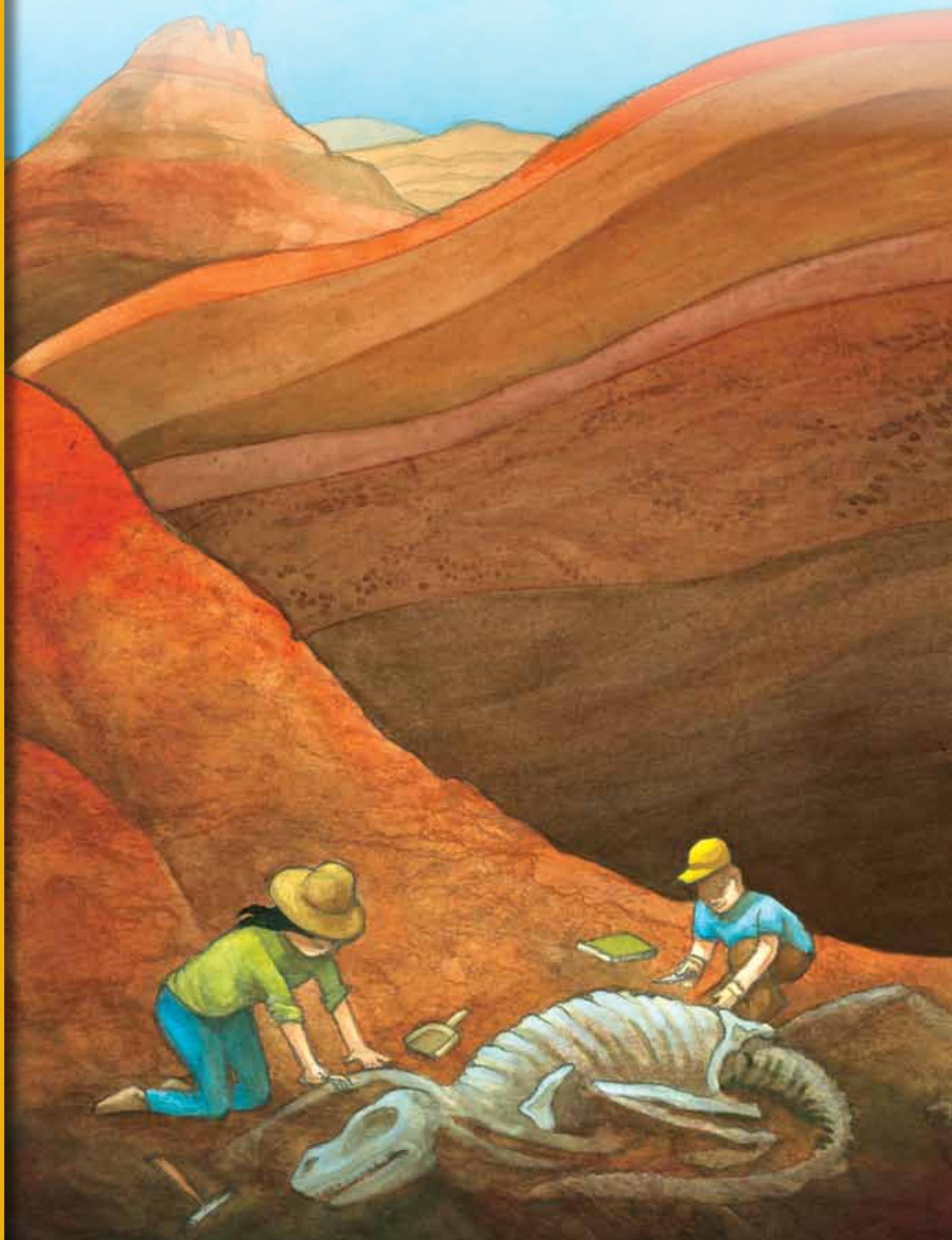
The History of the Earth

Tell It Again!™ Read-Aloud Anthology



GRADE 1

Core Knowledge Language Arts® • Listening & Learning™ Strand

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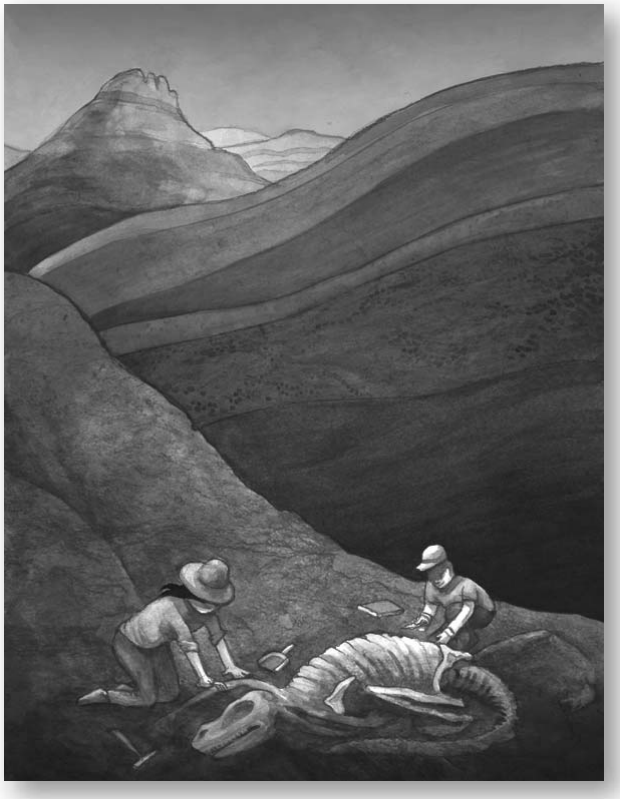

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Tell It Again!™ Read-Aloud Anthology

Listening & Learning™ Strand

GRADE 1

Core Knowledge Language Arts®

Core Knowledge®

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The History of the Earth

Tell It Again!™ Read-Aloud Anthology

Alignment Chart for The History of the Earth

The following chart contains core content objectives addressed in this domain. It also demonstrates alignment between the Common Core State Standards and corresponding Core Knowledge Language Arts (CKLA) goals.

