and probably produced by professionals
3. To indicate that artists could have painted either by lamplight or by torchlight
4. To argue that a more efficient light source must have been used to produce cave art

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

1. custom
2. complication
3. expense
4. conclusion

4. Select the TWO answer choices mentioned in paragraphs 2 and 3 as supporting the idea that cave artists used platforms and scaffolding. To receive credit you must select TWO answer choices.

1. Most caves were unsafe, and platforms and scaffolding would have helped prevent accidents.
2. Some cave walls have sockets cut into them where the scaffolding must have been secured.
3. Most drawings are huge or at a height impossible to reach by a person while standing.
4. Some caves had several galleries that were interconnected by means of platforms.

5. The word "ephemeral" in the passage is closest in meaning to

1. undeveloped
2. short-lived
3. of poor quality
4. hard to find

5. According to paragraph 4, all of the following contribute to the quality of cave art EXCEPT

1. the accurate depiction of human anatomy
2. the variety and detail of animal figures
3. the alternation of static and moving forms
4. the understanding of the principles of motion

6. According to paragraph 4, all of the following contribute to the quality of cave art EXCEPT

1. the accurate depiction of human anatomy
2. the variety and detail of animal figures
3. the alternation of static and moving forms
4. the understanding of the principles of motion

7. According to paragraph 3, Paleolithic art production can be described as a studio system because

1. the art was on display in caves as it is in art studios and galleries today
2. Paleolithic artists studied their materials and techniques almost scientifically
3. it required lighting and the use of scaffolding
4. it depended on the collaboration of a group of masters and assistants

8. Which of the following can be inferred from paragraph 1 about large cave galleries?

1. Some contain open areas where engravings were made.
2. They were visited by multiple generations of cave people.
3. Most of the art works in them take the form of polychrome paintings.
4. Cave people lived inside them for many years.

9. Look at the four squares that indicate where the following sentence could be added to the passage.

**Without assistants to perform these needed tasks, cave artists would have been unable to create large and difficult-to-reach paintings.**

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

10. 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.

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

View Text.

1. Cave drawings from the Paleolithic are of high artistic quality and are evidently the work of professionals.
2. Answer Choices
3. Open-air engravings were made without an artistic or historical sense, and consequently were not meant to last through the ages.
4. The sheer size of cave art and the nature of the environment required artists to use platforms, scaffolding, and torches.
5. The work must have involved the collaboration of assistants who became apprentices to the master and eventually produced art of their own.
6. Assistants made the paints, built the scaffolding and a variety of tools, and obtained the models for their masters.
7. Evidence suggests that the art studio system of the Paleolithic appears to have served as the basis for the art studio system of Egypt.
8. The high-quality depiction of animal forms reveals careful observation of their anatomy and knowledge of the principles of motion.

**The River Nile in Ancient Egypt**

The special character of the Nile, which made it central to ancient Egyptian culture, was its annual inundation (flooding). During June the river began to rise, and a quantity of green water appeared. The color is said to have resulted from the brief period of reproduction of myriad minute organisms. During August the Nile rose rapidly and assumed a muddy red color created by the rich red earth brought into its waters by its tributaries. The Nile continued to rise until mid-September, then remained at that level for two or three weeks. In October it rose again slightly, then began to fall gradually until May, when it reached its lowest level.

The Nile has created a convex shaped in an elevated curve floodplain. In convex floodplains, sediments (clays and silts) are deposited by flood waters, making the land nearest the river have the highest elevation. The convex floodplain is marked by natural levees that form elevated barriers immediately adjacent to the river. These levees rise a few meters above the seasonally inundated lowlands. When the Nile floods, the water covers most of the low-lying land up to the edge of the desert. ■When the floods subside, the waters are trapped behind the levees and prevented from returning to the river. ■The benefit of such topography is obvious: the water can be used where it stands or can be channeled to other areas as dictated by agricultural needs.

■Ancient records, those preserved both in texts and in the visible evidence on ancient devices for measuring water levels called nilometers, indicate that a flood of six meters was perilously low and that one of nine meters was high enough to cause damage to crops and villages. ■ A flood of seven to eight meters was ideal in that low-lying areas and basins throughout the whole valley would be flooded up to the edge of the rising ground of the desert, but towns, villages, and dikes that served as paths and water barriers remained above the water level.

