



The Earth Inside-Out, Part I

2

☑ **Lesson Objectives**

Core Content Objectives

Students will:

- ✓ Explain that much of our knowledge of the earth and its history is the result of the work of many scientists
- ✓ Identify the layers of the earth: crust, mantle, and core (outer and inner)
- ✓ Describe the crust

Language Arts Objectives

The following language arts objectives are addressed in this lesson. Objectives aligning with the Common Core State Standards are noted with the corresponding standard in parentheses. Refer to the Alignment Chart for additional standards addressed in all lessons in this domain.

Students will:

- ✓ With assistance, categorize and organize information about the earth's crust (W.1.8)
- ✓ Clarify information about “The Earth Inside-Out, Part I,” by asking questions that begin with *what* (SL.1.2)
- ✓ Orally retell important facts and information from “The Earth Inside-Out, Part I” (SL.1.4)

Core Vocabulary

core, n. The center of the earth

Example: It is impossible to journey to the earth's core because it is too hot for humans.

Variation(s): none

crust, n. The hard, thick, outer covering of the earth

Example: The workers drilled a few inches into the earth's crust.

Variation(s): none

eroded, v. Worn away

Example: The writing on the Sphinx had been eroded by the wind and sand.

Variation(s): erode, erodes, eroding

layer, n. A part that lies over or under another


Example: The baker added a thin layer of chocolate to the cake.

Variation(s): layers

mantle, n. The layer of the earth between the crust and the core

Example: The mantle is the layer beneath the earth's crust.

Variation(s): none

<i>At a Glance</i>	Exercise	Materials	Minutes
<i>Introducing the Read-Aloud</i>	What Have We Already Learned?	globe	10
	Purpose for Listening		
<i>Presenting the Read-Aloud</i>	The Earth Inside-Out, Part I	U.S. map; ruler or yardstick; glass jar filled with distinct layers of soil, clay, and rock	15
<i>Discussing the Read-Aloud</i>	Comprehension Questions		10
	Word Work: Layer		5
 Complete Remainder of the Lesson Later in the Day			
<i>Extensions</i>	Vocabulary Instructional Activity: Varies		20
	Earth's Crust	Instructional Master 2B-1 (optional); chart paper, chalkboard, or whiteboard	



The Earth Inside-Out, Part I

2_A

Introducing the Read-Aloud

10 minutes

What Have We Already Learned?

Review with students what they learned from the previous read-aloud about the surface of the earth. Using the globe, remind students that the earth is covered by land called continents, and water called oceans. The earth is mostly made up of rocks, and geologists like Gerry study rocks.

Review with students that the northernmost point of the earth is called the North Pole and the southernmost point of the earth is called the South Pole. You may want to place stickers on the North Pole and South Pole on your globe for easy reference. Remind students that the imaginary line that runs around the middle of the earth is called the equator. The equator divides the earth into two equal halves, a northern half with the North Pole and a southern half with the South Pole. You may want to place a piece of red yarn around the middle of the globe to highlight the equator.

Ask students to chant three times the three important words that Gerry the Geologist said to remember when learning about geology. (*Heat! Pressure! Time!*)

Purpose for Listening

Tell students that they have been talking about the surface of the earth. Ask students if they remember what the surface of something is. Explain that today they are going to learn about the inside of the earth. Quickly review the concepts of *in* and *on* with students. Tell them to listen carefully to find out what the inside of the earth is like.



The Earth Inside-Out, Part I

◀ Show image 2A-1: Gerry digging

- 1 What does Gerry study if he is a geologist? What do the parts of the word *geology* mean again?
- 2 The earth has layers—sort of like a sheet and a blanket are different layers of covers on a bed. What other things that you know have layers?

Hello! Gerry the Geologist here again. ¹ I woke up this morning and started digging this hole in the ground. Each time I push my shovel into the earth, I bring up a load of soil, and I've noticed that each load of soil has a few rocks in it. I am digging this hole today to teach you about the outer **layer** of the earth. ²



◀ Show image 2A-2: Topsoil and clay

- 3 Dirt is displaced soil, or soil that has moved from where it originally belonged.
- 4 *Texture* means the way something feels when you touch it.
- 5 [Show the depths of "several feet" and then "a few inches" with a ruler or yardstick as you continue reading.]
- 6 Here, the word *change* means to become different. The word *change* also has other meanings. The word *change* also means money in the form of coins, like pennies, nickels, dimes, and quarters.

Beneath your backyard, the sidewalk, the school—actually, beneath most every place people live—there is soil, which is sometimes called dirt. ³ Different types of soil appear in the earth in layers. Each layer of soil is made of different things, which can give it a different color or a different texture. ⁴

The thickness of the soil varies, or is different, depending on where you live. In some places on the earth, the soil is several feet thick. ⁵ In other places on the earth it is just a few inches, and in some places on the earth there is no soil at all. Here, where I live, the soil is rich and dark near the surface. However, as I dig deeper into the earth, I can see a definite color change. ⁶ The color in this soil has changed from dark brown to bright red. That color change means I have reached a layer of reddish clay. It's getting a little harder to dig now, so I'll have to use my pickax.

