

# Tennessee TCAP 2020 Grade 4 Science Practice

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Answer Key Materials  
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# Tennessee Comprehensive Assessment Program TCAP

## Science Grade 4 | Practice Test



***Please PRINT all information in the box.***

Student Name: \_\_\_\_\_

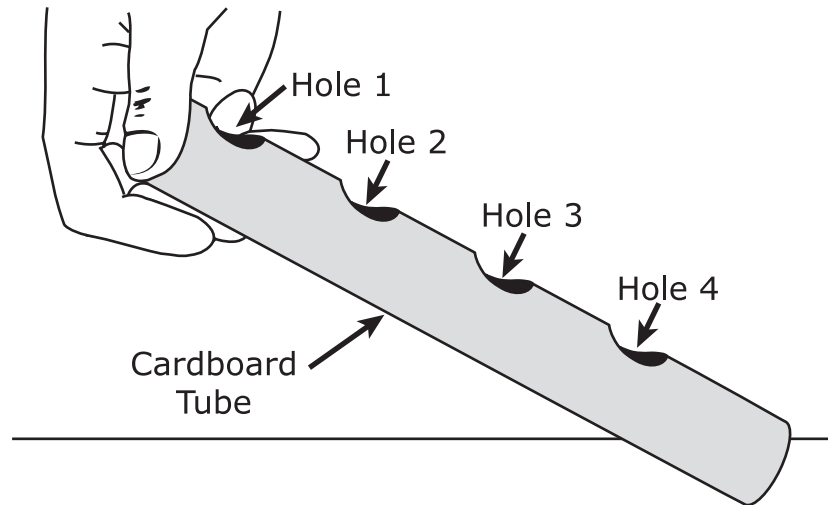
Teacher Name: \_\_\_\_\_

School: \_\_\_\_\_

District: \_\_\_\_\_

**All practice test items represent the appropriate grade level/content standards—however, the practice test may contain item types that no longer appear on the operational assessment.**

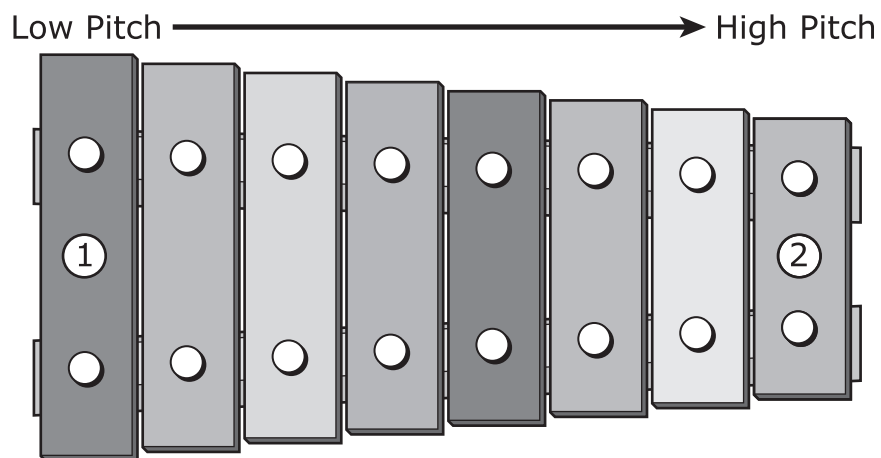
1. A student sets up the cardboard tube shown. The student holds the tube at an angle. The student drops a ball into each hole, then measures how fast the ball travels when it comes out of the tube.



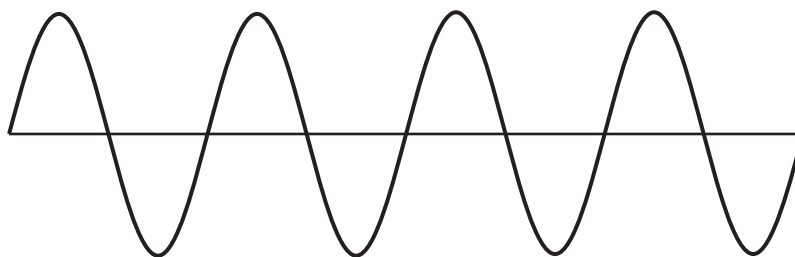
**Dropping the ball into which hole will cause the ball to travel the fastest?**

- A.** Hole 1, because the ball will have the most potential energy
- B.** Hole 2, because the ball will have the most kinetic energy
- C.** Hole 3, because the ball will have the least potential energy
- D.** Hole 4, because the ball will have the least kinetic energy

2. A student struck the bars shown on this xylophone. The student used the same amount of force to strike each bar. Each note that the student played had the same volume.



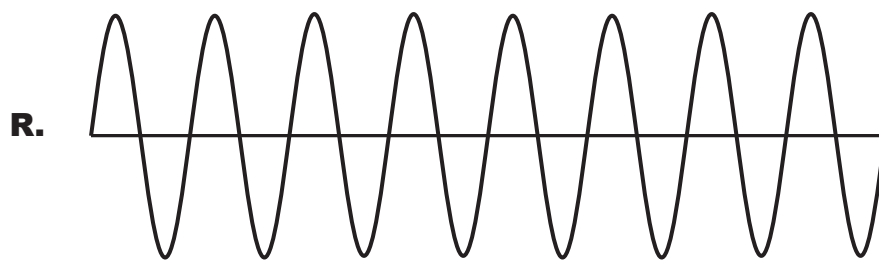
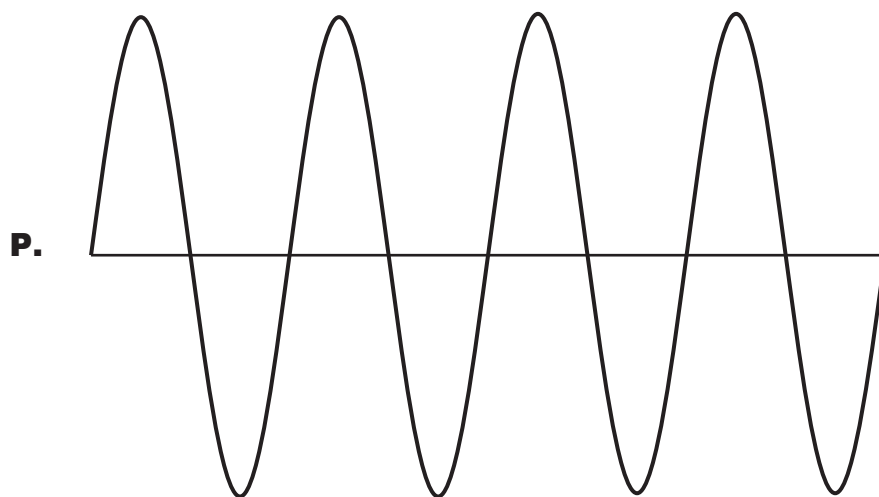
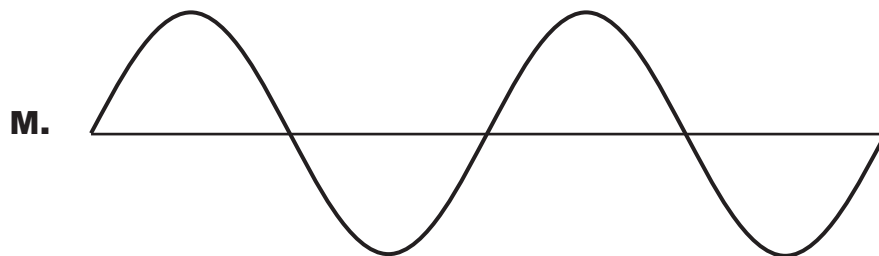
Each time the student struck the xylophone, a machine recorded the wave as an image. The picture shows the wave image recorded when the student struck bar 1 on the xylophone.



