

Tennessee Comprehensive Assessment Program

TCAP

Science Grade 8 Test Practice





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Metadata—Science

Items

Page Number	Cluster (N/A for Standalone items)	Grade	Item Type	Key	TN Standards	SEP	CCC
1	N/A	8	MC	D	8.ESS2.4	CEDS	PAT
3	N/A	8	MS	A, C, D	8.ESS2.3	ARGS	SYS
4	N/A	8	MC	B	8.LS4.3	CEDS	CE
5	N/A	8	MS	C, D	8.PS2.4	MOD	SPQ
6	N/A	8	MC	D	8.LS4.5	INFO	SPQ
7	N/A	8	MC	B	8.PS2.6	MOD	CE
12	Earth's Changing History	8	MC	A	8.ESS2.4	CEDS	CE
13	Earth's Changing History	8	MC	D	8.ESS2.4	CEDS	SPQ
14	Earth's Changing History	8	MC	C	8.ESS2.4	CEDS	SPQ
15	Earth's Changing History	8	MC	C	8.LS4.3	DATA	CE
16	Earth's Changing History	8	MC	A	8.LS4.3	DATA	CE
17	N/A	8	MC	A	8.PS2.5	ARGS	SC
18	N/A	8	MC	C	8.ESS1.1	CEDS	-
19	N/A	8	MS	C, E	8.PS2.4	INV	SC
20	N/A	8	MC	C	8.ESS3.1	DATA	PAT

Metadata Definitions

Grade	Grade level or Course.
Item Type	Indicates the type of item. MC= Multiple Choice; MS= Multiple Select
Key	Correct answer.
TN Standards	Primary educational standard assessed.
SEP	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	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.

00. *Lystrosaurus* and *Cynognathus* were land-dwelling reptiles that lived more than 250 million years ago. *Mesosaurus* was an aquatic organism that lived more than 270 million years ago. The map shows several sites where fossils from these species have been found.

Fossil Locations



Key	
■	<i>Lystrosaurus</i>
●	<i>Cynognathus</i>
▲	<i>Mesosaurus</i>

What reasoning **best** explains why fossils of the same species were found in different locations?

- A.** The fossil species traveled long distances while alive over large bodies of water, and these species were able to populate other areas.
- B.** The organisms lived and died in one central area, and some of their remains were later carried by waterways and ocean currents to other landmasses, where they fossilized.
- C.** The similarities between the organisms that lived at the different fossil sites were due to random chance, and not because the same species lived in the different areas.
- D.** The landmasses were joined together at the time that the fossil species lived, and the continents have moved since the organisms lived on Earth.

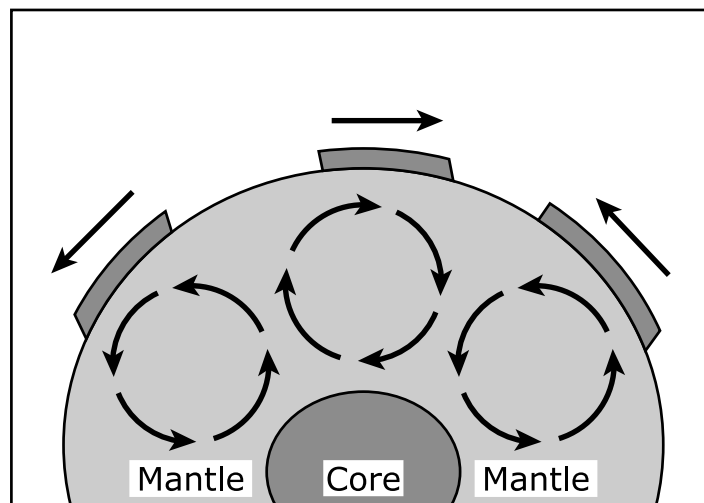
00. The table shows the temperatures of the mantle and the core of Earth's interior.

Mantle and Core of Earth

Layer of Earth	Temperature (°C)
Mantle	870–2,200
Core	2,200–5,000

The figure shows convection currents in Earth's interior.

Convection Currents in Earth



Which **three** statements about tectonic plate movement are supported by the information?

