TPO42
Reading

Geographic Isolation of Species

Biologist Ernst Mayr defined a species as “an actually or potentially interbreeding population that does not interbreed with other such populations when there is opportunity to do so.”A key event in the origin of many species is the separation of a population with its gene pool (all of the genes in a population at any one time) from other populations of the same species, thereby preventing population interbreeding With its gene pool isolated, a separate population can follow its own evolutionary course. In the formation of many species, the initial isolation of a population seems to have been a geographic barrier This mode of evolving new species is called allopatric speciation.

Many factors can isolate a population geographically.A mountain range may emerge and gradually split a population of organisms that can inhabit only lowland lakes, certain fish populations might become isolated in this way. Similarity, a creeping glacier may gradually divide a population, or a land bridge such as the Isthmus of Panama may form and separate the marine life in the ocean waters on either side.

How formidable must a geographic barrier be to keep populations apart? It depends on the ability of the organisms to move across barriers.Birds and coyotes can easily cross mountains and rivers. The passage of wind-blown tree pollen is also not hindered by such barriers, and the seeds of many plants may be earned back and forth on animals In contrast, small rodents may find a deep canyon or a wide river an effective barrier. For example, the Grand Canyon, in the southwestern United Slates, separate the range of the while-tailed antelope squirrel from that of the closely related Harris’ antelope squirrel. Smaller, with a shorter tail that is white underneath, the white-tailed antelope squirrel inhabits deserts north of the canyon and west of the Colorado River in southern California Hams' antelope squirrel has a more limited range in deserts south of the Grand Canyon.

Geographic isolation creates opportunities for new species to develop, but it does not necessarily lead to new species because speciation occurs only when the gene pool undergoes enough changes to establish reproductive barriers between the isolated population and its parent population.The likelihood of allopatric speciation increases when a population is small as well as isolated, making it more likely than a large population to have its gene pool changed substantially. For example,in less than two million years, small populations of stray animals and plants from the South American mainland that managed to colonize the Galapagos Islands gave rise to all the species that now inhabit the islands.

When oceanic islands are far enough apart to permit populations to evolve in isolation, but close enough to allow occasional dispersions to occur, they are effectively outdoor laboratories of evolution.The Galapagos island chain is one of the world s greatest showcases of evolution Each island was born from underwater volcanoes and was gradually covered by organisms derived from strays that rode the ocean currents and winds from other islands and continents. Organisms can also be carried to islands by other organisms, such as sea birds that travel long distances with seeds clinging to their feathers.

The species on the Galapagos Islands today, most of which occur nowhere else, descended from organisms that floated, flew, or were blown over the sea from the South American mainland For instance, the Galapagos island chain has a total of thirteen species of closely related birds called Galapagos finches These birds have many similarities but differ in their feeding habits and their beak type, which is correlated with what they eat Accumulated evidence indicates that all thirteen finch species evolved from a single small population of ancestral birds that colonized one of the islands.Completely isolated on the island after migrating from the mainland, the founder population may have undergone significant changes in its gene pool and become a new species. Later, a few individuals of this new species may have been blown by storms to a neighboring island. Isolated on this second island, the second founder population could have evolved into a second new species, which could later recolonize the island from which its founding population emigrated.Today each Galapagos island has multiple species of finches, with as many as ten on some islands.

paragraph 1

Biologist Ernst Mayr defined a species as “an actually or potentially interbreeding population that does not interbreed with other such populations when there is opportunity to do so.” A key event in the origin of many species is the separation of a population with its gene pool (all of the genes in a population at any one time) from other populations of the same species, thereby preventing population interbreeding With its gene pool isolated, a separate population can follow its own evolutionary course. In the formation of many species, the initial isolation of a population seems to have been a geographic barrier This mode of evolving new species is called allopatric speciation.

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

A.early B.crucial C.noticeable D.frequent

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

A.best B.usual C.first D.actual

3.According to paragraph 1. allopatric speciation is possible when

A. a population contains all the different genes present in a species at a particular time
B. a population becomes isolated due to the presence of a geographic barrier
C. genetic mixing begins to occur in previously separate populations of a species
D. a species is successful in crossing a geographic barrier

paragraph 1&2

Biologist Ernst Mayr defined a species as “an actually or potentially interbreeding population that does not interbreed with other such populations when there is opportunity to do so.”A key event in the origin of many species is the separation of a population with its gene pool (all of the genes in a population at any one time) from other populations of the same species, thereby preventing population interbreeding With its gene pool isolated, a separate population can follow its own evolutionary course. In the formation of many species, the initial isolation of a population seems to have been a geographic barrier This mode of evolving new species is called allopatric

speciation.

Many factors can isolate a population geographically. A mountain range may emerge and gradually split a population of organisms that can inhabit only lowland lakes, certain fish populations might become isolated in this way. Similarity, a creeping glacier may gradually divide a population, or a land bridge such as the Isthmus of Panama may form and separate the marine life in the ocean waters on either side.

4.How is paragraph *2* related to paragraph 1?

A. Paragraph 2 points out a number of ways in which the phenomenon of geographic isolation mentioned in paragraph 1 can occur
B. Paragraph 2 identifies discoveries that led to the conclusion presented in paragraph 1 that geographic isolation has played a rote in the origin of many species
C. Paragraph 2 provides evidence supporting the statement in paragraph 1 that a population can follow its own evolutionary course once its gene pool becomes isolated
D. Paragraph 2 explains why the term “allopatric” was adopted to describe the method of speciation described in paragraph 1

paragraph 3

How formidable must a geographic barrier be to keep populations apart? It depends on the ability of the organisms to move across barriers. Birds and coyotes can easily cross mountains and rivers. The passage of wind-blown tree pollen is also not hindered by such barriers, and the seeds of many plants may be earned back and forth on animals In contrast, small rodents may find a deep canyon or a wide river an effective barrier. For example, the Grand Canyon, in the southwestern United Slates, separate the range of the while-tailed antelope squirrel from that of the closely related Harris’ antelope squirrel. Smaller, with a shorter tail that is white underneath, the white-tailed antelope squirrel inhabits deserts north of the canyon and west of the Colorado River in southern California Hams' antelope squirrel has a more limited range in deserts south of the Grand Canyon.

5.In paragraph 3, the author contrasts a variety of organisms to illustrate which of the following points?

A. Geographic barriers are less likely to keep apart populations of plants than populations of animals.
B. Geographic barriers are more likely to keep apart populations of large organisms than populations of small organisms
C. Some members of a species are able to cross geographic barriers, while other members of the same species are not.
D. The effectiveness of geographic barriers in keeping organisms apart depends on an organism’s ability to move across barriers.

6.Paragraph 3 supports the idea that white-tailed antelope squirrels and Hams' antelope squirrels have which of the following in common?