*(This item continues on the next page.)*

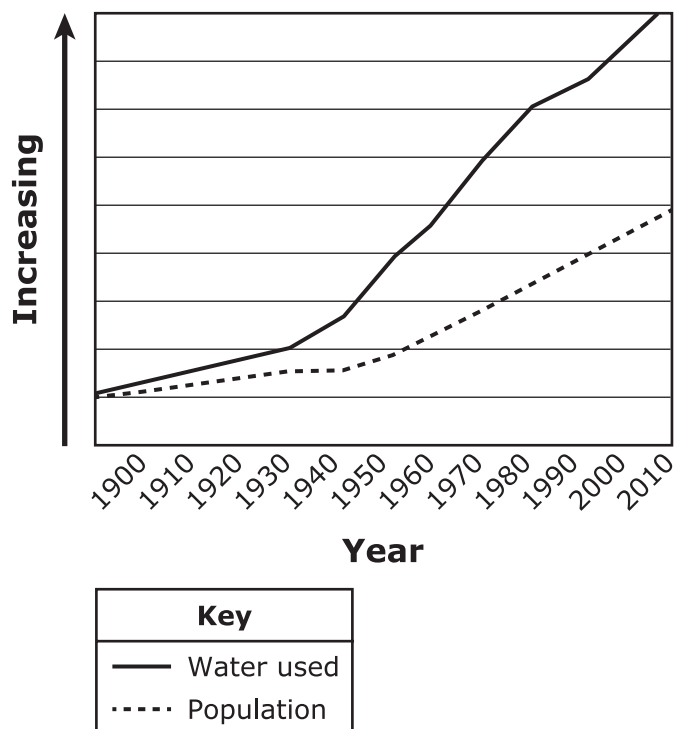
(**Item 2**, continued from the previous page)

**Which picture shows the most likely wave image recorded when the student struck bar 2 on the xylophone?**



3. The graph shows population growth and water usage for the world.

### Global Water Use and Population



Which statement is correct based on the data shown?

- A.** The amount of water used is not related to the human population.
- B.** The amount of water used is higher when the human population is lower.
- C.** The amount of water used is lowest when the human population is highest.
- D.** The amount of water used is higher when the human population is higher.

4. Which three statements correctly describe materials plants need?

- M.** Plants need sunlight to grow.
- P.** Plants need water to grow.
- R.** Plants need soil to photosynthesize.
- S.** Plants need carbon dioxide to photosynthesize.
- T.** Plants need oxygen to photosynthesize.

5. The table shows typical temperatures in a gray wolf habitat.

### Gray Wolf Habitat Temperatures

Season	Typical Nighttime Temperature (°C)	Typical Daytime Temperature (°C)
Winter	0	2
Spring	2	17
Summer	9	28
Fall	1	14

Which of these best describes a way that gray wolves adapt to survive the changing temperatures?

- A. Wolves develop a heavy coat in the fall and shed it in the spring.
- B. Each wolf's howl sounds different from the others.
- C. A wolf pack works together to find food in the fall.
- D. Wolves are most active at sunrise and sunset.



6. Students took turns rolling a ball across a classroom floor. A sensor measured the speed of the ball at the one-meter mark. The students recorded the speed in a data table.

### Speed of Rolling Ball

Roll	Speed (meters per second)
1	8
2	7
3	9
4	4

**Which conclusion is supported by the data?**

- M.** The ball had the most energy on roll 1.
- P.** The ball had the least energy on roll 4.
- R.** The ball had less energy on roll 1 than on roll 2.
- S.** The ball had more energy on roll 2 than on roll 3.

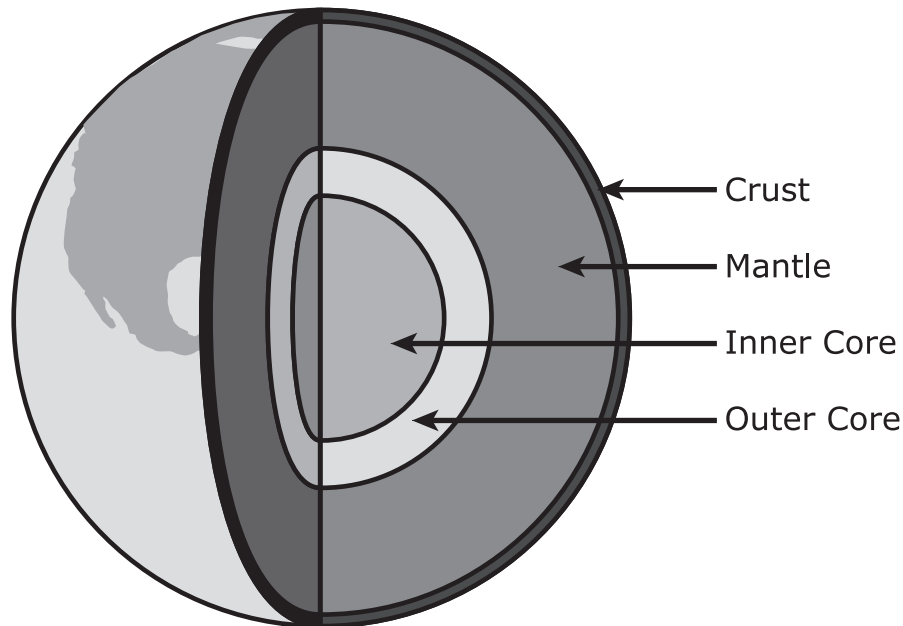
**7. A science quote from an article about land use is shown.**

“Science studies show that when people build more roads, parking lots, sidewalks, and rooftops, there is more storm water runoff. This can cause more flooding and erosion.”