- A. Tectonic plates move in the same direction as the convection currents near the surface.
- B. As the dense rock in the mantle rises, the rock pushes the crust upward and creates convection currents.
- C. Tectonic plates can collide because convection currents can move the plates toward each other.
- D. As the core heats the mantle, the difference in temperature causes convection currents.
- E. Tectonic plates at the surface stop moving once they collide with each other, causing convection currents to also stop.

00. A scientist observes a species of beetle that lives on the trunks of hardwood trees in a forest. The beetles are either brown or green. Birds in the area are predators of the beetles. After a time, the scientist observes that the number of green beetles in the population has decreased, while the number of brown beetles has increased.

Which statement **best** explains the decrease in the number of green beetles?

- A.** The green beetles tend to have longer lifespans than the brown beetles.
- B.** The green beetles are more easily spotted by predatory birds.
- C.** The brown beetles move more slowly when approached by predatory birds.
- D.** The brown beetles reproduce more slowly than the green beetles.

00. A skydiver's velocity quickly decreases when a parachute is opened. The figure shows the forces on a skydiver and parachute when they are falling with a constant velocity.

Forces on a Skydiver Falling with a Constant Velocity

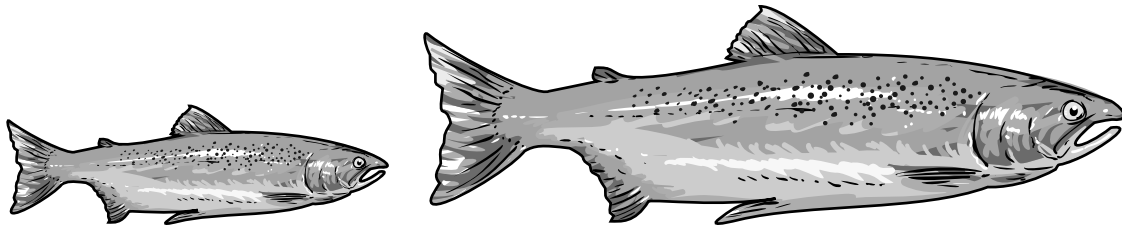


Which **two** statements correctly compare the forces acting on the skydiver and parachute?

- A. The upward force is smaller in size and opposite in direction to the downward force.
- B. The upward force is greater in size and opposite in direction to the downward force.
- C. The upward force and downward force are balanced in size and in opposite directions.
- D. The downward force in the model includes the force of gravity on the skydiver and parachute.
- E. The upward force in the model includes the force of gravity on the skydiver and parachute.

00. Scientists working for a commercial fish farm inserted a growth gene from a Chinook salmon into the egg of an Atlantic salmon. The result was a faster growing, genetically altered salmon. Genetically altered salmon can reach adulthood in 16 to 28 months. It takes 36 months for normal Atlantic salmon to reach adulthood. The figure shows normal and genetically altered salmon at 18 months of age.

**Normal and Genetically Altered Salmon
at 18 Months of Age**



**Normal Atlantic
Salmon**

Length: 33 cm
Weight: 1.5 kg

**Genetically Altered
Salmon**

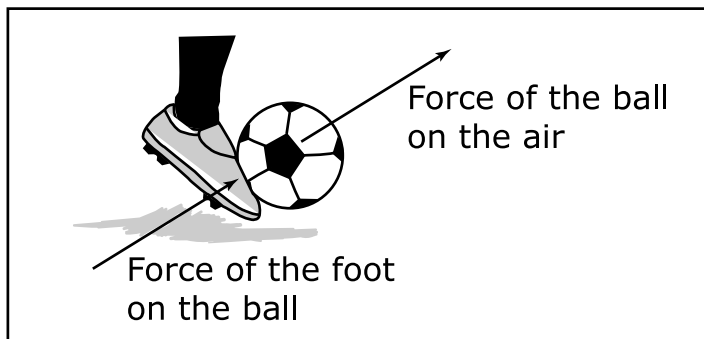
Length: 61 cm
Weight: 3.0 kg

Which statement describes a potential risk of using genetic engineering on salmon?