Alignment Chart for The History of the Earth	**Lesson**							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Core Content Objectives								
Identify geographical features of the earth's surface: oceans and continents	✓							
Locate the North Pole, the South Pole, and the equator on a globe	✓							
Describe the shape of the earth	✓							
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		✓						
Describe the mantle and core inside the earth			✓					
Describe volcanoes and geysers			✓	✓				
Describe how heat, pressure, and time cause many changes inside the earth			✓	✓			✓	
Identify common minerals in the earth					✓			
Explain how minerals are used by people					✓			
Identify the three types of rocks: igneous, sedimentary, and metamorphic						✓		
Describe how heat, pressure, and time cause the formation of igneous, sedimentary, and metamorphic rocks						✓		
Describe fossils							✓	✓
Explain how fossils provide information about the history of the earth							✓	✓
Explain how we know about dinosaurs								✓
Describe various dinosaurs								✓

Alignment Chart for The History of the Earth

		Lesson							
		1	2	3	4	5	6	7	8
Reading Standards for Informational Text: Grade 1									
Key Ideas and Details									
STD RI.1.1	Ask and answer questions about key details in a text.								
CKLA Goal(s)	Ask and answer questions (e.g., *who, what, where, when*), orally or in writing, requiring literal recall and understanding of the details and/or facts of a nonfiction/informational read-aloud				✓				
	Answer questions that require making interpretations, judgments, or giving opinions about what is heard in a nonfiction/informational read-aloud, including answering *why* questions that require recognizing cause/effect relationships				✓				
STD RI.1.3	Describe the connection between two individuals, events, ideas, or pieces of information in a text.								
CKLA Goal(s)	Describe the connection between two individuals, events, ideas, or pieces of information in a nonfiction/informational read-aloud							✓	✓
Craft and Structure									
STD RI.1.4	Ask and answer questions to help determine or clarify the meaning of words and phrases in a text.								
CKLA Goal(s)	Ask and answer questions about unknown words and phrases in nonfiction/informational read-alouds and discussions				✓				
Integration of Knowledge and Ideas		Lesson							
		1	2	3	4	5	6	7	8
STD RI.1.7	Use the illustrations and details in a text to describe its key ideas.								
CKLA Goal(s)	Use illustrations and details in a nonfiction/informational read-aloud to describe its key ideas				✓				
STD RI.1.9	Identify basic similarities in and differences between two texts on the same topic (e.g., in illustrations, descriptions, or procedures).								
CKLA Goal(s)	Compare and contrast (orally or in writing) similarities and differences within a single nonfiction/informational read-aloud or between two or more nonfiction/informational read-alouds				✓	✓	✓		✓
Range of Reading and Level of Text Complexity									
STD RI.1.10	With prompting and support, read informational texts appropriately complex for Grade 1.								
CKLA Goal(s)	Listen to and demonstrate understanding of nonfiction/informational read-alouds of appropriate complexity for Grades 1–3				✓				

Alignment Chart for The History of the Earth		Lesson							
		1	2	3	4	5	6	7	8
Writing Standards: Grade 1									
Text Types and Purposes									
STD W.1.1	Write opinion pieces in which they introduce the topic or name the book they are writing about, state an opinion, supply a reason for the opinion, and provide some sense of closure.								
CKLA Goal(s)	Write opinion pieces in which they introduce the topic or name the book they are writing about, state an opinion, supply a reason for the opinion, and provide some sense of closure							✓	✓
STD W.1.2	Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure.								
CKLA Goal(s)	Plan and/or draft, and edit an informative/ explanatory text that presents information from a nonfiction/informational read-aloud that includes mention of a topic, some facts about the topic, and some sense of closure	✓				✓			
Research to Build and Present Knowledge									
STD W.1.8	With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.								
CKLA Goal(s)	With assistance, categorize and organize facts and information within a given domain to answer questions		✓			✓	✓		
Speaking and Listening Standards: Grade 1									
Comprehension and Collaboration									
STD SL.1.1	Participate in collaborative conversations with diverse partners about Grade 1 topics and texts with peers and adults in small and large groups.								
STD SL.1.1a	Follow agreed-upon rules for discussions (e.g., listening to others with care, speaking one at a time about the topics and texts under discussion).								
CKLA Goal(s)	Use agreed-upon rules for group discussion, e.g., look at and listen to the speaker, raise hand to speak, take turns, say “excuse me” or “please,” etc.	✓							
STD SL.1.1b	Build on others’ talk in conversations by responding to the comments of others through multiple exchanges.								
CKLA Goal(s)	Carry on and participate in a conversation over at least six turns, staying on topic, initiating comments or responding to a partner’s comments, with either an adult or another child of the same age	✓							

Alignment Chart for The History of the Earth		Lesson							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
STD SL.1.1c	Ask questions to clear up any confusion about the topics and texts under discussion.								
CKLA Goal(s)	Ask questions to clarify information about the topic in a fiction or nonfiction/informational read-aloud				✓				
STD SL.1.2	Ask and answer questions about key details in a text read aloud or information presented orally or through other media.								
CKLA Goal(s)	Ask and answer questions (e.g., *who, what, where, when*), orally or in writing, requiring literal recall and understanding of the details, and/or facts of a fiction or nonfiction/informational read-aloud		✓		✓		✓	✓	
STD SL.1.3	Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.								
CKLA Goal(s)	Ask questions to clarify directions, exercises, classroom routines, and/or what a speaker says about a topic	✓							
Presentation of Knowledge and Ideas									
STD SL.1.4	Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.								
CKLA Goal(s)	Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly		✓	✓	✓	✓	✓		
STD SL.1.5	Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.								
CKLA Goal(s)	Add drawings or other visual displays to oral or written descriptions when appropriate to clarify ideas, thoughts, and feelings	✓				✓		✓	✓
STD SL.1.6	Produce complete sentences when appropriate to task and situation.								
CKLA Goal(s)	Produce complete sentences when appropriate to task and situation				✓				
Language Standards: Grade 1									
Vocabulary Acquisition and Use									
STD L.1.5	With guidance and support from adults, demonstrate understanding of word relationships and nuances in word meanings.								
STD L.1.5c	Identify real-life connections between words and their use (e.g., note places at home that are *cozy*).								
CKLA Goal(s)	Identify real-life connections between words and their use (e.g., note places at home that are *cozy*)				✓				

Alignment Chart for The History of the Earth

		Lesson							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
STD L.1.6	Use words and phrases acquired through conversations, reading and being read to, and responding to texts, including using frequently occurring conjunctions to signal simple relationships (e.g., *because*).								
CKLA Goal(s)	Use words and phrases acquired through conversations, reading and being read to, and responding to texts, including using frequently occurring conjunctions to signal simple relationships (e.g., *because*)				✓				
Additional CKLA Goals									
Prior to listening to a given read-aloud, identify orally what they know and have learned about the topic					✓				
Discuss personal responses to information pertaining to the read-aloud		✓							
Identify new meanings for familiar words and apply them accurately		✓							✓
Use frequently occurring conjunctions, such as *and* and *or*				✓				✓	
Evaluate and select read-alouds on the basis of personal choice for reading								✓	

✓ These goals are addressed in all lessons in this domain. Rather than repeat these goals as lesson objectives throughout the domain, they are designated here as frequently occurring goals.