A. They are the two smallest rodents now found in the southwestern United States.

B. They have white coloring underneath their tails

C. They cannot cross the Grand Canyon

D. They cannot survive in desert conditions

paragraph 4

Geographic isolation creates opportunities for new species to develop, but it does not necessarily lead to new species because speciation occurs only when the gene pool undergoes enough changes to establish reproductive barriers between the isolated population and its parent population. The likelihood of allopatric speciation increases when a population is small as well as isolated, making it more likely than a large population to have its gene pool changed substantially. For example, in less than two million years, small populations of stray animals and plants from the South American mainland that managed to colonize the Galapagos Islands gave rise to all the species that now inhabit the islands.

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

A.experiences B.allows C.prevents D.causes

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. Geographic isolation is sometimes but not always the reason for the creation of reproductive barriers between a parent population and the populations descended from it

B. Genetic changes in a geographical isolated population do not necessarily make the population look different enough from its parent population to be considered a new species

C. Geographical isolation allows the separated populations to evolve independently of each other and so can lead to the formation of new species

D. Geographic isolation can lead to new species only if the gene pool of the isolated population changes enough to prevent it from reproducing with the parent population

9.According to paragraph 4, why does the size of a population affect the likelihood of allopatric speciation?

A. Because smaller populations are more likely than larger ones to become geographically isolated

B. Because the gene pool of a small isolated population is more likely to undergo substantial change than is the gene pool of a larger population

C. Because a isolated population can become a new species with substantially less change to its gene pool than would be required by a larger population

D. Because smaller populations are more likely to be made up of stray animals or plants than larger populations are

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

A.were able B.were forced C.arrived D.expanded

paragraph 5

When oceanic islands are far enough apart to permit populations to evolve in isolation, but close enough to allow occasional dispersions to occur, they are effectively outdoor laboratories of evolution. The Galapagos island chain is one of the world s greatest showcases of evolution Each island was born from underwater volcanoes and was gradually covered by organisms derived from strays that rode the ocean currents and winds from other islands and continents. Organisms can also be carried to islands by other organisms, such as sea birds that travel long distances with seeds clinging to their feathers.

11.Paragraph 5 supports the idea that the Galapagos island chain was able to become "one of the world's greatest showcases of evolution" primarily because of

A. the richness of the volcanic soil of each of the islands in the chain
B. the distance of the individual islands from each other and from the mainland
C. the relativity long time it took for the islands to become covered by organisms
D. the outdoor laboratories that scientists have built on the islands to study evolution

paragraph 6

The species on the Galapagos Islands today, most of which occur nowhere else, descended from organisms that floated, flew, or were blown over the sea from the South American mainland For instance, the Galapagos island chain has a total of thirteen species of closely related birds called Galapagos finches These birds have many similarities but differ in their feeding habits and their beak type, which is correlated with what they eat Accumulated evidence indicates that all thirteen finch species evolved from a single small population of ancestral birds that colonized one of the islands. Completely isolated on the island after migrating from the mainland, the founder population may have undergone significant changes in its gene pool and become a new species. Later, a few individuals of this new species may have been blown by storms to a neighboring island. Isolated on this second island, the second founder population could have evolved into a second new species, which could later recolonize the island from which its founding population emigrated. Today each Galapagos island has multiple species of finches, with as many as ten on some islands.

12.According to paragraph 6. what is true about the thirteen species of Galapagos finches?

A. All thirteen species are now found on most of the Galapagos Islands
B. All thirteen species are descended from the same population of ancestral birds
C. All thirteen species evolved on the island that was originally colonized by finches from the mainland.
D. All thirteen species occur only in small, completely isolated populations.

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

This process of speciation and colonization could have been repeated over and over again, gradually involving all the islands in the chain.

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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.

The geographic isolation of a population can result in the rise of a new species.

Answer Choices

A.Isolation can result when a geographic barrier forms and splits a population or when a few organisms somehow get carried across an existing geographic barrier and form a new population

B.Speciation is more likely when an isolated population is small because significant genetic changes are more likely to occur in a small population than in a large one

C.Because of the geographic isolation of the Galapagos Islands, the species that now inhabit them have gene pools that have not changed very much since the islands were first populated.

D.Fish populations are more easily isolated by geographic barriers than are populations of most other organisms because fish cannot move across areas where there is no water.

E.The Galapagos Islands are well situated for speciation because they provide opportunities for population isolation while also making occasional dispersions between islands possible.

F.Evidence indicates that the first organisms to reach the Galapagos Islands were probably a small population of finches that,in less than two million years of isolation,evolved into thirteen species.

Explaining Dinosaur Extinction

Dinosaurs rapidly became extinct about 65 million years ago as part of a mass extinction known as the K-T event, because it is associated with a geological signature known as the K-T boundary, usually a thin band of sedimentation found in various parts of the world (K is the traditional abbreviation for the Cretaceous, derived from the German name *Kreidezeit).* Many explanations have been proposed for why dinosaurs became extinct. For example, some have blamed dinosaur extinction on the development of flowering plants, which were supposedly more difficult to digest and could have caused constipation or indigestion—except that flowering plants first evolved in the Early Cretaceous, about 60 million years before the dinosaurs died out. In fact, several scientists have suggested that the duckbill dinosaurs and homed dinosaurs, with their complex battery of grinding teeth, evolved to exploit this new resource of rapidly growing flowering plants Others have blamed extinction on competition from the mammals, which allegedly ate all the dinosaur eggs—except that mammals and dinosaurs appeared at the same time in the Late Triassic, about 190 million years ago, and there is no reason to believe that mammals suddenly acquired a taste for dinosaur eggs after 120 million years of coexistence Some explanations (such as the one stating that dinosaurs all died of diseases) fail because there is no way to scientifically test them, and they cannot move beyond the realm of speculation and guesswork.

This focus on explaining dinosaur extinction misses an important point the extinction at the end of the Cretaceous was a global event that killed off organisms up and down the food chain. It wiped out many kinds of plankton in the ocean and many marine organisms that lived on the plankton at the base of the food chain. These included a variety of clams and snails, and especially the ammonites, a group of shelled squidlike creatures that dominated the Mesozoic seas and had survived many previous mass extinctions. The K-T event marked the end of the marine reptiles, such as the mosasaurs and the plesiosaurs, which were the largest creatures that had ever lived in the seas and which ruled the seas long before whales evolved. On land, there was also a crisis among the land plants, in addition to the disappearance of dinosaurs. So any event that can explain the destruction of the base of the food chain (plankton in the ocean, plants on land) can better explain what happened to organisms at the top of the food chain, such as the dinosaurs. By contrast, any explanation that focuses strictly on the dinosaurs completely misses the point The Cretaceous extinctions were a global phenomenon, and dinosaurs were just a part of a bigger picture.

