MISSISSIPPI DEPARTMENT OF EDUCATION

Ensuring a bright future for every child

Mississippi Academic Assessment Program (MAAP)

Science
Grade 8

PRACTICE TEST
Spring 2023

The Science Grade 8 Practice Test is a useful tool for Mississippi educators to use in preparing students for the format of the Mississippi Academic Assessment Program for Science. The items were written and aligned to the 2018 Mississippi College- and Career-Readiness Standards for Science. **This document contains 25 science grade 8 items.**

Use the scenario to answer the next two questions.

Solar Power

Solar power is usable energy that is generated from sunlight in the form of electric or thermal energy. Solar energy is captured in a variety of ways, the most common of which is solar panels. Solar panels are composed of photovoltaic cells that convert sunlight into electricity. The table provides details about the advantages and disadvantages of both black solar panels and blue solar panels.

Comparing Black and Blue Solar Panels

Type	Details
black solar panels (monocrystalline)	• are more efficient at generating electricity • create more toxic (silicon) waste • require fewer panels • are more expensive
blue solar panels (polycrystalline)	• are less efficient at generating electricity • create less toxic (silicon) waste • require more panels • are less expensive

A school district in Mississippi would like to install solar panels. They would like to rely less on power from the local power company. The district is trying to determine the best option for producing electricity from solar energy.

1. Which statement describes the strongest reason the school district should consider in choosing one type of solar panel over the other?

A. Blue solar panels are cheaper and more efficient than black solar panels.

B. Black solar panels are cheaper and more efficient than blue solar panels.

C. Blue solar panels are cheaper and more environmentally friendly than black solar panels.

D. Black solar panels are cheaper and more environmentally friendly than blue solar panels.

2. A backsheet is used to stick the solar cells together in a grid pattern to form a solar panel. The backsheet can be seen through the gaps between the solar cells, and the color impacts the overall appearance and efficiency of the panel. Solar panels that use black backsheets tend to absorb more thermal energy. This absorption of thermal energy causes solar panels to deteriorate faster than normal.

Students want to test different-colored backsheets for efficiency and appearance. Order the steps the students should follow by recording the letter of each step in the table.

Order	Step
1st	
2nd	
3rd	Create a hypothesis on which backsheet would be the most efficient.
4th	
5th	

Ⓟ Place different-colored backsheets with solar panels on a roof.

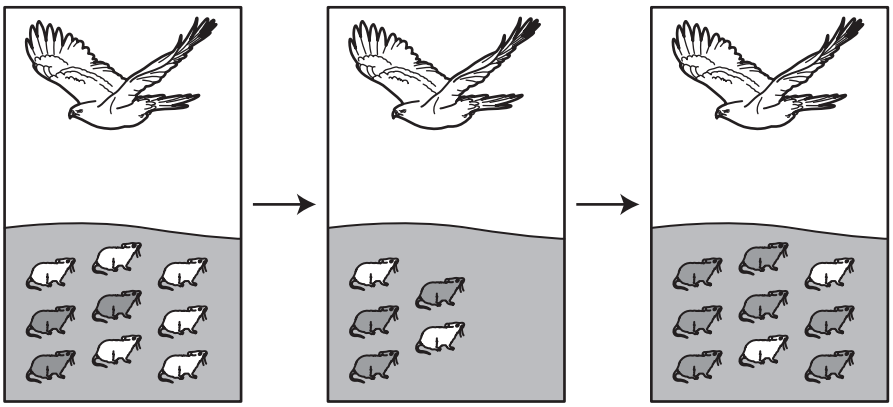
Ⓐ Analyze the data and decide whether the hypothesis should be accepted or rejected.

Ⓒ Collect efficiency and appearance data from solar panels with different backsheets.

Ⓡ Research different-colored backsheets available for purchase and advantages and disadvantages.

3. The diagram shows a change to a mouse population in an area with dark-colored rocks.

Mouse Predation by Birds of Prey over Time



generation 1 generation 2

Which statement **best** explains the change between generation 1 and generation 2?

A. Natural selection favored the light-colored mice in generation 1, which resulted in more dark-colored mice in generation 2.

B. Natural selection favored the dark-colored mice in generation 1, which resulted in more light-colored mice in generation 2.

C. Natural selection favored the light-colored mice in generation 1, which resulted in fewer dark-colored mice in generation 2.

D. Natural selection favored the dark-colored mice in generation 1, which resulted in fewer light-colored mice in generation 2.

4. For much of its history, Mississippi was covered by an inland sea. Which evidence would **best** support this geologic claim?

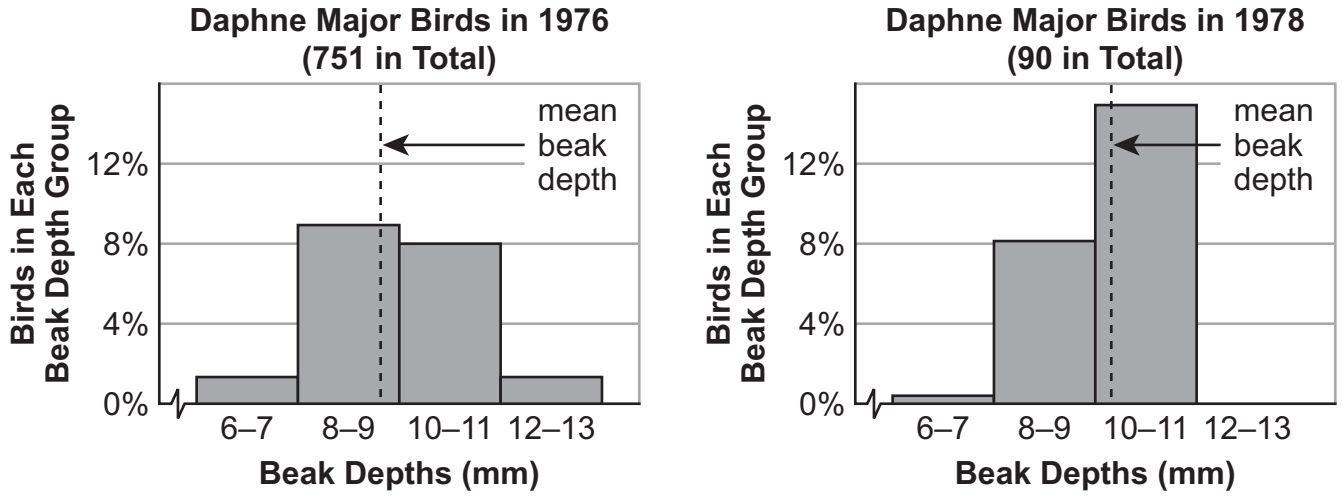
A. fossils of both marine and land organisms found mixed in several rock layers and no fossils of organisms located beneath those layers