Introduction to The History of the Earth

This introduction includes the necessary background information to be used in teaching *The History of the Earth* domain. The *Tell It Again! Read-Aloud Anthology* for *The History of the Earth* contains eight daily lessons, each of which is composed of two distinct parts, so that the lesson may be divided into smaller chunks of time and presented at different intervals during the day. The entire lesson will require a total of sixty minutes.

This domain includes a Pausing Point, following Lesson 4, after the layers of the earth have been introduced. At the end of the domain, a Domain Review, a Domain Assessment, and Culminating Activities are included to allow time to review, reinforce, assess, and remediate content knowledge. **You should spend no more than twelve days total on this domain.**

Week One				
Day 1	**Day 2 #**	**Day 3 #**	**Day 4**	**Day 5 ⑩#**
Lesson 1A: "Our Home, Earth" (40 min.)	Lesson 2A: "The Earth Inside-Out, Part I" (40 min.)	Lesson 3A: "The Earth Inside-Out, Part II" (40 min.)	Lesson 4A: "The Earth Inside-Out, Part III" (40 min.)	Pausing Point (60 min.)
Lesson 1B: Extensions (20 min.)	Lesson 2B: Extensions (20 min.)	Lesson 3B: Extensions (20 min.)	Lesson 4B: Extensions (20 min.)	
60 min.	60 min.	60 min.	60 min.	60 min.

Week Two				
Day 6 #	**Day 7 #**	**Day 8 #**	**Day 9**	**Day 10 #**
Lesson 5A: "Minerals" (40 min.)	Lesson 6A: "The Three Types of Rocks" (40 min.)	Lesson 7A: "Fossils" (40 min.)	Lesson 8A: "Dinosaurs" (40 min.)	Domain Review (60 min.)
Lesson 5B: Extensions (20 min.)	Lesson 6B: Extensions (20 min.)	Lesson 7B: Extensions (20 min.)	Lesson 8B: Extensions (20 min.)	
60 min.	60 min.	60 min.	60 min.	60 min.

Week Three	
Day 11 ⑩#	**Day 12 #**
Domain Assessment (60 min.)	Culminating Activities (60 min.)
60 min.	60 min.

⑩ Lessons include Student Performance Task Assessments

\# Lessons require advance preparation and/or additional materials; please plan ahead

Domain Components

Along with this Anthology, you will need:

- *Tell It Again! Media Disk* or *Tell It Again! Flip Book** for *The History of the Earth*
- *Tell It Again! Image Cards* for *The History of the Earth*
- *Tell It Again! Supplemental Guide* for *The History of the Earth*

*The *Tell It Again! Multiple Meaning Word Posters* for *The History of the Earth* are found at the end of the *Tell It Again! Flip Book** for *The History of the Earth.*

Recommended Resource:

- *Core Knowledge Grade 1 Teacher Handbook,* edited by E.D. Hirsch, Jr. and Souzanne A. Wright (Core Knowledge Foundation, 2004) ISBN: 978-1890517700

Why The History of the Earth Is Important

In this domain, students will learn about the geographical features of the earth's surface. They will also learn about the inside of the earth and characteristics of its various layers.

The domain focuses on the geographical features of the earth's surface and the layers of the earth. Students will learn about the shape of the earth, the North and South Poles, and the equator. Students will also learn the names of the layers of the earth—the crust, the mantle, and the core—and characteristics of each layer. Students will learn how occurrences such as volcanoes and geysers give information about the layers of the earth.

The read-alouds also focus on minerals and rocks. Students will learn about the importance of rocks and minerals in their daily lives. They will also learn about the three types of rocks and characteristics of each type. Students will learn how rocks and minerals are taken from the earth's crust to be used by people. Students will also learn about fossils and their importance in giving us knowledge about the history of living things on the earth.

We recommend that you provide a collection and visual

representations of fossils, rocks, and dinosaur models for tactile learning and find plenty of opportunities for students to interact with these.

Students will get a good introduction to the basics of geology and paleontology, and those in Core Knowledge schools will review and extend their learning about the earth in much greater depth in fourth grade.

What Students Have Already Learned in Core Knowledge Language Arts During Kindergarten

The following domains, and the specific core content that was targeted in those domains, are particularly relevant to the read-alouds students will hear in *The History of the Earth*. This background knowledge will greatly enhance your students' understanding of the read-alouds they are about to enjoy:

Plants

- Explain that there are many different kinds and sizes of plants
- Explain that different kinds of plants grow in different environments
- Describe what plants need to live and grow: food, water, air, and sunlight
- Identify the root, stem, branch, leaf, flower, fruit, and seed of a plant

Taking Care of the Earth

- Explain that Earth is composed of natural resources (land, water, and air) and that humans, plants, and animals depend on Earth's natural resources to live
- Identify examples of land, water, and air from their own environments
- Explain that natural resources are things found in nature that are valuable and of great importance to people
- Identify key natural resources and describe how people use them

Core Vocabulary for The History of the Earth

The following list contains all of the core vocabulary words in *The History of the Earth* in the forms in which they appear in the read-alouds, or, in some instances, in the "Introducing the Read-Aloud" section at the beginning of the lesson. Boldfaced words in the list have an associated Word Work activity. The inclusion of the words on this list does not mean that students are immediately expected to be able to use all of these words on their own. However, through repeated exposure throughout the lessons, they should acquire a good understanding of most of these words and begin to use some of them in conversation.

Lesson 1

equator
geologist
geology
pressure
surface

Lesson 2

core
crust
eroded
layer
mantle

Lesson 3

disasters
liquid
molten
solid
volcano

Lesson 4

destructive
eruption
geysers
lava
magma

Lesson 5

characteristics
gemstones
minerals
traces

Lesson 6

artifacts
igneous
metamorphic
sedimentary
sediments

Lesson 7

fossil
impression
paleontologist
preserved

Lesson 8

debris
excavating
extinct
fossilized
meteor
meteorite

Student Performance Task Assessments

In the *Tell It Again! Read-Aloud Anthology* for *The History of the Earth,* there are numerous opportunities to assess students' learning. These assessment opportunities range from informal observations, such as *Think Pair Share* and some Extension activities, to more formal written assessments. These Student Performance Task Assessments (SPTA) are identified in the *Tell It Again! Read-Aloud Anthology* with this icon: ⑩. There is also an end-of-domain summative assessment. Use the Tens Conversion Chart located in the Appendix to convert a raw score on each SPTA into a Tens score. On the same page, you will also find the rubric for recording observational Tens scores.