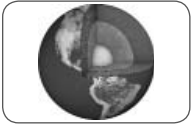


◀ Show image 2A-3: Topsoil, clay, and bedrock

- 7 [To model layers of topsoil, clay, and bedrock for students, fill a glass jar with potting soil, red clay, and rock so they can easily see the changes in color and texture between layers.]

Clank! My pick just hit something really hard below the red clay. The farther down I go, the harder the clay becomes. Pretty soon, I will hit bedrock—a solid layer of hard rock that I won't be able to dig through with my shovel. ⁷

8 Remember *pressure* is one of the three words Gerry said we should keep in mind. Pressure, or pushing, from top layers is one reason deeper layers of soil are harder to dig.



← **Show image 2A-4: Diagram of the layers of the earth**

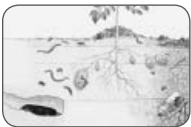
I dug this hole to show you that there are different layers of soil and rock beneath your feet. The farther you go into the earth, the more things change. The dark soil on top is fairly easy to dig into with a shovel, but the deeper layer of clay is harder to dig because it has been compacted—or squished—by the weight or pressure of everything above it.⁸

9 [Point to each layer in the diagram as you read about it.]

This diagram shows you what the inside of the earth would look like if you could cut out a big chunk of it. The **crust** is the outermost layer of the earth, represented here by a thin, brown line.⁹ I have been digging into the very outermost portion of the crust today.

10 [Show students the distance from New York to California on the map.] That is one thousand miles farther than the width of the United States!

Most of the earth is rock, and most of that rock is beneath the crust in the other three layers: the **mantle** (red), the outer **core** (orange), and the inner core (yellow). The distance from the surface—where you and I live—all the way to the middle of the inner core, is nearly four thousand miles.¹⁰ This is one thick planet!



← **Show image 2A-5: Earth's crust**

11 Three miles would be about the distance from here to ____; twenty miles would be about the distance from here to ____.

I will teach you more about the mantle, outer core, and inner core next time. For now, let's focus on the thinnest layer: the crust. The earth's crust is between three and twenty miles, depending on where you are on earth.¹¹ Most people, plants, and animals live on the surface, or outermost edge of the crust.

Remember, the earth's surface is covered by oceans and continents. Everything alive on earth lives in, on, or above these oceans and continents on the crust. For example, you and your dog live on the crust. Worms and moles, on the other hand, live underground, or in the crust. Birds fly in the air above the crust, and fish swim in the water that is flowing on the crust.



← **Show image 2A-6: Layers in the crust**

The crust is where geologists like me look to learn about the history of the earth. In the crust, we find different layers of rock, which teach us about different periods of time in the earth's history.¹² Each layer of rock was formed during a different period of time in the earth's history, so we can study each layer to learn about each period of time.

12 Remember that the earth is over 4,500,000,000 (four billion, five hundred million) years old!



← **Show image 2A-7: Grand Canyon**

Geologists search the crust for clues about the history of the earth. I already introduced you to this place, called the Grand Canyon. Here, the geology of the earth's crust sits like an open book waiting to be read.¹³ Layer upon layer of different rock tells the geologist when this place was covered with a cool ocean and when it was not.

13 "Open book" is a saying that means something is easy to learn about and understand. The Grand Canyon makes it easy for geologists to learn about the earth's crust because all of the layers are visible and easy to see.



← **Show image 2A-8: Arches National Park**

Geological or earth changes can do all sorts of tricky things to the rocks on the earth's crust. These formations in Arches National Park, in the state of Utah, show what thousands of years of wind, rain, and ice can do to this type of stone.



← **Show image 2A-9: Uluru**

Some rocks are mysterious. This is called Uluru, or Ayers Rock. It is the only tall thing in an otherwise flat, barren grassland in the middle of Australia. Geologists have figured out that this is a remnant left over from a time when the entire surface there was covered in this type of rock.¹⁴ Eventually, all the other rock **eroded** away due to wind and rain, and only this one mound of rock remained.¹⁵

14 A remnant is something left over or remaining.

15 All the other rock was worn away by wind and rain.



← **Show image 2A-10: Cave**

Different places tell different stories. Not all interesting rocks are above ground. This photo was taken down in a cave, which is a large hole or space underground. A cave is basically an area in the

earth's crust that has been hollowed out for one reason or another, usually as a result of underground water flowing in and dissolving the rock over millions of years. Caves are really amazing places to explore!



← **Show image 2A-11: Gerry with shovel looking at hole he dug**

People usually do not think too much about what is happening underground, deep below our feet, but the fact is that what happens deep underground has everything to do with what we see in the world around us. Next time, we will take a closer look at what's happening in those other layers. I'd better go ahead and fill in this hole now. See you next time!

Discussing the Read-Aloud

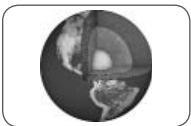
15 minutes

Comprehension Questions

10 minutes

If students have difficulty responding to questions, reread pertinent passages of the read-aloud and/or refer to specific images. If students give one-word answers and/or fail to use read-aloud or domain vocabulary in their responses, acknowledge correct responses by expanding students' responses using richer and more complex language. Ask students to answer in complete sentences by having them restate the question in their responses.

