Physical Properties of Minerals

【Paragraph 1】A mineral is a naturally occurring solid formed by inorganic processes. Since the internal structure and chemical composition of a mineral are difficult to determine without the aid of sophisticated tests and apparatus, the more easily recognized physical properties are used in identification.

【Paragraph 2】Most people think of a crystal as a rare commodity, when in fact most inorganic solid objects are composed of crystals. The reason for this misconception is that most crystals do not exhibit their crystal form: the external form of a mineral that reflects the orderly internal arrangement of its atoms. Whenever a mineral forms without space restrictions, individual crystals with well-formed crystal faces will develop Some crystals, such as those of the mineral quartz, have a very distinctive crystal form that can be helpful in identification. However, most of the time, crystal growth is interrupted because of competition for space, resulting in an intergrown mass of crystals, none of which exhibits crystal form.

【Paragraph 3】Although color is an obvious feature of a mineral, it is often an unreliable diagnostic property. Slight impurities in the common mineral quartz, for example, give it a variety of colors, including pink, purple (amethyst), white, and even black. When a mineral, such as quartz, exhibits a variety of colors, it is said to possess exotic coloration. Exotic coloration is usually caused by the inclusion of impurities, such as foreign ions, in the crystalline structure Other minerals-for example, sulfur, which is yellow, and malachite, which is bright green-are said to have inherent coloration because their color is a consequence of their chemical makeup and does not vary significantly.

【Paragraph 4】Streak is the color of a mineral in its powdered form and is obtained by rubbing a mineral across a plate of unglazed porcelain. Whereas the color of a mineral often varies from sample to sample, the streak usually does not and is therefore the more reliable property.

【Paragraph 5】Luster is the appearance or quality of light reflected from the surface of a mineral Minerals that have the appearance of metals, regardless of color, are said to have a metallic luster Minerals with a nonmetallic luster are described by various adjectives, including vitreous (glassy), pearly, silky, resinous, and earthy (dull).

【Paragraph 6】One of the most useful diagnostic properties of a mineral is hardness, the resistance of a mineral to abrasion or scratching. This property is determined by rubbing a mineral of unknown hardness against one of known hardness, or vice versa A numerical value can be obtained by using Mohs' scale of hardness, which consists of ten minerals arranged in order from talc, the softest, at number one, to diamond, the hardest, at number ten. Any mineral of unknown hardness can be compared with these or with other objects of known hardness. For example, a fingernail has a hardness of 2.5, a copper penny 5, and a piece of glass 5.5. The mineral gypsum, which has a hardness of two, can be easily scratched with your fingernail. On the other hand, the mineral calcite, which has a hardness of three, will scratch your fingernail but will not scratch glass Quartz, the hardest of the common minerals, will scratch a glass plate.

【Paragraph 7】The tendency of a mineral to break along planes of weak bonding is called cleavage Minerals that possess cleavage are identified by the smooth, flat surfaces produced when the mineral is broken. The simplest type of cleavage is exhibited by the micas. Because the micas have excellent cleavage in one direction, they break to form thin, flat sheets Some minerals have several cleavage planes, which produce smooth surfaces when broken, while others exhibit poor cleavage, and still others exhibit no cleavage at all When minerals break evenly in more than one direction, cleavage is described by the number of planes exhibited and the angles at which they meet. Cleavage should not be confused with crystal form. When a mineral exhibits cleavage, it will break into pieces that have the same configuration as the original sample does. By contrast, quartz crystals do not have cleavage, and if broken, would shatter into shapes that do not resemble each other or the original crystals. Minerals that do not exhibit cleavage are said to fracture when broken Some break into pieces with smooth curved surfaces resembling broken glass Others break into splinters or fibers, but most fracture irregularly.