Above and Beyond

In the *Tell It Again! Read-Aloud Anthology* for *The History of the Earth,* there are numerous opportunities in the lessons and the Pausing Point to challenge students who are ready to attempt activities that are above grade level. These activities are labeled "Above and Beyond" and are identified with this icon: .

Supplemental Guide

Accompanying the *Tell It Again! Read-Aloud Anthology* is a *Supplemental Guide* designed to assist education professionals who serve students with limited English language skills or students with limited home literacy experience, which may include English Language Learners (ELLs) and children with special needs. Teachers whose students would benefit from enhanced oral language practice may opt to use the *Supplemental Guide* as their primary guide in the Listening & Learning strand. Teachers may also choose to begin a domain by using the *Supplemental Guide* as their primary guide before transitioning to the *Tell It Again! Read-Aloud Anthology,* or may choose individual activities from the *Supplemental Guide* to augment the content covered in the *Tell It Again! Read-Aloud Anthology.*

The *Supplemental Guide* activities that may be particularly relevant to any classroom are the Multiple Meaning Word Activities and

accompanying Multiple Meaning Word Posters, which help students determine and clarify different meanings of words; Syntactic Awareness Activities, which call students' attention to sentence structure, word order, and grammar; and Vocabulary Instructional Activities, which place importance on building students' general academic, or Tier 2, vocabulary. These activities afford all students additional opportunities to acquire a richer understanding of the English language. Several of these activities have been included as Extensions in the *Tell It Again! Read-Aloud Anthology.* In addition, several words in the *Tell It Again! Read-Aloud Anthology* are underlined, indicating that they are multiple-meaning words. The accompanying sidebars explain some of the more common alternate meanings of these words. *Supplemental Guide* activities included in the *Tell It Again! Read-Aloud Anthology* are identified with this icon: ⇆.

Recommended Resources for The History of the Earth

Trade Book List

The *Tell It Again! Read-Aloud Anthology* includes a number of opportunities in Extensions, the Pausing Point, and the Domain Review for teachers to select trade books from this list to reinforce domain concepts through the use of authentic literature. In addition, teachers should consider other times throughout the day when they might infuse authentic domain-related literature. If you recommend that families read aloud with their child each night, you may wish to suggest that they choose titles from this trade book list to reinforce the domain concepts. You might also consider creating a classroom lending library, allowing students to borrow domain-related books to read at home with their families.

1. *Dave's Down-to-Earth Rock Shop,* by Stuart J. Murphy and illustrated by Cat Bowman Smith (HarperCollins, 2005) ISBN 978-0064467292
2. *Digging Up Dinosaurs (Let's-Read-and-Find-Out Science 2)*, by Aliki (HarperCollins, 1988) ISBN 978-0064450782
3. *Dinosaurs (Magic Tree House Guide*), by Will Osborne, Mary Pope Osborne, and Sal Murdocca (Random House Books for Young Readers, 2000) ISBN 978-0375802966

4. *Dinosaurs Before Dark (Magic Tree House, No. 1),* by Mary Pope Osborne and illustrated by Sal Murdocca (Random House Books for Young Readers, 1992) ISBN 978-0679824114
5. *Earthquake in the Early Morning (Magic Tree House, No. 24)*, by Mary Pope Osborne and Sal Murdocca (Random House Books for Young Readers, 2001) ISBN 978-0679890706
6. *Earthquakes (Let's-Read-and-Find-Out Science 2)*, by Franklyn M. Branley and Megan Lloyd (HarperCollins, 2005) ISBN 978-0064451888
7. *Exploring Rocks and Minerals (Exploring Earth and Space),* by Greg Roza (Powerkids Press, 2012) ISBN 978-1448885763
8. *Fossils Tell of Long Ago (Let's-Read-and-Find-Out Science 2)*, by Aliki (HarperCollins, 1990) ISBN 978-0064450935
9. *Hill of Fire,* by Thomas P. Lewis and pictures by Joan Sandin. (HarperCollins, 1983) ISBN 978-0064440400
10. *Home on Earth: A Song about Earth's Layers,* by Laurie Purdie Salas and illustrated by Viviana Garofoli (Picture Window Books, 2009) ISBN 978-1404852969
11. *How to Dig a Hole to the Other Side of the Earth*, by Faith McNulty and illustrated by Marc Simont (HarperCollins, 1992) ISBN 978-0874992335
12. *If You Find a Rock*, by Peggy Christian and photographs by Barbara Hirsch Limber (Sandpiper, 2008) ISBN 978-0152063542
13. *Kids Who Walk on Volcanoes,* by Paul Otteson (Avalon Travel Publishing, 1996) ISBN 978-1562613082
14. *Let's Go Rock Collecting (Let's-Read-and-Find-Out Science 2)*, by Roma Gans and Holly Keller (HarperCollins, 1997) ISBN 978-0064451703
15. *The Magic School Bus Inside the Earth,* by Joanna Cole and illustrated by Bruce Degen (Scholastic, 1989) ISBN 978-0590407601

16. *The Magic School Bus in the Time of the Dinosaurs*, by Joanna Cole and illustrations by Bruce Degen (Scholastic, 1995) ISBN 978-0590446891
17. *Magic Tree House Fact Tracker #1: Dinosaurs: A Nonfiction Companion to Magic Tree House #1: Dinosaurs Before Dark,* by Will Osborne, Mary Pope Osborne, and illustrated by Sal Murdocca (Random House Books for Young Readers, 2000) ISBN 978-0375802966
18. *My Visit to the Dinosaurs (Let's-Read-and-Find-Out Science 2),* by Aliki (HarperCollins, 1985) ISBN 978-0064450201
19. *The Pebble in My Pocket: A History of Our Earth*, by Meredith Hooper and illustrations by Chris Coady (Viking Juvenile, 1996) ISBN 978-0670862597
20. *Planet Earth/Inside Out*, by Gail Gibbons (Morrow Junior Books, 1995) ISBN 978-0688096809
21. *Rocks in His Head*, by Carol Otis Hurst and James Stevenson (HarperCollins, 2001) ISBN 978-0060294038
22. *Sabertooths and the Ice Age: A Nonfiction Companion to Sunset of the Sabertooth*, by Mary Pope Osborne, Natalie Pope Boyce, and Sal Murdocca (Random House Books for Young Readers, 2005) ISBN 978-0375823800
23. *Sunset of the Sabertooth (Magic Tree House, No. 7)*, by Mary Pope Osborne and Sal Murdocca (Random House Books for Young Readers, 1996) ISBN 978-0679863731
24. *Vacation Under the Volcano (Magic Tree House, No. 13)*, by Mary Pope Osborne and Sal Murdocca (Random House Books for Young Readers, 1998) ISBN 978-0679890508
25. *Volcanoes (Let's-Read-and-Find-Out Science 2)*, by Franklyn M. Branley and Megan Lloyd (Collins, 2008) ISBN 978-0064451895
26. *Volcanoes: Mountains That Blow Their Tops*, by Nicholas Nirgiotis (Grosset and Dunlap, 1996) ISBN 978-0448411439
27. *Wonderful World of Dinosaurs,* by Christina Wilsdon (Disney Press, 2012) ISBN 978-1423168485