According to one theory, the Age of Dinosaurs ended suddenly 65 million years ago when a giant rock from space plummeted to Earth. Estimated to be ten to fifteen kilometers in diameter, this bolide (either a comet or an asteroid) was traveling at cosmic speeds of 20-70 kilometers per second, or 45,000-156,000 miles per hour. Such a huge mass traveling at such tremendous speeds carries an enormous amount of energy. When the bolide struck this energy was released and generated a huge shock wave that leveled everything for thousands of kilometers around the impact and caused most of the landscape to burst into flames. The bolide struck an area of the Yucatan Peninsula of Mexico known as Chicxulub, excavating a crater 15-20 kilometers deep and at least 170 kilometers in diameter. The impact displaced huge volumes of seawater, causing

much flood damage in the Caribbean. Meanwhile, the bolide itself excavated 100 cubic kilometers of rock and debris from the site, which rose to an altitude of 100 kilometers. Most of it fell back immediately, but some of it remained as dust in the atmosphere for months. This material, along with the smoke from the fires, shrouded Earth, creating a form of nuclear winter. According to computerized climate models, global temperatures fell to near the freezing point, photosynthesis halted, and most plants on land and in the sea died. With the bottom of the food chain destroyed, dinosaurs could not survive.

paragraph 1

Dinosaurs rapidly became extinct about 65 million years ago as part of a mass extinction known as the K-T event, because it is associated with a geological signature known as the K-T boundary, usually a thin band of sedimentation found in various parts of the world (K is the traditional abbreviation for the Cretaceous, derived from the German name *Kreidezeit).* Many explanations have been proposed for why dinosaurs became extinct. For example, some have blamed dinosaur extinction on the development of flowering plants, which were supposedly more difficult to digest and could have caused constipation or indigestion—except that flowering plants first evolved in the Early Cretaceous, about 60 million years before the dinosaurs died out. In fact, several scientists have suggested that the duckbill dinosaurs and homed dinosaurs, with their complex battery of grinding teeth, evolved to exploit this new resource of rapidly growing flowering plants Others have blamed extinction on competition from the mammals, which allegedly ate all the dinosaur eggs—except that mammals and dinosaurs appeared at the same time in the Late Triassic, about 190 million years ago, and there is no reason to believe that mammals suddenly acquired a taste for dinosaur eggs after 120 million years of coexistence Some explanations (such as the one stating that dinosaurs all died of diseases) fail because there is no way to scientifically test them, and they cannot move beyond the realm of speculation and guesswork.

1. In paragraph 1, why does the author include a discussion of when flowering plants evolved?

A. To help explain why some scientists believe that the development of flowering plants led to dinosaur extinction

B. To cast doubt on the theory that the development of flowering plants caused dinosaurs to become extinct

C. To suggest that dinosaurs were able to survive for as long as they did because of the availability of flowering plants

D. To emphasize that duckbill dinosaurs and horned dinosaurs were the first dinosaurs to become extinct

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

A. inevitably

B. gradually

C. Supposedly

D. Increasingly

3. According to paragraph 1 the extinction of the dinosaurs is unlikely to have been the result of competition from mammals because

A. mammals would not have been capable of eating dinosaur eggs

B. mammals did not appear in any significant numbers until after the Late Triassic

C. mammals and dinosaurs did not, in fact, compete for any of the same resources
D. mammals and dinosaurs lived together for roughly 120 million years before the extinction

paragraph 2

This focus on explaining dinosaur extinction misses an important point the extinction at the end of the Cretaceous was a global event that killed off organisms up and down the food chain. It wiped out many kinds of plankton in the ocean and many marine organisms that lived on the plankton at the base of the food chain. These included a variety of clams and snails, and especially the ammonites, a group of shelled squidlike creatures that dominated the Mesozoic seas and had survived many previous mass extinctions. The K-T event marked the end of the marine reptiles, such as the mosasaurs and the plesiosaurs, which were the largest creatures that had ever lived in the seas and which ruled the seas long before whales evolved. On land, there was also a crisis among the land plants, in addition to the disappearance of dinosaurs. So any event that can explain the destruction of the base of the food chain (plankton in the ocean, plants on land) can better explain what happened to organisms at the top of the food chain, such as the dinosaurs. By contrast, any explanation that focuses strictly on the dinosaurs completely misses the point The Cretaceous extinctions were a global phenomenon, and dinosaurs were just a part of a bigger picture.

paragraph 3

According to one theory, the Age of Dinosaurs ended suddenly 65 million years ago when a giant rock from space plummeted to Earth. Estimated to be ten to fifteen kilometers in diameter, this bolide (either a comet or an asteroid) was traveling at cosmic speeds of 20-70 kilometers per second, or 45,000-156,000 miles per hour. Such a huge mass traveling at such tremendous speeds carries an enormous amount of energy. When the bolide struck this energy was released and generated a huge shock wave that leveled everything for thousands of kilometers around the impact and caused most of the landscape to burst into flames. The bolide struck an area of the Yucatan Peninsula of Mexico known as Chicxulub, excavating a crater 15-20 kilometers deep and at least 170 kilometers in diameter. The impact displaced huge volumes of seawater, causing much flood damage in the Caribbean. Meanwhile, the bolide itself excavated 100 cubic kilometers of rock and debris from the site, which rose to an altitude of 100 kilometers. Most of it fell back immediately, but some of it remained as dust in the atmosphere for months. This material, along with the smoke from the fires, shrouded Earth, creating a form of nuclear winter. According to computerized climate models, global temperatures fell to near the freezing point, photosynthesis halted, and most plants on land and in the sea died. With the bottom of the food chain destroyed, dinosaurs could not survive.

4. According to paragraph 2, what is problematic about some scientists' focus on dinosaur extinction?
A. Dinosaurs became extinct so long ago that no theory about their disappearance can be proven scientifically.
B. Dinosaurs were not the only organisms that went extinct at the end of the Cretaceous period.
C. More marine organisms went extinct during the Cretaceous than did dinosaur species.
D. It is more important to understand how plankton and other marine organisms came to thrive

during the Cretaceous period.

5. According to paragraph 2, each of the following became extinct during the K-T event EXCEPT
A. early species of whales
B. marine reptiles
C. various species of clams
D. many species of land plants

6. What makes the extinction of “the ammonites” especially significant?
A. They were among the largest creatures that ever lived.
B. They existed at the lowest level of the food chain.
C. They had been able to survive in the Mesozoic seas.
D. They had survived many previous mass extinctions.

7. The word “halted” in the passage is closest in meaning to
A. slowed
B. stopped
C. contracted
D. declined

8. The word “strictly" in the passage is closest in meaning to
A. exclusively
B. mainly
C. initially
D. Wrongly

9. The word “crisis” in the passage is closest in meaning to
A. collapse
B. disturbance
C. critical situation
D. loss

10. How does paragraph 3 relate to paragraph 2?
A. Paragraph 3 provides an alternative explanation to the one provided in paragraph 2.
B. Paragraph 3 provides an explanation that satisfies the conditions set forth in paragraph 2.
C. Paragraph 3 provides the facts to support the theory presented in paragraph 2.
D. Paragraph 3 presents a theory that calls into question the position described in paragraph 2.

paragraph 3

According to one theory, the Age of Dinosaurs ended suddenly 65 million years ago when a giant rock from space plummeted to Earth. Estimated to be ten to fifteen kilometers in diameter, this bolide (either a comet or an asteroid) was traveling at cosmic speeds of 20-70 kilometers per second, or 45,000-156,000 miles per hour. Such a huge mass traveling at such tremendous speeds carries an enormous amount of energy. When the bolide struck this energy was released

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11. Paragraph 3 answers all of the following questions EXCEPT:
A. Why did the bolide fall to Earth?
B. How fast was the bolide traveling?
C. How was the bolide capable of generating a shock wave?
D. How did the bolide cause flood damage to the Caribbean?