**Which human activity is the author talking about in the quote?**

- A.** harvesting crops
- B.** mining minerals
- C.** trading goods
- D.** building cities

8. The diagram shown is a model of the different layers inside Earth.

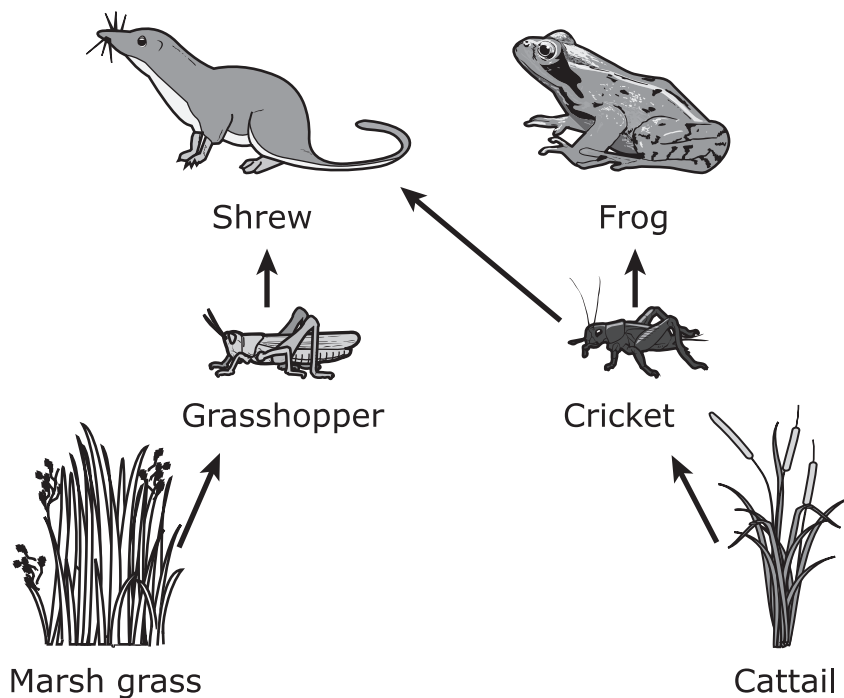


Which two statements best compare the crust to the rest of the layers?

- M.** The crust surrounds all the other layers and is solid.
- P.** The crust is the innermost layer and is liquid.
- R.** The crust is the thinnest layer and is solid.
- S.** The crust is the outermost layer and is liquid.
- T.** The crust is the thickest layer and is solid.

9. A simplified food web of a marsh ecosystem is shown.

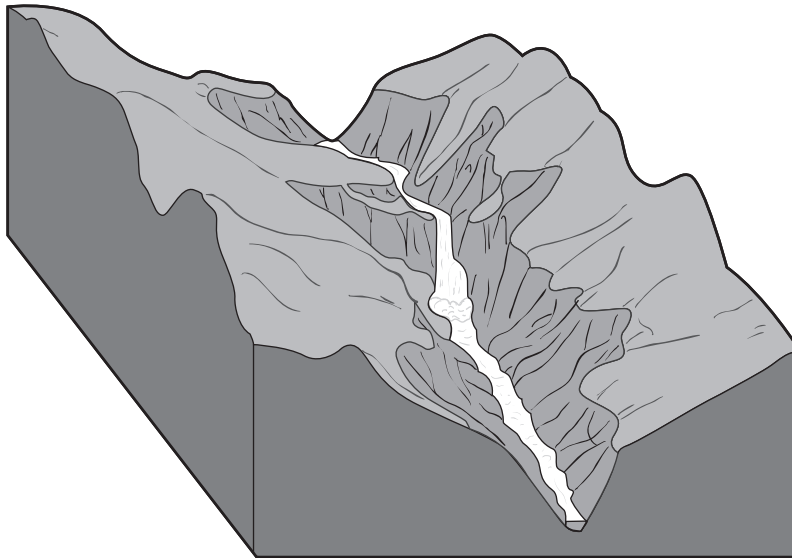
### Marsh Ecosystem



Which organisms get energy from crickets?

- A. cattails and grasshoppers
- B. cattails and frogs
- C. shrews and frogs
- D. grasshoppers and shrews

10. The diagram shows a V-shaped valley. The valley did not exist thousands of years ago.

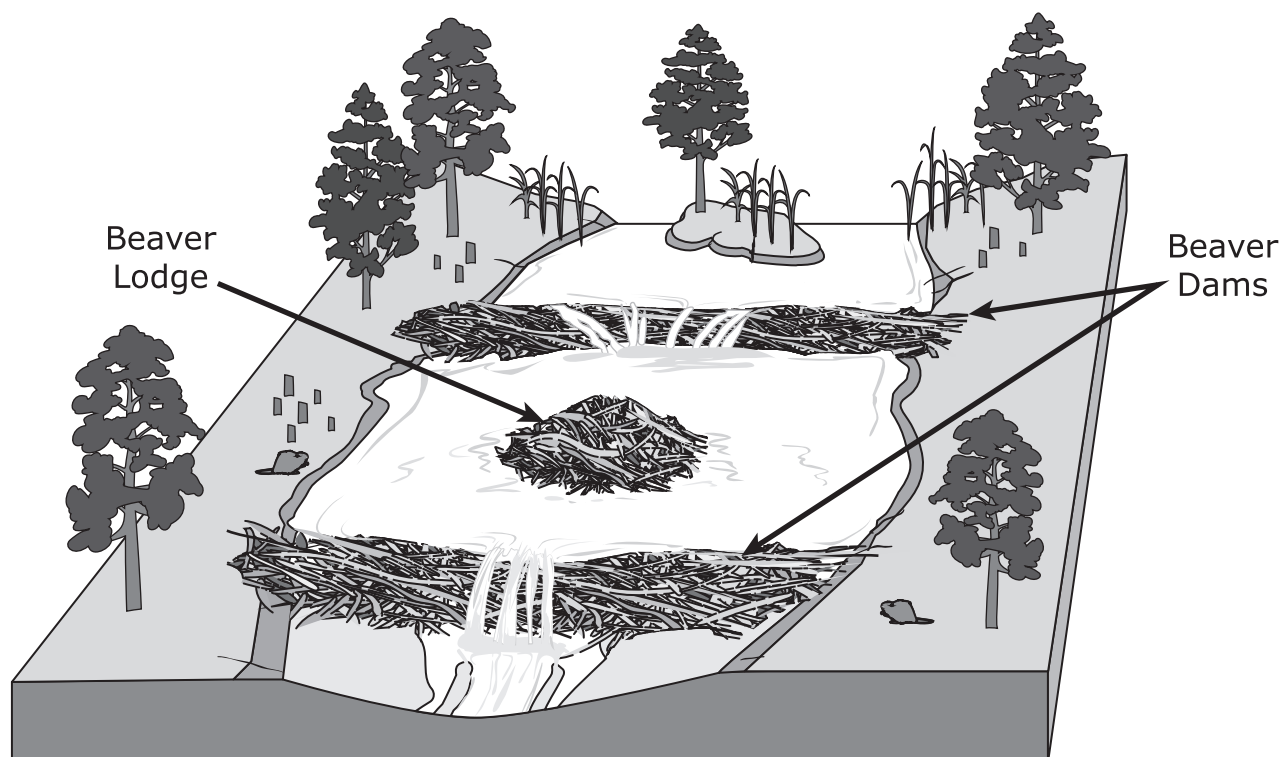


This valley is most likely the result of

- M.** sediment being deposited by slow-moving water.
- P.** riverbanks being eroded by fast-moving water.
- R.** earthquakes causing the ground to split open.
- S.** glaciers moving sediment to a new location.

