

Drawing Magma

Overview:

During this lesson students will learn about and illustrate the three types of places where magma reaches Earth's surface (convergent boundaries, divergent boundaries, and hotspots).

Objectives:

The student will:

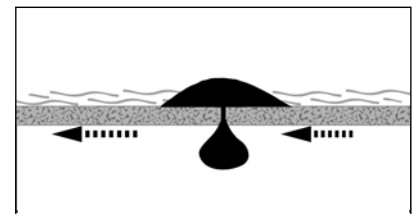
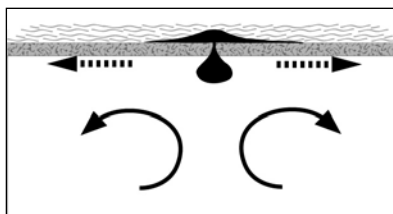
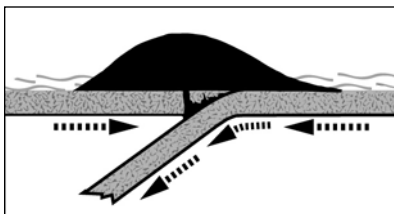
- understand that magma reaches Earth's surface at convergent boundaries, divergent boundaries, and hotspots;
- illustrate how magma reaches Earth's surface at convergent boundaries, divergent boundaries and hotspots;
- learn that shield volcanoes can form at divergent boundaries;
- learn that shield volcanoes can form at hotspots; and
- learn that composite or "strato" volcanoes usually form at convergent boundaries.

Materials:

- *Ola Ka Honua: Volcanoes Alive* multimedia and video playlist
- Colored pencils, crayons, or markers
- Transparency: "Places Magma Reaches Earth's Surface"
- Student Information Sheet: "Places Magma Reaches Earth's Surface"
- Student Worksheet: "Drawing Magma"

Answers to Student Worksheet:

1. See figure at bottom left
2. b) composite
3. See figure at bottom center
4. a) shield
5. See figure at bottom right
6. a) shield



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Activity Procedure:

1. Explain that magma is hot, molten rock that forms deep inside Earth's mantle. Magma can reach Earth's surface at divergent boundaries, convergent boundaries, and hotspots.
2. Distribute the Student Information Sheet: "Places Magma Reaches Earth's Surface." Ask students to read the information sheet with you.
3. Discuss divergent boundaries. Explain that divergent boundaries are places where two of Earth's plates move apart. Point out that shield volcanoes generally form at divergent boundaries, such as an ocean floor spreading center. Shield volcanoes generally have a smooth, broad, low shape with gentle sloping sides.
4. Discuss hotspots. Explain that hotspots are unusually hot areas beneath a plate, where narrow plumes of magma rise from Earth's mantle to the surface. Point out that shield volcanoes often form at hotspots.
5. Discuss convergent boundaries. Explain that convergent boundaries are places where two of Earth's plates crash together. Point out that composite or "strato" volcanoes form at convergent boundaries. Composite volcanoes have rugged, steep sides and are made up of layers of lava, ash, and cinder.
6. Distribute the Student Worksheet: "Drawing Magma" and coloring utensils. Divide students into groups, then ask them to help each other draw and answer the questions on the Student Worksheet: "Drawing Magma." Ask students to use their information sheets to help them draw each place where magma reaches Earth's surface.

Extension Idea: Ask students to create one drawing that illustrates all three ways magma can reach Earth's surface. Ask them to label convection current, heat source, magma, lava, hotspot, and crust types.