1. The word “apparatus' in the passage is closest in meaning to

   A. equipment

   B. procedures

C. experiments

D. laboratories

2. According to paragraph 2, which of the following is a mistaken belief that people have about crystals?

A. Crystals always have a well-formed shape

B. Minerals are generally composed of crystals.

C. The atoms of a crystal have an orderly arrangement.

D. Crystals are always solid and inorganic.

3. Why is the color of a mineral an "an unreliable diagnostic property"?

A. Different minerals can have the same color

B. The color is often not a result of the chemical makeup that determines the identity of the mineral.

C. The color of a mineral cannot be predicted from knowing what foreign ions it contains.

D. No two pieces of the same mineral have exactly the same color.

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

A. bright

B. essential

C. superficial

D. transparent

5. According to paragraph 3, how do different samples of the same mineral come to exhibit a variety of colors?

A. The samples have different crystalline structures.

B. The samples contain different varieties of quartz.

C. The samples differ in the impurities they contain

D. The samples were formed in different exotic conditions.

6. Which of the following can be inferred about streak from paragraph 4?

A. When a sample of a mineral is rubbed on unglazed porcelain, the color of the streak is usually the same as the color of the sample.

B. In most cases, different samples of a mineral produce streaks that are all of the same color even though the samples themselves are of different colors.

C. When a streak is made, the impurities in the mineral are removed and the true color of the mineral is revealed

D. Streak color is reliable for identifying minerals because a given mineral sample always yields the same color of streak each time it is rubbed

7. The discussion of Mohs' scale in paragraph 6 answers which of the following questions?

A. How was it determined that Mohs' scale would have ten minerals?

B. Is quartz one of the ten minerals that determine Mohs' scale?

C. Does Mohs' scale apply to materials other than minerals?

D. What mineral is harder than quartz and softer than diamond?

8. It can be inferred from paragraph 6 that the mineral quartz

A. has no fixed degree of hardness

B. might scratch the surface of a diamond

C. is harder than calcite

D. has atoms that are weakly bonded to each other

9. The word "configuration" in the passage is closest in meaning to

O effect

O range

O transformation

O form

10. According to paragraph 7, which of the following is true of the cleavage of micas?

A. Micas are the only minerals to break along planes of weak bonding

B. Micas exhibit poor cleavage because they tend to break unevenly.

C. Micas break in one direction, forming thin sheets with smooth surfaces

D. Micas break in several directions, forming a number of angles and planes.

11. According to paragraph 7, minerals that exhibit no cleavage

A. break evenly in more than one direction

B. have no crystalline form

C. shatter in pieces of various shapes and sizes

D. have surfaces that resemble broken glass

12. Why does the author warn Cleavage should not be confused with crystal form?

A. Because most people have the mistaken belief that the surfaces of crystals are planes of crystal cleavage

B. Because the author's characterization of cleavage in terms of smooth planes and the angles between them could easily be mistaken for a description of crystal form

C. To make the point that crystal form and cleavage are the same property only in the simplest cases of cleavage, such as mica

D. To introduce a discussion of minerals the have cleavage but not crystal form

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

Each mineral has an orderly arrangement of atoms (crystalline structure) and a definite chemical composition that give it a unique set of physical properties.

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

A mineral is a naturally occurring solid formed by inorganic processes. 【A】Since the internal structure and chemical composition of a mineral are difficult to determine without the aid of sophisticated tests and apparatus., the more easily recognized physical properties are used in identification【B】Most people think of a crystal as a rare commodity, when in fact most inorganic solid objects are composed of crystals【C】The reason for this misconception is that most crystals do not exhibit their crystal form: the external form of a mineral that reflects the orderly internal arrangement of its atoms【D】whenever a mineral forms without space restrictions, individual crystals with well-formed crystal faces will develop. Some crystals, such as those of the mineral quartz, have a very distinctive crystal form that can be helpful in identification. However, most of the time, crystal growth is interrupted because of competition for space, resulting in an intergrown mass of crystals, none of which exhibits crystal form.

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.

Drag your answer choices to the spaces where they belong. To remove an answer choice, click on it.

Minerals have a number of physical properties, some of which are useful for mineral identification.