11. A beaver is a mammal that builds its home in a stream or river. The beaver's home is called a lodge. The beaver builds the lodge in the middle of a pond it creates by building dams in the stream. The picture shows a model of a stream ecosystem with two beaver dams and a beaver lodge.

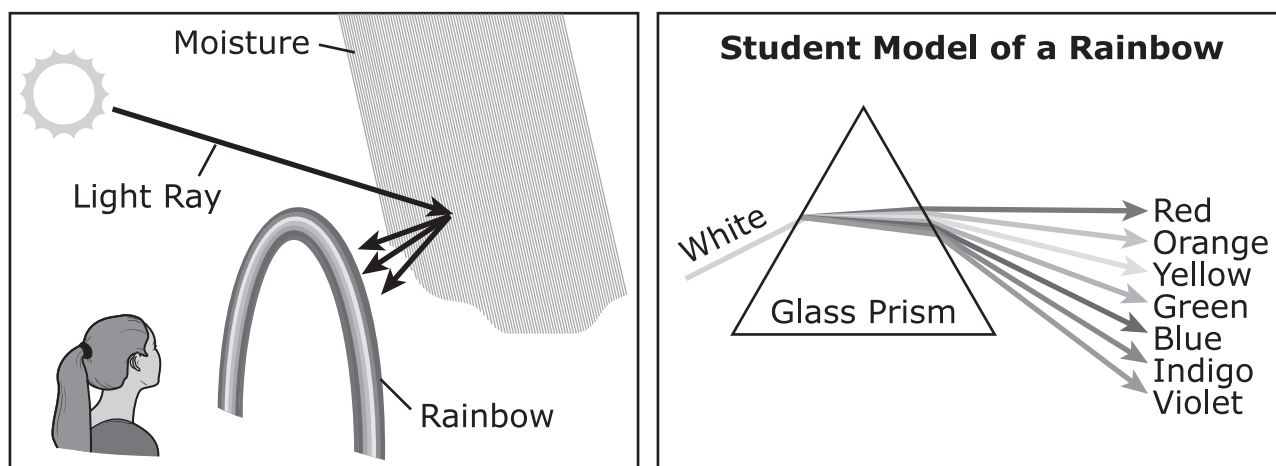
### Model of a Stream Ecosystem



**Based on the model, what would most likely happen to the ecosystem if the beavers and their dams were removed?**

- A.** The trees would have more water to use as the stream water moves more slowly through the ecosystem.
- B.** The stream would be wider and deeper as the stream water moves more slowly through the ecosystem.
- C.** The banks of the stream would have less erosion as the stream water moves more quickly through the ecosystem.
- D.** The water used by plants on the banks of the stream would be reduced as the stream water moves more quickly through the ecosystem.

12. A student saw a rainbow outside after school. The next day the student decided to model how rainbows form. The student shines white light through a glass prism and sees how the light splits up into many colors.



**Which two ways does the student's model need to be changed to better show how rainbows are formed?**

- M.** The prism should be as high in the air as rainbows are.
- P.** The model needs to be outside because rainbows only form outside.
- R.** The prism should have a round shape because raindrops are round.
- S.** The prism should be made of water instead of glass because rain is made of water.
- T.** Sunlight should be used instead of white light because sunlight and white light are made of different things.

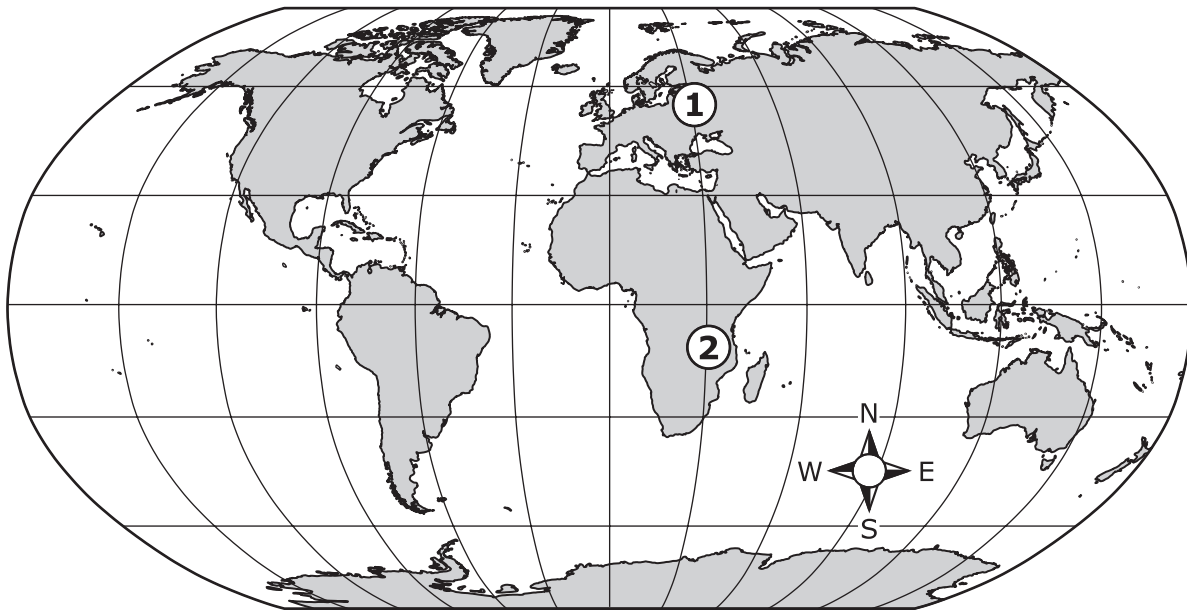
- 13. On a forest field trip, a student is assigned a list of observations to make. One observation the student looks for is evidence of mechanical weathering.**

**Which activity would allow the student to check mechanical weathering off the list?**

- A.** an acorn falling out of a tree
- B.** an ant placing a soil particle on an anthill
- C.** a puddle getting smaller as the sun shines on it
- D.** a stone becoming smooth in a flowing riverbed



14. A student labeled two locations on a map as shown.

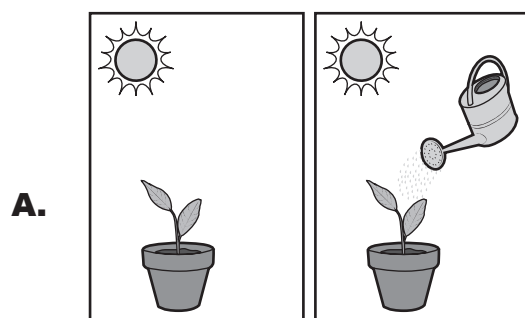


The student claims locations 1 and 2 may experience sunset at the same time. Which statement provides evidence for this argument?