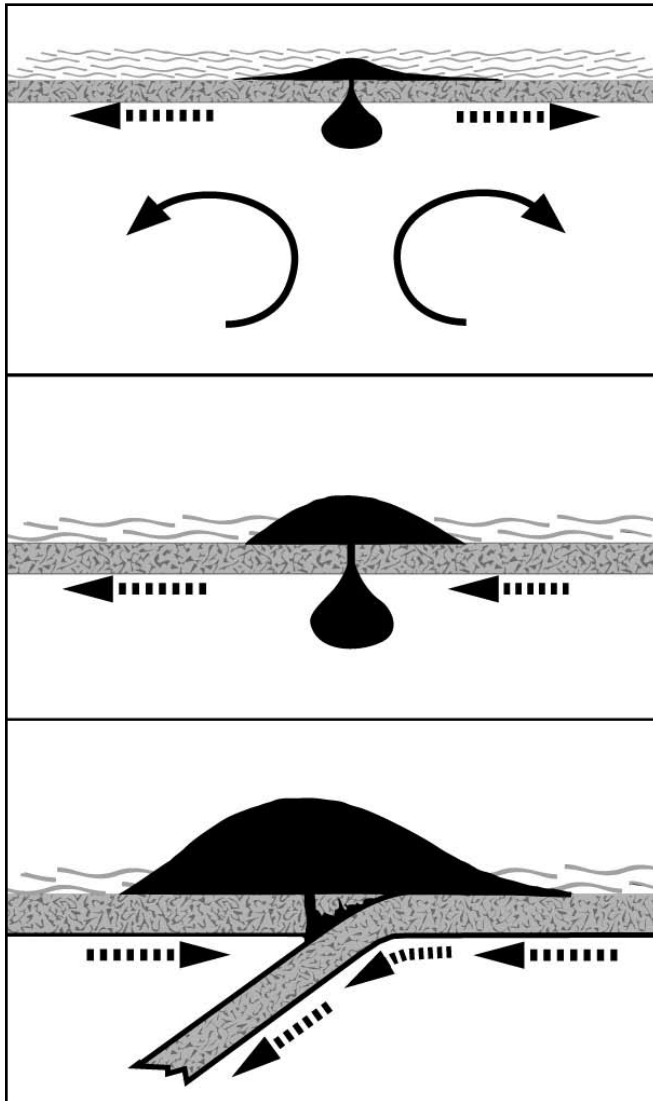


Cultural Tie

Consider showing *Holo Mai Pele*, a PBS video production of chants and dances passed down from generation to generation in Hawai'i. The hulas within the video include movements which illustrate volcanic processes, such as ka hu'ahu'a 'ana (to bubble up) which resembles convection, and pahūpahū (explosion motions).

Places Magma Reaches Earth's Surface

Magma is hot, molten rock that forms deep inside Earth's mantle. Convection current carries magma to Earth's surface, where it becomes lava. Magma can reach Earth's surface at divergent boundaries, convergent boundaries, and hotspots.



Divergent boundaries:

At divergent boundaries, hot magma squeezes up through a long crack between two plates. The magma becomes hot lava on the ocean floor and piles up in layers, forming a shield volcano. A shield volcano has a smooth, broad, low shape with gentle, sloping sides.

Hotspots:

Hotspots are plumes of magma that migrate toward Earth's surface from one spot. Magma flows from these hotspots, and piles up to form shield volcanoes above them. More than 100 hotspots around the world have been active over the past 10 million years.

Convergent boundaries:

Many cracks form at convergent boundaries, where two plates crash together. Sometimes one plate slides beneath the other. Then magma and the remelted plate flow upward to the surface where they form composite or "strato" volcanoes. These volcanoes have rugged, steep sides and are made up of layers of lava, ash, and cinder.

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Directions: Demonstrate your understanding of convergent and divergent boundaries and hotspots by answering the questions and illustrating the concepts below. On drawings include and label convection current, heat source, magma, lava, direction of plate movement and type of crust (continental or oceanic).

1. Using the diagram on the Student Information Sheet, draw an example of how magma reaches Earth's surface at a convergent boundary.



2. What kind of volcano usually forms at a convergent boundary?
- a) shield
 - b) composite
 - c) cinder cone

3. Draw an example of how magma reaches Earth's surface at a divergent boundary.



4. What kind of volcano usually forms at a divergent boundary?
- a) shield
 - b) composite
 - c) cinder cone

5. Draw an example of how magma reaches Earth's surface at a hotspot.



6. What kind of volcano usually forms at a hotspot?
- a) shield
 - b) composite
 - c) cinder cone