12. Paragraph 3 strongly suggests that if the bolide impact theory is correct, the majority of the extinctions associated with the K-T event resulted from
A. sunlight being blocked for months by dust and smoke in Earth's atmosphere
B. widespread flooding that followed the displacement of huge volumes of seawater
C. the leveling of the landscape by the shock wave that was generated when the bolide struck Earth
D. the rise in global temperatures caused by the fires that burned much of the landscape

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

Some explanations seem plausible until the facts are considered.

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

Dinosaurs rapidly became extinct about 65 million years ago as part of a mass extinction known as the K-T event, because it is associated with a geological signature known as the K-T boundary, usually a thin band of sedimentation found in various parts of the world (K is the traditional abbreviation for the Cretaceous, derived from the German name *Kreidezeit).* [■] Many explanations have been proposed for why dinosaurs became extinct. [■] For example, some have blamed dinosaur extinction on the development of flowering plants, which were supposedly more difficult to digest and could have caused constipation or indigestion—except that flowering plants first evolved in the Early Cretaceous, about 60 million years before the dinosaurs died out. [■]In fact, several scientists have suggested that the duckbill dinosaurs and homed dinosaurs, with their complex battery of grinding teeth, evolved to exploit this new resource of rapidly growing flowering plants. [■]Others have blamed extinction on competition

from the mammals, which allegedly ate all the dinosaur eggs—except that mammals and dinosaurs appeared at the same time in the Late Triassic, about 190 million years ago, and there is no reason to believe that mammals suddenly acquired a taste for dinosaur eggs after 120 million years of coexistence Some explanations (such as the one stating that dinosaurs all died of diseases) fail because there is no way to scientifically test them, and they cannot move beyond the realm of speculation and guesswork.

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.**

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

To review the passage, click **VIEW TEXT.**

Over the years, scientists have proposed a number of theories as to why dinosaurs suddenly became extinct about 65 million years ago.

Answer Choices

A. Many explanations for dinosaur extinction have been proposed, but most of them are either called into question by known facts or are merely unsupported hypotheses.

B. Focusing on dinosaurs misses the point that the extinction, at about the same time, of the shelled squidlike creatures that dominated the Mesozoic seas was far more scientifically significant.

C. Computerized climate models of global temperature fluctuations support the theory that a huge rock from space hit the Yucatan Peninsula in Mexico about 65 million years ago.

D. Although mammals and dinosaurs appeared at about the same time in the Late Triassic, the K-T event, which marked the end of the dinosaurs, apparently had relatively little impact on mammals.

E. Any satisfactory explanation of the mass extinction of dinosaurs must take into account the fact that the disappearance of the dinosaurs was part of a global mass extinction.

F. A huge bolide striking Earth would have created conditions in which most plants would have died, thus explaining the mass extinction of organisms—including dinosaurs—further up the food chain.

Callisto and Ganymede

From 1996 to 1999, the Galileo spacecraft passed through the Jovian system, providing much information about Jupiter's satellites. Callisto, the outermost of Jupiter's four largest satellites, orbits the planet in seventeen days at a distance from Jupiter of two million kilometers. Like our own Moon. Callisto rotates in the same period as it revolves, so it always keeps the same face toward Jupiter. Its noontime surface temperature is only about -140° C, so water ice is stable on its surface year-round. Callisto has a diameter of 4.820 kilometers, almost the same as that of Mercury. Its mass is only one-third as great, which means its density must be only one-third as great as well. This tells us that Callisto has far less of the rocky metallic materials found in the inner planets and must instead be an icy body through much of its interior.

Callisto has not fully differentiated, meaning separated into layers of different density materials. Astronomers can tell that it lacks a dense core from the details of its gravitational pull on the Galileo spacecraft during several very close flybys. This fact surprised scientists, who expected that all the big icy moons would be differentiated. It is much easier for an icy body to differentiate than for a rocky one, since the melting temperature of ice is so low. Only a little heating will soften the ice and get the process started, allowing the rock and metal to sink to the center and the slushy ice to float to the surface. Yet Callisto seems to have frozen solid before the process of differentiation was complete.

Like our Moon's highlands, the surface of Callisto is covered with impact craters. The survival of these craters tells us that an icy object can form and retain impact craters m its surface. In thinking of ice so far from the Sun, it is important not to judge its behavior from that of the much warmer ice we know on Earth; at the temperatures of the outer solar system, ice on the surface is nearly as hard as rock, and behaves similarly. Ice on Callisto does not deform or flow like ice in glaciers on Earth. Callisto is unique among the planet-sized objects of the solar system in its absence of interior forces to drive geological evolution. The satellite was born dead and has remained geologically dead for more than four billion years.

Ganymede, another of Jupiter's satellites and the largest in our solar system, is also cratered, but less so than Callisto. About one-quarter of its surface seems to be as old and heavily cratered; the rest formed more recently, as we can tell by the sparse covering of impact craters as well as the relative freshness of the craters. Ganymede is a differentiated world, like the terrestrial planets. Measurements of its gravity field tell us that the rock and metal sank to form a core about the size of our Moon, with a mantle and crust of ice floating above it. In addition, the Galileo spacecraft discovered that Ganymede has a magnetic field, the signature of a partially molten interior. Ganymede is not a dead world, but rather a place of continuing geological activity powered by an internal heat source. Much of its surface may be as young as half a billion years.

The younger terrain is the result of tectonic and volcanic forces Some features formed when the crust cracked, flooding many of the craters with water from the interior. Extensive mountain ranges were formed from compression of the crust, forming long ridges with parallel valleys spaced one to two kilometers apart. In some places older impact craters were split and pulled apart. There are even indications of large-scale crustal movements that are similar to the plate tectonics

of Earth.

Why is Ganymede different from Callisto? Possibly the small difference in size and internal heating between the two led to this divergence in their evolution. But more likely the gravity of Jupiter is to blame for Ganymede's continuing geological activity. Ganymede is close enough to Jupiter that tidal forces from the giant planet may have episodically heated its interior and triggered major convulsions on its crust.

paragraph 1

From 1996 to 1999, the Galileo spacecraft passed through the Jovian system, providing much information about Jupiter's satellites. Callisto, the outermost of Jupiter's four largest satellites, orbits the planet in seventeen days at a distance from Jupiter of two million kilometers. Like our own Moon. Callisto rotates in the same period as it revolves, so it always keeps the same face toward Jupiter. Its noontime surface temperature is only about -140° C, so water ice is stable on its surface year-round. Callisto has a diameter of 4.820 kilometers, almost the same as that of Mercury. Its mass is only one-third as great, which means its density must be only one-third as great as well. This tells us that Callisto has far less of the rocky metallic materials found in the inner planets and must instead be an icy body through much of its interior.