- M.** Both locations are on the same line of longitude.
- P.** Both locations are on the same line of latitude.
- R.** Both locations are in the Eastern Hemisphere.
- S.** Both locations are on the same continent.

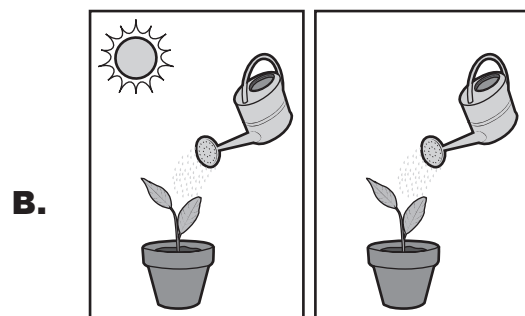
15. A student states that plants need sunlight to grow. The student plans an investigation to help support the argument with evidence. The diagrams represent four different setups.

Which setup will give the most evidence to support the student's claim?



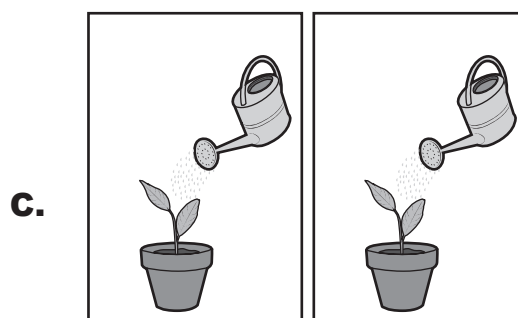
Plant 1

Plant 2



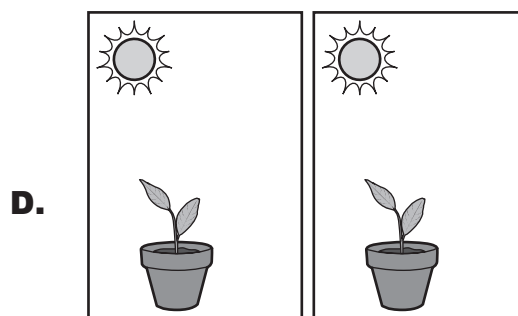
Plant 1

Plant 2



Plant 1

Plant 2



Plant 1

Plant 2

16. The table shows information about some energy resources.

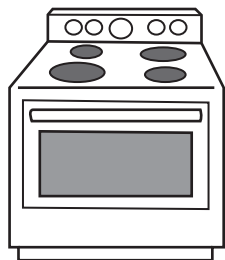
### Energy Resources

Energy Resource	Percentage of Electricity Produced by Resource
Coal	30%
Wind	6%
Natural gas	32%
Solar	1%

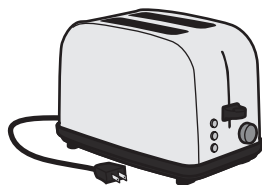
After observing the table, students conclude that renewable resources of energy should be used more to have cleaner air.

Which three explanations support this conclusion?

- M.** More wind energy produced means more pollution.
- P.** Natural gas is a fossil fuel that must be removed from under the ground.
- R.** The largest amount of electricity is produced from nonrenewable resources.
- S.** Getting coal from beneath Earth's surface destroys the ecosystem in that location.
- T.** Solar cells absorb energy that would normally be used by plants to make oxygen.

**17. Many objects produce thermal energy.**

Object 1



Object 2



Object 3



Object 4

**Students want to sort the objects into two groups.**

- Group 1: Objects that use electricity to produce thermal energy
- Group 2: Objects that use stored energy to produce thermal energy

**Which question should the students ask to decide which object to put into Group 2?**

- A.** How much thermal energy does the object produce?
- B.** How do people use the thermal energy produced by the object?
- C.** Can the object produce thermal energy without being plugged in?
- D.** Can the thermal energy produced by the object be changed into another form of energy?

18. An area with many different types of plants is experiencing a drought. The table shows rainfall for four years.

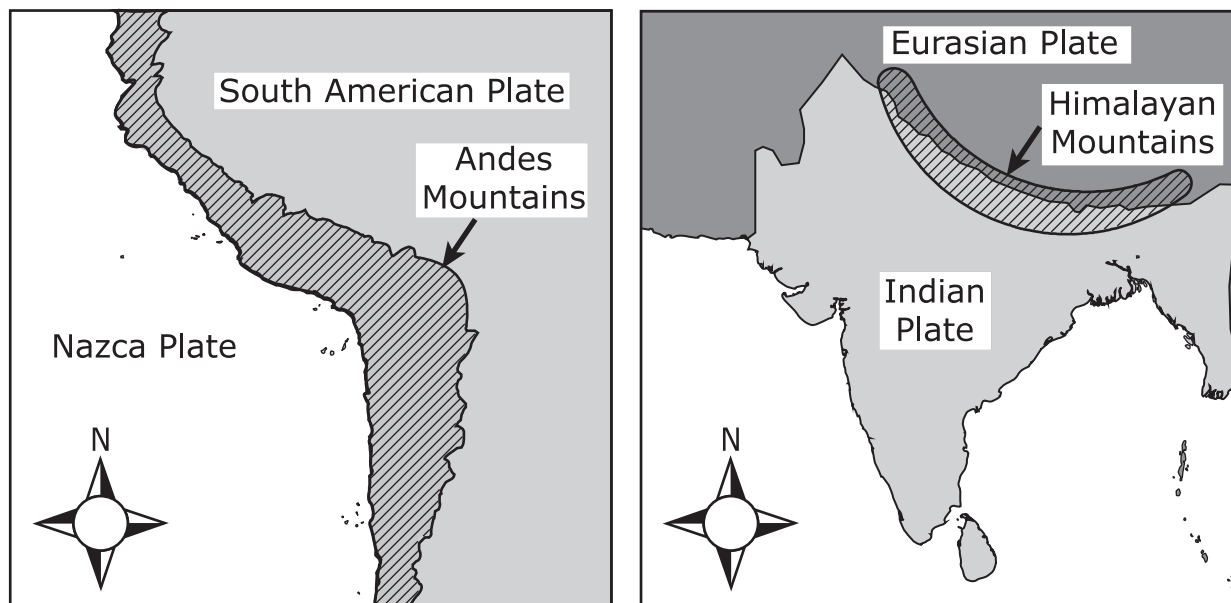
**Rainfall**

Year	Rainfall (cm)
1	22
2	19
3	16
4	14

Scientists predict that the rainfall pattern will continue during a fifth year. Which two types of plants will have the best chance of surviving in these conditions?