Answer Choices

A. Most minerals show a characteristic crystal form that results from the way their atoms are arranged in the crystal structure.

B. Luster is a good guide to the identity of glassy and metallic minerals, but not those that have dull or earthy appearance.

C. Some minerals characteristically split along one or more smooth planes of cleavage while others typically fracture unevenly.

D. For many minerals, the streak formed by a rubbing a mineral sample on unglazed porcelain is a more reliable guide for identification that the color of the sample.

E. The relative hardness of a mineral as determined by Mohs' scale is very useful for identifying a mineral sample.

F. Quartz has a characteristic crystal form, but no cleavage and its color varies widely from sample to sample, all of which make it a typical mineral.

【Paragraph 1】In the 1920s, Aleksandr Oparin, a Russian biochemist, proposed and developed the idea that life originated in the warm, watery environment of early Earth’ s surface, under an atmosphere mostly composed of methane. The early seas were believed by Oparin to be rich in simple organic molecules, which reacted to form more complex molecules, eventually leading to proteins and life. Then, almost 30 years after Oparin published his ideas, Stanley Miller demonstrated that amino acids, the building blocks of the proteins necessary for life, could form under conditions thought to prevail on early Earth Miller’ s experiment was elegant. He passed electric discharges through a mixture of methane, hydrogen, ammonia, and steam, and when he analyzed the results, found that he had made amino acids. The discharges were a proxy for lightning, the gas mixture an educated guess about what the early atmosphere may have been like. Amino acids cannot replicate themselves, and are not themselves alive. Nevertheless, this experiment has long been recognized as a landmark for understanding a process that must have been one of the important steps in the evolution of life on Earth, the natural synthesis of amino acids However, it now seems likely that Miller’ s experiments may not be directly applicable to the events of the early Archean (that is, early in the geologic eon that lasted from Earth’ s formation until about 2.5 billion years ago).

【Paragraph 2】One of the problems hindering understanding of the origin of life is that environmental conditions on early Earth are not known with any certainty. It is possible to make only reasoned estimates. For example, for some fairly long period of time after formation, perhaps as much as several hundred million years, the surface must have been much hotter than it is today. Continued impacts of meteorites, large and small, would have added further heat energy, and in the earliest part of Earth history the larger impacting bodies may have broken through the cooling crust to expose underlying molten material Large quantities of volcanic gases would have been released into the atmosphere as lavas erupted onto the surface, producing a greenhouse effect far more severe than anything likely to result from human activity. It is quite possible that the early atmosphere was many times as dense as today’ s, and that the seas and oceans were hot. Some have even suggested that because of the high atmospheric pressure, the oceans could have been hotter than the boiling point of water today However, life as we know it is quite sensitive to temperature, and no modern organisms are known to survive much above 100°C It is unlikely that life became established until surface temperatures had decreased to this level, or lower.

【Paragraph 3】Although we do not know the precise composition of the early atmosphere, there has been enough progress made on this subject in recent years that it is possible to say with some certainty that the methane-rich composition envisioned by Oparin, and the methane-ammonia-hydrogen mixture used by Miller in his experiments, are probably not very realistic. Based on studies of our closest neighbor planets, Mars and Venus, and also considering evidence from Earth’ s sedimentary rocks, it seems probable that Earth’ s early atmosphere was rich in carbon dioxide rather than methane. On both Mars and Venus, carbon dioxide is by far the most abundant gas in the atmosphere. On Earth it is a minor constituent. But there is an enormous amount of this compound buried in the sedimentary rocks of Earth’ s crust, enough so that, if it were all released, our atmosphere would be much more like those of our neighboring planets. How did carbon dioxide gas end up in the crust? The answer lies in what geologists refer to as the carbon cycle Through a series of chemical reactions, carbon dioxide from the atmosphere finds itself, in dissolved form, in the oceans. In seawater it combines with calcium to precipitate as calcium carbonate, the main constituent of limestone Over geologic time so much carbon dioxide from the atmosphere has been converted to limestone in this fashion that there is more than 100,000 times as much stored as limestone as there is in the atmosphere.

