

## Chapter: The Geosphere

Read each question thoroughly. The Science Coach boxes will help you apply the skills and concepts you need to answer the questions.

For questions 1, 2, and 3, refer to the following passage.

In this group of questions, you will use your knowledge of the Earth's layers to answer three questions.

### Modeling Earth's Layers

A class has been studying the various layers of the Earth. Ms. Aguilar, their 7th-grade science teacher, has given the class the following household materials:

- aluminum foil
- electrical tape
- plastic zip- top bag
- sheet of thick, flexible foam
- small rubber ball
- water

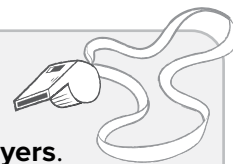
Ms. Aguilar challenges the class to use the materials to make a model of Earth's layers. After careful consideration, the students decide to place the small rubber ball in the middle. Next, they put some water in the plastic bag and zip it closed. They wrap the water-filled bag around the rubber ball and secure it in place with tape. They then place the flexible foam around the bag of water before using the tape to keep it intact. Finally, the students completely cover the model in aluminum foil.

1. What does the small rubber ball represent in the students' model?

- (A) the crust
- (B) the mantle
- (C) the inner core
- (D) the outer core

#### Science Coach

Think about the order of **Earth's layers**. Where is the rubber ball located in the students' **model**? Which of Earth's layers would be in the same position?

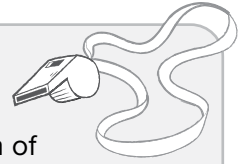


2. What material did the students use for the mantle and why?

- (F) The students used aluminum foil because it is thin.
- (G) The students used the rubber ball because it is round and solid.
- (H) The students used the bag full of water because the mantle is liquid.
- (I) The students used the foam because it is thick and squishy but still solid.

**Science Coach**

Consider the properties of each of **Earth's layers**. Which material would be best for **modeling** the mantle? What property or properties makes this material the best choice?

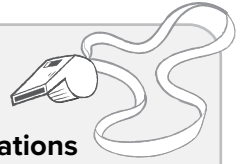


3. What is a limitation of the students' model?

- (A) It does not show distinct layers.
- (B) It does not show the outer core as liquid.
- (C) It does not show temperature and density differences.
- (D) It does not show the mantle being thicker than the crust.

**Science Coach**

Consider the **benefits and limitations of the student's model**. Which details about **Earth's layers** are accurately represented in the model? Which detail is not shown?



4. Kai is working on a presentation about the patterns found within the rock cycle. So far, Kai has four slides, as described.

**Slide 1:** Uplift exposes rocks to erosion and weathering.

**Slide 2:** Igneous rocks form where tectonic plates move apart.

**Slide 3:** Metamorphic rocks can become sedimentary rocks but not igneous rocks.

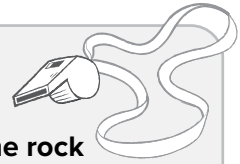
**Slide 4:** Sedimentary rocks can become metamorphic rocks deep below Earth's surface.

Which slide should Kai NOT include and why?

- (F) Kai should not use slide 1 because uplift does not expose rocks to surface processes.
- (G) Kai should not use slide 2 because tectonic plates have no role in the formation of igneous rocks.
- (H) Kai should not use slide 3 because metamorphic rocks can become igneous rocks through subduction.
- (I) Kai should not use slide 4 because sedimentary rocks form at or near Earth's surface.

### Science Coach

Think about the **patterns within the rock cycle**. How does one type of rock transform into another type of rock? What processes are involved? Which statement does not correctly identify a pattern found within the rock cycle?



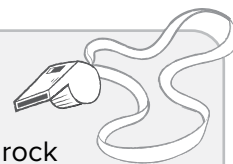
5. While on vacation in Hawaii, Maria picked up a black, glass-like rock. She used a hand lens to study the rock closely, but she could not see individual mineral crystals. When she returned home, Maria researched the rock and found that it is called obsidian, or volcanic glass.

Which statement **best** explains how obsidian is formed?