1. According to paragraph 1, which of the following statements about Callisto is true?

A. It is the satellite closest to Jupiter's surface

B. Its surface temperature is constant at all times of the day.

C. It has the same mass and diameter as the planet Mercury

D. It completes one rotation every seventeen days.

2. According to paragraph 1, how do scientists know that Callisto is made up largely of ice?

A. A sample of its interior was taken by the Galileo spacecraft in the late 1990s

B. It has too low a density to contain much rocky metallic material

C. With a noontime surface temperature of only about .140° C. the ice on it never melts

D. All of the bodies in the Jovian system are icy, because they are so far from the Sun.

paragraph 2

Callisto has not fully differentiated, meaning separated into layers of different density materials. Astronomers can tell that it lacks a dense core from the details of its gravitational pull on the Galileo spacecraft during several very close flybys. This fact surprised scientists, who expected that all the big icy moons would be differentiated. It is much easier for an icy body to differentiate than for a rocky one, since the melting temperature of ice is so low. Only a little heating will soften the ice and get the process started, allowing the rock and metal to sink to the center and the slushy ice to float to the surface. Yet Callisto seems to have frozen solid before the process of differentiation was complete.

3.Why does the author provide the information that "It is much easier for an icy body to differentiate than for a rocky one"?

A. To support the claim that all of the big icy moons are differentiated

B. To suggest that Callisto may be a rocky body rather than an icy one

C. To explain why scientists expected Callisto to be differentiated

D. To refute the claim that Callisto could not differentiate because it was frozen solid

4. All of the following questions are answered in paragraph 2 EXCEPT:

A. Why was Callisto frozen solid before differentiation was complete?

B. What allows the process of differentiation to get started?

C. Why is it easier for an icy body to differentiate than a rocky one?

D. How do astronomers know that Callisto lacks a dense core?

paragraph 3

Like our Moon's highlands, the surface of Callisto is covered with impact craters. The survival of these craters tells us that an icy object can form and retain impact craters m its surface. In thinking of ice so far from the Sun, it is important not to judge its behavior from that of the much warmer ice we know on Earth; at the temperatures of the outer solar system, ice on the surface is nearly as hard as rock, and behaves similarly. Ice on Callisto does not deform or flow like ice in glaciers on Earth. Callisto is unique among the planet-sized objects of the solar system in its absence of interior forces to drive geological evolution. The satellite was born dead and has remained geologically dead for more than four billion years.

5. 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 should not be assumed that surface ice has the same characteristics wherever it is found

B. Surface ice and rock are much more similar in temperature in the outer solar system than they are on Earth.

C. The further away surface ice is from the Sun, the more its temperature differs from that of the warmer ice on Earth

D. In the cold of the outer solar system, surface ice is so hard it behaves more like rock than like the warmer ice on Earth

6.According to paragraph 3, how is Callisto different from all other planet-sized objects in the solar system?

A. It can form and retain impact craters on its icy surface

B. It has ice glaciers that do not flow or deform.

C. It has never had the interior forces required for geological evolution.

D. It is more than four billion years old.

paragraph 4

Ganymede, another of Jupiter's satellites and the largest in our solar system, is also cratered, but less so than Callisto. About one-quarter of its surface seems to be as old and heavily cratered; the rest formed more recently, as we can tell by the sparse covering of impact craters as well as the relative freshness of the craters. Ganymede is a differentiated world, like the terrestrial planets. Measurements of its gravity field tell us that the rock and metal sank to form a core about the size of our Moon, with a mantle and crust of ice floating above it. In addition, the Galileo spacecraft discovered that Ganymede has a magnetic field, the signature of a partially molten interior. Ganymede is not a dead world, but rather a place of continuing geological activity powered by an internal heat source. Much of its surface may be as young as half a billion years.

7. The word "signature" in the passage is closest in meaning to
A. primary cause
B. end result
C. identifying mark
D. by-product

8. According to paragraph 4, each of the following provides evidence about Ganymede's interior EXCEPT
A. Ganymede's large size
B. measurements of Ganymede's gravity field
C. the fact that Ganymede has a magnetic field
D. the fact that Ganymede continues to be geologically active

paragraph 5

The younger terrain is the result of tectonic and volcanic forces Some features formed when the crust cracked, flooding many of the craters with water from the interior. Extensive mountain ranges were formed from compression of the crust, forming long ridges with parallel valleys spaced one to two kilometers apart. In some places older impact craters were split and pulled apart. There are even indications of large-scale crustal movements that are similar to the plate tectonics of Earth.

9. The word "Extensive" in the passage is closet in meaning to
A. Unusual
B. Large
C. New
D. Steep

10. Paragraph 5 supports each of the following statements about Ganymede EXCEPT:
A. All water on it has always been frozen solid.
B. There is evidence that part of its crust once broke open

C. Its crust has been subject to forces that have created mountains and valleys.
D. Some of its older craters have been split apart by more recent geological activity

paragraph 6

Why is Ganymede different from Callisto? Possibly the small difference in size and internal heating between the two led to this divergence in their evolution. But more likely the gravity of Jupiter is to blame for Ganymede's continuing geological activity. Ganymede is close enough to Jupiter that tidal forces from the giant planet may have episodically heated its interior and triggered major convulsions on its crust.

11. According to paragraph 6, the differences in how Callisto and Ganymede evoked are most probably due to differences in their
A. size and internal heating
B. distance from Jupiter
C. chemical and physical composition
D. age

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

The difference between Ganymede and Callisto, however, extend much further below the surface of the satellites.

Where would the sentence best fit? Click on square [■] to add the sentence to the passage

Ganymede, another of Jupiter's satellites and the largest in our solar system, is also cratered, but less so than Callisto. [■] About one-quarter of its surface seems to be as old and heavily cratered; the rest formed more recently, as we can tell by the sparse covering of impact craters as well as the relative freshness of the craters. [■] Ganymede is a differentiated world, like the terrestrial planets. [■] Measurements of its gravity field tell us that the rock and metal sank to form a core about the size of our Moon, with a mantle and crust of ice floating above it. [■] In addition, the Galileo spacecraft discovered that Ganymede has a magnetic field, the signature of a partially molten interior. Ganymede is not a dead world, but rather a place of continuing geological activity powered by an internal heat source. Much of its surface may be as young as half a billion years.

13. **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.

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

Between 600 B.C. and 450 B.C., Athens changed the distribution of political power between the aristocracy and ordinary citizens.

