



# Mississippi Academic Assessment Program (MAAP)

Science  
Grade 8

PRACTICE TEST

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.**

1. About 40% of the world's population lives within 100 kilometers of a coastal area. A student is asked to identify and explain which type of renewable energy resource is most appropriate for these areas.

Which information **best** completes the student's assignment?

- A. Floating solar panels are most appropriate because coastal areas are cloudy and offshore waves are always calm.
- B. Fossil fuels are most appropriate because coastal winds will prevent the accumulation of pollution along coastal areas.
- C. Nuclear energy is most appropriate because seawater is readily available in coastal areas and can be used to cool the nuclear reactors.
- D. Wind energy is most appropriate because offshore wind is nearly constant in coastal areas and is easy to transmit to the communities.

2. A builder constructs buildings in an area that has long, cold winters. The builder needs a way to keep costs low for owners while keeping each building properly heated. To achieve this goal, the builder decides to use both passive and active solar energy as heating sources.

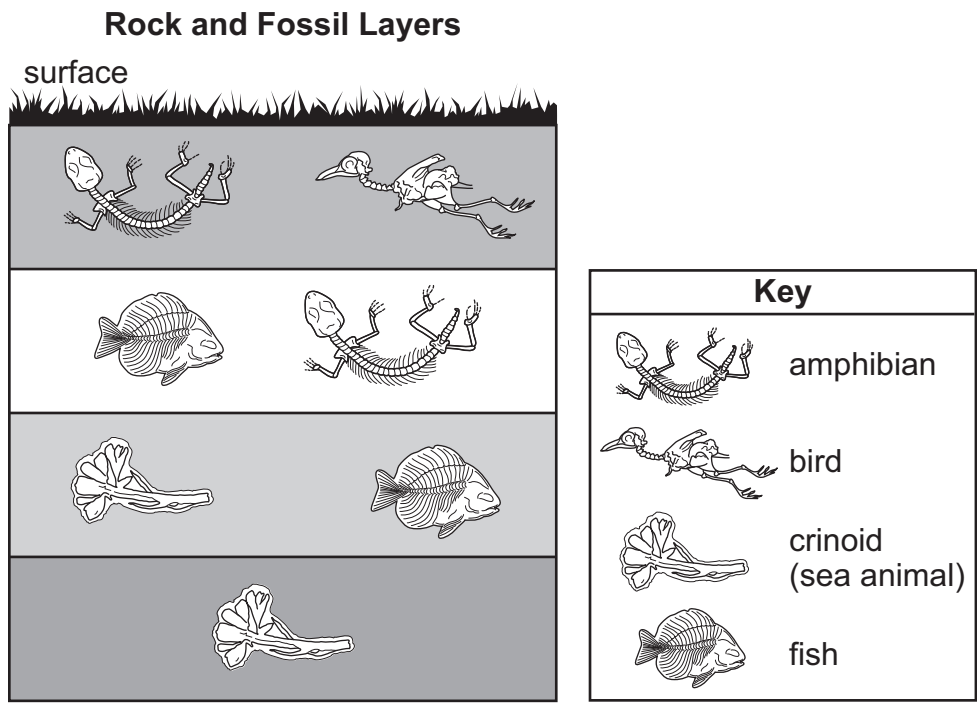
Identify **two** examples of passive solar energy and **two** examples of active solar energy. Record the numbers in the correct side of the chart.

**Examples of Solar Energy to Heat Buildings**

Passive Solar Energy	Active Solar Energy

- ① Air is forced across coils with heated water and blown into a room.
- ② Large glass window panes allow light to pass through them and into a room.
- ③ Clay bricks on the outside of a building absorb and release heat slowly over time.
- ④ Heated water is pumped from a container through small tubes beneath the flooring.

3. A scientist has identified layers of rock containing different fossils. The diagram shows the arrangement of the rock and fossil layers.