- M.** plants with stems that store water and plants with large colorful flowers
- P.** plants with large colorful flowers and plants with sharp thorns
- R.** plants with sharp thorns and plants with long root systems
- S.** plants with long root systems and plants with stems that store water

19. The map on the left shows the Andes mountain range in South America. The map on the right shows the Himalayan mountain range in India.



**The mountain ranges in these maps are evidence that mountain ranges**

- A.** form at the border of two tectonic plates.
- B.** form in the middle of a tectonic plate.
- C.** exist on their own separate tectonic plates.
- D.** represent the formation of new tectonic plates.

20. Students classified organisms based on their roles in a forest ecosystem. The data table shows how the students classified the organisms of a forest ecosystem.

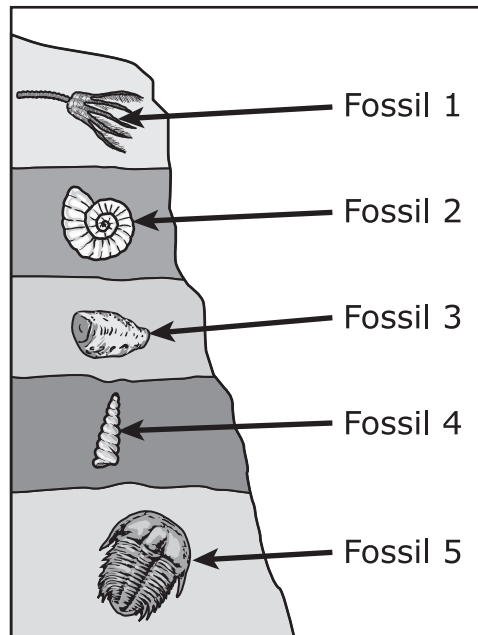
### Forest Ecosystem

Part of System	Role in Ecosystem
Sun	Energy source
Plant	Producer
Deer	Herbivore
Wolf	Carnivore
Earthworm	Decomposer

Which two energy flows are correct based on the students' classifications?

- M. Plant → Wolf
- P. Plant → Deer
- R. Sun → Deer
- S. Sun → Plant
- T. Earthworm → Wolf

**21. Scientists found layers of rock containing the fossils shown.**



**Which conclusion can scientists make from studying these rock layers?**

- A.** Fossil 1 is the oldest fossil.
- B.** Fossil 2 is older than Fossil 3.
- C.** Fossil 4 is younger than Fossil 5.
- D.** Fossil 5 is the youngest fossil.



22. A photograph of a river delta is shown.

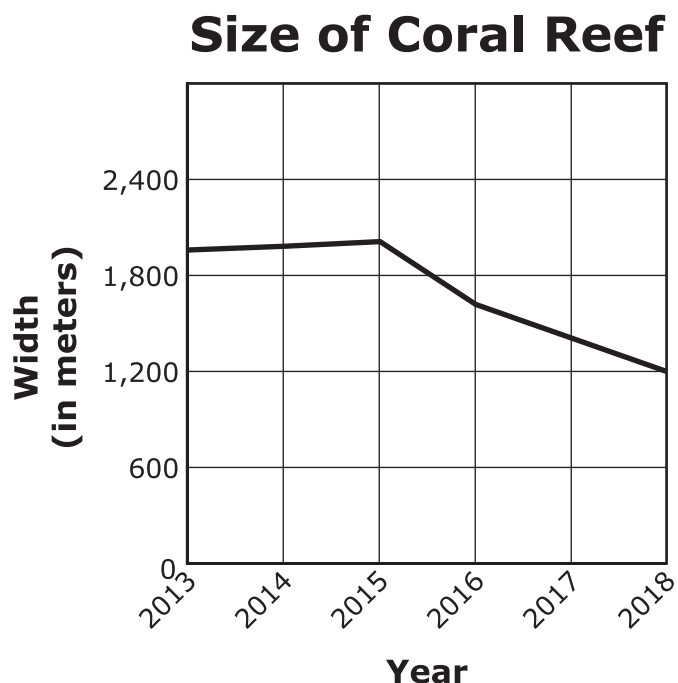


Source: Public Domain

**Which statement correctly describes the delta in the photograph?**

- M.** Deposition is causing the delta to become narrower over time.
- P.** Deposition is causing the delta to become bigger over time.
- R.** Erosion is causing the delta to become smaller over time.
- S.** Erosion is causing the delta to become wider over time.

23. Some animals protect coral reefs while others harm them. The Crown of Thorns Starfish came to a certain coral reef in the Pacific Ocean in 2015. The graph shows the size of the reef over time.








**Which statement about the size of the reef is supported by the data in the graph?**

- A.** The number of starfish in the area dropped after 2015.
- B.** The starfish made the coral reef smaller from 2015 to 2018.
- C.** The coral reef was healthy and growing from 2013 to 2018.
- D.** The coral reef lost more than 2,000 meters from 2015 to 2018.

24. Students dropped a ball of dough from different heights and timed how long it took the ball to fall to the floor. They then drew the shape of the dough after it hit the floor. Their data are in the table.

### Dough Drop Data

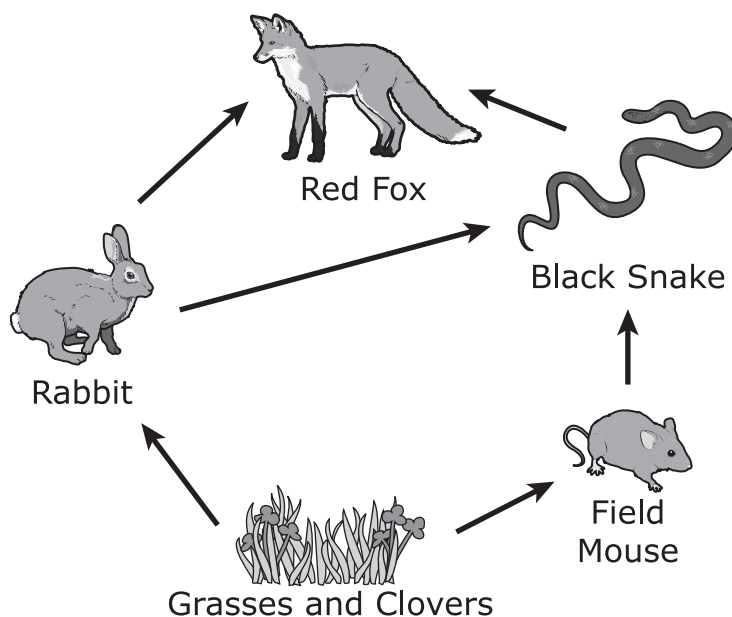
Height (m)	Time (s)	Shape
1	0.45	
2	0.64	
3	0.78	
4	0.90	
5	1.01	

Based on the data collected, which two conclusions can students make about the speed and energy of the dough when it hit the floor?