Callisto

Ganymede

阅读三

Answer Choices

A. It has a core that consists mainly of rock and metal.

B. It may have formed as recently as half a billion years ago

C. Its interior is not fully solid

D. Its evolution has probably been strongly influenced by Jupiter's gravity

E. It always keeps the same face toward Jupiter as it orbits the planet

F. Its crust is covered by slow-moving glaciers

G. Its entire surface is heavily cratered

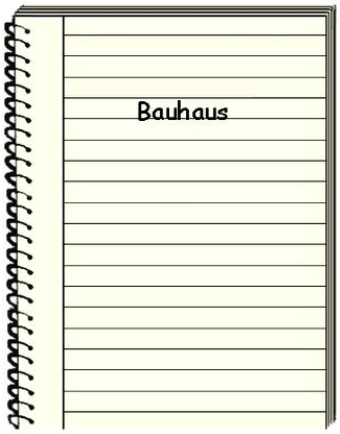
TPO 42 阅读题答案
阅读一
1-5 B C B A D　　6-10 C A D B A　　11-13 B B C
14.ABE

阅读二
1-5 B C D B A　　6-10 D B A C B　　11-12 A A
13 B
14.AEF

阅读三
1-5　D B C A D　　6-10 C C A B A　　11-12　B B
13　**Callisto**：EG；**Ganymede**：CAD

Listening
TPO 42

Conversation1



QUESTIONS

1. **Why does the student want to talk to the professor?**

A. To let him know that she has no background in art
B. To discuss the topic of her art history paper
C. To inform him that she is unable to print out the class syllabus at the computer lab
D. To get another copy of the material from class

2. What point does the professor make about the early Bauhaus school?

A. Its intention was to create a distinctive artistic style.
B. It started out with a focus on architecture.
C. It was conceived as an experiment in education.
D. Its founding director supported traditional classroom teaching.

3. Why does the student mention her German studies?

A. To indicate that she is interested in different fields of study
B. To indicate that she knows about the German art school
C. To explain why she is taking a class about Bauhaus
D. To explain why she thinks Bauhaus centered on architecture

4. What is the professor s opinion about how Bauhaus works should be displayed?

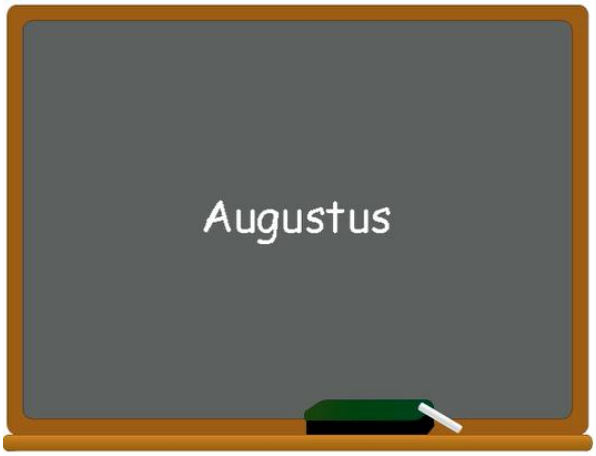
A. They should focus on a famous Bauhaus artist.
B. They should reveal the diversity of the Bauhaus.
C. They should be based on a single Bauhaus technique.
D. They should be arranged by time period

5. What does the professor say about the museum that the student is required to visit?

Click on 2 answers.

A. Its Bauhaus exhibit is organized by themes.
B. Its Bauhaus exhibit will not be there much longer.
C. It offers students a price reduction on Thursday nights.
D. It will probably be quite crowded next weekend.

Lecture 1(Art History)



QUESTIONS

1. What is the main purpose of the lecture?

A. To explain why a particular statue of a Roman emperor is so famous
B. To discuss how classical Greek and Roman statues looked in ancient times
C. To describe the types of pigments Greek and Roman artists applied to statues
D. To explain a shift from monochrome to polychrome statues in ancient times

2. Why does the professor mention statues created by Renaissance artists in fifteenth-century Europe?

A. To emphasize the importance of color in Renaissance works of art
B. To help explain the method used to determine the age of a statue
C. To point out the origin of the belief that ancient marble statues were monochrome
D. To point out that Renaissance artists used other materials besides marble to create statues

3. According to the professor, what are two reasons that ancient statues may no longer have any visible traces of paint?

Click on 2 answers.

.

A. The paint was eroded away.
B. The marble absorbed the paint over time.
C. Museum curators intentionally removed the paint.
D. The paint was accidentally removed during cleaning.

4. What is the professor's opinion about ancient statues that were once painted?

A. They should be judged by their form rather than their color.
B. They should be interpreted with the artists' intentions in mind.
C. They should be fully restored to their original colors.
D. They probably represent only a small minority of classical statues.

5. According to the professor, what is significant about the paint on the statue of Augustus?

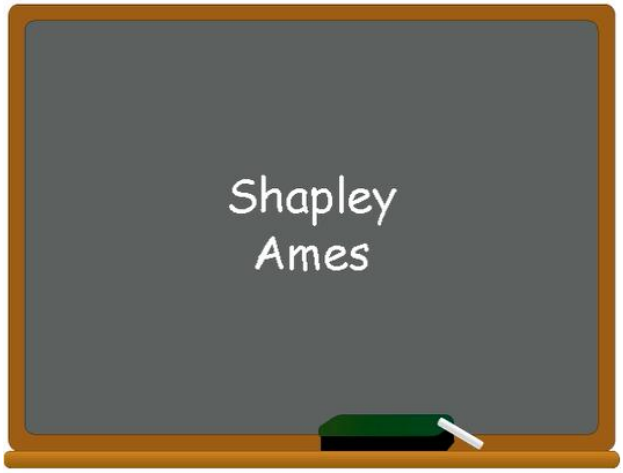
Click on 2 answers.

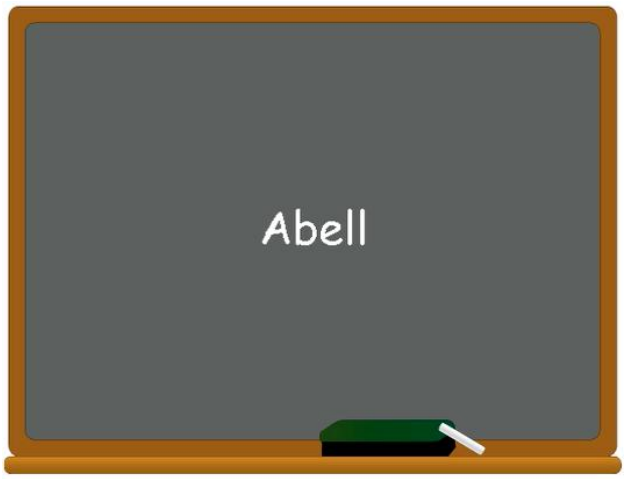
A.It helped protect the statue from erosion.
B.The different colors were made from valuable pigments.
C.The color of the armor indicated the youth of Augustus.
D.The color of the cloak symbolized authority.

6. What does the professor imply that art historians should do?

A. Try to preserve deteriorating ancient pigments with an organic surface treatment.
B. Educate the public about the damage caused by cleaning works of art.
C. Study the remaining traces of pigments on as many ancient sculptures as possible.
D. Try to re-create the mineral-based paints that were used in ancient times.

Lecture 2(Astronomy)





QUESTIONS

1. What is the main purpose of the lecture?

A. To explain the difficulty of classifying distant objects in the universe
B. To introduce a classification system for galaxy clusters
C. To present some recent discoveries about the shapes of galaxies
D. To describe some differences between galaxies and clusters

2. What did Shapley and Ames discover about the universe?

A. Most galaxies are symmetrical.
B. More galaxies exist in the universe than was once believed.
C. Galaxies occur in clusters throughout the universe.
D. Clusters are distributed uniformly throughout the universe.