**Part A:** Using the diagram, arrange the fossils in order from youngest to oldest by recording the letter of each fossil in the chart.

youngest
oldest

(A)  
amphibian

(B)  
bird

(C)  
crinoid

(D)  
fish

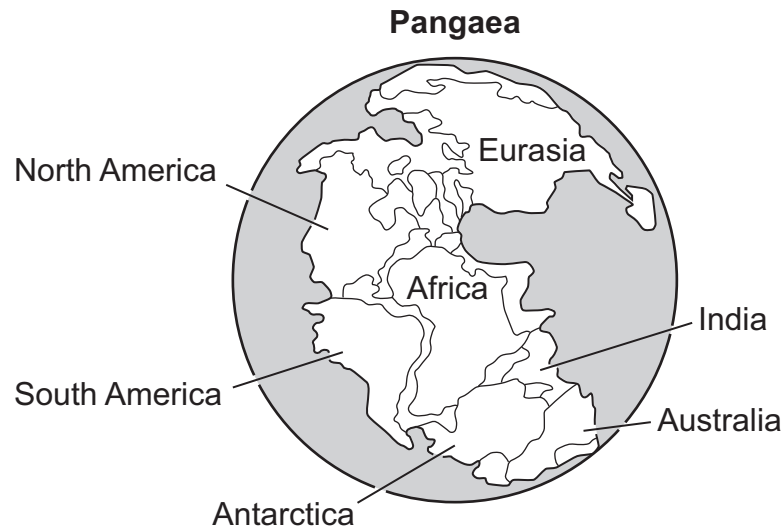
***(Question 3 continued)***

**Part B:** The scientist claims that the landscape in the area changed over time. Which statement uses fossil evidence to **best** support the scientist's claim?

- A.** The fossils show that the area had little to no water during the observed time.
- B.** The fossils show that the area remained covered in water during the observed time.
- C.** The fossils show that the area had little water at first but became wetter during the observed time.
- D.** The fossils show that the area was covered in water at first but became drier during the observed time.

4. Mass extinctions cause sudden reductions to biodiversity. Species loss can have a negative effect on an ecosystem. Which statement **best** describes how a mass extinction might have a beneficial effect on an ecosystem?
- A. The change in the ecosystem increases the opportunities for diverse organisms to find mates and produce offspring.
  - B. The accumulation of nutrients within the ecosystem ensures that all surviving organisms have direct access to nutrients.
  - C. The removal of organisms reduces competition for resources and provides an opportunity for some surviving species to adapt.
  - D. The decrease in animal populations enables plants to become reestablished in areas where all plants were once eliminated.

5. Scientists have proposed that at one time in Earth's history there was a supercontinent called Pangaea, as shown in the diagram.

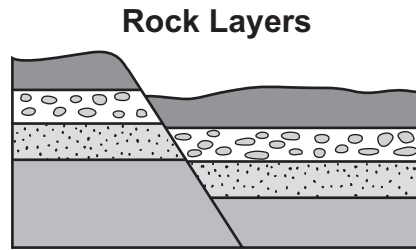


Which statement describes the causes that **most likely** led to the breaking apart of Pangaea?

- A. Solar radiation from the Sun along with meteor impacts caused cracks to form in Pangaea.
- B. Convection in Earth's interior caused Pangaea to separate into several different landmasses.
- C. Weathering and erosion caused earthquakes that resulted in breaks in the continental crust.
- D. Forces from within Earth resulted in some areas sinking below sea level and others rising upward.



6. The diagram shows a geological cross section of rock layers at Earth's surface.



Which statement **best** describes the pattern shown in the diagram?

- A. The layers formed due to varying temperatures within Earth's crust, and the shifting is due to Earth's gravitational pull toward Earth's core.
- B. The layers formed due to varying temperatures within Earth's crust, and the shifting is due to the movement of two tectonic plates at a plate boundary.
- C. The layers formed due to different types of sediment being deposited on Earth's surface, and the shifting is due to Earth's gravitational pull toward Earth's core.
- D. The layers formed due to different types of sediment being deposited on Earth's surface, and the shifting is due to the movement of two tectonic plates at a plate boundary.

7. A student learned that the Himalayas were formed by the collision of the Indian Plate and the Eurasian Plate 50 million years ago. The student gathered the following information.