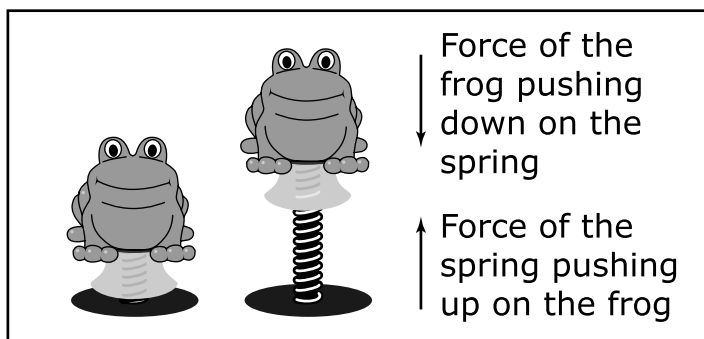
- A. A trait can be introduced that was not originally present in the salmon.
- B. The desired trait appears quickly compared to natural or selective breeding.
- C. A large number of genes with unknown effects are involved during the process.
- D. The salmon could have a negative impact once released into an ecosystem.

00. Which figure correctly shows arrows that represent an action-reaction force pair?

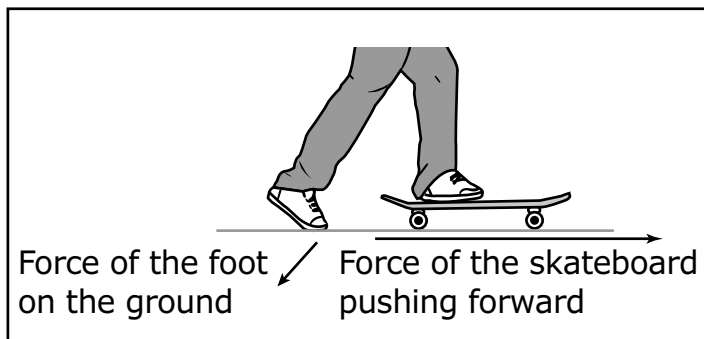
A.



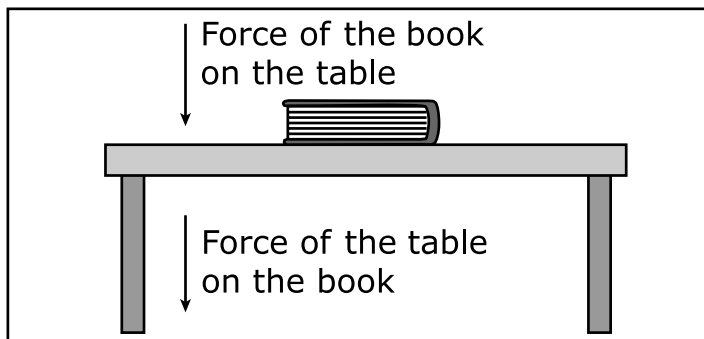
B.



C.



D.



Questions XX–XX refer to the passage(s) and image(s) shown.

Earth’s Changing History – Part 1

The Himalayas are a mountain range that formed at the boundary between the Indian Plate and the Eurasian Plate. While most mountain ranges decrease in height, scientists predict that the Himalayas will become taller and that related earthquake activity in the region will increase.

Figure 1 shows the changing positions of the continents and Madagascar from 170 million years ago to the present day.