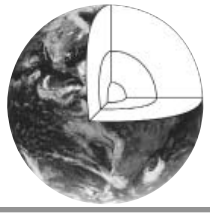
Websites and Other Resources

Student Resources

1. Earth from Space
   http://visibleearth.nasa.gov/view_cat.php?categoryID=1484
2. Caillou the Paleontologist
   http://pbskids.org/caillou/immersivegames/?gameID=4
3. American Museum of Natural History
   http://www.amnh.org
4. Animated Geyser
   http://www.classzone.com/books/earth_science/terc/content/visualizations/es1403/es1403page01.cfm
5. Science Kids
   http://www.sciencekids.co.nz

Teacher Resources

1. Minerals
   http://www.rocksforkids.com/RFK/identification.html
2. Rocks
   http://www.geography4kids.com/files/earth_rocktypes.html
3. Geological Society of America
   http://www.geosociety.org
4. Geology
   http://www.geology.com



Our Home, Earth

1

☑ *Lesson Objectives*

Core Content Objectives

Students will:

- ✓ Identify geographical features of the earth's surface: oceans and continents
- ✓ Locate the North Pole, the South Pole, and the equator on a globe
- ✓ Describe the shape of the earth
- ✓ Explain that much of our knowledge of the earth and its history is the result of the work of many scientists

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:

- ✓ Draw pictures and write simple sentences to depict details from the read-aloud "Our Home, Earth" (W.1.2)
- ✓ Clarify directions by asking classmates about the directions for an activity in which they are drawing a scene from the read-aloud (SL.1.3)
- ✓ Write and illustrate details from the read-aloud "Our Home, Earth" and discuss with one or more peers (SL.1.5)
- ✓ Discuss personal responses to what is inside the earth
- ✓ Identify new meanings of familiar words, such as *stick,* and apply them accurately

Core Vocabulary

equator, *n.* The imaginary line around the center of the earth, halfway between the north and south poles
Example: Isabelle is from Ecuador, which is a country in South America near the equator.
Variation(s): none

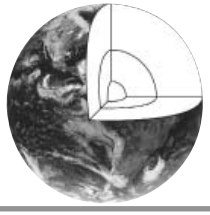
geologist, *n.* Someone who studies the history of the earth
Example: A geologist spoke to the class about her studies in Hawaii.
Variation(s): geologists

geology, *n.* The scientific study of the history of the earth
Example: In his spare time, he read books to learn more about geology.
Variation(s): none

pressure, *n.* The continuous force of one object on another
Example: The nutcracker helped the girl create enough pressure to crack the walnut open.
Variation(s): pressures

surface, *n.* The topmost layer or outside of something
Example: She wiped the surface of the table with a wet cloth after dinner.
Variation(s): surfaces

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**Domain Introduction**		10
	Where Are We?	globe	
	Purpose for Listening		
Presenting the Read-Aloud	**Our Home, Earth**	globe	15
Discussing the Read-Aloud	**Comprehension Questions**	globe	10
	Word Work: Surface	classroom object	5
	Complete Remainder of the Lesson Later in the Day		
Extensions	**Multiple Meaning Word Activity: Stick**	Poster 1M (Stick)	20
	Drawing the Read-Aloud	drawing paper, drawing tools	
Take-Home Material	**Family Letter**	Instructional Masters 1B-1, 1B-2	*



Our Home, Earth

1A

Introducing the Read-Aloud *10 minutes*

Domain Introduction

Tell students that this domain is titled "The History of the Earth." Review with students that *history* refers to things that happened in the past, and Earth is the planet where we live. Explain that scientists know that the planet Earth has existed for many, many years. Tell students that many scientists believe the planet Earth is billions of years old. Explain to students that a billion is a very, very long number, which means that Earth is very, very old. Emphasize that scientists are always discovering new things about the earth, and our universe. The history of the earth tells of the fascinating things that are or have been a part of the earth since its beginning. Tell students that they will be learning about rocks and minerals, fossils, volcanoes, and geysers.

Where Are We?

Show students a globe, and tell them that it is a model, or a small copy, of the earth. We use models to learn about things that are too big or too far away to study in the classroom. Tell students that you will use the globe to help them learn about the earth, the planet where we live.

Review with students details about where they live. Point to the appropriate location on the globe as you say the following:

- You live in (your city)
- (Your city) is in the state of (your state)
- (Your state) is in the country of the United States of America
- The United States of America is on the continent of North America
- North America is on planet Earth

Explain that even though it seems that the ground we stand on is flat and still, we actually live on only a tiny part of a huge sphere, or ball, just like this globe. This huge sphere is called Earth.

Remind students that they already learned about the solar system—our home in space—in the *Astronomy* domain, and that Earth, the planet on which we live, is just one of eight planets within the solar system. Tell students that in learning about the history of the earth, they are going to learn a lot more about our planet.

Tell students that the earth is covered by both land and water. Point out the colors used to distinguish land and water on your classroom globe. Preview with students that another name for the land of the earth is the *continents* of the earth. Tell students that they will learn about the seven continents of the earth in this domain. Preview with students that another name for the water of the earth is the *oceans* of the earth. Tell students that they will learn about the five oceans of the earth in this domain.

Purpose for Listening

Tell students that today they are going to meet an interesting scientist who knows a lot about the earth. Tell them to listen carefully to learn more about the earth.

Presenting the Read-Aloud — **15** *minutes*

Our Home, Earth

Show image 1A-1: Gerry the Geologist

Hello, kids! My name is Gerry and I'm a **geologist.** [1] A geologist is a type of scientist. A scientist studies and learns all about the world in which we live. Geologists are scientists who study rocks and what's inside the earth.

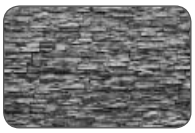
1 Let's call him "Gerry the Geologist!" Do you hear how the beginning sound of "Gerry" and "Geologist" are the same? That's called alliteration.