**Data**

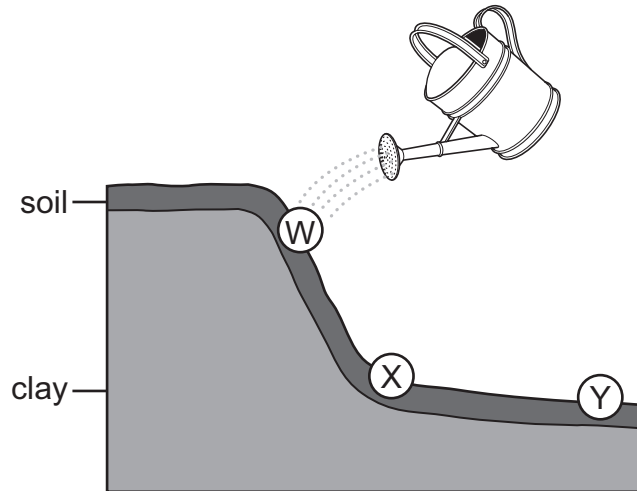
- Scientists estimate that the elevation of the Himalayas has been increasing by over 9 meters per century (100 years).
- In 1954, the elevation of the highest peak of the Himalayas, Mount Everest, was measured to be 8,848 meters.
- In May 2019, Mount Everest was measured to be 8,848.86 meters.

Based on this information, which statement **best** describes the elevation of the Himalayas?

- A. The elevation of the Himalayas is increasing at a faster rate than in past centuries because there are few acting causes of erosion at upper elevations.
- B. The elevation of the Himalayas is increasing at a slower rate than in past centuries because the causes of erosion increase their effect as the force of gravity decreases.
- C. The elevation of the Himalayas is increasing at a faster rate than in past centuries because the two tectonic plates forming the range are colliding faster now than in the past.
- D. The elevation of the Himalayas is increasing at a slower rate than in past centuries because the pressure of the two colliding tectonic plates is spread along a wider area now than in the past.

8. Students design an investigation to study how the slope of a hill affects soil formation. The diagram shows the investigation setup. The students will measure the depth of the soil at locations W, X, and Y before and after sprinkling water over the surface.

**Side View of Investigation Setup**



**Part A:** Record the number of each variable in the correct column of the chart.

**Variables**

Controlled	Dependent	Independent

- ① starting soil depth
- ② rate of water sprinkled over surface
- ③ length of time water is sprinkled over surface
- ④ soil type
- ⑤ slope of hill
- ⑥ ending soil depth

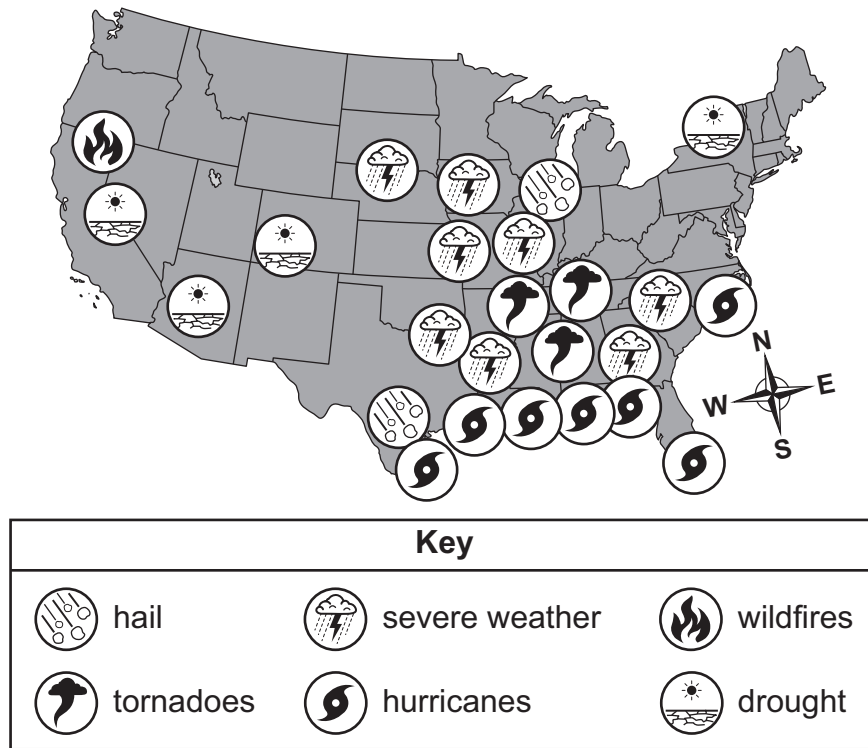
**Part B:** Circle one word or phrase in each set of options to predict how the slope of a hill **most likely** affects soil formation.