1. According to paragraph 1, why were Miller's experimental results significant?

A. They explained the chemical composition of Earth during the early Archean

B. They provided evidence of the importance of electrical charges on early Earth

C. They showed how a key step in the evolution of life on Earth might have occurred.

D. They demonstrated that amino acids could be created only in the presence of methane gas

2. According to paragraph 1, in setting up his experiment, Miller assumed each of the following to be true EXCEPT:

A. Earth’ s early atmosphere probably included hydrogen and ammonia

B. Lightning probably occurred on early Earth.

C. Electrical discharges took place deep below early Earth's surface.

D. Water was present in the early Earth

3. In stating that Miller’ s experiment was ” elegant” the author means that the experiment was

A. overly expensive to conduct

B. sophisticated but simple

C. based on incorrect information

D. scientifically unnecessary

4. In paragraph 1, why does the author remark that “Amino acids cannot replicate themselves, and are not themselves alive” ?

A. To suggest that other researchers were unable to reproduce Miller’ s experimental results

B. To establish the fact that Miller's experiment did not fully explain the origins of life

C. To point out an error in Miller’ s educated guess about what the early atmosphere was like

D. To support a statement about the importance of Miller’ s experiment

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

O In spite of this

O It is obvious that

O By comparison

O Therefore

6. The phrase “more severe “ in the passage is closest in meaning to

A. longer lasting

B. better defined

C. worse

D. stranger

7. According to paragraph 2, which of the following could have made it possible for oceans on early Earth to be hotter

than 100°C?

A. The absence of any established life-forms

B. The heat added to the water by molten lavas

C. High pressure within the atmosphere

D. The composition of the ocean water

8. Select the TWO answer choices that, according to paragraph 2, describe effects that would have resulted from the impacts of meteorites on early Earth. To receive credit, you must select TWO answers

A. Materials beneath the surface became molten.

B. Seas and oceans became larger.

C. Heat was added to Earth's surface.

D. Volcanic gases were added to the atmosphere

9. Paragraph 2 supports which of the following ideas about life on Earth?

A. Life on Earth probably first became established below the surface.

B. Life probably did not get established until several hundred million years after Earth's formation.

C. The earliest forms of life to become established were probably more sensitive to temperature than modern organisms are.

D. Meteorites were probably responsible for bringing the first organisms to Earth

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. Because we still know little about the precise composition of Earth's early atmosphere, we cannot evaluate Oparin's theory or Miller's methane-ammonia-hydrogen experiment

B. Current knowledge suggests that Oparin and Miller were wrong about the composition of Earth's early atmosphere.

C. We now know that it was very unrealistic of Oparin and Miller to think that they could identify the precise methane-rich mixture that made up the early atmosphere.

D. Recent progress in understanding Earth's early history indicates that both Oparin and Miller clearly envisioned the precise atmospheric composition of early Earth

Although we do not know the precise composition of the early atmosphere, there has been enough progress made on this subject in recent years that it is possible to say with some certainty that the methane-rich composition envisioned by Oparin, and the methane-ammonia-hydrogen mixture used by Miller in his experiments, are probably not very realistic. Based on studies of our closest neighbor planets, Mars and Venus, and also considering evidence from Earth's sedimentary rocks, it seems probable that Earth's early atmosphere was rich in carbon dioxide rather than methane. On both Mars and Venus, carbon dioxide is by far the most abundant gas in the atmosphere. On Earth it is a minor constituent. But there is an enormous amount of this compound buried in the sedimentary rocks of Earth’ s crust, enough so that, if it were all released, our atmosphere would be much more like those of our neighboring planets. How did carbon dioxide gas end up in the crust? The answer lies in what geologists refer to as the carbon cycle Through a series of chemical reactions, carbon dioxide from the atmosphere finds itself, in dissolved form, in the oceans. In seawater it combines with calcium to precipitate as calcium carbonate, the main constituent of limestone Over geologic time so much carbon dioxide from the atmosphere has been converted to limestone in this fashion that there is more than 100,000 times as much stored as limestone as there is in the atmosphere.