- M.** The dough had the fastest speed and the least kinetic energy when dropped from a height of 1 meter.
- P.** The dough had the slowest speed and the most kinetic energy when dropped from a height of 1 meter.
- R.** The dough had more speed and kinetic energy when dropped from a height of 2 meters than from 1 meter.
- S.** The dough had less speed and kinetic energy when dropped from a height of 4 meters than from 3 meters.
- T.** The dough had the fastest speed and the most kinetic energy when dropped from a height of 5 meters.

25. The food web shown is from an area in Tennessee.

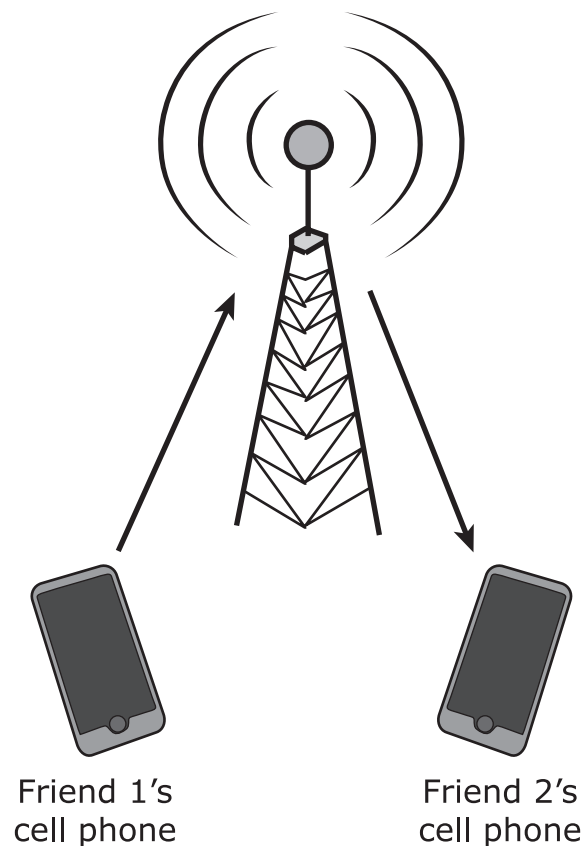
### Forest Food Web



**Which organisms are decomposers that should be added to complete the food web?**

- A.** Hawk and Earthworm
- B.** Tree and Fungi
- C.** Earthworm and Fungi
- D.** Squirrel and Bacteria

26. Two friends live near each other. Friend 1 calls Friend 2. Friend 1 talks into the cell phone. The cell phone changes the sound of Friend 1's voice into digital information. The digital information goes to the nearest radio tower as radio waves. The radio tower sends those radio waves to Friend 2's cell phone. Friend 2's cell phone changes the radio waves back into digital information. The digital information is then turned into sound so that Friend 2 can hear Friend 1.



**Why are Friend 1's sounds turned into digital information?**

- M.** in case people do not speak clearly
- P.** so the sounds can be sent as radio waves
- R.** so Friend 2 can communicate with the tower
- S.** in case the radio waves do not reach Friend 2's cell phone

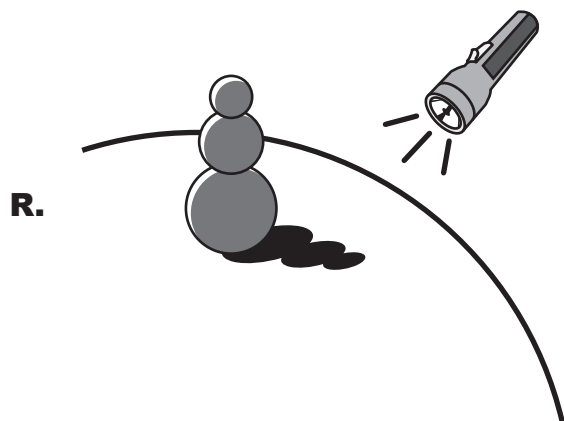
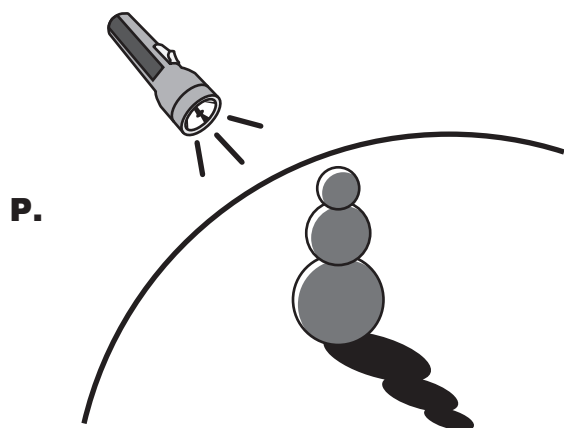
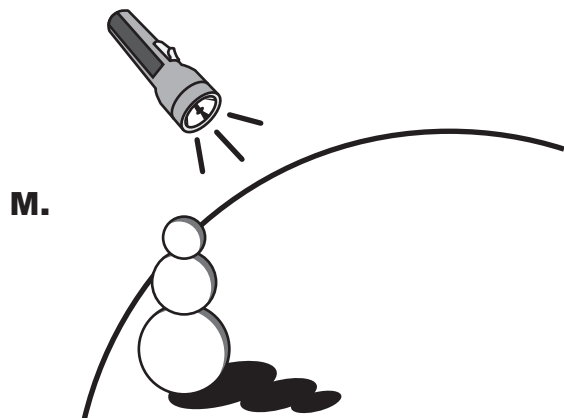
**27. Students choose playground activities to demonstrate energy transfer.**

**Which activity shows a transfer of potential energy to kinetic energy?**

- A.** sliding from the top of a slide
- B.** hanging from monkey bars
- C.** sitting on a bench
- D.** hiding behind a tree

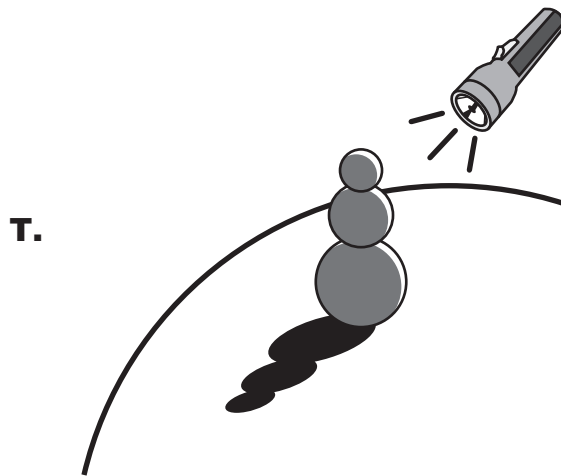
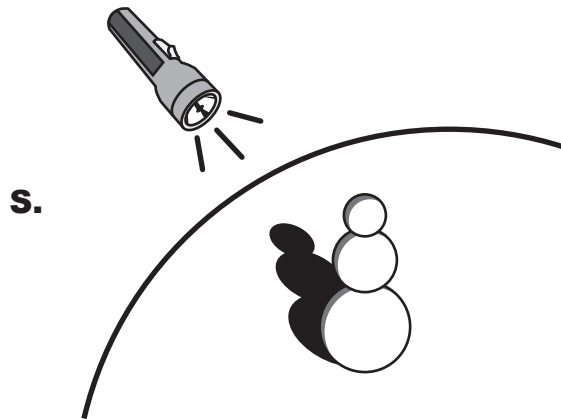
28. Shadows of objects on Earth change throughout the day. This occurs because Earth rotates.