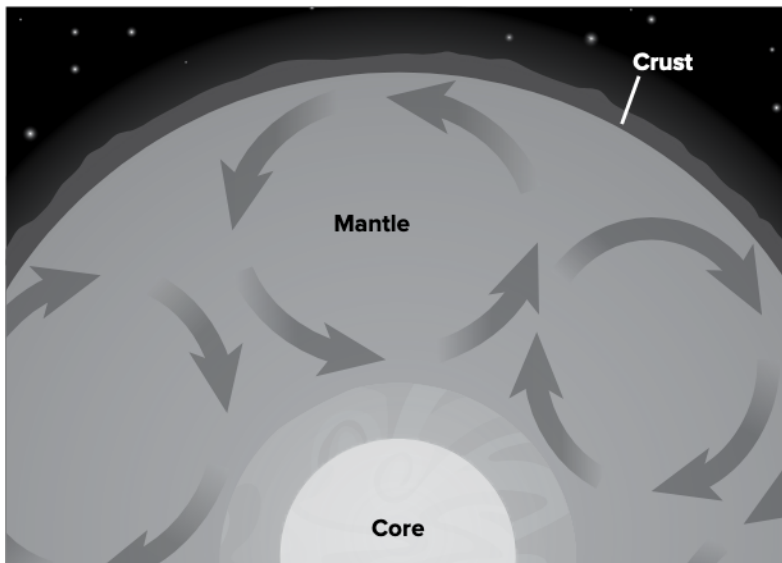
- (A) Obsidian is a foliated igneous rock that formed on Earth's surface.
- (B) Obsidian is an intrusive igneous rock that cooled slowly inside Earth.
- (C) Obsidian is an extrusive igneous rock that cooled quickly on Earth's surface.
- (D) Obsidian is a sedimentary igneous rock that formed deep within Earth's crust.

### Science Coach

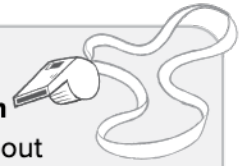
Read the description of the rock carefully. What clues does the description give about the type of rock Maria found? Do the **processes that form** that type of **rock** generally occur on or near **Earth's surface** or **below the surface**?



6. Jayden and Sophia are studying Earth's layers. They find the diagram shown in their textbook.

**Science Coach**

Study the **diagram** carefully. Think about what you know about the differences between the crust, the mantle, and the core. What type of **cycle** is represented in the graphic?



What does the diagram show?

- (F) convection currents in the mantle
- (G) pressure differences in the mantle
- (H) speed of P-waves through the mantle
- (I) circulation of water through the mantle

7. Sonia is preparing a presentation about Earth's layers. She has recorded some information about each layer but has not completed the table.

**Table 1: Properties of Earth's Layers**

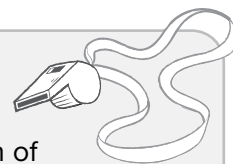
Layer	Density (g/cm <sup>3</sup> )	Other properties
	11.1	liquid, iron
	3.9	solid, silicates
	3.3	solid, plastic
	2.7	solid, brittle
	13.0	solid, iron
	5.0	solid, silicates

From top to bottom, how should Sonia label each layer in the table?

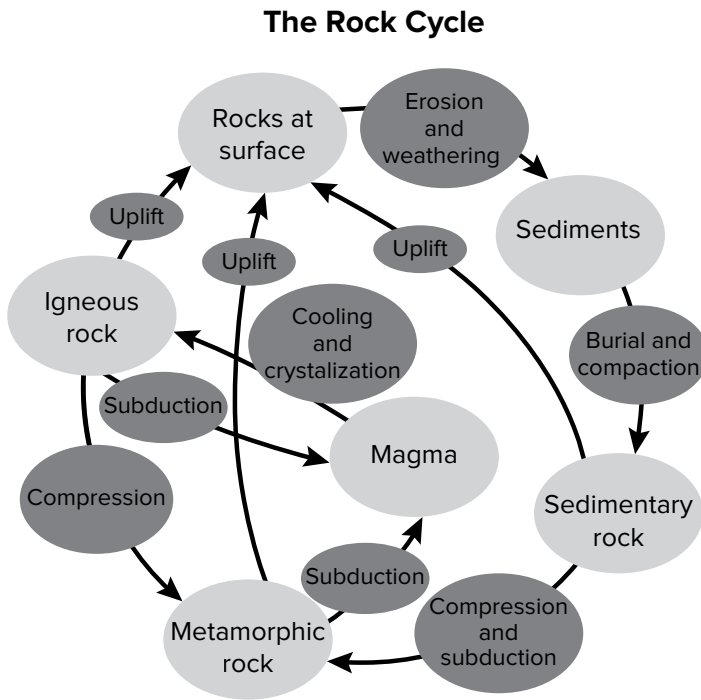
- (A) lithosphere, asthenosphere, upper mantle, lower mantle, outer core, inner core
- (B) inner core, lower mantle, upper mantle, outer core, lithosphere, asthenosphere
- (C) asthenosphere, upper mantle, lithosphere, inner core, outer core, lower mantle
- (D) outer core, upper mantle, asthenosphere, lithosphere, inner core, lower mantle

**Science Coach**

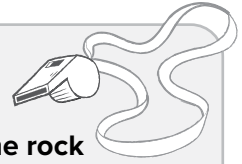
Think about the properties of each of **Earth's layers**. How does the density of the layers change from the surface to the core? What other properties can you use as clues to the identity of each layer?



8. The diagram shows the processes involved in the rock cycle.

**Science Coach**

Think about the **patterns within the rock cycle**. Consider the geologic processes involved in the formation of each type of rock. What factors are involved? Which factor does the formation of both types of rock have in common?