1. *Literal* What is inside the earth ? (There are layers and a lot of rock inside the earth.)



← **Show image 2A-4: Diagram of the layers of the earth**

2. *Literal* [Point to each layer as you ask each question.] What is the name of the outermost layer? (The name of the outermost layer is the crust.) What is the name of the next layer? (The name of the next layer is the mantle.) What is the name of the next layer? (The name of the next layer is the outer core.) What is the name of the innermost layer? (The name of the innermost layer is the inner core.)
3. *Literal* Was Gerry digging in the crust, mantle, or core? (Gerry was digging in the crust.)
4. *Literal* On which layer of the earth do we live? (We live on the crust.)

5. *Literal* What kinds of things are found in the crust of the earth? (Soil, rocks, and small animals are found in the crust of the earth.)
6. *Inferential* Why do geologists study the layers of rock in the earth's crust? (Geologists study the layers of rock in the earth's crust to learn about different time periods in the history of the earth.)

[Please continue to model the *Question Pair Share* process for students, as necessary, and scaffold students in their use of the process.]

7. *Evaluative What? Pair Share:* Asking questions after a read-aloud is one way to see how much everyone has learned. Think of a question you can ask your neighbor about the read-aloud that starts with the word *what*. For example, you could ask, "What did you learn about in today's read-aloud?" Turn to your neighbor and ask your *what* question. Listen to your neighbor's response. Then your neighbor will ask a new *what* question, and you will get a chance to respond. I will call on several of you to share your questions with the class.
8. After hearing today's read-aloud and questions and answers, do you have any remaining questions? [If time permits, you may wish to allow for individual, group, or class research of the text and/or other resources to answer these questions.]

Word Work: Layer

5 minutes

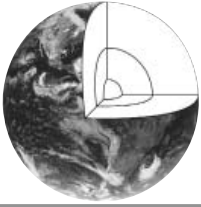
1. In the read-aloud you heard, “I am digging this hole today to teach you about the outer *layer* of the earth.”
2. Say the word *layer* with me.
3. A *layer* is a part that lies over or under another part [Quickly review *over* and *under* with students.]
4. I spread a layer of peanut butter on the slice of bread.
5. Have you ever eaten food that had more than one layer? Have you ever worn more than one layer of clothing? Try to use the word *layer* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students’ responses: “I wore a layer of _____ and a layer of _____.”]
6. What’s the word we’ve been talking about?

Use a *Making Choices* activity for follow-up. Directions: I will describe two different layers of something. You will decide which layer you prefer. Be sure to use the word *layer* in your answer. Remember to answer in complete sentences. (Answers may vary for all.)

1. Would you rather have a layer of mustard or a layer of ketchup on a sandwich?
2. Would you rather walk barefoot on a layer of rocks or a layer of grass?
3. Would you rather wear one layer or several layers of clothing?
4. Would you rather the ground be covered with a layer of snow or a layer of leaves?
5. Would you rather try to dig through a layer of soil or a layer of rock?



Complete Remainder of the Lesson Later in the Day



The Earth Inside-Out, Part I

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Extensions

20 minutes

↔ Vocabulary Instructional Activity: *Varies*

1. In the read-aloud you heard, “The thickness of the soil *varies*, or is different, depending on where you live.”
2. Say the word *varies* with me.
3. *Varies* means changes, or becomes different. Another form of the word *varies* is *vary*.
4. The school lunch menu varies, or changes, from day to day.
5. What other things can vary from day to day? Try to use the word *varies* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students’ responses: “Something that varies from day to day is . . .”]
6. What’s the word we’ve been talking about?

Use a *Drawing* activity for follow-up. Directions: Draw something that varies from day to day. For example, you might draw the different types of weather we have each day. Tell your neighbor what varies in your drawing. Remember to use complete sentences.



Earth’s Crust (Instructional Master 2B-1, optional)

◀ Show image 2B-1: Living things and Earth’s crust


Tell students that the tree and dog are *on* the crust, the roots and soil are *in* the crust, and the birds are *above* the crust. Review with students the meanings of the prepositions *on*, *in*, and *above* as necessary.

Ask students to think about what they learned from the read-aloud about the crust of the earth. Have students brainstorm things that they heard about in the read-aloud or have observed above

the crust. You may wish to reread the applicable part of the read-aloud. Record students' responses on chart paper, a chalkboard, or a whiteboard. Tell students that you are going to write down what they say, but that they are not expected to be able to read what you write because they are still learning all the rules for decoding. Emphasize that you are writing what they say so that you don't forget. Tell them that you will read the words to them.

Follow the same procedures for filling in "on the crust" and "in the crust."

Once the chart has been completed, read it to the class.

 Above and Beyond: Instructional Master 2B-1 has been included if you have students who are ready to add to the drawing on their own, using the sound-spelling correspondences taught thus far.