The ancient Egyptians fully understood the extent to which their lives and prosperity depended on the unfailing regularity of the inundation. The occasional low flood and consequent shortage of food were enough to cause much anxiety among the populace at the beginning of each flood season. Ancient Egyptians, therefore, never became completely confident about the annual inundation and its gifts, even though it usually brought a layer of fresh, rich silt and waters for irrigation that made agriculture in the Nile Valley relatively easy. The generally predictable crops and resulting surplus freed a significant segment of the population from agricultural labor, allowing for the development of nonfarming occupations, such as full-time craftspeople, bureaucrats, and priests.

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The importance of the Nile to Egyptian civilization is reflected in the role that it played in religion and the myths that revolved around the river. The Nile was known in antiquity by the Egyptian name Iteru, meaning great river. The personification of the inundation was a god named Hapy, who was associated with fertility and regeneration. The ancient Egyptians had various conceptions of the origin of the inundation. Some texts relate that it began in a cavern at Philae, while others credit the site Gebel Silsila (about 100 kilometers to the north) as the source. It was believed that veneration of the gods associated with these sites in the Aswan area could ensure a sufficient inundation. The Famine Stela, a text carved on rocks at Sehel near Philae, records a famine that was averted by donations of land and goods to the Temple of Khnum at Aswan. This text was formerly thought to date from the reign of Djoser (2687-2667 B.C.), but in reality it dates to the Ptolemaic period some 2,500 years later.

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

1. tiny
2. ancient
3. distinct
4. simple

2. It can be inferred from paragraph 1 that the Nile reached its highest level in

1. May
2. June
3. October
4. September

3. According to paragraph 1, what was the reason for the change in the color of the Nile River that occurred in August?

1. The rapid rise of the waters of the Nile
2. The presence of organisms in the Nile
3. The transporting of earth by tributaries of the Nile
4. The seasonal warming of the waters of the Nile

4. The word "consequent" in the passage is closest in meaning to

1. expected
2. immediate
3. periodic
4. resulting

5. Paragraph 3 implies which of the following about the Nile's floods in ancient Egypt?

1. Egyptians managed to protect their crops and villages from floods of nine meters or higher by creating dikes that served as water barriers.
2. Floods of six meters and floods reaching nine meters occurred almost as often as those of seven to eight meters.
3. Floods of nine meters could cover the dikes used as paths and water barriers.
4. Even floods of seven to eight meters may have caused significant damage to the towns closest to the river basins.

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.

1. The ancient Egyptians had enough rich silt and water for agriculture because they were never overly confident.
2. Since annual flooding provided sufficient silt and water for agriculture, the ancient Egyptians never worried about the river and its gifts.
3. Although the inundations usually made agriculture in the Nile Valley comparatively easy, the Egyptians never took for granted the rich silt and irrigation the floods provided.
4. Although the gifts of the Nile did not make agriculture easy, the Egyptians worried the floods might not come.

7. The author mentions "full-time craftspeople, bureaucrats, and priests"

in the passage in order to

1. compare how segments of the Egyptian population contributed to the development of an extremely successful society
2. specify some of the nonfarming occupations that developed in Egyptian society because of agricultural surpluses
3. demonstrate why the Egyptians reached a higher level of prosperity than other societies with similarly regular river floods
4. help explain why only a small segment of the Egyptian population pursued occupations other than farming

8. According to paragraph 5, views have changed on which of the following aspects of the Famine Stela?

1. When the text was written
2. Whether the text is authentic
3. Why the text was written
4. Whether the text was composed by Egyptians

9. Look at the four squares that indicate where the following sentence could be added to the passage.

**Nile floods, however, could be a mixed blessing.**

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

10. 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.

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

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The Nile was central to the life of ancient Egyptians.

Answer Choices

1. Agriculture was successful in the Nile Valley because of the seasonal patterns of flooding and the geographical features of the floodplain.
2. Natural levees protected crops from floods by preventing floodwaters from reaching the lowlands.
3. Nilometers and ancient records indicate that water levels reached by the annual inundation were very predictable, usually varying by less than a meter from year to year.
4. The Nile floods usually resulted in agricultural surpluses, but very low or high floods could cause food shortages or damage to villages.
5. The annual inundation was so important to Egyptian life that the location of temples was selected based on myths about where the flood originated.
6. Practices of honoring gods associated with flood sites and of making offerings to ensure adequate flooding demonstrate the great importance of the Nile to Egyptians.

**Marsh Plant Strategies**

A salt marsh is a coastal ecosystem in the zone between land and open salt water that is regularly flooded by the tides. Although salt marshes are highly productive and superficially lush, they are extremely stressful habitats for vascular plants (plants with internal systems for conducting liquid). The plants that dominate salt marshes are specialized to deal with the problems associated with waterlogged, saline soils (soils that are salty and full of water). Most vascular plants would die under typical salt marsh conditions.