Figure 1. Changing Positions of Landmasses

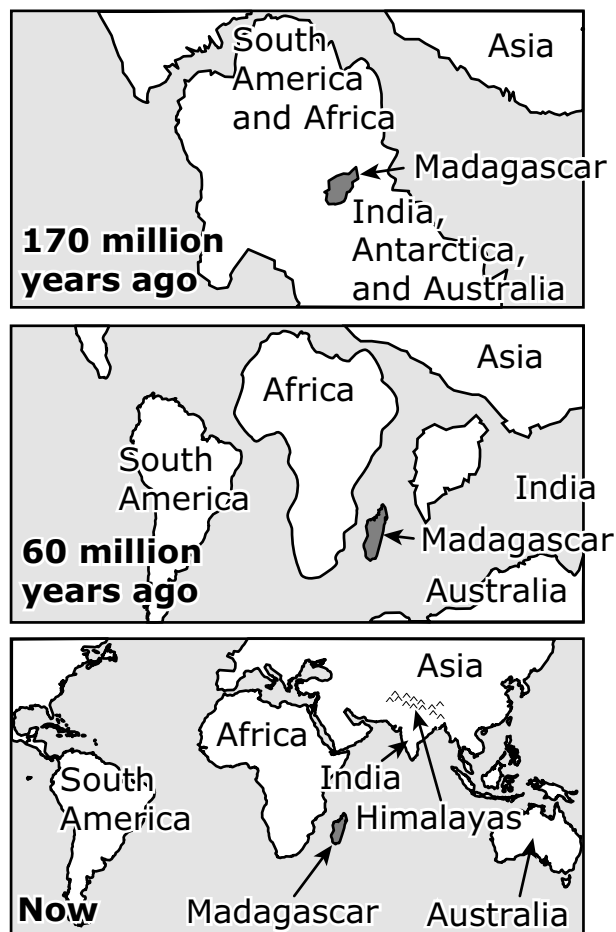


Table 1 shows the continents where fossils of several extinct species have been found.

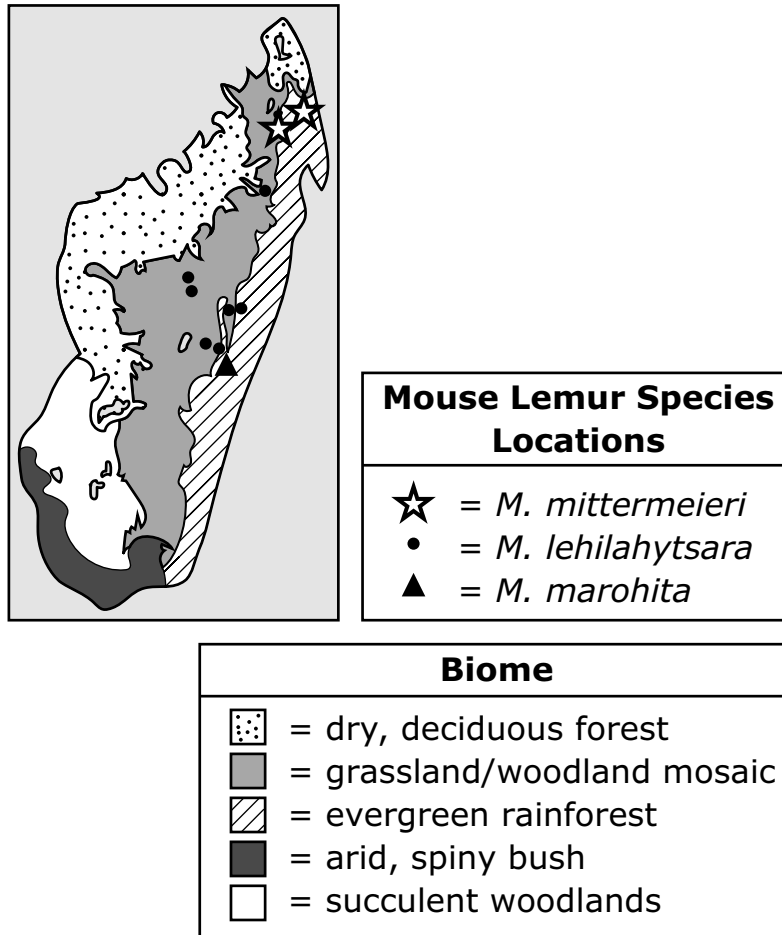
Table 1. Distribution of Fossils

Fossil Species	Continents Where Fossils Are Found
<i>Cynognathus</i>	<ul style="list-style-type: none">• South America• Africa
<i>Mesosaurus</i>	<ul style="list-style-type: none">• South America• Africa
<i>Glossopteris</i>	<ul style="list-style-type: none">• South America• Africa• India• Antarctica• Australia

Earth's Changing History – Part 2

Figure 2 shows the different ecosystems of Madagascar and the locations of different species of mouse lemurs.

Figure 2. Madagascar Biomes and Mouse Lemurs



Source: Yoder, A.D., et al., *PNAS*, 2016

Because of Madagascar's location, lemurs became isolated from the rest of the world. More than 100 species once inhabited the many different environmental niches found in Madagascar. When humans arrived in Madagascar, many of the lemur species went extinct because of hunting and other activities.