B. fossils of both marine and land organisms located in surface rock layers and fossils of land organisms located beneath those surface layers

C. fossils of land organisms located in surface rock layers and fossils of marine organisms located in several layers beneath those surface layers

D. fossils of marine organisms located in a single surface rock layer and fossils of land organisms located in multiple layers beneath that surface layer

5. Peter and Rosemary Grant studied the birds on a tiny island known as Daphne Major for many years. The graphs show data they collected during 1976 and 1978. It is important to note that in the year between these data collections there was a severe drought that resulted in only 90 birds surviving.



Which **two** statements are **best** supported by these data?

A. Young birds that survived the drought began eating insects instead of seeds.

B. All birds that survived the drought had beaks that were over 10 mm in depth.

C. More birds with large beaks survived the drought than birds with small beaks.

D. Birds with small beaks ate less food and had a survival advantage during the drought.

E. Average beak depth in the bird population in 1978 was greater than it had been in 1976.

6. A group of students in a class is researching how cellular telephones transmit sound from one person to another person who is hundreds of miles away. The group presents a step-by-step description to the class.

Cellular Telephone Process

1. The cellular telephone converts sound energy into digital signals.
2. The digital signals are transmitted to a cell tower a few miles away.
3. The cell tower transmits the digital signals to a switching office.
4. The switching office transmits the digital signals to another cell tower hundreds of miles away.
5. The cell tower transmits the digital signals to the telephone of the person receiving the call a few miles away.
6. The receiver telephone converts digital signals into sound.

Which statement **most** accurately describes a step of the cellular telephone transmission process?

A. In step 1, digital information is converted into mechanical waves.

B. In step 2, the digital signals are transmitted using electromagnetic waves.

C. In step 5, the digital signals are transmitted using sound waves.

D. In step 6, sound waves are converted into electromagnetic waves.

7. The development of a city has drastically reduced the number of milkweed plants in the area. Monarch butterflies lay their eggs on milkweed plants. Milkweed plants then act as the primary food source for the monarch butterfly caterpillar. These caterpillars eat the milkweed plant to protect themselves from predators.

Which effect will **most likely** be observed in this city due to the decrease in the number of milkweed plants?

A. Monarch butterfly populations will increase due to a lack of food resources.

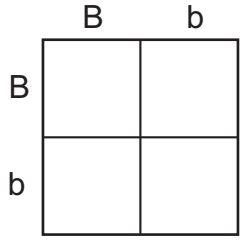
B. Monarch butterfly populations will increase in the area so that some individuals survive.

C. Due to a lack of habitat, the monarch butterflies will find other plants to lay their eggs on.

D. Due to a lack of food resources and habitat, the population of monarch butterflies will decrease.

8. Chickens have traits for either white beaks (B) or yellow beaks (b). The white-beak trait is dominant to the yellow-beak trait.

Part A: Two chickens with white beaks are crossed. Record the genetic combinations for offspring produced during the cross to **best** complete the Punnett square.



BB **Bb** **bb**

Part B: Record the percentage of offspring expected to express the white-beak trait during the cross from part A.

_____%

9. Mississippi depends on groundwater for over 75% of its freshwater needs. The table lists some factors that affect the amount of groundwater in Mississippi.

Record an "X" in each row to describe each factor as beneficial to groundwater supplies or harmful to groundwater supplies.

	Beneficial	**Harmful**
Precipitation is greater than evaporation.		
The amount of groundwater used to grow crops increases.		
Areas of soil are replaced with paved surfaces.		
The amount of water in wetlands decreases.		

10. Students were asked to relate the rock cycle to dinosaur fossil formation. Which flowchart **best** represents the process that formed the dinosaur fossils in Mississippi?

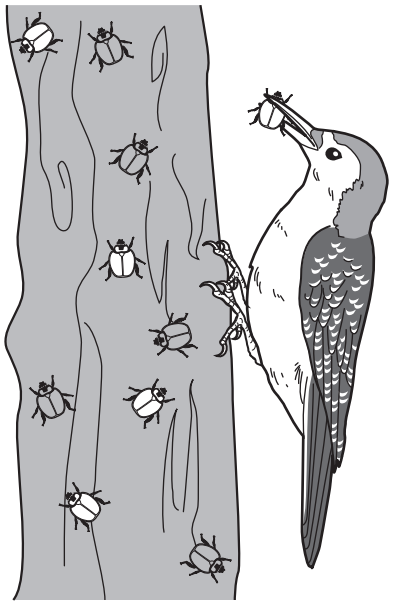
A. Compaction and cementation of sedimentary rock occurs. → Dinosaur remains are deposited in sediments.