Which process is involved in forming **both** metamorphic and sedimentary rocks?

- (F) cementation
- (G) crystallization
- (H) heat
- (I) pressure



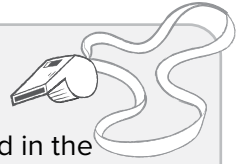
9. Juan is making a list of the rock cycle processes that take place below the Earth's surface.

Which process belongs on Juan's list?

- (A) erosion
- (B) deposition
- (C) melting
- (D) weathering

**Science Coach**

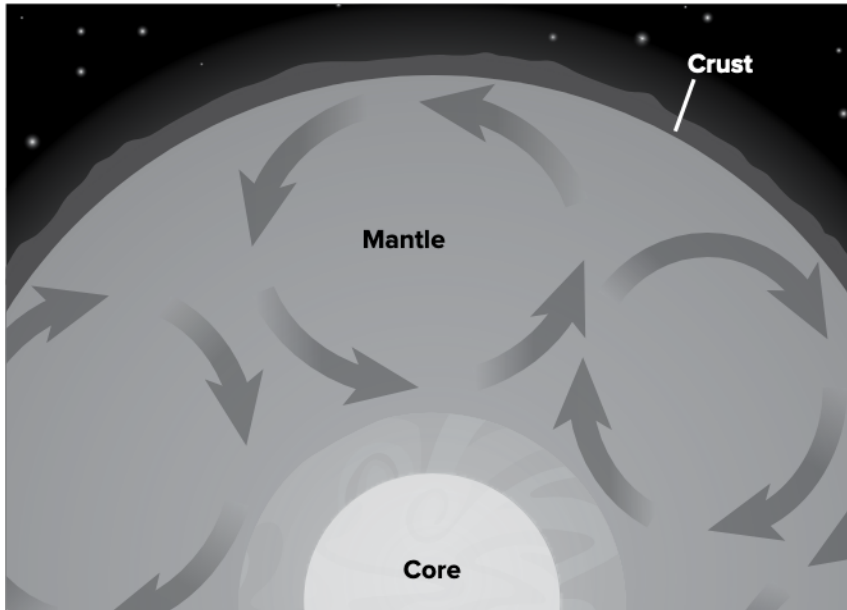
Think about the processes involved in the **rock cycle**. Which of these events take place on **Earth's surface**? Which ones take place **below the surface**?



## Chapter: The Geosphere

Answer the questions that follow.

1. The diagram shows the convection currents in Earth's mantle.



What causes convection currents to form in Earth's mantle?

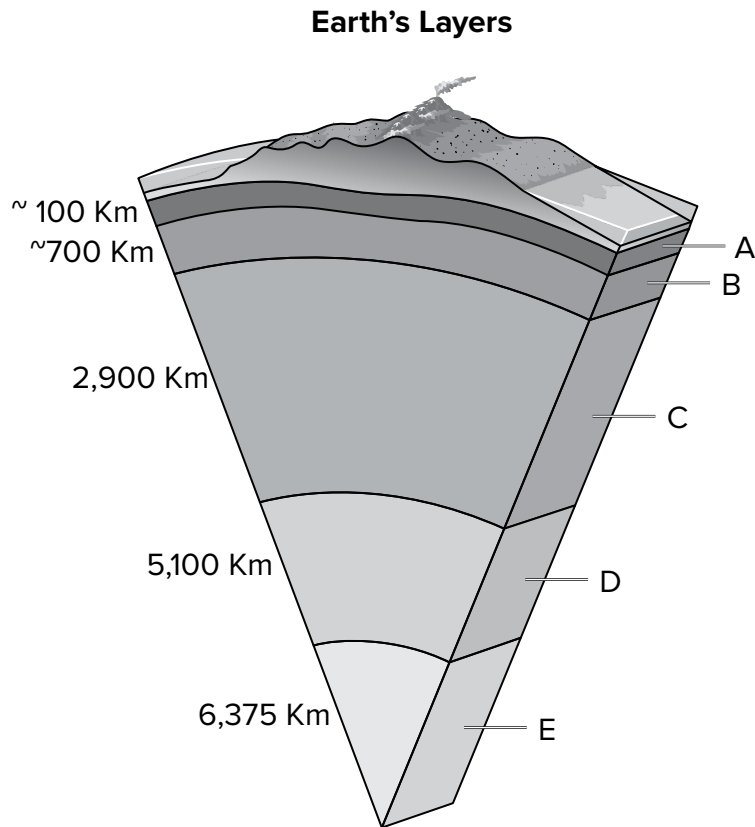
- (A) The asthenosphere is plastic.
- (B) Pressure increases with depth.
- (C) The core is hotter than the crust.
- (D) The mantle is thicker than the crust.