Table 2 shows the characteristics of some extinct and living lemur species.

Table 2. Characteristics of Extinct and Living Lemur Species

Species	Status	Characteristics
<i>A. fontoynontii</i>	Extinct	<ul style="list-style-type: none">• 190–210 kg mass• Arms longer than legs
<i>P. ingens</i>	Extinct	<ul style="list-style-type: none">• 45–60 kg mass• Longer limbs suitable for climbing
<i>D. madagascariensis</i>	Endangered	<ul style="list-style-type: none">• 2.5–3 kg mass• Highly mobile ears• Long, bushy tail
<i>A. laniger</i>	Vulnerable	<ul style="list-style-type: none">• 0.6–1.3 kg mass• Small, furry ears• Long tail• Strong legs for leaping

- 00.** Which explanation for the formation of the Himalayas is **best** supported by the information in Figure 1 (Part 1)?
- A.** As India converged with Asia, the edges of the landmasses were pushed upward.
 - B.** As India converged with Asia, the edges of the landmasses were forced down into Earth's interior.
 - C.** As India moved away from Asia, the edge of each landmass moved upward at Earth's ocean ridges.
 - D.** As India moved away from Asia, the edge of one landmass was forced underneath the edge of the other.

- 00.** Which explanation for the change in the position of Madagascar in relation to India is supported by the information in Figure 1 (Part 1)?
- A.** India and Madagascar are on the same tectonic plate, which has increased in size.
 - B.** India and Madagascar are on the same tectonic plate, which has decreased in size.
 - C.** India and Madagascar are on different tectonic plates that have moved toward each other.
 - D.** India and Madagascar are on different tectonic plates that have moved away from each other.

- 00.** *Glossopteris* was a plant that lived on Earth between 300 and 200 million years ago. Which explanation for the distribution of *Glossopteris* fossils is **best** supported by the information in Figure 1 and Table 1 (Part 1)?
- A.** Birds carried *Glossopteris* seeds to different continents.
 - B.** The different continents had the ideal environment for *Glossopteris*.
 - C.** The continents were once a single landmass, allowing *Glossopteris* to spread over a large area.
 - D.** Increased weathering, erosion, and deposition displaced *Glossopteris* fossils onto different continents.

- 00.** Deforestation is rapidly shrinking the habitat of the mouse lemur species *M. mittermeieri*.

Based on the information in Figure 2 (Part 2), which claim describes the way this species could **most likely** survive a loss of habitat?

- A.** Individuals will respond to a new environment by producing offspring with different traits.
- B.** Individuals will start breeding with species in another habitat to develop the traits necessary for survival in that habitat.
- C.** Individuals with traits more suited to survival in grassland or woodland habitats will reproduce and pass those traits on to their offspring.
- D.** Individuals moving into a different habitat will make changes to the environment to make it resemble their original habitat.

00. A student wants to organize the data in Table 1 (Part 2) to show which characteristics were advantageous for lemur survival when humans arrived in Madagascar.

Which table should the student produce to best present this information?

A.

Advantageous	Disadvantageous
Small mass Long tail	Large mass

B.

Advantageous	Disadvantageous
Large mass Long limbs	Small mass

C.

Advantageous	Disadvantageous
Small mass	Large mass Small ears

D.

Advantageous	Disadvantageous
Small mass	Large mass Strong legs

- 00.** A student pushed a ball several times across a grassy surface, using the same amount of force each time. The student measured the distance the ball traveled after each push. Next, the student used the same ball and applied the same force but pushed the ball across concrete instead of grass. After several more trials, the student observed that the ball consistently traveled farther across the concrete than across the grassy surface.

Which explanation for the difference in distance the ball rolled is **best** supported by the evidence in the student's investigation?

- A.** The ball experienced more resistance as it traveled across the grassy surface than it did traveling across the concrete.
- B.** The ball experienced less resistance as it traveled across the grassy surface than it did traveling across the concrete.
- C.** The grassy surface had a weaker gravitational attraction to the ball than the concrete had.
- D.** The grassy surface had a stronger gravitational attraction to the ball than the concrete had.

00. Based on evidence collected from studying the light from galaxies, scientists have shown that the universe is expanding at an accelerating rate.