B. Dinosaur remains are deposited in sediments. → Compaction and cementation of sedimentary rock occurs.

C. Heat and pressure convert metamorphic rock to sedimentary rock. → Dinosaur remains are deposited in metamorphic rock.

D. Dinosaur remains are deposited in metamorphic rock. → Heat and pressure convert metamorphic rock to sedimentary rock.

11. A type of beetle lives on trees in an area with birds. Beetles are either brown or green. The diagram shows a group of beetles interacting with a bird predator.



Key
brown beetles
green beetles

Circle one word in each set of options to explain how natural selection will **most likely** affect the beetle population.

(Genetic / Environmental) factors determine the coloration of an individual beetle.

(Genetic / Environmental) factors determine which individual beetles will survive. Over time, there will likely be (more / fewer) brown beetles than green beetles in the population.

12. A student is comparing features of different instruments that can help predict volcanic eruptions.

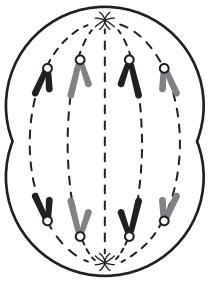
Circle the instrument that could be used **most** safely when a volcano is showing an increase in activity.

Predicting Volcanic Eruptions

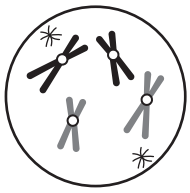
Instrument	Description
portable seismometer	The instrument is placed on surfaces around a volcano to measure earthquake vibrations caused by magma movements.
tiltmeter	The instrument is placed on the surface to measure changes in surface tilt potentially caused by movements of magma.
thermal imaging	Measurements are taken of ground temperatures from a helicopter.
correlation spectrometer (COSPEC)	The instrument sits atop a tripod to collect gas samples from volcanic vents.
Global Positioning System (GPS)	Multiple GPS receivers are placed on surfaces around a volcano to measure changes in surface tilt potentially caused by movements of magma.

13. Which diagram **best** represents a phase of mitosis that ensures the resulting cells contain identical genetic information?

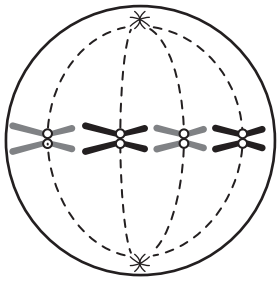
A.



B.



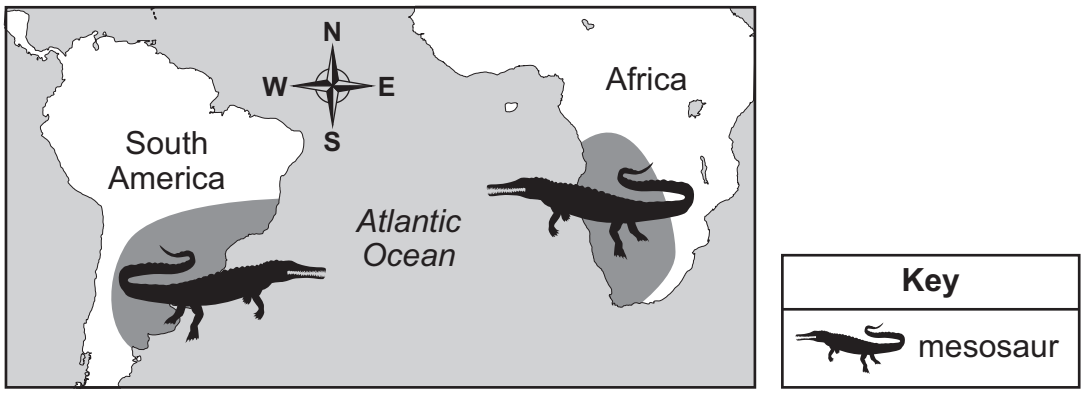
C.



D.

14. *Mesosaurus* was a genus of freshwater land reptiles. The map shows the locations of mesosaur fossils on two continents.

Locations of Mesosaur Fossils



Part A: Which statement **best** explains the presence of mesosaur fossils in these locations?

A. South America and Africa were joined together when mesosaurs were alive.

B. South America and Africa became separated by an ocean before mesosaurs lived.

C. South America and Africa once had a land bridge, which allowed mesosaurs to travel between the continents.

D. South America and Africa had very different climates, which allowed mesosaurs to migrate through the ocean.

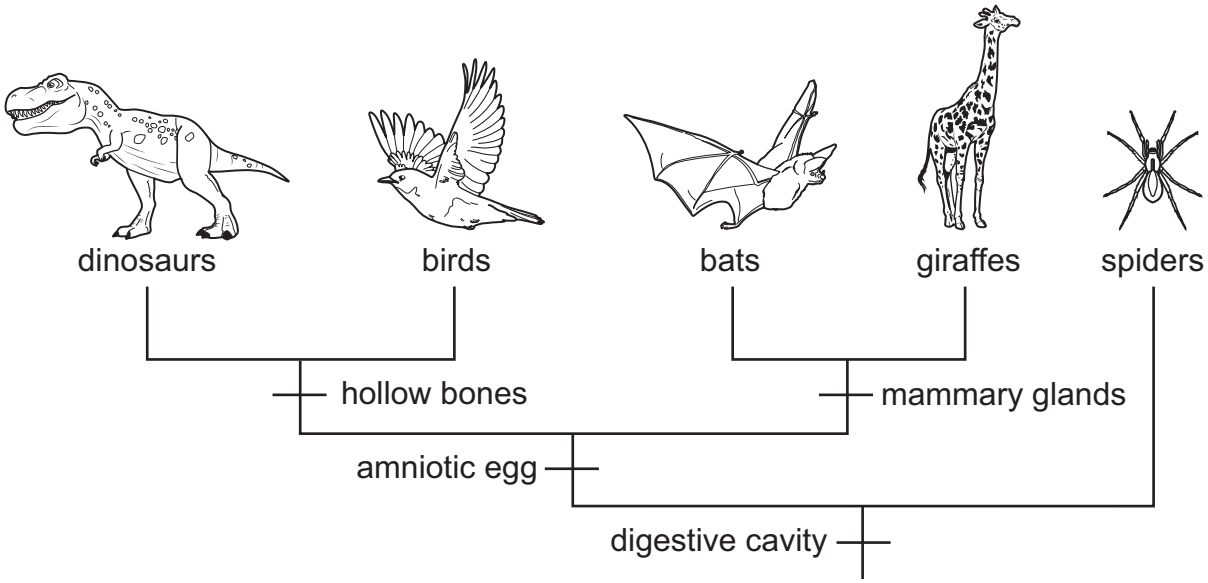
Part B: Circle one phrase in each set of options to make a conclusion about the types of rock in the locations where mesosaur fossils are found.

