Layers of the Earth

Grade Range: Elementary School
Lesson Time: 40 minutes

Key Terms
- Atmosphere
- Crust
- Dissect
- Exosphere
- Inner core
- Mantle
- Outer core
- Troposphere

Activity Overview
Did you know that billions of years ago, Earth was a giant ball of molten magma? That was one hot mess! Over time, the outer layer of the magma cooled, forming Earth’s hard outer layer of rock. Students will peel back and explore the four layers of Earth, investigating their depths, composition, and order.

Essential Questions
1. What systems can be observed on the Earth?
2. How do the layers of the Earth interact with each other?

Objectives
- Measure the approximate depth of each layer of Earth
- Label each layer of Earth in order

Introduction
Engage the students in a discussion by asking, “Where does lava come from?” Guide the students toward understanding that lava comes from magma that is deep under Earth’s surface. This will lead into a discussion of the layers of Earth. Tell the students that they will investigate and explore the layers of Earth.

zSpace Activity
Activity Questions Provided in Studio
Answers may vary. Sample answers are provided below.

1. Here we are on Earth! Use Dissect mode to remove the top layer of Earth. Take a photo once you remove this layer. Write your observations about this layer.
   *Photo. I observed that this layer seems to be transparent, like it might be part of the atmosphere.*

2. You just removed the exosphere. The exosphere is above the gaseous layer of the atmosphere.
3. Using Dissect mode, remove the next layer of Earth. Take a photo once you remove this layer. Write your observations about this layer.
   Photo. I observed that this layer seems to have clouds on it.

4. You just removed the troposphere. This is what we usually call the “atmosphere.” It is a layer of gases above the surface of Earth.

5. Using Dissect mode, remove the next layer of Earth. Take a photo once you remove this layer. Write your observations about this layer.
   Photo. I observed that this layer seems to be the Earth’s hard surface.

6. You just removed the crust of Earth. This is a thin layer of hard rock that covers the surface of Earth. All of Earth’s ground-based life lives here. Use the Ruler tool to measure the depth (thickness) of the crust. How thick is the crust?
   Approximately 40 km

7. Using Dissect mode, remove the next layer of Earth (below the crust). Take a photo once you remove this layer. Write your observations about this layer.
   Photo. I observed that this layer is red and is thicker than the crust.

8. You just removed Earth’s mantle. The mantle is a thick layer of hot, dense, semi-solid rock below Earth’s surface. Magma is found inside the upper portion of the mantle. Use the Ruler tool to measure the depth (thickness) of the mantle. How thick is the mantle?
   Approximately 3,000 km

9. Using Dissect mode, remove the next layer of Earth (below the mantle). Take a photo once you remove this layer. Write your observations about this layer.
   Photo. I observed that this layer is yellow and seems to be a little bit thinner than the mantle.

10. You just removed the outer core. The outer core is the outer layer of the core (center) of Earth. This layer is liquid, and scientists believe it is responsible for Earth’s magnetic field. Use the Ruler tool to measure the depth (thickness) of the outer core. How thick is the outer core?
    Approximately 2,300 km

11. Using Dissect mode, remove the final layer of Earth (below the outer core). Take a photo once you remove this layer. Write your observations about this layer.
    Photo. I observed that this layer is more like a ball than a layer.

12. You just removed the innermost layer of Earth - the inner core. This “layer” of Earth is actually more like a ball of solid iron.

13. In previous questions, you measured the thickness of each of the layers. Add those numbers together. Write the answer in the answer box below.
    Approximately 5,340 km

14. This is the depth under Earth’s surface at which the inner core begins. It is hard to believe it is that deep under the surface, isn’t it?

15. Now, using the Notes tool, label each layer with its name and the approximate depth. You do not need to write the depth for the inner core. The parts you need to label are: outer core, mantle, crust, and inner core. Take a photo of your labeled model.
    Photo.

Closing

Questions for Discussion

1. Do you think anything lives in the mantle, outer core, or inner core layers of Earth? Explain your thoughts.
No, I do not believe anything lives in any of those layers! They are far too hot for anything to survive.

2. If you could use an apple as a model of Earth, what parts of the apple would represent each layer?
   The peel of the apple would represent the crust of Earth. The “meat” of the apple would represent the mantle of Earth. The core of the apple would represent the inner and outer core of Earth.

3. Why do you think the inner core of Earth is solid?
   I think the inner core of Earth is solid because there is so much weight and pressure surrounding it, and it is all being pulled in toward the core by gravity. All this material being pushed inward has caused the inner core to be compressed into a solid “ball.”

Extension Activity: Create a model of Earth’s layers using any materials available.

Follow-up Activity: The Rock Cycle - Studio

**Differentiation**

- Group students heterogeneously to allow students with a strong command of the English language to assist in reading or interpreting questions
- Provide a handout with a list of vocabulary terms and definitions that will appear in the activity
- Allow students to provide answers that are handwritten, typed, or verbal
- Have students work as partners or in small groups (younger children could partner with older buddies)
- Use text-to-speech if needed
- Enrichment: Students could work on the discussion questions and lead the class discussion
- Enrichment: Students could research similar topics and create presentations
- Enrichment: Students could build a model of a key concept