11. According to paragraph 3, what is the significance of the fact that the rocks of Earth's crust now contain an enormous amount of calcium carbonate?

A. It explains why Oparin and Miller believed that Earth's early atmosphere was methane rich.

B. It supports the idea that the atmosphere of early Earth was rich in carbon dioxide.

C. It helps explain where the carbon dioxide in Earth’ s atmosphere came from

D. It provides evidence about the likely composition of the crust of early Earth.

12. The word “fashion” in the passage is closest in meaning to

A. period

B. composition

C. way

D. view

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

Oparin, however, had no experimental evidence for the processes he proposed.

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

Conditions on Earth When Life Began

In the 1920s, Aleksandr Oparin, a Russian biochemist, proposed and developed the idea that life originated in the warm, watery environment of early Earth’ s surface, under an atmosphere mostly composed of methane 【A】.The early seas were believed by Oparin to be rich in simple organic molecules, which reacted to form more complex molecules, eventually leading to proteins and life 【B】.Then, almost 30 years after Oparin published his ideas, Stanley Miller demonstrated that amino acids, the building blocks of the proteins necessary for life, could form under conditions thought to prevail on early Earth.【C】 Miller's experiment was elegant. He passed electric discharges through a mixture of methane, hydrogen, ammonia, and steam, and when he analyzed the results, found that he had made amino acids. 【D】The discharges were a proxy for lightning, the gas mixture an educated guess about what the early atmosphere may have been like. Amino acids cannot replicate themselves, and are not themselves alive Nevertheless, this experiment has long been recognized as a landmark for understanding a process that must have been one of the important steps in the evolution of life on Earth, the natural synthesis of amino acids However, it now seems likely that Miller’ s experiments may not be directly applicable to the events of the early Archean (that is, early in the geologic eon that lasted from Earth’ s formation until about 2.5 billion years ago)

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Building on Oparin' s ideas about how life began on Earth, Miller' s 1950s research showed that natural processes could have formed amino acids.

Answer Choices

A. It now seems likely that conditions on early Earth differed in important ways from those that Miller tried to simulate in his experiment

B. Life could not have become established in the early Archean without the greenhouse effect produced by the volcanic gases that were released into the atmosphere.

C. The amount of calcium carbonate in sedimentary rock suggests that the early atmosphere was probably rich in carbon dioxide rather than methane.

D. Neither Oparin nor Miller considered the role that meteorites would have played in determining environmental conditions on early Earth

E. Temperatures in the seas and oceans of early Earth were probably high and had to cool for life to become established

F. Like the atmospheres on Mars and Venus, Earth's atmosphere today remains substantially unchanged from what it was in the early period after the planets formed

Grasses of the Prairie

【Paragraph 1】Around 140 species of grasses naturally occur in the arid Great Plains grasslands of North America One key to the prairie grasses' success is their ability to conserve water in a dry environment. Like most plants, grasses take in water through their roots and lose it as water vapor through tiny mouth-shaped valves, or stomata, in their leaves. The larger the surface of the leaf and the more stomata it bears, the greater the risk that the plant will lose too much moisture through evaporation and collapse Grasses are protected from this trauma by having a reduced number of stomata and by the design of their leaves, which take the form of narrow blades What' s more, the surfaces of these reduced leaves are often modified—corrugated with ridges or covered in hairs-so that the wind can' t sweep across the surface and draw out moisture The roughened surface holds a thin layer of humid air next to the leaf and thus helps to reduce the "evaporative demand," or drying power, of the atmosphere. Some grasses, including western wheatgrass, June grass, and blue grama, roil up the edges of their leaves during times of drought to help keep their tissues from drying out.