Tidal flooding of salt marshes creates waterlogged soils, particularly at low, frequently flooded elevations and in poorly-drained sediments. The physiological problem with waterlogged soils is that they become depleted of oxygen. Marsh plants produce oxygen as a byproduct of photosynthesis (the process by which plants obtain energy from sunlight) aboveground. Their belowground tissues, however, consume oxygen through metabolic activities faster than the soil oxygen levels can be replenished. Without oxygen, plant roots are unable to provide nutrients to aboveground plant structures.

Wetland plants have both architectural and metabolic adaptations to cope with waterlogged soils. Architecturally, plants that live in waterlogged soils usually have roots near the soil surface to facilitate the roots' uptake of oxygen. ■ Smooth cordgrass, which dominates frequently flooded salt marsh habitats on the Atlantic coast of North America, has surface roots in the top 2-3 centimeters of the marsh surface to oxygenate deeper root structures. ■Mangroves, which dominate tropical wetlands, have aboveground roots that oxygenate belowground roots. ■Plants that dominate waterlogged soils typically have well-developed aerenchyma tissue, a type of tissue that transports oxygen to belowground structures. ■The aerenchyma tissue forms a system of air passages extending from the leaves to belowground plant parts that allows oxygen to passively diffuse (spread without the plant's expending energy) to belowground roots. Marsh plants that are common in waterlogged low marsh soils all have well-developed aerenchyma tissue, and many marsh plants respond to waterlogged soil by increasing the size of the tissue. Marsh plants that live in drier high marsh habitats have less developed aerenchyma tissue than those found in low marsh habitats. In addition to these structural modifications, many marsh plants also have well-developed metabolic pathways that avoid using oxygen, thus reducing their dependence on root oxygenation.

Salt stress is the second serious physical problem for salt marsh plants. High salt concentrations (salinities) in the soil draw water from roots, making salt marshes physiologically dry habitats. Consequently, marsh plants are similar to desert plants in terms of the mechanisms they use to conserve water. Salt marsh plants have several strategies to deal with high soil salinities. To minimize water loss through the roots, most marsh plants contain high concentrations of solutes (substances like sugar dissolved in the water of their tissues). Maintaining the proper pressure difference between the water inside and outside the plant ensures that the vascular system will continue to draw fluid from the soil and distribute nutrients to aboveground body parts. Since high salt concentrations can be detrimental to plant metabolism, however, plants often use organic solutes, not salt, to maintain these pressures.

To manage tissue salt concentrations, many salt marsh plants have salt glands, specialized leaf cells that concentrate and excrete salt. These plants deal with high soil salinities by passively taking up high-salinity fluid from the root zone, removing excess salts with their

salt glands, and, again, balancing their systems with organic solutes. Examination of the leaves of these plants in the field reveals salt crystals that show the locations of salt glands.

Another common strategy for dealing with saline soils is the maintenance of high tissue water concentrations as a buffer against water loss. This strategy is similar to that of desert plants, but is complicated in salt marsh plants by the need to maintain the high concentrations of solutes. Plants that make use of this strategy accomplish this by isolating the stored water in enlarged storage cells, while maintaining high solute concentrations in their vascular systems. These plants have other conspicuous structural modifications to reduce water loss, including reduced leaf surface area and stems devoted to photosynthesis (which also permits reduced surface area). One plant, Salicornia, has entirely lost its leaves and is essentially a low surface area photosynthetic stem.

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

1. generally
2. particularly
3. on the surface
4. on occasion

2. According to paragraph 2, which of the following is a problem for marsh plants?

1. Surviving in marshes requires particularly fast metabolic activities.
2. There is not enough oxygen available to effectively perform photosynthesis.
3. Marsh plants consume soil oxygen more quickly than the soil receives it back.
4. Plants have difficulty developing root tissues in the poorly-drained soil.

3. Why does the author provide the information that smooth cordgrass "has surface roots in the top centimeters of the marsh surface to oxygenate deeper root structures"?

1. To illustrate a structural adaptation common to marsh plants
2. To give an example of a marsh plant that has an extensive belowground root structure
3. To explain why structural adaptations are more effective than metabolic ones
4. To explain why mangroves are better suited to the Atlantic Coast of North America than smooth cordgrass is

4. According to paragraph 3, all of the following are true of aerenchyma tissue EXCEPT:

1. It is capable of expanding in size.
2. It is more developed in plants in high marsh habitats than in those in low marsh habitats.
3. It is located both aboveground and belowground in plants.
4. It is important for transporting oxygen to roots.