The rock containing mesosaur fossils is most likely (the same / a different) age

and (the same / a different) type on both continents.

15. The cladogram shows the evolutionary relationships and physical changes among five animals.

Cladogram with Five Animals



Based on the cladogram, which statement identifies **two** animals that are closely related to each other?

A. Birds and bats are closely related because they both have wings.

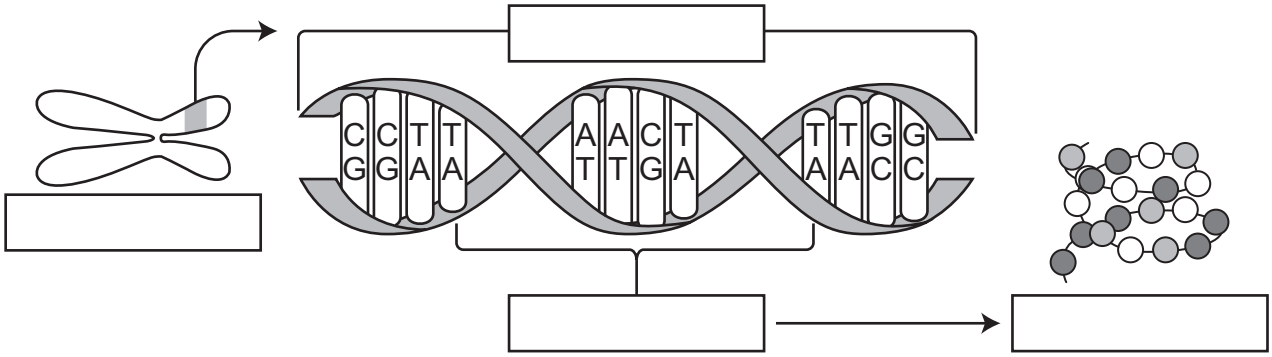
B. Dinosaurs and bats are closely related because they both have digestive cavities.

C. Bats and giraffes are closely related because they both have mammary glands.

D. Giraffes and spiders are closely related because they both have more than two legs.

16. The diagram shows some of the genetic materials involved in producing a cellular product. Record the numbers of the labels in the boxes to **best** complete the diagram.

Genetic Materials Producing a Cellular Product



(1) DNA

(2) gene

(3) protein

(4) chromosome

17. Which statement **best** describes how Earth processes are responsible for changes at the surface of the planet?

A. Constructive processes, such as mountain building, are caused by convergent plate boundaries, and destructive processes, such as weathering and erosion, do not occur at a constant rate.

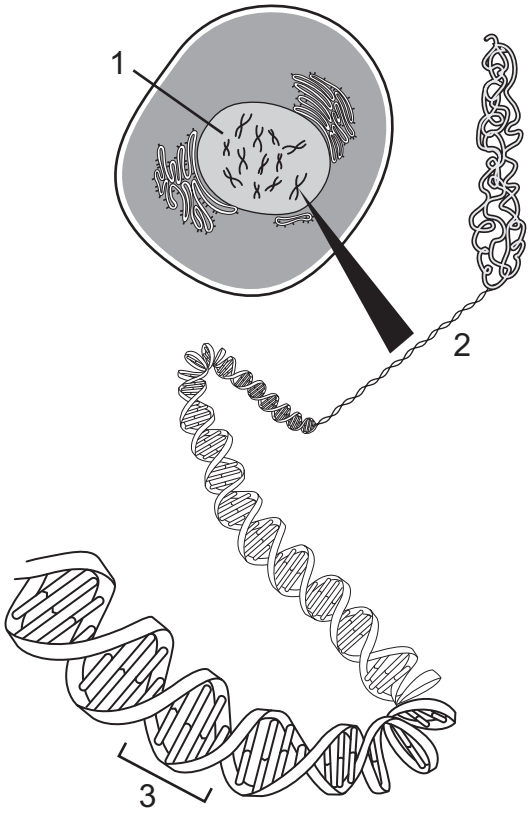
B. Destructive processes, such as mountain building, are caused by convergent plate boundaries, and constructive processes, such as weathering and erosion, occur at a constant rate.

C. Constructive processes, such as mountain building, are caused by divergent plate boundaries, and destructive processes, such as weathering and erosion, occur at a constant rate.

D. Destructive processes, such as mountain building, are caused by divergent plate boundaries, and constructive processes, such as weathering and erosion, do not occur at a constant rate.

18. The model represents the basic components of genetics.

Genetic Components Model



Organize the concepts that are shown by each letter in this model by recording the letters in the correct position.

