

Tennessee TCAP 2023
Grade 4 Science

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Tennessee Comprehensive Assessment Program

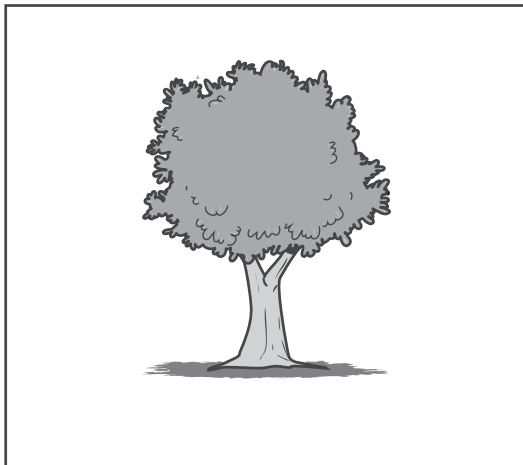
TCAP

Science Grade 4 Item Release

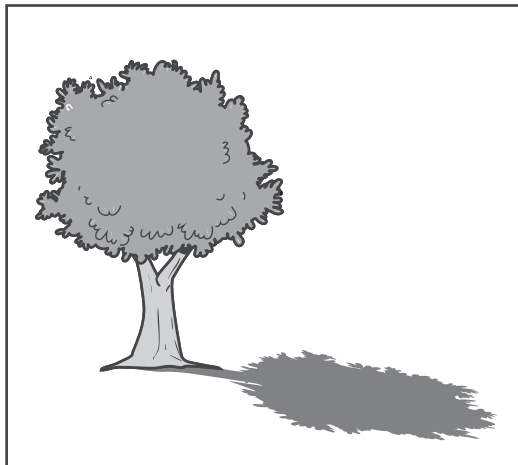


- 00.** A student observes the shadow of a tree at two different times during the day.

**Noon
Shadow**



**3:00 P.M.
Shadow**



Which of these causes the length and direction of the shadow to change?

- A.** the rotation of Earth on its axis
- B.** the amount of light given off by the sun
- C.** the distance between Earth and the moon
- D.** the revolution of Earth in orbit around the sun

- 00.** Students investigated how rocks change over time. The students used sugar cubes to model the rocks. The students put five sugar cubes into a plastic bottle. The students put the lid on the bottle and shook the bottle. The table shows the observations the students made.

Rock Investigation Observations

Number of Times the Bottle Was Shaken	Description of Sugar Cubes
0	Shaped like a cube, sharp corners, straight edges
60	Broken edges, rounded corners
120	Shaped like a sphere, much smaller in size, smoother

Which description of weathering is **most** similar to the way the rocks changed in the investigation?

- A.** Water in the cracks of a large rock freezes and expands, causing the rock to break apart.
- B.** Tree roots grow underneath a large flat rock, causing the rock to break into small pieces.
- C.** Fast-moving streams move rocks that then rub against each other, causing the rocks to change shape.
- D.** Animals dig into a rocky surface to make a den, causing the rock to crumble.

- 00.** The table shows information about one renewable and one nonrenewable energy source.

Energy from Wind	Energy from Coal
<ul style="list-style-type: none">• The sun heats the ground.• The ground heats the air above it.• The heated air rises.• Cool air rushes in to take the place of the air that rose.• The energy from the moving air is captured by a wind turbine.	<ul style="list-style-type: none">• Plants receive energy from the sun.• The plants die in a swamp.• The plants are buried by many layers of sediment.• Heat and pressure turn the plants into coal.• Energy from coal is released by burning the coal.

Which statement correctly compares the energy from wind and the energy from coal based on the table?