5. According to paragraph 4, in what sense are salt marshes dry habitats for plants?

1. They contain some of the same plants found in deserts.
2. Their salty soils are poor in nutrients.
3. They contain solutes that make it hard for the plants to draw water from the soil.
4. Their salty soils make it difficult for the plants to retain water.

6. According to paragraph 5, the function of salt glands in marsh plants is to

1. prevent the roots from taking up high-salinity fluid
2. break down large salt crystals
3. remove organic solutes from plant roots
4. get rid of extra salt

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

1. common
2. successful
3. noticeable
4. specialized

8. Paragraph 6 suggests which of the following about marsh plants that maintain a high tissue water concentration?

1. They find it easier to store water than desert plants do.
2. They store water mainly in their leaves.
3. They must keep stored water separate from their vascular systems.
4. They are able to survive in almost any soil.

9. Look at the four squares that indicate where the following sentence could be added to the passage.

**In addition to these varying root adaptations, most wetland plants share a common method of ensuring that enough oxygen reaches the roots.**

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

10. 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.

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

View Text.

Some plants grow in a type of coastal ecosystem called a salt marsh.

Answer Choices

1. Vascular plants are generally well suited for salt marsh conditions because they have internal systems for conducting liquid.
2. Marsh soils provide insufficient oxygen, so plants have developed specialized adaptations that maximize oxygen uptake and facilitate its transport through the plant.
3. Marsh plants have root structures that extend far belowground where it is easier to take in nutrients because the soil is less salty.
4. By maintaining high solute concentrations, marsh plants achieve a proper fluid balance and avoid losing too much water through their roots.
5. Marsh plants have adaptations for living in salty soil, including means for preventing water loss and leaf cells that concentrate and remove salt.
6. In order to reduce their need for water, a variety of salt marsh plants remain very small and thus essentially form a low ground cover.

Listening

Section 1

1. Why does the woman go to see the man?

1. To check the status of her job application
2. To arrange a campus tour for some visitors
3. To begin training as a campus tour guide
4. To get information for a prospective student

2. What does the woman say about her visit to the school as a prospective student?

1. She decided to attend the school based on the tour.
2. She was impressed by the knowledge of the tour guide she met.
3. She does not remember very much about her visit.
4. She did not take a tour of the campus during her visit.

3. What strategy does the man suggest for promoting the school to prospective students?

1. Focusing on the school’s most popular programs
2. Scheduling tours during special events whenever possible
3. Personalizing the tour based on visitors’ individual interests
4. Giving tours that are longer than those at other schools

4. What does the man imply when he mentions the story of how the school was founded?

Click on 2 answers.

1. He tells the story during every tour he leads.
2. Most prospective students forget the story relatively quickly.
3. Telling the story can help guides understand the people on the tour.
4. The story includes an equal mixture of jokes and facts.

5. Why does the woman say this:

1. She hopes that the man is exaggerating.
2. She feels overwhelmed by her task.
3. She is impressed by the man’s professionalism.
4. She already knows a lot about the school.

6. What is the main topic of the lecture?

1. Problems arising from the decrease in availability of drinking water
2. Various ways to remove salt from seawater
3. Reasons why seawater is generally unfit for industrial purposes
4. Recently discovered applications for freshwater in energy production

7. According to the professor, why is soap usually ineffective in salt water?

1. The sodium in soap cannot dissolve in water that has a high concentration of salt.
2. Sand particles in seawater can prevent soap from removing grease.
3. The presence of salt increases the temperature at which soap can remove grease.
4. Sodium reacts with soap to form substances incapable of removing grease.

8. What practical problem with the process of distilling water does the professor discuss?

1. It may not work as well on land as it does on ships.
2. It requires a large amount of energy.
3. It is faster with river water than with seawater.
4. It requires the use of expensive equipment.

9. What does the professor point out about sand filtration of water?

1. It is the most common method of purifying water in cities.
2. It is more effective if the water is heated first.
3. It successfully removes substances other than salt.
4. It is a recently developed method of desalination.

10. What comparison does the professor make between reverse osmosis and vapor filtration?

1. Both reverse osmosis and vapor filtration use distillation as a step in the process.
2. Both reverse osmosis and vapor filtration have been used for decades.
3. Vapor filtration is more effective than reverse osmosis.
4. Vapor filtration is more common than reverse osmosis.

11. What does the professor imply when he says this:

1. Large cities should find alternative methods of freezing large amounts of water.
2. The students should visit a city that practices freezing water to desalinize it.
3. Freezing large amounts of water is a surprisingly interesting process.
4. Desalination of large amounts of water through freezing is impractical.