Areas with steep slopes will experience ( low / high ) amounts of soil erosion, resulting in a ( thin or missing / thick and rich ) layer of topsoil.

Flat areas at the base of slopes will experience ( low / high ) amounts of soil deposition, resulting in a ( thin or missing / thick and rich ) layer of topsoil.

9. The map shows weather and climate disasters that occurred within the United States in a recent year. Each disaster resulted in damages that reached or exceeded \$1 billion.

**Recent Billion-Dollar Weather and Climate Disasters**



Each year, the Federal Emergency Management Agency (FEMA) must build a budget to provide disaster relief money for that year. Based on the map, which pair of regions **most likely** requested that FEMA increase its budget for flooding?

- A. East and Northeast
- B. North and Northwest
- C. West and Southwest
- D. South and Southeast

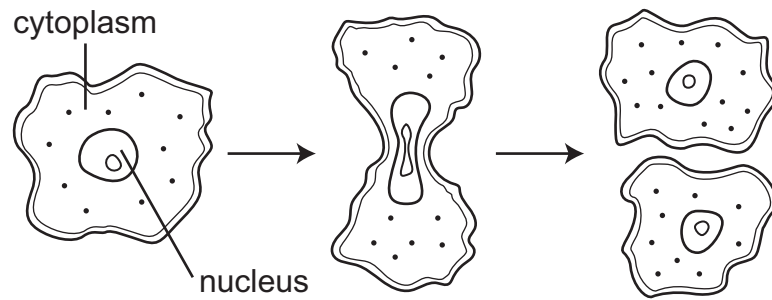
10. Volcanic eruptions can be more easily predicted than earthquakes. Scientists constantly monitor certain factors to help make predictions about volcanic eruptions.

Which technological method of predicting volcanic eruptions is the **most** effective?

- A. Scientists use pH meters to measure the acidity of groundwater and surface water near volcanoes.
- B. Scientists study the history of a volcano to determine when it was active and when it became dormant.
- C. Scientists use satellite images to monitor changes in temperature and surface features of volcanoes in remote locations.
- D. Scientists use seismographs to measure the length and strength of earthquakes to try to determine when a volcano will become active.

11. An amoeba is a unicellular organism that moves through its water habitat by stretching its body surface. The diagram below shows binary fission in an amoeba.

### Binary Fission in an Amoeba



Circle a word or phrase in each set of options to describe this process.

Binary fission is a type of ( asexual / sexual ) reproduction similar to ( meiosis / mitosis ) and results in two daughter cells that are ( identical to / different from ) the parent cell.

**12.** Circle a word or phrase in each set of options to correctly describe the process of meiosis.

A single cell divides ( once / twice ) to produce ( two / four / eight ) cells that contain ( the same / half the ) number of chromosomes as the original cell.

13. In the years following some major extinction events, surviving marine organisms had to live in warmer water. Warmer water contains less dissolved oxygen than colder water.

How did this environmental change **most likely** affect marine organisms?

- A. Individual organisms tended to decrease in size.
- B. Each organism spent less time searching for food.
- C. Organisms spent more time actively exploring their environment.
- D. Organisms altered their habitat to be closer to the surface of the water.



Use the scenario to answer the next two questions.

### **Puzzling Genetics**

Gregor Mendel investigated the genetics of pea plants in the 1850s. He knew that the offspring of some plants always produce offspring of the same color. He crossed purebred white-flowering pea plants with purebred purple-flowering pea plants to produce generation 1. Then, he crossed two of the generation 1 offspring to produce generation 2. The table shows the results of these crosses.

<b>Results</b>	
<b>Generation</b>	<b>Offspring Flower Color</b>
1	100% purple
2	75% purple 25% white

Mendel's work provided science with the basics of genetics.

14. Which statement **best** describes the genetic material in the nucleus of pea plant cells?
- A. Genes are made of chromosome pairs held together by DNA strands.
  - B. Genes are clusters of proteins that make up the DNA on chromosomes.
  - C. Paired DNA strands are held together by chromosomes that are stored inside genes.
  - D. Chromosomes are made of tightly coiled DNA strands that have smaller sections called genes.

15. Gregor Mendel investigated the genetics of pea plants.

**Part A:** Circle a word or phrase in each set of options to describe the results of the investigation in the scenario.

The results observed in generation 1 best support the principle of

( independent assortment / dominance / the segregation of alleles ).