2. Fulgurite forms when lightning strikes sand or rock. The high temperature of the lightning binds sand grains or rock together into fulgurite.

What type of rock is fulgurite?

- ☐ F igneous
- ☐ G metamorphic
- ☐ H sedimentary
- ☐ I weathered

3. Madison sketched a model of Earth's layers but did not finish labeling the model with the names of each layer.



From A to E, how should Madison label each layer?

- Ⓐ lithosphere, upper mantle, lower mantle, outer core, inner core
- Ⓑ inner core, outer core, lower mantle, upper mantle, lithosphere
- Ⓒ upper mantle, lower mantle, lithosphere, inner core, outer core
- Ⓓ inner core, lithosphere, lower mantle, outer core, upper mantle

4. A student made a model of Earth's layers using modeling clay and a tennis ball. The student cut the tennis ball in half. It was hollow inside. The student placed a ball of red clay in the center and wrapped a layer of gray clay around it. Then, the student wrapped a layer of blue clay and a layer of green clay around the gray. The outside of the tennis ball represented the crust.

What is one limitation of the student's model?

- ☐ F It does not have enough layers.
- ☐ G It does not show that the inner core is solid.
- ☐ H It does not show that the outer core is liquid.
- ☐ I It does not show that the mantle is thicker than the crust.

5. Which object has features that would **best** model Earth's crust?

- Ⓐ an orange
- Ⓑ a foam cup
- Ⓒ an eggshell
- Ⓓ a marble

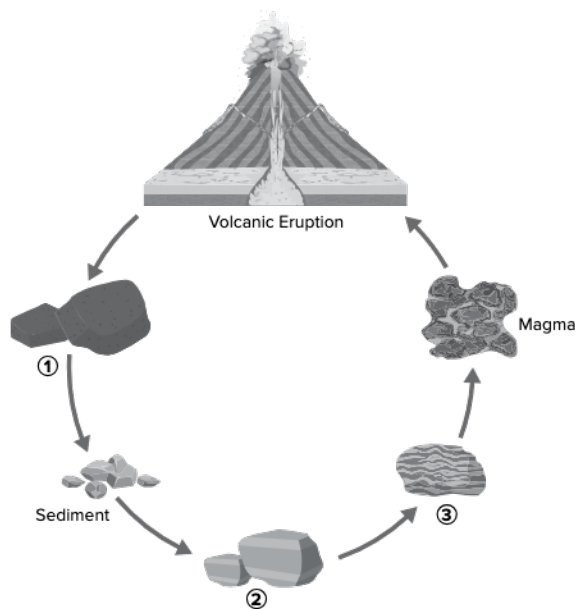
For questions 6, 7, and 8, refer to the following passage and illustration.

In this group of questions, you will use your knowledge about the rock cycle to answer three questions.

### The Rock Cycle

Ms. Mason's Earth Science class is studying the geosphere. She instructs the class to model how rock material is recycled on Earth. The class draws a diagram to show some of the processes involved in the rock cycle. The class draws a diagram to show some of the processes involved in the rock cycle. The students' diagram is incomplete. Ms. Mason has added numbers and letters to areas of the diagram that need more explanation. Rocks are labeled with the numbers one (1) through three (3). The letters A through F indicate different processes within the rock cycle. Finally, Ms. Mason challenges the class to think of a way to add the role of mountain building to their diagram.

### Partial Rock Cycle



6. In order, from numbers 1 through 3, what labels should the students add to their diagram?
- (F) igneous rock, metamorphic rock, sedimentary rock
  - (G) igneous rock, sedimentary rock, metamorphic rock
  - (H) metamorphic rock, sedimentary rock, igneous rock
  - (I) sedimentary rock, metamorphic rock, igneous rock

7. How should the students label the arrows B and C?

- Ⓐ B: high temperature and pressure; C: melting and cooling
- Ⓑ B: melting and cooling; C: high temperature and pressure
- Ⓒ B: deposition, compaction, and cementation; C: weathering and erosion
- Ⓓ B: weathering and erosion; C: deposition, compaction, and cementation



8. Two students, Rina and Jack, make the following claims:

**Rina:** Metamorphic rock can form when tectonic plates collide.

**Jack:** Uplift brings rock to the surface where weathering and erosion can take place.

Which response **best** describes the students' claims?

- ☐ F Rina is correct because only Rina's claim describes the process of mountain building.
- ☐ G Jack is correct because only Jack's claim describes the process of mountain building.
- ☐ H Both students are correct because both their claims describe the process of mountain building.
- ☐ I Both students are incorrect because their claims do not describe the process of mountain building.

9. Why is Earth's inner core solid?

- Ⓐ It is made of iron.
- Ⓑ It is cooler than the outer core.
- Ⓒ There is movement in the outer core.
- Ⓓ There is more pressure than in the outer core.