Which two models show how the sun causes shadows to appear on Earth?



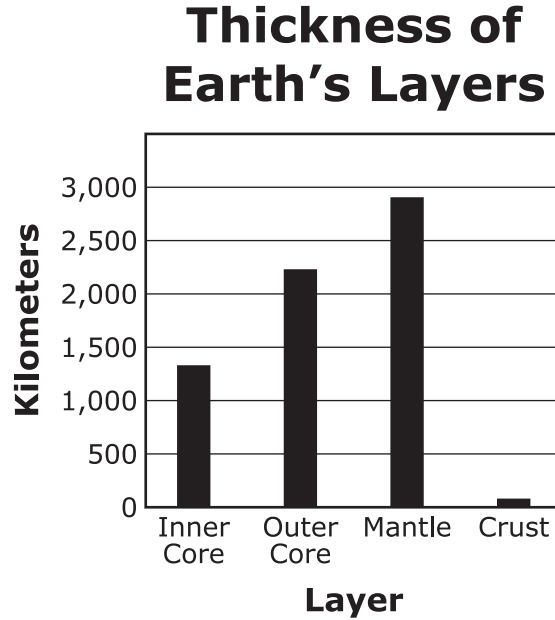
*(This item continues on the next page.)*

(**Item 28**, continued from the previous page)





29. The graph shows the thickness of Earth's layers.



Which table correctly identifies Earth's layers from thinnest to thickest?

**A.**

Thinnest			Thickest
Crust	Inner Core	Outer Core	Mantle

**B.**

Thinnest			Thickest
Mantle	Crust	Inner Core	Outer Core

**C.**

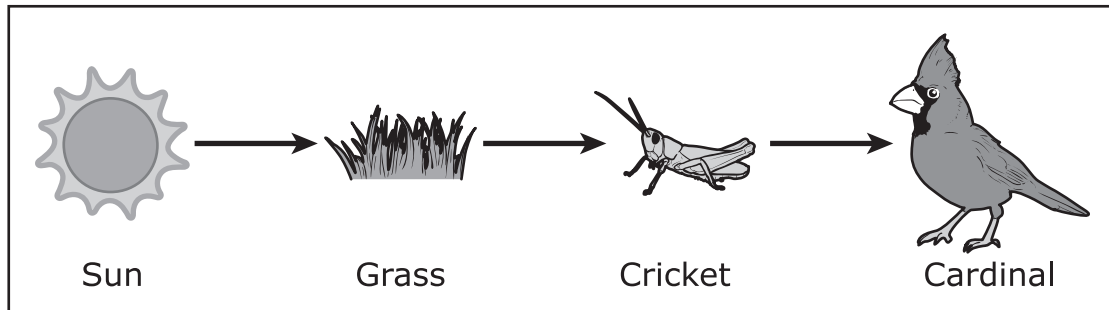
Thinnest			Thickest
Crust	Inner Core	Mantle	Outer Core

**D.**

Thinnest			Thickest
Inner Core	Outer Core	Mantle	Crust

30. A food chain is shown.

### Food Chain



The energy that the organisms in this food chain use for growth began as energy from the

- M. cardinal.
- P. cricket.
- R. grass.
- S. sun.



This is the end of the Grade 4 Science test.

1. ☒ A ☐ B ☐ C ☐ D
2. ☐ M ☐ P ☒ R ☐ S
3. ☐ A ☐ B ☐ C ☒ D
4. ☒ A ☒ B ☐ R ☒ S ☐ T (select **three**)
5. ☒ A ☐ B ☐ C ☐ D
6. ☐ M ☒ P ☐ R ☐ S
7. ☐ A ☐ B ☐ C ☒ D
8. ☒ A ☐ P ☒ R ☐ S ☐ T (select **two**)
9. ☐ A ☐ B ☒ C ☐ D
10. ☐ M ☒ P ☐ R ☐ S
11. ☐ A ☐ B ☐ C ☒ D
12. ☐ M ☐ P ☒ R ☒ S ☐ T (select **two**)
13. ☐ A ☐ B ☐ C ☒ D
14. ☒ A ☐ P ☐ R ☐ S
15. ☐ A ☒ B ☐ C ☐ D
16. ☐ M ☒ P ☒ R ☒ S ☐ T (select **three**)
17. ☐ A ☐ B ☒ C ☐ D
18. ☐ M ☐ P ☐ R ☒ S
19. ☒ A ☐ B ☐ C ☐ D
20. ☐ M ☒ P ☐ R ☒ S ☐ T (select **two**)
21. ☐ A ☐ B ☒ C ☐ D
22. ☐ M ☒ P ☐ R ☐ S
23. ☐ A ☒ B ☐ C ☐ D
24. ☐ M ☐ P ☒ R ☐ S ☒ T (select **two**)
25. ☐ A ☐ B ☒ C ☐ D

26. ☐ M ☒ ☐ R ☐ S
27. ☒ ☐ B ☐ C ☐ D
28. ☐ M ☒ ☐ R ☐ S ☒ (select **two**)
29. ☒ ☐ B ☐ C ☐ D
30. ☐ M ☐ P ☐ R ☒

## TCAP Practice Test Standards Alignment and Key - Grade 4 Science

Question No.	Key	Standard
1	A	4.PS3.2
2	R	4.PS4.1
3	D	4.ESS2.3
4	M, P, S	4.LS2.1
5	A	4.LS2.5
6	P	4.PS3.1
7	D	4.ESS3.2
8	M, R	4.ESS2.4
9	C	4.LS2.3
10	P	4.ESS1.1
11	D	4.LS2.4
12	R, S	4.PS4.2
13	D	4.ESS2.1
14	M	4.ESS1.2
15	B	4.LS2.1
16	P, R, S	4.ESS3.1
17	C	4.PS3.3
18	S	4.LS2.5
19	A	4.ESS2.2
20	P, S	4.LS2.2
21	C	4.LS4.1
22	P	4.ESS1.1
23	B	4.ESS2.3
24	R, T	4.PS3.1
25	C	4.LS2.3
26	P	4.PS4.3
27	A	4.PS3.2
28	P, T	4.ESS1.2
29	A	4.ESS2.4
30	S	4.LS2.2