The generation 2 pea plants that have white flowers are ( heterozygous / homozygous ).

**Part B:** Which statement **best** describes the conclusion that can be made from these pea plant crosses?

- A. The trait for pea flower color is controlled by a pair of genes through one allele from each parent.
- B. The trait for pea flower color is randomly inherited on one allele from one of the two parents.

16. The list shows some results of student research related to the genetic engineering of animals.

**Results of Animal Genetic Engineering**

1. A pig is genetically engineered to produce a phosphorus-metabolizing enzyme, reducing phosphorus (an agricultural pollutant) in manure.
2. Animals used in genetic engineering are altered to meet human needs.
3. Chickens bred for rapid growth experience imbalanced growth, which leads to bone fractures and immobility.
4. Scientists are working to reduce waiting lists for organ transplants by genetically engineering pig organs for use in humans.

Which chart correctly classifies the listed results as societal benefits or ethical challenges?

**A. Results of Animal Genetic Engineering**

Societal Benefit	Ethical Challenge
1	3
2	4

**B. Results of Animal Genetic Engineering**

Societal Benefit	Ethical Challenge
1	2
4	3

**C. Results of Animal Genetic Engineering**

Societal Benefit	Ethical Challenge
2	1
3	4

**D. Results of Animal Genetic Engineering**

Societal Benefit	Ethical Challenge
3	1
4	2

17. A student is reading about a bacterium that affects a host's digestive system. The bacterium undergoes a mutation that results in the production of a protein different from the one originally coded for by the nucleus. The new protein provides the bacterium with a slime coating that is not affected by common antibiotics.

Which statement describes how this mutation **most likely** affects the bacterium?

- A. The mutation is beneficial for the bacterium since it provides protection.  
The mutation does not affect the host since mutated bacteria cannot reproduce.
- B. The mutation is not beneficial for the bacterium since it changes the genetic code of the bacterium.  
The mutation does not affect the host since mutated bacteria cannot reproduce.
- C. The mutation is beneficial for the bacterium since it provides protection.  
The mutation negatively affects the host since the bacterium will be more likely to reproduce.
- D. The mutation is not beneficial for the bacterium since it changes the genetic code of the bacterium.  
The mutation negatively affects the host since the bacterium will be more likely to reproduce.

- 18.** Charles Darwin observed finches on the Galápagos Islands. Darwin noticed that finches on different islands had different beak shapes. He also noticed that there were many similarities shared by the finches from the different islands. These similarities convinced Darwin that the finches of the Galápagos Islands were all related through a common ancestor.

How did Charles Darwin explain the differences in the beak shapes of finches on the different islands?

- A.** The different beaks were needed to build a variety of bird nests on each island.
- B.** The different beaks resulted from the different types of food available on each island.
- C.** The different beaks provided protection from predators that were unique to each island.
- D.** The different beaks were the result of unsuccessful mating among finches on each island.

19. The red fox and coyote are two animals that look similar to one another but do not belong to the same species. Some of their differences are outlined in the chart below.