【Paragraph 2】Why aren' t the stomata kept tightly closed to seal moisture inside the leaf? The reason is that the stomata also supply plants with fresh air for photosynthesis. If plants sealed their stomata, this life-sustaining process would come to a halt for lack of carbon dioxide. But if the stomata are thrown wide open, the plants risk death due to the loss of moisture through their gaping valves. Prairie grasses resolve this dilemma by strategic scheduling. In the fierce blaze of the midday sun, the stomata close so that water vapor is held in and carbon dioxide is kept out. In this state, the leaf can capture solar energy and store it in energy-rich molecules (a process that requires sunlight but not carbon dioxide). Then, in the cool of the evening, when the evaporative demand drops off, the stomata snap open, letting water vapor trickle out but also permitting carbon dioxide to flood into the leaf By mobilizing the energy that was stockpiled earlier in the day, the leaf uses this carbon dioxide to manufacture the sugars and other molecules that it needs for growth (a process that can be accomplished in total darkness). The result is that prairie grasses are partially nocturnal: they do most of their growing at night or in the early hours of the morning.

【Paragraph 3】Prairie grasses also have another ingenious way of evading the demands of the sun. Like many grassland creatures (prairie dogs, ground squirrels, cottontails, badgers, and so on), they take refuge underground What we think of as "grass' ' -the aboveground leaves and stems-actually constitutes less than half of the organism Between 60 and 80 percent of the plant, by weight, typically grows below ground. A 3-meter stand of big bluestem is anchored underground by a mass of coarse, fibrous roots that reaches as much as 3 6 meters into the earth Blue grama, for its part, seldom lifts its seed heads very far above the ground, but its network of fine, branching roots can sometimes probe the soil for water almost two meters down.

【Paragraph 4】These extensive systems of roots push thirstily through the soil, intent on sucking up every available drop of water. But if the soil is very dry, as it is during periods of drought, the roots can' t draw in enough moisture to keep pace with losses from the stomata. Grasses respond by transferring their most valuable resources (including sugars and proteins) from their leaves into their roots and, especially, into their rhizomes (underground stems). Dead to the world above ground-withered and crisp-the plants live frugally below the surface, drawing on their cached supplies and biding their time until the weather improves When the rains eventually return, as they inevitably do, the grasses explode into action, sending out fresh rhizomes, which in turn put out fresh leaves and roots, to produce a burgeoning network of tender growth. The amazingly resilient blue grama can revive from dormancy, become green, and grow on as little as five millimeters of rainfall.

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

A. possibility

B. damage

C. thirst

D. excess

2. In paragraph 1, why does the author mention ridges and hairs?

A. To argue that these characteristics are not found on larger leaf surfaces

B. To identify additional characteristics that help leaves conserve moisture

C. To indicate the possible locations of stomata

D. To provide examples of types of reduced leaves

3. What is the dilemma mentioned in the opening sentence of paragraph 3?

A. Prairie plants need to be close to each other but the more plants there are in an area, the more difficult it is for each of them to get enough moisture for photosynthesis

B. Plants open the stomata to let in energy from the sun, but this sometimes leads to a buildup of too much carbon dioxide.

C. When plants open their stomata, they lose water, but when they keep them closed, they cannot collect carbon dioxide for photosynthesis

D. |n strong heat and sunlight, plants need to close their stomata, but this uses so much energy that the plants cannot grow strong