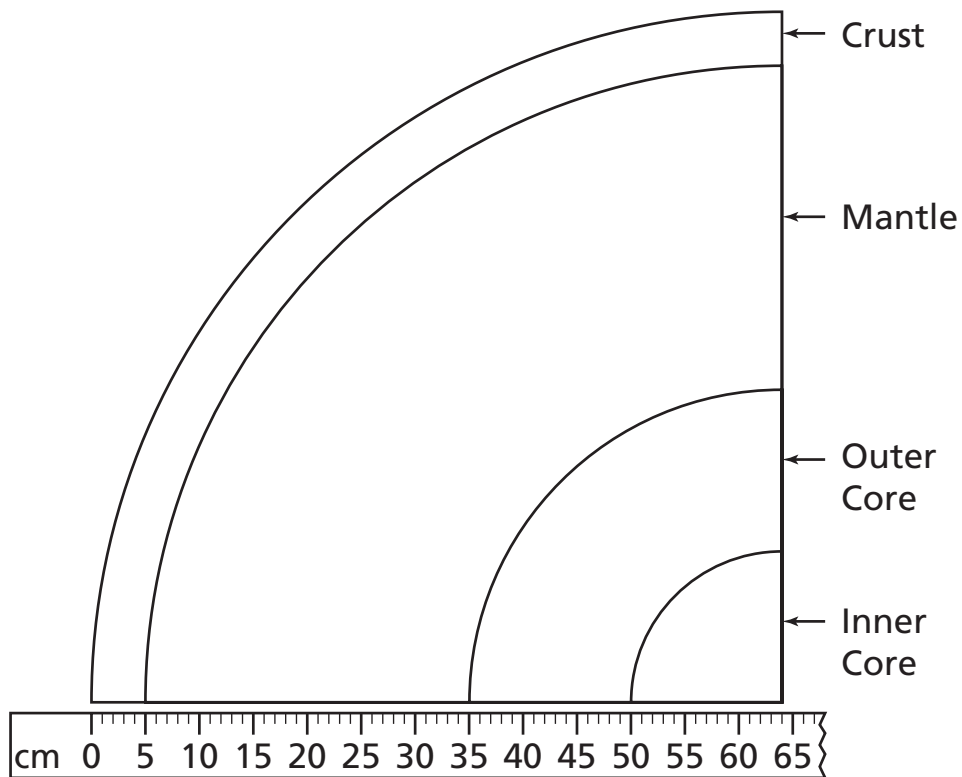
- A.** Wind energy takes millions of years to form, but coal energy forms in a very short period of time.
- B.** Energy from wind and energy from coal both start as energy from the sun.
- C.** Wind is a source of stored energy, but coal is a source of kinetic energy.
- D.** Wind and coal both have to be burned to release the stored energy.

00. A student is making a poster to display a diagram of Earth's layers. The table shows the student's plan for the thickness of each layer.

Diagram of Earth's Layers

Layer	Measurement (cm)
Crust	1
Mantle	30
Outer Core	20
Inner Core	10

The picture shows part of the student's diagram being measured with a meterstick.



Which layer did the student draw correctly?

- A.** Crust
- B.** Mantle
- C.** Outer Core
- D.** Inner Core

- 00.** A city bridge was damaged. The city council plans to hire a company to replace the bridge. The bridge should be made out of concrete and steel so that it is strong enough for cars. It should take six months or less to build. The total cost should be less than \$500,000.

The city council asks different companies to design a bridge for the project. The table shows each company's plans.

Bridge Plans

Company	Estimated Cost	Time to Build (months)	Materials
1	\$600,000	7	Concrete and steel
2	\$450,000	5	Concrete and steel
3	\$400,000	8	Wood and concrete
4	\$700,000	4	Wood and steel

Which company's plan **best** meets the needs of the city?

- A.** Company 1
- B.** Company 2
- C.** Company 3
- D.** Company 4

- 00.** The table shows the roles of organisms in a food chain.

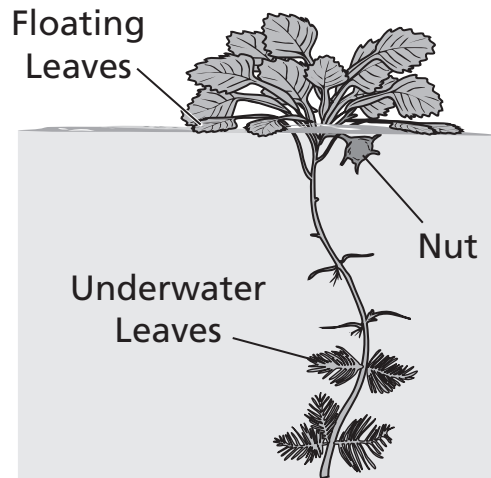
Roles of Organisms

Organism	Role
Raccoon	Omnivore
Cougar	Carnivore
Algae	Producer
Snail	Herbivore

Which diagram correctly shows how energy transfers in this food chain?