1: _____

2: _____

3: _____

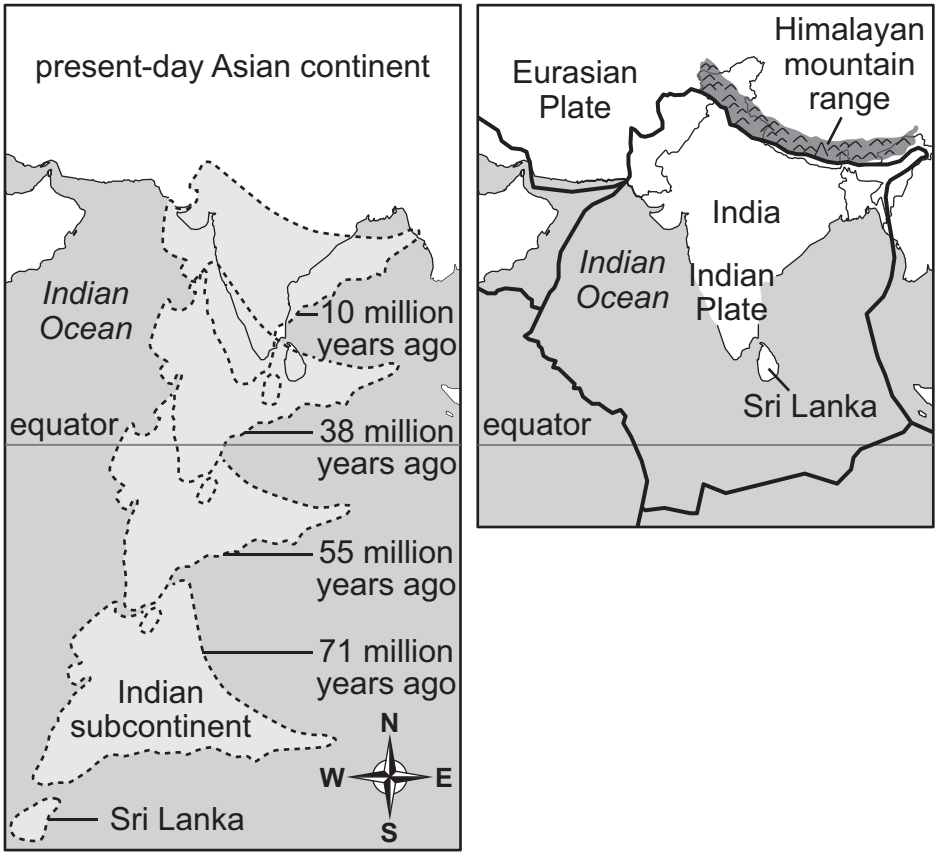
Ⓐ A DNA segment has protein synthesis instructions.

Ⓑ Chromosomes are located in the nucleus.

Ⓒ Chromosomes are composed of DNA molecules.

19. The maps show the changes in India's location over time and the location of the Himalayan mountain range.

Location of India over Time



Part A: Circle a word or phrase in each set of options to **best** describe how the Himalayan mountain range has changed over time.

The Himalayan mountain range started forming when the Indian subcontinent began colliding with the (equator / oceanic plate / Eurasian Plate). The mountain range is currently (increasing / decreasing) in height.

Part B: Which process **best** describes the cause of the changes to India's location over time?

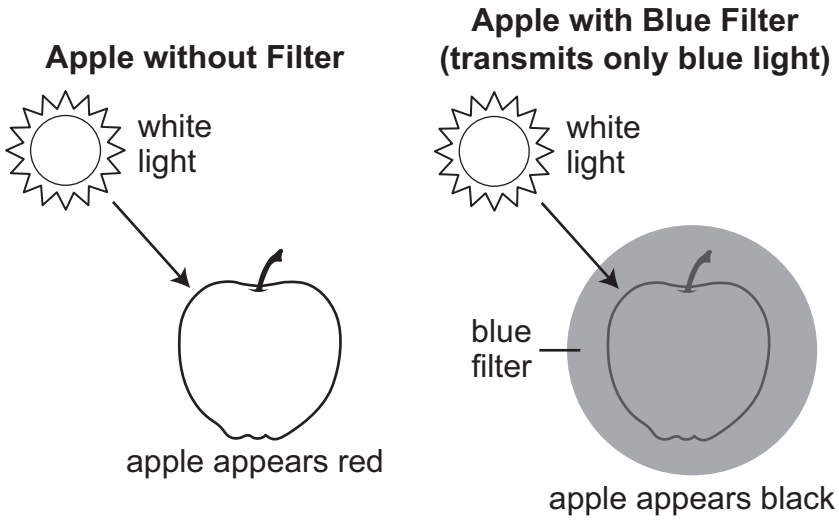
A. currents in the Indian Ocean

B. magnetic forces near Earth's equator

C. convection currents in Earth's mantle

D. gravitational pull from the Eurasian Plate

20. A teacher places an apple on a table in a sunlit classroom. The students observe that the apple appears red. The teacher then holds a blue filter in front of the apple. The blue filter transmits only blue light. The students observe that the apple appears black.



Why does the apple appear black and not red when observed with the blue filter?

A. The colors of the visible spectrum are destroyed by the filter, and no colors are reflected.

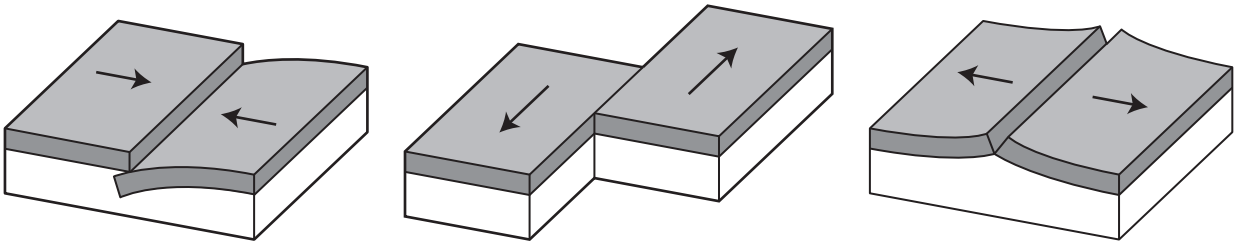
B. The colors of the visible spectrum are destroyed by the filter, and no colors are absorbed.