Which line of evidence **best** supports the expanding universe model?

- A.** the color of the galaxies, because the color provides information on the temperature of the galaxies
- B.** the color of the galaxies, because the color provides information about the elements the galaxies contain
- C.** the velocity of the galaxies, because their current motion gives information about the position of the galaxies in the past
- D.** the velocity of the galaxies, because their current motion gives information about the mass of the galaxies

00. Students used calculations to predict the time it would take a toy car to travel 2 meters while being pulled with a constant force. The measurements the students used in their calculations are listed.

- mass of the car
- force of pull on the car
- force of friction on the car

The predicted and actual times for the car to travel 2 meters is shown in the table.

Predicted vs. Actual Time

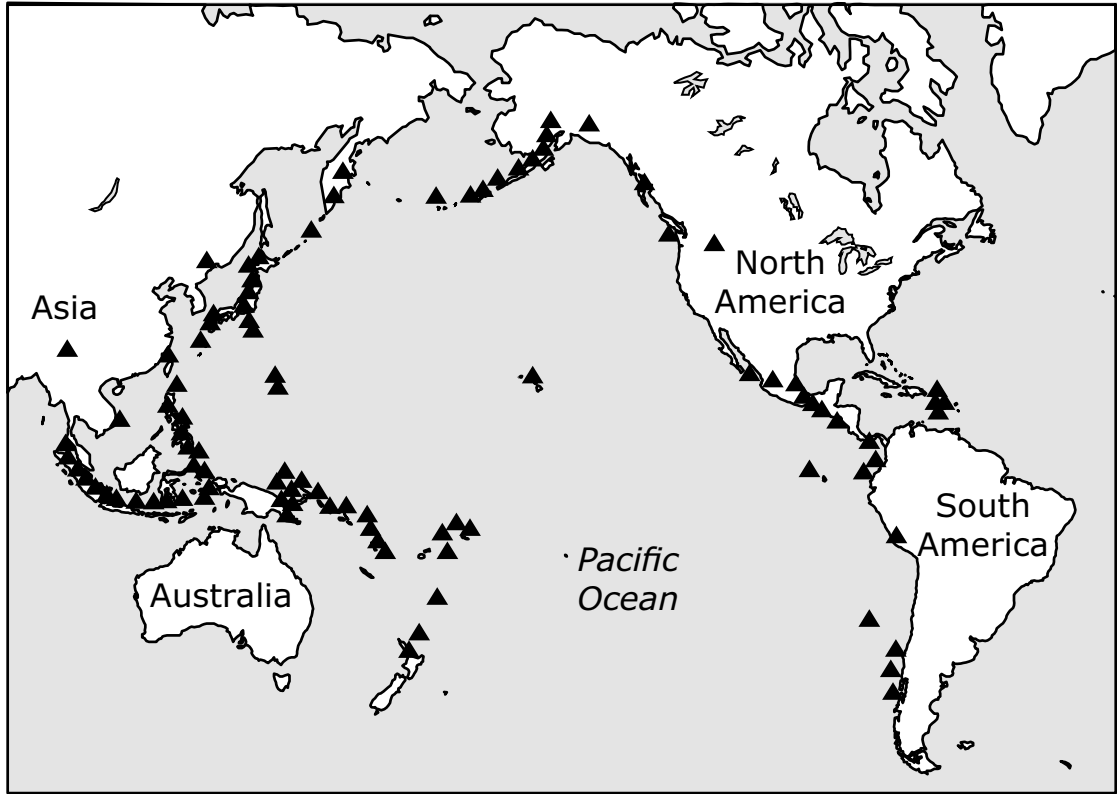
Predicted Time (seconds)	Actual Time (seconds)
4.5	3.5

Which **two** statements could explain why the actual time was different from the predicted time?

- A.** The distance the car traveled was longer than 2 meters.
- B.** The students did not include air resistance acting on the car in their calculations.
- C.** The mass of the car was measured incorrectly.
- D.** The students pulled the car with a smaller force than they used in their calculations.
- E.** The students included too much friction on the car in their calculations.

00. Map 1 shows the historic locations of volcanic activity around the Pacific Ocean in an area known as the Ring of Fire.