Show image 1A-2: Collage of rocks

That's right: rocks! From pebbles to stones to boulders, from a grain of sand to the highest mountain, rocks are everywhere. And I want you to know all about rocks, from how they are created to how they are used in people's everyday lives.

Show image 1A-3: Jeweled crown

People used rocks to make the jewels on this crown.



Show image 1A-4: Rock wall

People use rocks to make buildings, walls, and streets.

Show image 1A-5: Marble statue of Abraham Lincoln

A sculptor carved a big rock to make this sculpture of Abraham Lincoln.

Show image 1A-6: Rocky mountain vista

Geologists use rocks to learn about the earth. In the ancient Greek language, the word *geo* means earth, and *–ology* means "the study of." When we combine these word parts, we have *geo-ology*, or just ***geology*****,** which is the study of the earth. [2] Since the earth is mostly made of rock, we geologists spend most of our time studying rocks. Many of the rocks we see on the **surface** of the earth, from mountains down to pebbles, are created by incredible forces at work deep inside the earth. [3] Thus, geologists study not only rocks, but also the forces at work inside the earth and on the earth's surface. We study the whole earth.

2 Geology is the study of what? What does each part of the word *geology* mean?

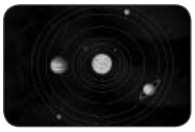
3 The surface of the earth is the outside of the earth. We walk and live on the surface of the earth. Have you ever wondered about what's inside the earth, or under the surface where we walk and live?

Show image 1A-7: Outer space

Some scientists believe the history of the earth begins a little over four-and-a-half billion years ago.[4] That's a long time—a very, very, very long time—ago. Before that, some scientists believe the materials that now make up Earth were orbiting, or floating around, our newly formed sun as billions of little bits and pieces. Over many, many years, it is believed by some scientists that these floating bits and pieces gradually stuck together until they made up Earth, as well as its neighbor, the moon, and the other planets.

When it was newly formed, Earth was basically one big ball of hot, melted rocks. Over time, however, some of these materials cooled and hardened, allowing the planet Earth to become what it is today.

4 [Write the number four-and-a-half billion (4,500,000,000) out for students so that they can get a sense of how long ago the earth's history began.] That's a very, very, very long time ago!



Show image 1A-8: Diagram of the solar system

Maybe you already know that Earth is a planet. Earth is one of eight major planets that orbits the sun.[5] Do you know the names of any of the other planets?[6] I do! Mercury, Venus, Mars, Jupiter, Saturn, Uranus, and Neptune.

Like the other planets in the solar system, Earth is trapped in the gravitational pull of the sun. This causes Earth to orbit, or revolve, around the sun. It takes one year, about 365 days, for Earth to complete an orbit around the sun.[7]

5 [Point to Earth on the diagram.] Earth is the third planet from the sun.

6 [Pause for responses and point out each planet on the diagram.]

7 [Ask two students to demonstrate by having one student be a stationary sun and the other be the orbiting Earth.]

Show image 1A-9: World map

The earth's orbit around the sun is not the *only* way Earth moves in space, however.

This map shows the earth's north and south poles.[8] The north and south poles are imaginary points at the northernmost and southernmost parts of the earth. The axis of rotation is like an imaginary line or "stick" going right through the earth at the north and south poles.[9] There is not really a "stick" running through the earth around which it turns. The axis is an imaginary line around which earth rotates. The earth rotates, or spins, in the same way

8 [Point to the north and south poles in the diagram.] Tell students there is a star marking the North Pole and a circle marking the South Pole.

9 Here, the word *stick* means a long, thin piece of wood. The word *stick* also has other meanings. The word *stick* also means to attach something to a surface using glue or tape, kind of like a sticker.

that a globe spins—on its axis. It takes one day, or twenty-four hours, for Earth to make a complete rotation. [10]

The map also shows the **equator,** an imaginary line around the middle of the earth. [11] The equator divides the earth into two equal halves. The area along the equator receives the most direct sunlight and is therefore generally the warmest area on the surface of the earth.

10 [Use a globe to demonstrate rotation.] It takes one day for Earth to go all the way around its axis. As the earth rotates, it also orbits the sun. [You may wish to demonstrate both motions of Earth by turning around and around as you walk in a circle around a student volunteer playing the stationary sun.]

11 [Point to the equator on the map. Tell students that the word *equator* sounds like the word *equal*. We can remember that the *equator* cuts the world into two *equal* halves.]

Show image 1A-10: Earth from space

Earth is sphere-shaped, like a ball, and it is surrounded by a thick blanket of air, called an atmosphere, where clouds float around. Most of the earth's surface is covered with water in the form of the five oceans: [12] Pacific, Atlantic, Indian, Arctic, and Southern (or Antarctic). And between these oceans there is land in the form of seven continents: North America, South America, Europe, Africa, Asia, Australia, and Antarctica.

12 [Point out the oceans and continents that are visible as you read.]

People haven't always known that the earth is round or that it rotates on its axis as well as orbits the sun; they haven't always known that there are five oceans and seven continents, or that most of the surface is covered in water. It has taken hundreds of years for scientists and explorers to develop all the knowledge about the earth that I just described in the last few minutes. But this barely begins to scratch the surface of what we now know about the history of the earth. [13]

13 "This barely begins to scratch the surface" is a phrase that people say when they mean that there is so much more left to learn about something.

Show image 1A-11: Heat, pressure, and time

There are three important words you need to keep in mind whenever you are thinking about geology, which is the study of the earth. *Heat* is the first. You can feel heat from a flame or from the sun on a sunny day. Heat causes many changes to the earth.

The second word is ***pressure,*** like the force you use when you push on something. [14] Pressure, or the force of weight, also causes many changes to the earth.

14 [Pause for students to push their hands together using pressure.]

Time is the third important geology word to remember. To understand geology, you need to think about time in a whole new way. Forget about minutes, hours, and days. These amounts of time don't mean much in geology. Geologists think in terms of many, many years. [15] It takes a long time for pressure and heat to do what they do.

15 Remember how long ago four-and-a-half billion years was!

Show image 1A-12: Grand Canyon with view of Colorado River

The Grand Canyon, located in Arizona, provides a lot of clues about the earth's formation and history. It took millions of years for the rushing water in the river to carve through the rocks to make this canyon. No other place on earth allows me to see and study so many different layers of rock at the same time. The rock on the upper rim of the Grand Canyon is estimated by some scientists to be about 230 million years old, whereas the rock layers at the very bottom of the canyon are estimated to have formed over two billion years ago. That rock is half as old as the earth is believed to be itself!