C. The other colors of the visible spectrum are reflected by the filter, and no colors are absorbed.

D. The other colors of the visible spectrum are absorbed by the filter, and no colors are reflected.

21. The models represent the three types of plate boundaries.

Three Plate Boundaries



boundary 1 boundary 2 boundary 3

Circle one number and one landform in the options to describe a convergent plate boundary.

Boundary (1 / 2 / 3) represents a convergent boundary. A common landform associated with this type of boundary is a (mid-ocean ridge / trench).

22. Bacterial infections can be treated with antibiotics, which are medicines that kill bacteria. However, an infection will resolve only if the person takes the antibiotic for a certain number of days; if not, the remaining living bacteria may mutate and become resistant to the antibiotic.

Circle one word or phrase in each set of options to **best** describe this situation.

A mutation in the bacteria likely (benefits / harms) the bacteria, and (benefits / harms) the person with the infection.

This situation will likely make treating the bacterial infection (easier / more difficult) in the future.

23. Selective breeding in plants focuses on desirable characteristics and breeds plants with these characteristics. Corn has been selectively bred to produce crops year after year that yield more ears of corn per plant. If selective breeding is not closely monitored, unintended problems may arise.

Which potential problem is **most likely** to occur if selective breeding of corn plants is practiced in an area for many generations?

A. The ears of corn that are produced vary so much that buyers decline to purchase the crops.

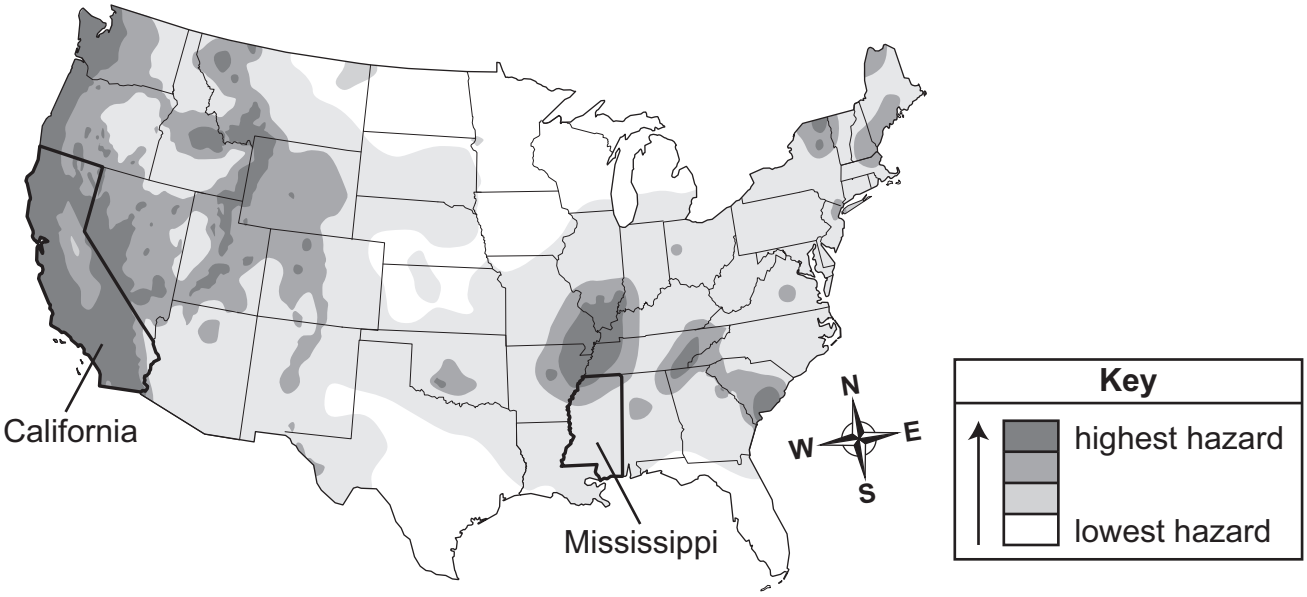
B. The corn plants are so similar genetically that entire crops are vulnerable to a rapidly spreading disease.

C. The stalks of the corn plants become so flexible and vine-like that they spread into other areas as an invasive species.

D. The corn plants attract so many insects that they must be treated with large amounts of insect-killing chemicals and the corn becomes unusable.

24. The map shows the earthquake hazard levels for different areas in the United States.

United States Earthquake Hazard Levels

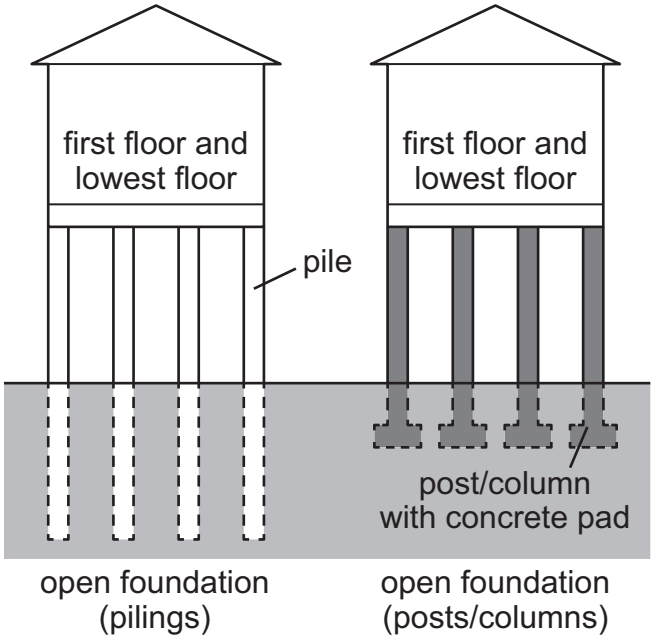


Record an "X" in each row to identify whether each statement is **more** true about California or Mississippi.