- A.** Raccoon → Cougar → Algae → Snail
- B.** Cougar → Algae → Snail → Raccoon
- C.** Snail → Raccoon → Cougar → Algae
- D.** Algae → Snail → Raccoon → Cougar

- 00.** Water chestnut is a plant that grows in ponds. The leaves float on the surface of the water. Water chestnut leaves grow fast and can cover the entire surface of the pond. This blocks sunlight from reaching other organisms in the pond. The picture shows some parts of a water chestnut plant.

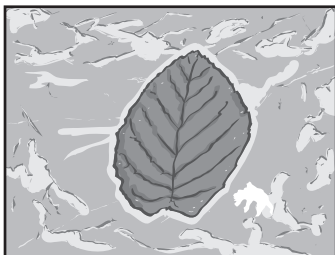


When water chestnuts begin to grow in a pond for the first time, which change will **most** likely result?

- A.** More fish will live in the pond.
- B.** Fewer insects will visit the pond.
- C.** Populations of other plants in the pond will decrease.
- D.** Populations of different fish will come to live in the pond.

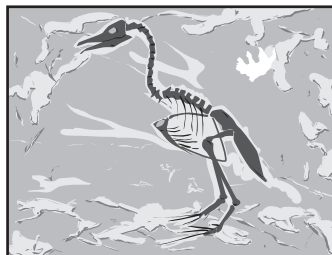
- 00.** Scientists think Tennessee was once covered by a shallow sea. Which fossil most likely led scientists to this conclusion?

A.



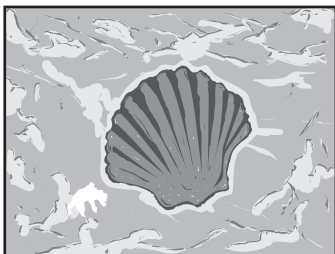
Leaf Fossil

C.



Bird Fossil

B.



Shell Fossil

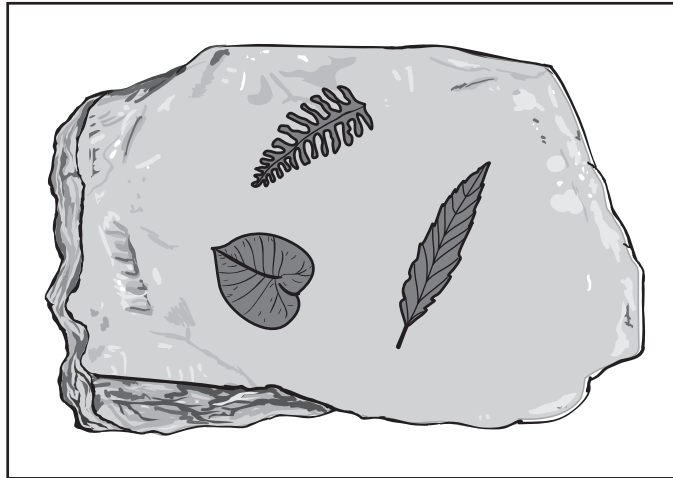
D.



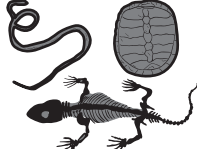


Insect Fossil

- 00.** Scientists search for fossils in Antarctica. Antarctica has the coldest climate on Earth. The diagram shows a large rock with fossils that was found in Antarctica. The scientists use the key to identify the fossils in the rock.