Remember: heat, pressure, and time are the main factors of geology. If you understand those three words, then you are ready to move ahead and learn many things about the history of the earth. [16]

16 [Have students chant three times, "Heat! Pressure! 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 does Gerry the Geologist study? (Gerry the Geologist studies rocks to learn about the earth.)
2. *Evaluative* How are rocks used by people? (Rocks are important to people because they are used in jewelry making, in building, and in art.) How have you ever used rocks? (Answers may vary.)

3. *Literal* What is the shape of the earth? (The earth is shaped like a sphere, which is just like the shape of a ball.)

4. *Literal* What do we call the land and water that cover the surface of the earth? (The land and water that cover the surface of the earth are called continents and oceans.)

5. *Literal* What are the North and South Poles? (The North Pole is the northernmost point on the earth. The South Pole is the southernmost point on the earth.) [Have a student locate the North Pole on the globe. Ask another student to locate the South Pole on the globe.]

6. *Literal* What is the equator? (The equator is an imaginary line around the middle of the earth at that divides the earth into two equal halves.) [Have a student locate the equator on the globe.]

7. *Literal* What are the three important words that Gerry said you need to remember when thinking about geology? (The three words you should remember when thinking about geology are *heat, pressure,* and *time.*)

8. *Inferential* When we talk about the history of the earth are we talking about a short time or a very long time? (When we talk about the history of the earth, we are talking about a very long time of billions of years.)

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

I am going to ask a question. I will give you a minute to think about the question, and then I will ask you to turn to your neighbor and discuss the question. Finally, I will call on several of you to share what you discussed with your partner.

9. *Evaluative* ***Think Pair Share:*** Would you like to be a geologist like Gerry? Why or why not? (Answers may vary.)

10. 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.]

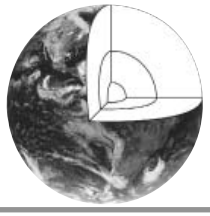
Word Work: Surface *5 minutes*

1. In the read-aloud you heard, "Many of the rocks we see on the *surface* of the earth, from mountains down to pebbles, are created by incredible forces at work deep inside the earth."
2. Say the word *surface* with me.
3. The surface of something is the outside or top of it. [Point out some surfaces in the classroom.]
4. I put the tea kettle on the surface of the stove.
5. Have you ever put something on the surface of an object, such as a table or desk? Try to use the word *surface* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "I put _____ on the surface of . . . "]
6. What's the word we've been talking about?

Note: Place familiar items, such as a stapler, marker, book bin, etc., on the surfaces of classroom tables and desks before doing this activity.

Use a *Naming* activity for follow-up. Directions: I have placed several objects on surfaces in the classroom. I would like you to identify what is on each surface. For example, I might ask, "What is on the surface of the desk?" Be sure to begin your responses with "_____ is on the surface of the desk."

Complete Remainder of the Lesson Later in the Day



Our Home, Earth

1B

Extensions — *20 minutes*

Multiple Meaning Word Activity: Stick

Sentence in Context

1. [Show Poster 1M (Stick).] In the read-aloud you heard, "The axis of rotation is like an imaginary line or "stick" going right through the earth at the north and south poles." Here, *stick* means a long, thin piece of wood. We can imagine the axis of rotation as a stick stuck through the earth. [Have students hold up one, two, or three fingers to indicate which image on the poster shows this meaning.]
2. *Stick* can also mean to push something into something. [Have students hold up one, two, or three fingers to indicate which image on the poster shows this meaning.]
3. *Stick* can also mean to attach something to a surface with glue or tape. [Have students hold up one, two, or three fingers to indicate which image on the poster shows this meaning.]
4. Now with your neighbor, make a sentence for each meaning of *stick*. Remember to use complete sentences. I will call on some of you to share your sentences. [Call on a few students to share their sentences.]

Drawing the Read-Aloud

Tell students to think about the read-aloud they listened to earlier in the day: "Our Home, Earth." Tell them to draw three details that they remember about the read-aloud, allowing no more than six to eight minutes for the drawing. Explain that the drawing does not have to recreate a "scene" from the read-aloud or represent a coherent, integrated drawing of the read-aloud; students may draw any three "things" that they remember about the read-aloud. Have students also write a word, phrase, or sentence about each

of the three things, using the sound-spelling correspondences they have been taught thus far.

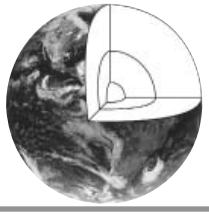
Before students begin, tell them that asking questions about the directions is one way to make sure everyone knows what to do. Have students think of questions to ask their neighbors about the directions you have just given. For example, students could ask, "What should we do first?" Have students turn to their neighbors and ask their questions about the directions given. Have several students share their questions and answers with the class.

Give students the opportunity to share their drawings and writing with a partner or the entire class. As the students share, expand their responses using richer and more complex language, including, if possible, any read-aloud vocabulary.

Take-Home Material

Family Letter

Send home Instructional Masters 1B-1 and 1B-2.



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

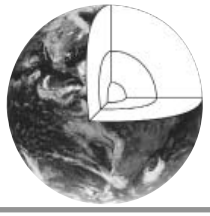
crust, *n.* The hard, thick, outer covering of the earth
Example: The workers drilled a few inches into the earth's crust.
Variation(s): none

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

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



The Earth Inside-Out, Part I

2A

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.

Presenting the Read-Aloud — *15 minutes*

The Earth Inside-Out, Part I

Show image 2A-1: Gerry digging

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]

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?

Show image 2A-2: Topsoil and clay

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.

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.

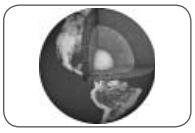
Show image 2A-3: Topsoil, clay, and bedrock

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]

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.]

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]

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.



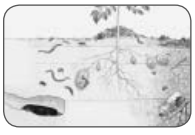
Show image 2A-4: Diagram of the layers of the earth

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.

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

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!

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!



Show image 2A-5: Earth's crust

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.

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

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

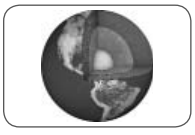
People usually do not think too much about what is happening underground, deep below our feet, but the fact is that what happens deep underground has everything to do with what we see in the world around us. Next time, we will take a closer look at what's happening in those other layers. I'd better go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

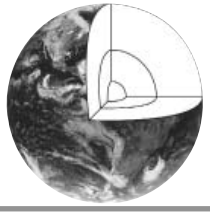
Word Work: Layer *5 minutes*

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

2B

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.