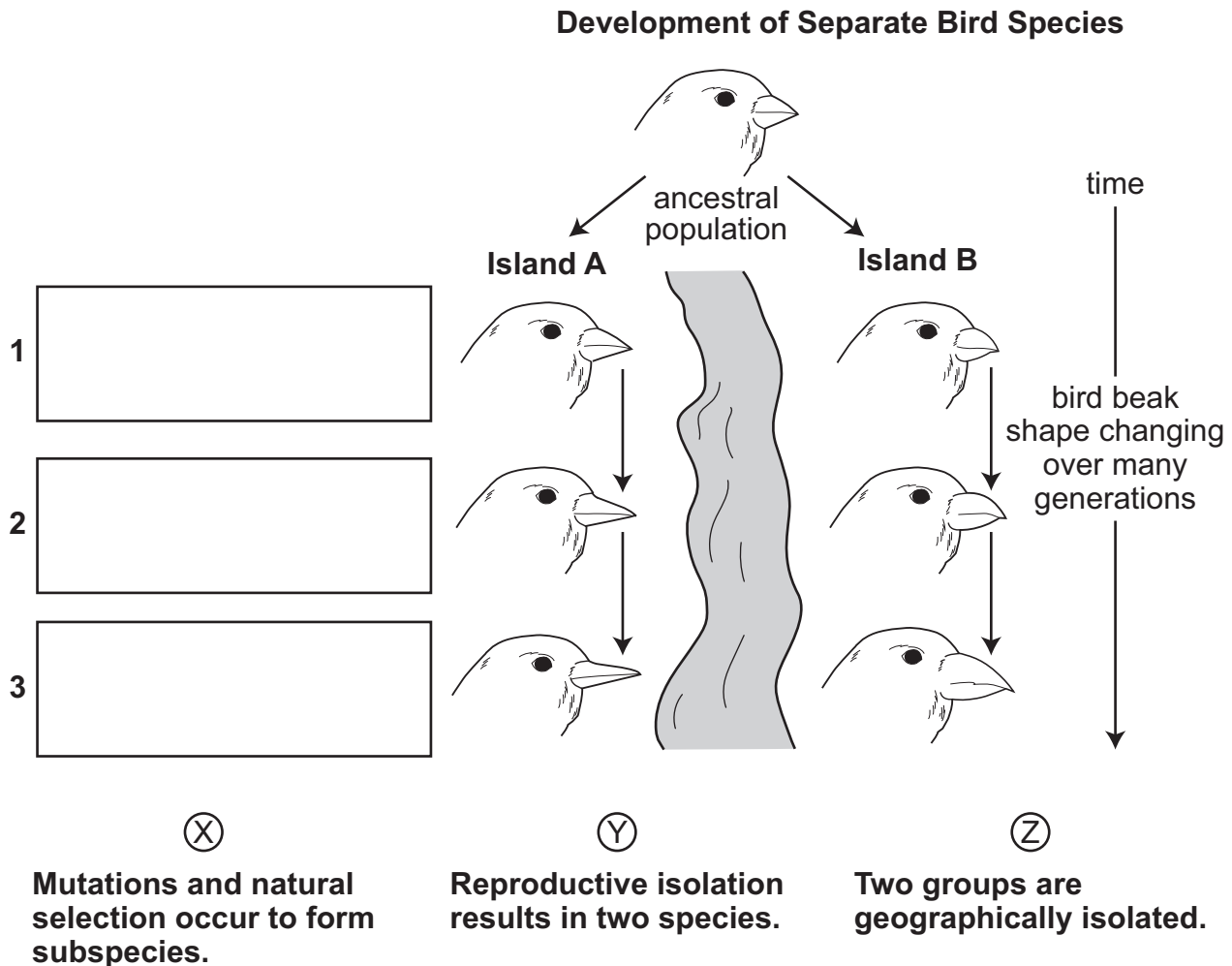
Red Fox	Coyote
is shy	can survive in various habitats by changing social habits
eats small rodents, birds, rabbits, and plants	is a scavenger; eats almost anything; will prey on livestock
prefers wooded areas; will build dens when breeding	does not require much shelter

The environment changes in an area with red foxes and coyotes due to an expanding town. Which explanation **best** describes the animal species that will be more likely survive by staying in the area?

- A. the coyote because it will find wooded areas for shelter
- B. the coyote because it will adapt to changing environments
- C. the red fox because it will avoid the more human-populated area
- D. the red fox because it will find shelter in abandoned houses and buildings

20. The diagram represents how an ancestral population of birds became separated on two different islands.

Record the letters of the descriptions in the boxes to show the steps that led to speciation if the birds did not travel between the islands.





- 21.** The energy of a single wave could power an electric car for hundreds of miles if its energy were converted into electrical energy in a wave energy converter. Which statement correctly describes the energy in ocean waves?
- A.** Ocean waves interact with other waves, diminishing in energy as the waves reach the shore.
  - B.** Ocean waves travel thousands of miles before reaching the shore, losing energy as they travel.
  - C.** Ocean waves move in different directions, making it difficult to harness energy for conversion into electrical energy.
  - D.** Ocean waves carry energy originating from the Sun, which unevenly heats the air and produces winds that transfer energy to the water surface.