Large Rock with Fossils

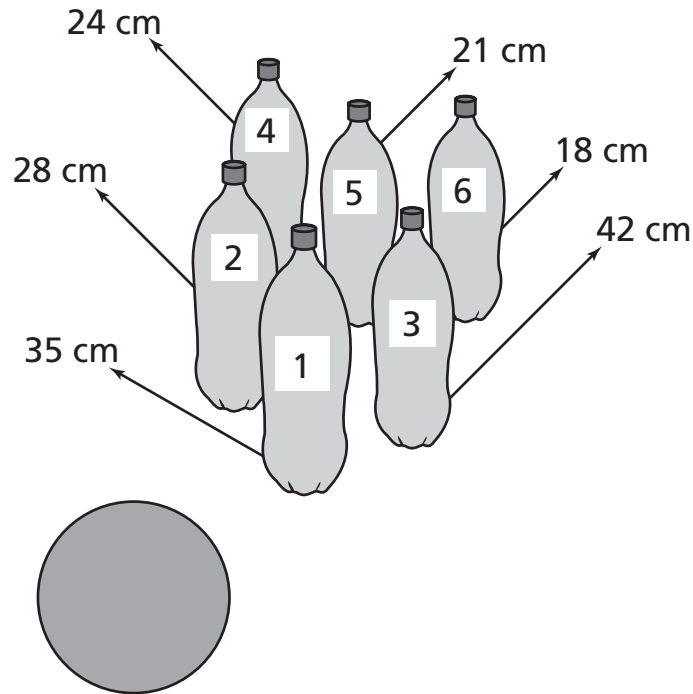


Key		
Ocean animal fossils	Warm climate plant fossils	Dry climate reptile fossils
		

Which conclusion should the scientists make based on these fossils?

- A.** Antarctica was once covered with water.
- B.** Antarctica is now covered with sandy soil.
- C.** Antarctica had a warmer climate at one time.
- D.** Antarctica now has many trees covering the landscape.

- 00.** Students arrange plastic bottles as shown. The students roll a ball toward the bottles. The ball strikes the bottles and causes them to fall and roll to a new position. The arrows show how far each bottle rolls.



Which statement makes an accurate claim about the bottles?

- A.** Bottle 1 has the least energy because it moves the shortest distance.
- B.** Bottle 5 has more energy than bottle 2 because it travels a farther distance
- C.** Bottle 6 has the least energy because it moves the shortest distance.
- D.** Bottles 2 and 3 have the same amount of energy because they are located beside each other.

Metadata – Grade 4

Items

Page Number	UIN	Grade	Item Type	Key	DOK	TN Standards	SEP	CCC
1	TS01S1150	4	MC	A	2	4.ESS1.2		CE
2	TS02S4001	4	MC	C	3	4.ESS2.1	INV	
3	TS02S3835	4	MC	B	3	4.ESS3.1	INFO	EM
4	TS02S2854	4	MC	B	3	4.ETS2.1	MOD	SQ
6	TS02S2832	4	MC	B	2	4.ETS2.2	CEDS	
7	TS02S1939	4	MC	D	2	4.LS2.2	MOD	EM
8	TS02S1951	4	MC	C	2	4.LS2.4		SC
9	TS02S3022	4	MC	B	1	4.LS4.1	ARGS	SF
10	TS02S2852	4	MC	C	2	4.LS4.1	CEDS	
11	TS02S2119	4	MC	C	3	4.PS3.1	INV	SC

Metadata Definitions:

UIN	Unique letter/number code used to identify the item.
Grade	Grade level or Course.
Item Type	Indicates the type of item. MC=Multiple Choice
Key	Correct answer.
DOK	Depth of Knowledge (cognitive complexity) is measured on a three-point scale. 1 = Recall or simple reproduction of information; 2 = Skills and concepts: comprehension and processing of text; 3 = Strategic thinking, prediction, elaboration.
TN Standards	Primary educational standard assessed. This includes the science ideas that students need to understand at each grade level.
SEP	Science and Engineering Practices: These are the essential practices of scientists and engineers which help students figure out explanations for phenomena or solutions for design problems.
CCC	Cross Cutting Concepts: These are concepts that permeate all science disciplines and provide a lens through which students can apply their science ideas to phenomena or design problems.