3. Why does the professor emphasize the number of clusters mapped by Abell?

A. To help explain why Abell's classification scheme was widely adopted
B. To explain why Abell was the first astronomer to notice spiral-shaped galaxies
C. To provide evidence that Abell's method of surveying galaxies was superior to that used for previous surveys
D. To show how much Abell relied on earlier research

4. What aspects of clusters did Abell use to classify them?

Click on 2 answers.

A. The density of the cluster
B. The shape of the cluster
C. The age of the cluster
D. The type of galaxies in the cluster

5. Why does the professor discuss the Coma and Virgo clusters?

A. To indicate a limitation of Abell's survey
B. To distinguish between rich and non-rich clusters
C. To demonstrate that clusters considered irregular in shape are basically spherical
D. To illustrate that the shape of a cluster is independent of the shape of the galaxies within it

6. What is the professor's opinion of Abell's assumption that all clusters are about the same size?

A. He is surprised that it has been disproved.
B. He believes that there is not enough data to support it.
C. He is impressed that it has been proved correct.
D. He thinks it is Abell's most important contribution to astronomy.

Conversation2

QUESTIONS

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

A. To register her group to perform for Parents' Weekend
B. To change the date when her dance group will give a performance
C. To complain about the floor in a newly built rehearsal room
D. To find out when a room she reserved will be available

2. Why is the student s group unable to rehearse in the student center?

A. The rehearsal space was overbooked.
B. The building is being renovated.
C. The rehearsal space was replaced by a game room.
D. The group did not reserve a rehearsal room.

3. What two points do the speakers make about tap dancing?

Click on 2 answers.

A. Tap dancing is becoming a popular form of entertainment on campus.
B. Tap dancing classes have always been offered at the university.
C. Tap dancing requires a certain type of flooring.
D. Tap dancing creates sounds that are important to the performance.

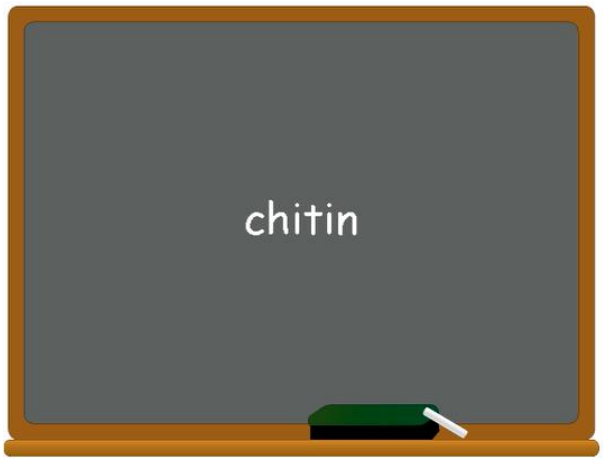
4. What does the man imply about the student theater?

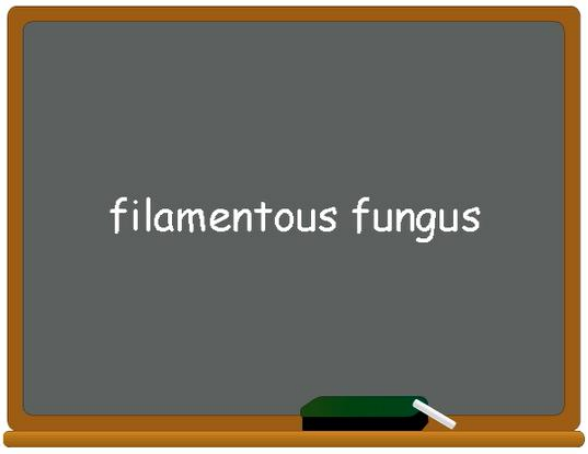
A. It is almost always booked.
B. It has not been renovated in a long time.
C. It is too small to accommodate the student s dance group.
D. It is rarely used for dance performances.

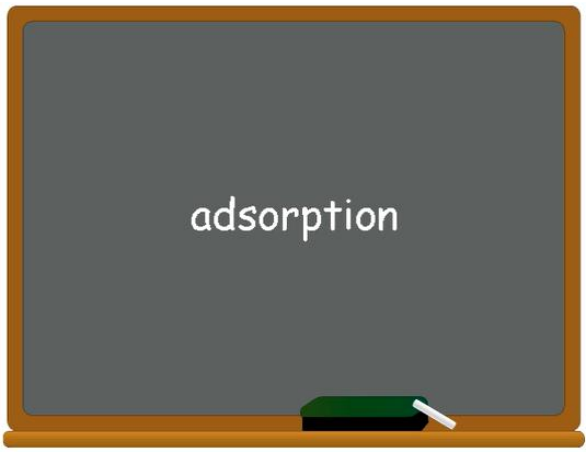
5. What does the man imply when he says this: 🎧

He is not sure what kind of rehearsal space the student needs.
He does not know of any rehearsal space off campus.
He is unable to reserve rehearsal space off campus.
He will call a dance studio in town.

Lecture3(Environmental Science)







QUESTIONS

1. What is the lecture mainly about?

A. Why fungi cannot grow well in polluted ecosystems
B. Why fungi pose a danger to the underground water system
C. How to prevent heavy metals from getting into the soil
D. How fungi can clean up pollution that is in the soil

2. What does the professor say about the way fungi get their food?

A. They use certain metal compounds in the soil as nutrients.
B. The enzymes that they produce allow them to absorb organic nutrients from the soil.
C. They separate nutrients from heavy metals and then return the metals to the soil.
D. Heavy metals interfere with their way of getting nutrients from the soil.

3. What two points does the professor make about chitin?

Click on 2 answers.

A. Chitin binds strongly to certain heavy metals.
B. Insects need chitin in order to digest the fungi they eat.
C. Chitin can be added to soil to create a good habitat for fungi.
D. The cell walls of fungi, like the exoskeletons of insects, contain chitin.

4. What do adsorption and absorption in fungi have in common?

A. They both can help the production of new filaments.
B. They both can increase the production of chitin.
C. They both can help keep pollutants out of groundwater.
D. They both result in the strengthening of cell walls.

5. Why does the professor mention the antibiotic penicillin?

A. To suggest that more fungi should be investigated as potential sources of medications
B. To point out that certain heavy metals are needed for the production of penicillin
C. To criticize the pharmaceutical industry for contributing to environmental pollution
D. To show how a waste product from one process can be useful in another process

Listen again to part of the lecture. Then answer the question.

6. Why does the professor say this: 

A. She does not have time to fully explain the reason.
B. She is hopeful that students will be able to figure out the reason.
C. She wonders why mushrooms are not already used for cleaning up pollution.
D. She realizes that the research she has been discussing is still in its early stages.