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

A. not needed

B. produced

C. stored up

D. inactive

5. In paragraph 3, why does the author include the phrase can be accomplished in total darkness?

A. To explain how prairie grasses are able to grow without losing a great deal of moisture

B. To emphasize the damaging effects that sunlight can have on sugars and other molecules needed for growth

C. To point out how even a little bit of light can interfere with the plant’ s ability to collect carbon dioxide

D. To show that nocturnal growth is stimulated only after prairie grasses have collected moisture from the evening air

6. According to paragraph 3, prairie grasses do each of the following during the night EXCEPT

A. collect and store energy

B. manufacture sugars

C. open the stomata

D. gather carbon dioxide

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

A. extended

B. fed

C. given strength

D. held in place

8. According to paragraph 4, why do prairie dogs, ground squirrels, and other grassland creatures burrow underground?

A. To find grass roots to eat

B. To hide from predators

C. To look for water

D. To avoid the sun

9. According to paragraph 4. what do people often not realize about grass?

A. Much of the grass plant lives below ground

B. The heaviest part of the plant is above ground

C. Its seed heads are very far above the ground

D. Less than half of all grasses have aboveground leaves and stems.

10. Paragraph 5 suggests that when there is plenty of water available in the soil, grasses

A. lose many of their rhizomes

B. store sugars and proteins in their leaves

C. use as little energy as possible

D. take in moisture mostly through the stomata

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

【Paragraph 4】These extensive systems of roots push thirstily through the soil, intent on sucking up every available drop of water. But if the soil is very dry, as it is during periods of drought, the roots can' t draw in enough moisture to keep pace with losses from the stomata. Grasses respond by transferring their most valuable resources (including sugars and proteins) from their leaves into their roots and, especially, into their rhizomes (underground stems). Dead to the world above ground-withered and crisp-the plants live frugally below the surface, drawing on their cached supplies and biding their time until the weather improves. When the rains eventually return, as they inevitably do, the grasses explode into action, sending out fresh rhizomes, which in turn put out fresh leaves and roots, to produce a burgeoning network of tender growth. The amazingly resilient blue grama can revive from dormancy, become green, and grow on as little as five millimeters of rainfall.

A. Until the weather improves, the plant must grow many new leaves to replace those that have died above the surface

B. When the weather changes suddenly, the parts of the plants that are not protected by the ground may wither and die from the shock

C. The plants still surviving underground will, when the weather improves, take the place of other plants that have died.

D. Until the weather improves, plants that appear lifeless survive underground by using their stored supplies economically

12. The word "resilient" in the passage is closest in meaning to

O quick to recover

O brightly colored

O fast growing

O complex

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

Leaf design, then, is valuable in moisture retention, but it is not the only effective strategy.

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

Grasses of the Prairie

Around 140 species of grasses naturally occur in the arid Great Plains grasslands of North America One key to the prairie grasses' success is their ability to conserve water in a dry environment. Like most plants, grasses take in water through their roots and lose it as water vapor through tiny mouth-shaped valves, or stomata, in their leaves. The larger the surface of the leaf and the more stomata it bears, the greater the risk that the plant will lose too much moisture through evaporation and collapse.【A】Grasses are protected from this trauma by having a reduced number of stomata and by the design of their leaves, which take the form of narrow blades. 【B】What's more, the surfaces of these reduced leaves are often modified-corrugated with ridges or covered in hairs-so that the wind can't sweep across the surface and draw out moisture. 【C】The roughened surface holds a thin layer of humid air next to the leaf and thus helps to reduce the "evaporative demand," or drying power, of the atmosphere. 【D】Some grasses, including western wheatgrass, June grass, and blue grama, roll up the edges of their leaves during times of drought to help keep their tissues from drying out.

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Grasses that live in the arid conditions of the prairie must develop ways to grow and produce energy while conserving moisture.

Answer Choices

A. Prairie grasses have developed broad, smooth leaves with plentiful stomata so that they are able to collect enough carbon dioxide to live in arid climates.

B. Prairie grasses close their stomata during the day to prevent the loss of moisture and open them at night to collect carbon dioxide

C. Extensive underground root and stem systems allow prairie grasses to draw moisture from the soil and to store valuable resources away from the sun.

D. Prairie grasses' abundant seed heads allow them to take advantage of the windstorms that commonly sweep across the prairie, carrying their seeds to more-favorable locations

E. Prairie grasses depend on the tunneling abilities of other grassland creatures to loosen the soil and create room for the grasses' massive underground root and stem systems

F. Prairie grasses conserve energy during periods of drought by entering a period of dormancy and grow quickly when rainfall becomes available again.