	California	**Mississippi**
Earthquakes may affect the entire state.		
Earthquakes may affect few people.		
Earthquake damage may be severe.		
Earthquake damage is unlikely to occur.		

25. Mississippi has certain requirements for the building of new structures on the beaches of the Gulf of Mexico which is affected by hurricanes. One requirement is certification from an engineer or architect that the structure is designed to be securely anchored on pilings or columns in the ground. The diagram shows two possible designs for this technology.

Two Coastal Engineering Designs



Select the **two** strongest explanations for how this requirement safeguards against natural hazards.

A. by preventing erosion underneath structures

B. by eliminating the risk of damage to structures

C. by providing support to structures on weak soils

D. by elevating structures high enough to avoid flooding

E. by increasing the cost of building structures on beaches

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Practice Test

The information for each item, including the performance objective, DOK level, item type, and correct answer, is located in this document. The items appear in the order as shown in the table.

Note: The item types are representative of items that will appear in administrations starting in Spring 2023.

Item Number	Performance Objective	DOK Level	Item Type	Correct Answer
1	(E.8.10.2) Create and defend a proposal for reducing the environmental effects humans have on Earth (e.g., population increases, consumer demands, chemical pollution, deforestation, and change in average annual temperature).	2	Multiple Choice	C
2	(E.8.10.4) Using an engineering design process, develop a system to capture and distribute thermal energy that makes renewable energy more readily available and reduces human impact on the environment (e.g., building solar water heaters, conserving home energy).*	2	Technology Enhanced	See Answer Key
3	(L.8.4A.1) Use various scientific resources to analyze the historical findings of Charles Darwin to explain basic principles of natural selection.	2	Multiple Choice	D
4	(E.8.7.3) Construct and analyze scientific arguments to support claims that most fossil evidence is an indication of the diversity of life that was present on Earth and that relationships exist between past and current life forms.	2	Multiple Choice	C
5	(L.8.4B.1) Analyze and interpret data (e.g. pictures, graphs) to explain how natural selection may lead to increases and decreases of specific traits in populations over time.	3	Technology Enhanced	See Answer Key
6	(P.8.6.7) Research the historical significance of wave technology to explain how digitized tools have evolved to encode and transmit information (e.g., telegraph, cell phones, and wireless computer networks).	2	Multiple Choice	B
7	(L.8.2B.1) Construct an argument based on evidence for how environmental and genetic factors influence the growth of organisms.	2	Multiple Choice	D
8	(L.8.2B.3) Use mathematical and computational thinking to analyze data and make predictions about the outcome of specific genetic crosses (monohybrid Punnett Squares) involving simple dominant/recessive traits.	2	Technology Enhanced	See Answer Key
9	(E.8.9A.7) Explain the interconnected relationship between surface water and groundwater.	2	Technology Enhanced	See Answer Key
10	(E.8.7.2) Create a model of the processes involved in the rock cycle and relate it to the fossil record.	2	Multiple Choice	B
11	(L.8.4A.2) Investigate to construct explanations about natural selection that connect growth, survival, and reproduction to genetic factors, environmental factors, food intake, and interactions with other organisms.	2	Technology Enhanced	See Answer Key
12	(E.8.9B.2) Compare and contrast technologies that predict natural hazards to identify which types of technologies are most effective.	2	Technology Enhanced	See Answer Key
13	(L.8.2A.2) Create a diagram of mitosis and explain its role in asexual reproduction, which results in offspring with identical genetic information.	2	Multiple Choice	A
14	(E.8.9A.3) Map land and water patterns from various time periods and use rocks and fossils to report evidence of how Earth's plates have moved great distances, collided, and spread apart.	2	Technology Enhanced	See Answer Key
15	(L.8.4B.4) Analyze displays of pictorial data to compare and contrast embryological and homologous/analogous structures across multiple species to identify evolutionary relationships.	2	Multiple Choice	C

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Item Number	Performance Objective	DOK Level	Item Type	Correct Answer
16	(L.8.2C.1) Communicate through diagrams that chromosomes contain many distinct genes and that each gene holds the instructions for the production of specific proteins, which in turn affects the traits of the individual (not to include transcription or translation).	2	Technology Enhanced	See Answer Key
17	(E.8.9A.4) Research and assess the credibility of scientific ideas to debate and discuss how Earth's constructive and destructive processes have changed Earth's surface at varying time and spatial scales.	2	Multiple Choice	A
18	(L.8.2A.1) Obtain and communicate information about the relationship of genes, chromosomes, and DNA, and construct explanations comparing their relationship to inherited characteristics.	2	Technology Enhanced	See Answer Key
19	(E.8.9A1) Investigate and explain how the flow of Earth's internal energy drives the cycling of matter through convection currents between Earth's surface and the deep interior causing plate movements.	2	Technology Enhanced	See Answer Key
20	(P.8.6.6) Obtain and evaluate scientific information to explain the relationship between seeing color and the transmission, absorption, or reflection of light waves by various materials.	2	Multiple Choice	D
21	(E.8.9A.5) Use models that demonstrate convergent and divergent plate movements that are responsible for most landforms and the distribution of most rocks and minerals within Earth's crust.	2	Technology Enhanced	See Answer Key
22	(L.8.2C.2) Construct scientific arguments from evidence to support claims about the potentially harmful, beneficial, or neutral effects of genetic mutations on organisms.	2	Technology Enhanced	See Answer Key
23	(L.8.2B.4) Debate the ethics of artificial selection (selective breeding, genetic engineering) and the societal impacts of humans changing the inheritance of desired traits in organisms.	2	Multiple Choice	B
24	(E.8.9B.1) Research and map various types of natural hazards to determine their impact on society.	2	Technology Enhanced	See Answer Key
25	(E.8.9B.3) Using an engineering design process, create mechanisms to improve community resilience, which safeguard against natural hazards (e.g., building restrictions in flood or tidal zones, regional watershed management, Firewise construction).*	2	Technology Enhanced	See Answer Key