22. A student is using an instrument to produce the following sound differences.

**Sound Differences**

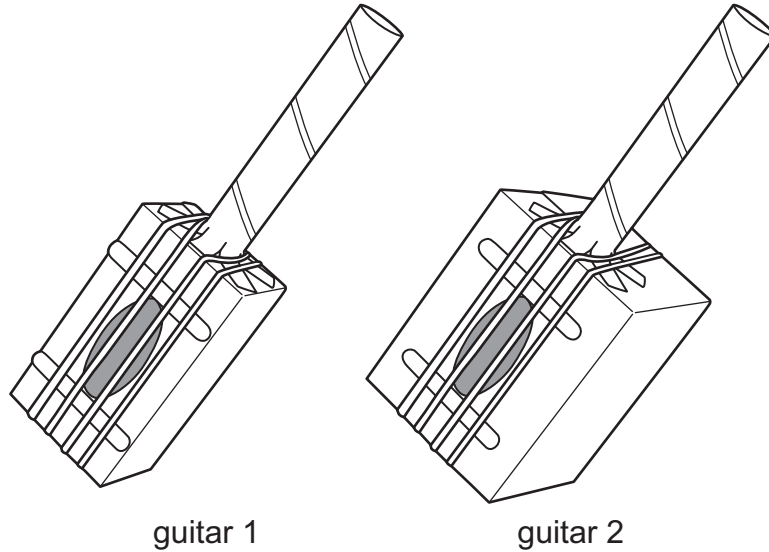
1. one loud sound and one quiet sound of the same pitch
2. two sounds of different pitches

Which statement **best** describes the sound differences produced by the student?

- A. Both sound difference 1 and sound difference 2 are caused by the amplitude of the sound waves.
- B. Both sound difference 1 and sound difference 2 are caused by the frequency of the sound waves.
- C. Sound difference 1 is caused by the amplitude of the sound waves, and sound difference 2 is caused by the frequency of the sound waves.
- D. Sound difference 1 is caused by the frequency of the sound waves, and sound difference 2 is caused by the amplitude of the sound waves.

23. A student uses rubber bands, paper towel tubes, and two tissue boxes of different sizes to build two guitars. Guitar 2 is deeper and wider than guitar 1. Both guitars have an equal length. The student uses four rubber bands, each with a different width, as strings on each guitar.

### Tissue Box Guitars



Which statement **best** describes the sounds made by the guitars?

- A. Guitar 1 is the louder guitar because the sound energy produced by plucking a rubber band causes a smaller volume of air in the box to resonate and amplify the sound.
- B. Guitar 2 is the louder guitar because the sound energy produced by plucking a rubber band causes a larger volume of air in the box to resonate and amplify the sound.
- C. Guitar 1 is the louder guitar because the rubber bands are stretched tighter around the box, amplifying the sound.
- D. Guitar 2 is the louder guitar because the rubber bands are less stretched around the box, amplifying the sound.

24. Students are given an object in a darkened room. The students are given four lights of different colors to use to determine the color of the object. The table shows the students' observations after shining each color of light on the object.

**Students' Observations**

Light Color	Observation
red	visible
blue	not visible
green	not visible
white	visible

Based on the students' information, which statement explains the **most likely** color of the object?

- A. The object is red because the red light and white light were reflected by the object.
- B. The object is red because the blue light and green light were reflected by the object.
- C. The object is blue green because the red light and white light were reflected by the object.
- D. The object is blue green because the blue light and green light were reflected by the object.

25. The electrical telegraph was the first point-to-point messaging system. This system worked by sending electrical signals through a wire laid between two stations. The telegraph system was eventually replaced by the telephone system.

Which statement **best** identifies the primary difference between these two communication systems?

- A. The telegraph converts mechanical energy to electrical signals; the telephone converts sound energy to light waves that are reflected from satellites to receiving stations.
- B. The telegraph converts sound waves to electrical signals that generate a code at the receiving station; the telephone converts light waves to electrical signals that generate sound waves.
- C. The telegraph transmits mechanical signals to produce sound waves at the receiving station; the telephone produces sound waves that are converted to electrical energy at a receiving station.
- D. The telegraph transmits coded electrical signals that are decoded at a receiving station; the telephone converts sound waves to electrical signals that travel through an electrical connection.

**Mississippi Academic Assessment Program**  
**Science**  
**Grade 8**  
**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 2021.