Lecture 4(Marketing)

QUESTIONS

1. What is the lecture mainly about?

A. The most common causes of service failures
B. Effective strategies for preventing service failures
C. The importance of having a plan to address service failures
D. Ways in which different industries respond to service failures

2. Why does the professor talk about a car rental agency?

A. To demonstrate the importance of employee training
B. To introduce the concept of service recovery
C. To point out that most service failures are within a company’s control
D. To point out that it is costly to implement a service recovery plan

3. Why does the student mention his experience at a hotel in Chicago?
A. To show how complaints about a negative experience can hurt a business
B. To illustrate a surprising result of a successful service recovery
C. To give an example of an ineffective service recovery
D. To stress the importance of preventive maintenance in the hotel industry

4. What is the professor’s opinion of the service recovery paradox?

A. It should not be relied on as a way to increase customer loyalty.
B. It does not produce long-lasting benefits for the service provider.
C. It is more common in the hotel industry than in other service industries.
D. It can only be beneficial if the customer is not aware of the original failure.

5. What point does the professor make when she mentions a fast-food restaurant?

A. Service failures should be analyzed from the service provider's perspective.
B. A customer’s reaction to a service failure can vary under different circumstances.
C. It is important for service managers to identify the source of a service failure.
D. Some service industries are more vulnerable than others to service failures.

6. Why does the professor say this: 🎧

A. To review the main points of the lecture
B. To suggest topics for the students’ next research assignment
C. To indicate possible reasons why negative word of mouth is damaging to businesses
D. To specify where research is needed to better understand service recovery

听力答案：

Conversation1
1-4DBDB 5AC

Lecture 1
1-2BC 3AD 4B 5BD 6 C

Lecture 2
1-3BCA 4AB5 6-7DC

Conversation 2

1- 2 DB 3 CD 4-5AC

Lecture 3

1-2 CB 3 AD 4-6 CDC

Lecture 4

1-6 CBBABD

Speaking

TPO-42

TASK 1 Independent Speaking, Personal Preference

Choose an accomplishment that required you to work very hard. Explain what the accomplishment was and why it was important to you.

TASK 2 Independent Speaking, Paired Choice

Some people prefer living in a big city. Other people prefer living in the countryside, away from urban areas. Which do you think is better? Explain why, using specific details in your explanation.

TASK 3 Integrated Reading/Listening/Speaking

No More Evening Classes?

The administration has announced that starting next fall, the university will stop offering evening classes in many departments. According to a university administrator, the decision was prompted by a steady decline in enrollments in evening classes. "Evening classes are just too small," the administrator said. When asked to explain the decline in enrollments, the administrator pointed to the fact that most evening classes are taught by teaching assistants, who are usually graduate students. “Surveys show that students prefer to take classes taught by experienced faculty members,” the spokesperson said, "probably because they simply know more than graduate teaching assistants do."

The man disagrees with the decision announced in the student newspaper. Explain why the university made the decision and why the man disagrees with it.

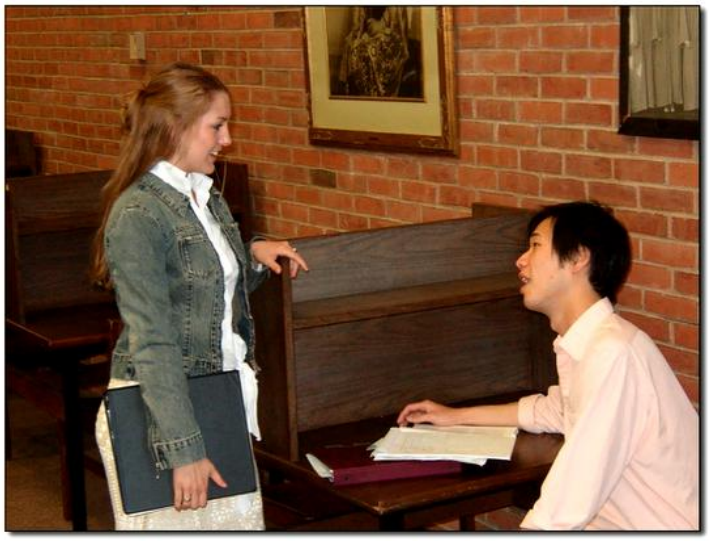
TASK 4 Integrated Reading/Listening/Speaking

Habituation

Habituation is a form of learning that is quite common among animals. When an animal experiences a situation for the first time, particularly one it considers threatening, it may instinctively respond by running away or by warning other members of its community with alarm calls. Normally, it responds this way each time the situation occurs. However, if through continuous and prolonged exposure the animal learns that the situation is harmless, the behavior gradually diminishes. Ultimately, it will stop responding to the situation altogether. Thus, through habituation a natural or instinctive behavior gradually changes.

Explain how the example of the prairie dog illustrates the concept of habituation.

TASK 5 Integrated Listening/Speaking



The speakers discuss two possible solutions to the woman's problem. Briefly

summarize the problem. Then state which solution you recommend and why.

TASK 6 Integrated Listening/Speaking

Using the example of the thunder bird, explain a possible effect of a major climate change.

Writing

TOP-42

TASK 1 Integrated Writing

Glass is a favored building material for modern architecture, yet it is also very dangerous for wild birds. Because they often cannot distinguish between glass and open air, millions of birds are harmed every year when they try to fly through glass windows. There are, however, several solutions that responsible businesses can use to prevent injuries to birds.

One-Way Glass

One solution is to replace the regular, clear glass with one-way glass that is transparent in only one direction. The occupants of the building can see out, but birds and others cannot see in. If birds cannot see through a window, they will understand that the glass forms a solid barrier and will not try to fly through it.

Colorful Designs

A second solution is to paint colorful lines or other designs on regular window glass. For example, a window could have a design of thin stripes painted over the glass. People would still be able to see through the openings in the design where there is no paint, while birds would see the stripes and thus avoid trying to fly through the glass. Architects can be encouraged to include colorful painted patterns on glass as part of the general design of buildings.

Magnetic Field

The third solution is to create an artificial magnetic field to guide birds away from buildings. Humans use an instrument called a magnetic compass to determine directions—either north, south, east, or west. Bird research has shown that birds have a natural ability to sense Earth's magnetic fields; this ability works just like a compass, and it helps birds navigate in the right direction when they fly. A building in a bird flight path can be equipped with powerful electromagnets that emit magnetic signals that steer birds in a direction away from the building.

Directions

You have 20 minutes to plan and write your response. Your response will be judged on the basis of the quality of your writing and on how well your response presents the points in the lecture and their relationship to the reading passage. Typically, an effective response will be 150 to 225 words.

Essay Topic

Summarize the points made in the lecture, being sure to explain how they cast doubt on the specific solutions proposed in the reading passage.

You must finish your answer in 20 minutes

TASK 2 Independent Writing

Directions

Read the question below. You have 30 minutes to plan, write, and revise your essay. Typically, an effective response will contain a minimum of 300 words.

Question:

Essay Topic

Workers are more satisfied when they have many different types of tasks to do during the workday than when they do similar tasks all day long.

Use specific reasons and examples to support your answer.