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Technology Enhanced Items
Answer Key

Item #2

Order	Step
1st	R
2nd	P
3rd	Create a hypothesis on which backsheet would be the most efficient.
4th	C
5th	A

Item #5

A. Young birds that survived the drought began eating insects instead of seeds.

B. All birds that survived the drought had beaks that were over 10 mm in depth.

C. More birds with large beaks survived the drought than birds with small beaks.

D. Birds with small beaks ate less food and had a survival advantage during the drought.

E. Average beak depth in the bird population in 1978 was greater than it had been in 1976.

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Technology Enhanced Items
Answer Key

Item #8

Part A: Two chickens with white beaks are crossed. Record the genetic combinations for offspring produced during the cross to **best** complete the Punnett square.

	B	b
B	**BB**	**Bb**
b	**Bb**	**bb**

BB **Bb** **bb**

Part B: Record the percentage of offspring expected to express the white-beak trait during the cross from part A.

75 %

Item #9

	Beneficial	Harmful
Precipitation is greater than evaporation.	X	
The amount of groundwater used to grow crops increases.		X
Areas of soil are replaced with paved surfaces.		X
The amount of water in wetlands decreases.		X

Item #11

(Genetic / Environmental) factors determine the coloration of an individual beetle.

(Genetic / Environmental) factors determine which individual beetles will survive. Over time, there will likely be (more / fewer) brown beetles than green beetles in the population.

Mississippi Academic Assessment Program
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Technology Enhanced Items
Answer Key

Item #12

Predicting Volcanic Eruptions

Instrument	Description
portable seismometer	The instrument is placed on surfaces around a volcano to measure earthquake vibrations caused by magma movements.
tiltmeter	The instrument is placed on the surface to measure changes in surface tilt potentially caused by movements of magma.
thermal imaging	Measurements are taken of ground temperatures from a helicopter.
correlation spectrometer (COSPEC)	The instrument sits atop a tripod to collect gas samples from volcanic vents.
Global Positioning System (GPS)	Multiple GPS receivers are placed on surfaces around a volcano to measure changes in surface tilt potentially caused by movements of magma.

Item #14

Part A: Which statement **best** explains the presence of mesosaur fossils in these locations?

A. South America and Africa were joined together when mesosaurs were alive.

B. South America and Africa became separated by an ocean before mesosaurs lived.

C. South America and Africa once had a land bridge, which allowed mesosaurs to travel between the continents.

D. South America and Africa had very different climates, which allowed mesosaurs to migrate through the ocean.

Part B: Circle one phrase in each set of options to make a conclusion about the types of rock in the locations where mesosaur fossils are found.

The rock containing mesosaur fossils is most likely (the same / a different) age

and (the same / a different) type on both continents.

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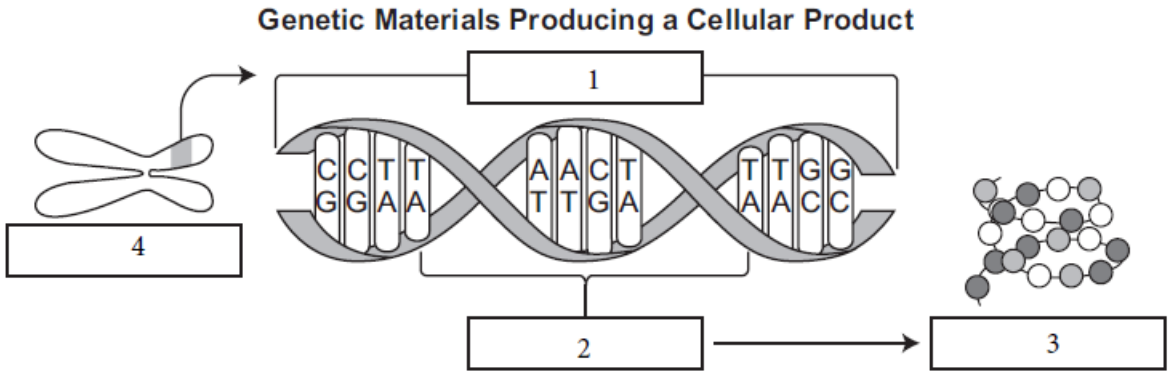
Technology Enhanced Items
Answer Key

Item #16



Item #18

1: B

2: C

3: A

Item #19

Part A: Circle a word or phrase in each set of options to **best** describe how the Himalayan mountain range has changed over time.

The Himalayan mountain range started forming when the Indian subcontinent began colliding with the (equator / oceanic plate /(Eurasian Plate)). The mountain range is currently ((increasing)/ decreasing) in height.

Part B: Which process **best** describes the cause of the changes to India's location over time?

A. currents in the Indian Ocean

B. magnetic forces near Earth's equator

(C.) convection currents in Earth's mantle

D. gravitational pull from the Eurasian Plate

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Item #21

Boundary ((1) / 2 / 3) represents a convergent boundary. A common landform associated with this type of boundary is a (mid-ocean ridge / (trench)).

Item #22

A mutation in the bacteria likely ((benefits) / harms) the bacteria, and (benefits / (harms)) the person with the infection.

This situation will likely make treating the bacterial infection (easier / (more difficult)) in the future.

Item #24

	California	Mississippi
Earthquakes may affect the entire state.	X	
Earthquakes may affect few people.		X
Earthquake damage may be severe.	X	
Earthquake damage is unlikely to occur.		X

Item #25

A. by preventing erosion underneath structures

B. by eliminating the risk of damage to structures

(C.) by providing support to structures on weak soils

(D.) by elevating structures high enough to avoid flooding

E. by increasing the cost of building structures on beaches