12. What is the lecture mainly about?

1. Why researchers disagree about the routes of the earliest migration from Africa to Australia
2. Why DNA research can only provide limited information about ancient societies
3. The role of archeological evidence in the study of ancient populations
4. A theory that explains migration to Australia and its earliest settlement

13. What inconsistency does the professor mention when she discusses the earliest artifacts found in Australia?

1. The artifacts seemed to be older than similar artifacts found in Africa.
2. The artifacts seemed to come from a very wide range of dates.
3. The artifacts were dated to a time before the presumed arrival of people in Australia.
4. Newer artifacts seemed less advanced than older artifacts.

14. What does the professor imply when she discusses the difference between DNA testing and genome sequencing?

1. DNA testing would not have been able to provide the type of information that the researchers needed.
2. DNA testing provided information to the researchers that contradicted the results gained from genome sequencing.
3. DNA testing requires a sample larger than a single human hair.
4. DNA testing requires that the sample tested be less than one year old.

15. What question were researchers able to answer after studying the mitochondrial DNA?

1. How closely related were the original inhabitants of Africa, Europe, India, and Australia?
2. What migration route did the ancestors of Aboriginal Australians use to get from India to Australia?
3. When did the ancestors of Aboriginal Australians separate from other ancient populations?
4. What other parts of the world were settled by the relatives of the ancestors of Aboriginal Australians?

16. What can be inferred about the single dispersal model?

1. It was developed after the oldest artifacts were found in Australia.
2. It will probably be verified as correct when more genome testing is done.
3. The evidence presented by the professor contradicts it.
4. Researchers who study only African artifacts support it.

17. What does the professor imply when she mentions that there might have been a migration to Australia from India about four thousand years ago?

1. It is surprising that evidence for a migration cannot be found in the DNA record.
2. There is strong evidence in Australia to support the idea.
3. It is likely that a migration from Africa to Australia would not have passed through India.
4. Indian artifacts that might be from this time period cannot be dated with precision.

Section 2

1. Why does the student go to the campus security office?

1. To find out which parking lot she is allowed to use
2. To explain why she did not deserve parking tickets
3. To request permission to park in a different lot
4. To find out why she cannot get a parking permit

2. Why were some students asked to move their cars out of their usual parking lot?

Click on 2 answers.

1. To protect the cars from damage
2. To make room for cars to park at the train station
3. To allow workers to replace signs at the parking lot
4. To provide space for tree-trimming machines

3. Why does the student complain about the notice she received?

1. It did not make clear that she would need a temporary permit.
2. It was not distributed to all the students in the building.
3. It did not specify how long she should park in the other lot.
4. It did not explain why students needed to move their cars.

4. What is the man's attitude toward the student's complaint?

1. He thinks that the complaint might be justified.
2. He is confident that his manager will agree with the student.
3. He feels that the student should not have gone out of town.
4. He is not sure whether he believes the student's story.

5. Why does the man say this:

1. To point out that the student should not be complaining
2. To ask the student to explain her problem more clearly
3. To indicate that he is surprised by the student's statement
4. To show that he understands the student's decision

6. What is the main purpose of the lecture?

1. To explain that reef fish coloration may have multiple functions
2. To compare colors and patterns of reef fish with other ocean fish
3. To discuss different methods fish use to convey information
4. To describe the way fish perceive colors

7. Why does the professor mention that different species of cleaner fish all have the same color blue?

1. To point out a color that fish can easily see
2. To remind students that fish with similar coloration are not always closely related
3. To point out that colors on fish do not always have a specific function
4. To support her claim that some fish use coloration to communicate

8. According to the professor, what was one finding of the study comparing the coloration of related species of fish living off both coasts of Panama?

1. Neither fish species uses its coloration for camouflage.
2. Coloration helps fish blend into their own surroundings.
3. Brightly colored fish can be found outside of coral reef environments.
4. Each species of fish uses its coloration for different purposes.

9. Why does the professor ask the students to imagine that she is holding a book?

1. To make sure that everyone is looking at the same page
2. To help explain how a certain experiment was conducted
3. To help clarify a concept she is describing
4. To recommend that the students reread the homework assignment

10. Why does the professor talk about the perception of the color yellow by reef fish?

1. To explain why yellow is not a good camouflage color for reef fish
2. To explain why biologists became interested in studying reef fish coloration
3. To give an example of a difference in perceptual ability between reef fish and humans
4. To show that there is little variation in the coloration of reef fish worldwide

11. What does the professor imply when she says this:

1. The student did not completely understand the question.
2. The student needs to clarify his response.
3. The student's assertion is incorrect.
4. The student is thinking about the wrong species of fish.