

Clay Model Earth

Overview:

During this lesson students will learn about Earth’s layers by making a clay model. As a result of this activity, students develop an understanding of the structure of Earth’s layers, particularly as it relates to thickness and solid or molten state. Students keep completed Earth models in the classroom for future reference during Units 2 and 3.

Note: You may wish to build a sample model Earth in the classroom, then have students build models as a homework assignment.

Objectives:

The student will learn:

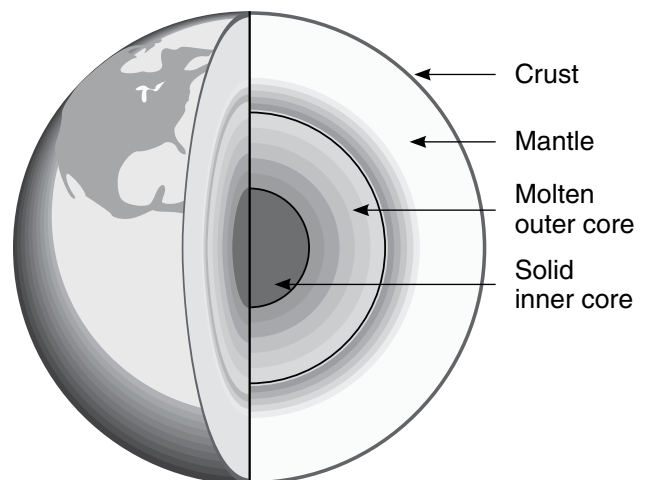
- to identify Earth’s layers, including the inner core, outer core, mantle, and crust;
- the relative size and thickness of each Earth layer;
- that Earth’s inner core is solid due to tremendous pressure; and
- that Earth’s outer core is molten, and exists in a “liquid” state.

Materials:

- Clay in the colors and amounts described in the activity procedure (see Note, following page)
- Marbles (25 mm) for each student
- Sharp knife
- Ruler
- Teacher Information Sheet: “The Thickness and State of Earth’s Layers”
- Transparency: “Earth’s Layers”
- Transparency: “Clay Model Earth”
- Student Worksheet: “Clay Model Earth”

Answers to Student Worksheet:

1. refer to diagram
2. outer core
3. mantle
4. crust
5. This is a critical thinking question; answers will vary.



Clay Model Earth

Activity Procedure:

1. Give a 25 mm marble and the following amounts of each color clay to each student:
 - One 4 oz. package of blue Model Magic* clay for Earth's crust (or 1 stick of traditional clay)
 - Two sticks of traditional orange clay for Earth's outer core
 - Three 4 oz. packages of red Model Magic* clay for Earth's mantle (or six sticks of traditional clay)

Note: *Crayola's Model Magic Modeling Compound was chosen for use in this lesson because it is light weight and will harden into Earth's solid layers. Regular clay was chosen for use for the outer core because it will remain soft indefinitely, depicting Earth's "liquid" layer.

2. Show Transparency: "Earth's Layers." Using the Teacher Information Sheet: "The Thickness and State of Earth's Layers," describe Earth's core, mantle, and crust. Emphasize the thickness of layers, and describe each layer as solid or liquid. The temperature and composition of each layer will be discussed in another lesson.
3. Inner Core: Help students build a clay model Earth by first explaining that the marble represents Earth's inner core. The radius of the inner core is 1300 km; it is solid because it is under a great deal of pressure. Explain that each student will use a marble to represent Earth's core. The marbles will be pushed into the center of the clay models after they have been cut in half.
4. Outer Core: Show Transparency: "Clay Model Earth." Ask students to roll orange clay into a ball about 72 mm in diameter (which is twice the radius shown in the transparency). Explain that the orange clay represents the outer core, which is about 2250 km thick. Most of the rock in the outer core is molten, which means it is so hot that it melts and acts like a liquid.
5. Mantle: Around the outer core, wrap red clay for the mantle. Earth's mantle, which is about 2900 km thick, is Earth's thickest layer. The mantle contains solid rock, although high temperature and pressure can cause some of this solid rock to flow slowly like an extremely thick liquid.
6. Crust: Around the mantle, spread a thin layer of blue clay for the crust. Earth's crust, which is 5 to 64 km thick, is the part of Earth on which we live. The crust is thickest under the continents, and thinnest under the oceans.
7. When the clay Earth model is complete, cut it in half using a sharp knife. Ask students to push a marble into the center of the orange clay to represent Earth's inner core. Remind students that Earth's inner core is solid, while Earth's outer core is molten, and acts like a liquid.
8. Distribute the Student Worksheet: "Clay Model Earth." Help students answer the questions.