Map 1. Historic Volcanic Activity around the Ring of Fire

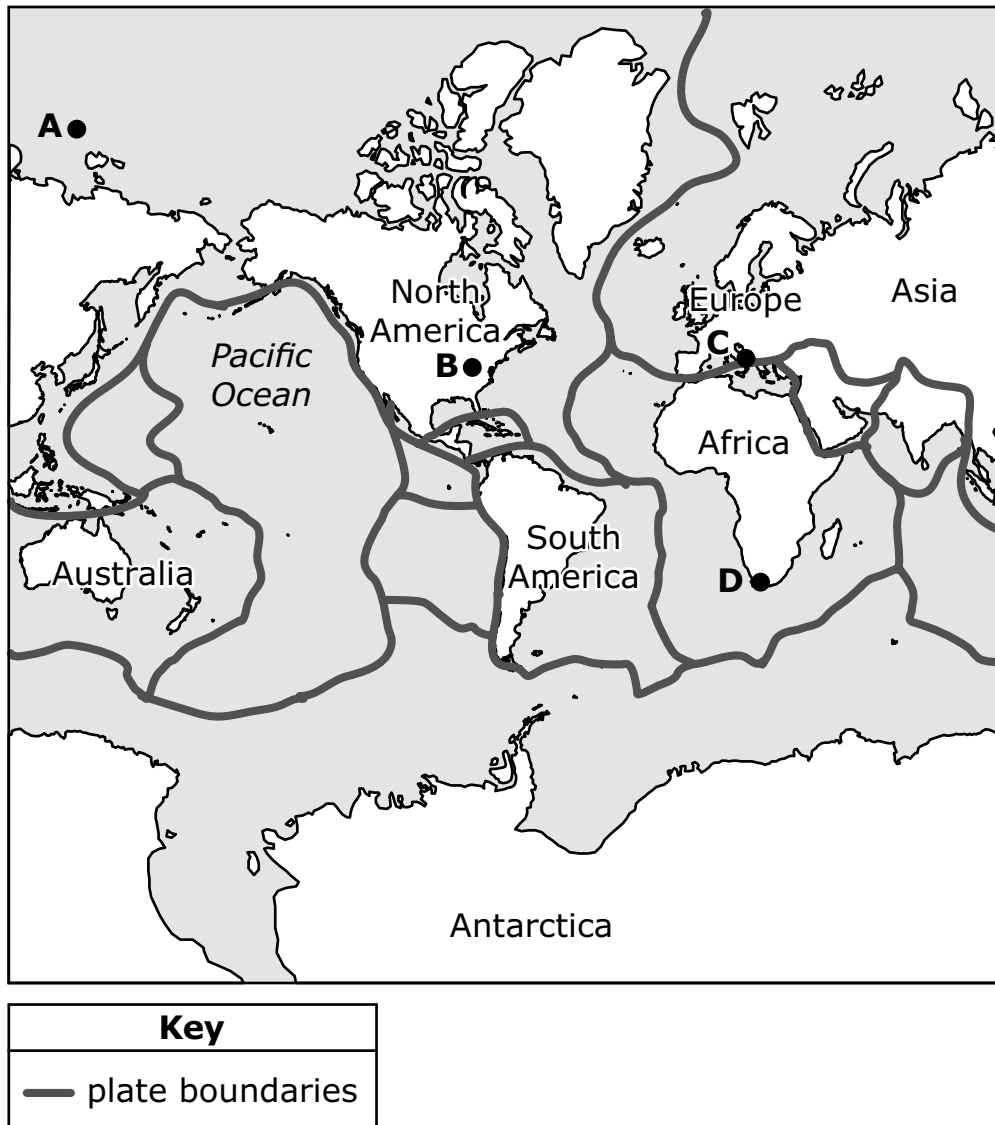


Key
▲ volcanoes

Source: NOAA

Map 2 shows the boundaries of Earth's seven major tectonic plates.

Map 2. Tectonic Plate Boundaries of Earth



Based on the information on the maps, at which location on Map 2 would a scientist predict volcanic activity that is caused by geologic processes similar to the volcanoes around the Ring of Fire?

- A.** Point A
- B.** Point B
- C.** Point C
- D.** Point D

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