

Earth's Moving Engine

Trace how internal heat changes Earth's surface.

SC.7.E.6.7 "Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline the two sentences that directly connect Earth's heat or circulating mantle material to tectonic plate movement. Then circle every occurrence of earthquake, volcano or volcanic eruption, mountain, or ocean basin, and write 1, 2, 3, and 4 beside the first occurrence of each different result type.

Heat Beneath the Crust

- ① Deep inside Earth, heat from the core and from radioactive elements warms mantle rock. Although this rock is solid, it can flow very slowly over long periods. Warmer mantle material becomes less dense and rises. Near the cooler upper mantle, it loses heat, becomes denser, and sinks. This slow circulation is called convection. Convection transfers heat and moves mantle material, helping to drag and push the tectonic plates above it. Plate movement stores stress where plates meet.
- ② At one boundary, plates can collide. If oceanic crust meets continental crust, the denser oceanic plate may sink beneath the other plate. As the sinking plate moves downward, some rock melts and magma can rise. Volcanoes may form at the surface. The collision also squeezes and thickens crust, building mountains. Many volcanic eruptions occur where moving plates interact, especially at convergent or divergent boundaries. These landforms clearly show results of material moving slowly inside Earth.
- ③ At other boundaries, plates pull apart. Magma rises into the opening, cools, and makes new oceanic crust. Over time, seafloor spreading can help create broad ocean basins. Plates can also slide past each other. Their rough edges may lock while plate motion continues. Stress builds until the rocks suddenly slip, releasing energy as an earthquake. Thus, Earth's internal heat drives mantle circulation, circulation moves plates, and plate interactions can produce earthquakes, volcanic eruptions, mountains, and ocean basins.

2 ANSWER WITH EVIDENCE Use the passage

- 1 How does heating and cooling cause mantle material to circulate, and how does this circulation affect tectonic plates?

- 2 How can a collision between an oceanic plate and a continental plate lead to both a volcano and a mountain?

- 3 What happens at a boundary where plates pull apart, and what large Earth feature can form over time?

- 4 Why can an earthquake occur when two plates slide past each other?

3 YOUR TURN Your own words

Use three panels to show one complete cause-and-effect chain from Earth's internal heat to one result at Earth's surface. In each panel, include arrows and labels that show heat or mantle movement, plate movement, and your chosen result: an earthquake, volcanic eruption, mountain, or ocean basin.

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PART 1 • READ AND MARK

Underline the two sentences that directly connect Earth's heat or circulating mantle material to tectonic plate movement. Then circle every occurrence of earthquake, volcano or volcanic eruption, mountain, or ocean basin, and write 1, 2, 3, and 4 beside the first occurrence of each different result type. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	How does heating and cooling cause mantle material to circulate, and how does this circulation affect tectonic plates?	Warmer, less-dense mantle material rises, while cooler, denser material sinks. This convection moves mantle material that helps drag and push tectonic plates.
2	How can a collision between an oceanic plate and a continental plate lead to both a volcano and a mountain?	The denser oceanic plate can sink, causing rock to melt and magma to rise into a volcano. The collision also squeezes and thickens crust, building mountains.
3	What happens at a boundary where plates pull apart, and what large Earth feature can form over time?	Magma rises into the opening, cools, and forms new oceanic crust. Seafloor spreading can help create an ocean basin over time.
4	Why can an earthquake occur when two plates slide past each other?	Their rough edges can lock while motion continues, so stress builds. When the rocks suddenly slip, they release energy as an earthquake.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Panel 1: Label "internal heat" and show warm mantle rising and cooler mantle sinking with arrows. Panel 2: Label "convection moves plates" and show two plates pulling apart with arrows. Panel 3: Label "magma rises, new crust forms, ocean basin grows" and show the result at the surface.

Accept scientifically accurate descriptions using the passage's cause-and-effect relationships. For the three-panel response, accept any of the four listed results if arrows and labels clearly connect internal heat, mantle or plate movement, and the surface result.