Item Number	Performance Objective	DOK Level	Item Type	Correct Answer
1	(E.8.10.1) Read and evaluate scientific information about advancements in renewable and nonrenewable resources. Propose and defend ways to decrease national and global dependency on nonrenewable resources.	2	Multiple Choice	D
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	(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	Technology Enhanced	See Answer Key
4	(E.8.7.4) Use research and evidence to document how evolution has been shaped both gradually and through mass extinction by Earth's varying geological conditions (e.g., climate change, meteor impacts, and volcanic eruptions).	2	Multiple Choice	C
5	(E.8.9A.2) Explore and debate theories of plate tectonics to form conclusions about past and current movements of rocks at Earth's surface throughout history.	2	Multiple Choice	B
6	(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	Multiple Choice	D
7	(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.	3	Multiple Choice	D
8	(E.8.9A.6) Design and conduct investigations to evaluate the chemical and physical processes involved in the formation of soils.	2	Technology Enhanced	See Answer Key
9	(E.8.9B.1) Research and map various types of natural hazards to determine their impact on society.	2	Multiple Choice	D
10	(E.8.9B.2) Compare and contrast technologies that predict natural hazards to identify which types of technologies are most effective.	2	Multiple Choice	C
11	(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	Technology Enhanced	See Answer Key
12	(L.8.2A.3) Construct explanations of how genetic information is transferred during meiosis.	2	Technology Enhanced	See Answer Key
13	(L.8.2B.1) Construct an argument based on evidence for how environmental and genetic factors influence the growth of organisms.	2	Multiple Choice	A
14	(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.	1	Multiple Choice	D
15	(L.8.2B.2) Use various scientific resources to research and support the historical findings of Gregor Mendel to explain the basic principles of heredity.	2	Technology Enhanced	See Answer Key

**Mississippi Academic Assessment Program  
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<b>Item Number</b>	<b>Performance Objective</b>	<b>DOK Level</b>	<b>Item Type</b>	<b>Correct Answer</b>
16	(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
17	(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	Multiple Choice	C
18	(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	B
19	(L.8.4B.2) Construct written and verbal explanations to describe how genetic variations of traits in a population increase some organisms' probability of surviving and reproducing in a specific environment.	2	Multiple Choice	B
20	(L.8.4B.3) Obtain and evaluate scientific information to explain that separated populations, that remain separated, can evolve through mutations to become a new species (speciation).	3	Technology Enhanced	See Answer Key
21	(P.8.6.2) Investigate research-based mechanisms for capturing and converting wave energy (frequency, amplitude, wavelength, and speed) into electrical energy.	2	Multiple Choice	D
22	(P.8.6.4) Use scientific processes to plan and conduct controlled investigations to conclude sound is a wave phenomenon that is characterized by amplitude and frequency.	2	Multiple Choice	C
23	(P.8.6.5) Conduct scientific investigations that describe the behavior of sound when resonance changes (e.g., waves in a stretched string and design of musical instruments).	2	Multiple Choice	B
24	(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	A
25	(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	D

Mississippi Academic Assessment Program  
Science  
Grade 8  
Practice Test  
Technology Enhanced Items  
Answer Key

Item #2

**Examples of Solar Energy to Heat Buildings**

Passive Solar Energy	Active Solar Energy
2, 3	1, 4

Item #3

Part A:

youngest
B
A
D
C
oldest

Part B: D

Item #8

Part A:

**Variables**

Controlled	Dependent	Independent
1, 2, 3, 4	6	5

Part B:

Areas with steep slopes will experience ( low / high ) amounts of soil erosion, resulting in a ( thin or missing / thick and rich ) layer of topsoil.

Flat areas at the base of slopes will experience ( low / high ) amounts of soil deposition, resulting in a ( thin or missing / thick and rich ) layer of topsoil.



Mississippi Academic Assessment Program  
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Technology Enhanced Items  
Answer Key

Item #11

Binary fission is a type of (asexual/sexual) reproduction similar to (meiosis/mitosis) and results in two daughter cells that are (identical to/different from) the parent cell.

Item #12

A single cell divides (once/twice) to produce (two/four/eight) cells that contain (the same/half the) number of chromosomes as the original cell.

Item #15

Part A:

The results observed in generation 1 best support the principle of (independent assortment/dominance/the segregation of alleles).

The generation 2 pea plants that have white flowers are (heterozygous/homozygous).

Part B: A

Item #20

1	Z
2	X
3	Y