The Thickness and State of Earth's Layers

CRUST

The crust is the outermost layer of Earth. This layer, on which life exists, is covered with soil, rock and water. Relative to the thickness of Earth's other layers, Earth's crust can be compared in thickness to the shell of an egg or the skin of an apple. The crust is thickest under the continents and thinnest under the oceans.

Thickness: 5 to 64 km (varies depending on which type of crust)

State: Solid

MANTLE

The mantle is Earth's thickest layer. About 80% of the volume of Earth is contained in Earth's mantle, which extends from the base of the crust to the liquid outer core. The mantle is generally considered to exist in a solid state, although high temperatures and pressure can cause some of this solid rock to flow like an extremely thick liquid.

Thickness: About 2900 km

State: Considered solid, but has the quality of plasticity, which means the solid rock in this layer can flow like a thick liquid

OUTER CORE

Most of the rock in Earth's outer core is molten, which means that it acts like a hot liquid. The outer core begins about 2900 kilometers below Earth's surface.

Thickness: About 2250 km

State: Molten liquid

INNER CORE

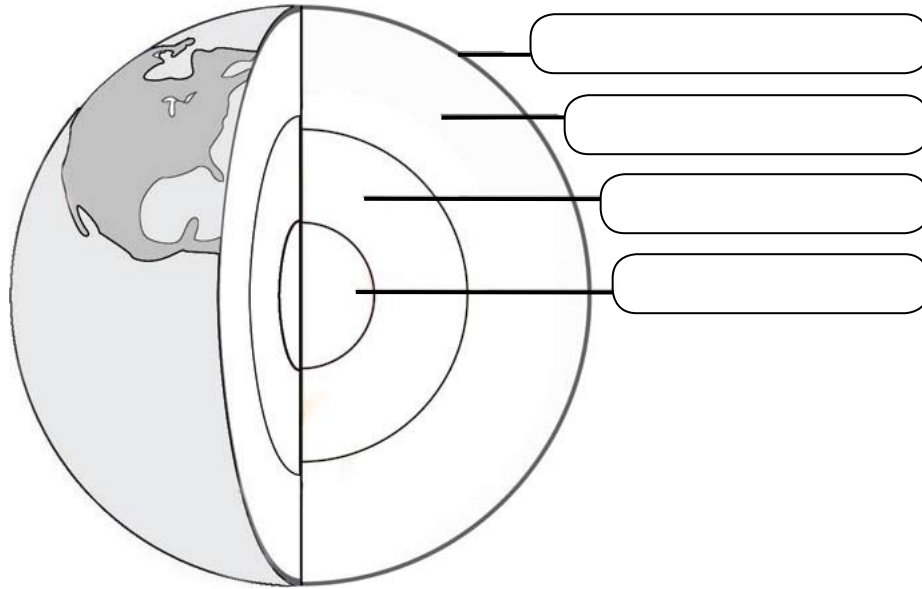
Earth's inner core is incredibly dense because it is under so much pressure. The inner core begins at a depth of about 5150 kilometers below Earth's surface.

Thickness: Radius is about 1300 km

State: Solid

Clay Model Earth

1. Label Earth's layers on the diagram below.



2. Name the layer of Earth that contains mostly liquid rock.

3. Name Earth's thickest layer. High temperatures can soften this layer and cause it to change shape.

4. Name Earth's thinnest layer.

5. How is the clay model similar to Earth? How is it different?