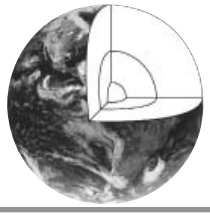
Ask students to think about what they learned from the read-aloud about the crust of the earth. Have students brainstorm things that they heard about in the read-aloud or have observed above

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.



The Earth Inside-Out, Part II

3

☑ *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 mantle and core inside the earth
- ✓ Describe volcanoes
- ✓ Describe how heat, pressure, and time cause many changes inside the earth

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:

- ✓ Write and illustrate a diagram of the layers of the earth, based on the read-aloud "The Earth Inside-Out, Part II," and discuss with one or more peers (W.1.5)
- ✓ Orally retell important facts and information from "The Earth Inside-Out, Part II" (SL.1.4)
- ✓ Use frequently occurring conjunctions, such as *and*

Core Vocabulary

disasters, *n.* Events that cause much destruction
Example: Technology has made it easier for scientists to predict natural disasters such as earthquakes.
Variation(s): disaster

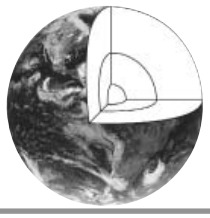
liquid, *adj.* Moving or flowing freely
Example: There is liquid rock deep inside the earth.
Variation(s): none

molten, *adj.* Made liquid by heat
Example: It takes very high temperatures to melt metals into molten forms.
Variation(s): none

solid, *adj.* Keeps its shape
Example: They put the water in the freezer so that it would become solid ice.
Variation(s): none

volcano, *n.* A mountain formed by the ejection of lava, gases, and ash from an opening in the earth's crust
Example: In order to study the volcano, the scientists had to climb from the bottom of the volcano to the very top.
Variation(s): volcanoes

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**What Have We Already Learned?**	globe	10
	Essential Background Information or Terms	two differently shaped clear containers; water	
	Purpose for Listening		
Presenting the Read-Aloud	**The Earth Inside-Out, Part II**	U.S. map	15
Discussing the Read-Aloud	**Comprehension Questions**		10
	Word Work: Solid		5
	Complete Remainder of the Lesson Later in the Day		
Extensions	**Syntactic Awareness Activity: Conjunction *and***		20
	The Layers of the Earth	Instructional Master 3B-1; drawing tools	



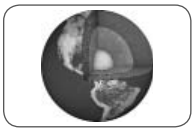
The Earth Inside-Out, Part II

3A

Introducing the Read-Aloud — *10 minutes*

What Have We Already Learned?

Review with students what they learned from the previous read-aloud about the outermost layer of the earth, the crust. Using the globe, remind students that the land and water on the surface of the crust are called continents and oceans. Have students assist you in locating the North Pole, the South Pole, and the equator.



Show image 3A-1: Diagram of the layers of the earth

Using the diagram, assist students in naming the layers of the earth: crust, mantle, outer core, and inner core. Remind students that we live on the crust, and that the crust is where geologists look to learn about the history of the earth. The many layers of rock found in the crust can teach us about different periods of time in Earth's history.

Ask students to chant and clap three times the three important words that Gerry the Geologist said to remember when studying geology. (*Heat! Pressure! Time!*) Heat, pressure, and time are important because they cause many changes to the earth.

Essential Background Information or Terms

Explain to students that all things on Earth can be described as being solid, liquid, or gas. Explain that if something is a solid, it keeps its shape. Tell students that if you pick up a book and hand it to someone else, it will still keep its same shape. It keeps its shape because the book is a solid.

Explain that if something is a liquid, it can be poured. It doesn't keep its shape, but takes on the shape of its container. Show students two differently shaped clear containers. Have students watch as you pour water from one container to another. Tell students that water is a liquid because it takes the shape of whatever container it is in.

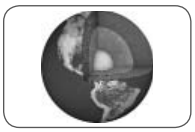
Explain that if something is a gas, it is often hard to see. Explain that the air around us is a gas. It is not solid because it does not keep its shape, and it is not liquid because it cannot be poured.

Explain that heat can change things from solids to liquids to gases. Tell students that an ice cube is the solid form of water. When heated, an ice cube can melt and become water. When we boil water, it heats up and becomes water vapor, which is a gas.

Purpose for Listening

Explain to students that in today's read-aloud they will hear that inside the earth are solids and liquids. Tell students to listen carefully to find out more from Gerry the Geologist about the other layers of the earth: the mantle and core.

Presenting the Read-Aloud — **15** *minutes*



The Earth Inside-Out, Part II

Show image 3A-1: Diagram of the layers of the earth [1]

Today, we are going to pretend that we can journey deep, deep into the earth, all the way to the very center, nearly four thousand miles from where you are sitting right now.

The first stop is the layer beneath the crust, which is called the mantle. The mantle is a whopping 1,800 miles thick and contains most of the earth's rock. [2] Because most of the earth is made of rock, that means that most of the earth is contained within the mantle.

The mantle is mostly made of solid rock. The closer to the crust, the cooler and harder the mantle tends to be. But as you go deeper, closer to the core, the mantle gets hotter and becomes soft and gooey. Heat closer to the core causes the rock inside the mantle to move around quite a bit. But in most places, it is still **solid** rather than **liquid.** [3]

The mantle surrounds the core, or center, of the earth. The core has two parts: the inner core and the outer core. The inner core is a solid metal ball. [4] The outer core is also metal, but it is not solid—it is made up of melted, or **molten,** metal. [5] This means that deep down inside the earth—thousands of miles beneath your feet—there is a giant sea of red-hot, molten metal surrounding a solid metal ball.

Scientists believe that the very center of the earth—the inner core—is actually hotter than the surface of the sun, which is a blazing 10,000 °F! [6] The inner core is much hotter than the outer core. It may seem strange, therefore, that the outer core of the earth is molten metal, yet the inner core—at the very center of the earth where it is hottest—is a solid ball of metal, which by the way is just a bit smaller than the moon!

1 [Point to the layers in the diagram as they are named in the read-aloud.]

2 [Show students the distance from New York to Colorado on a map, and tell them that it is roughly the thickness of the mantle.]

3 Did you hear the word *heat* again? Heat causes parts of the mantle to move around. Remember, solids keep their shape, while liquids move around and can be poured.

4 What does it mean if the inner core is solid?

5 If metal is molten, heat has changed it from solid to liquid.

6 A really hot day in the United States is about 100 °F, so 10,000 °F is extremely hot! [Write out the two numbers so that students can see just how much bigger 10,000 is.]

The reason that the inner core is solid has to do with the incredible pressure of the earth's entire weight pressing inward. The more pressure you put on something, the more heat you need to cause that thing to boil or melt. This is why the metal at the very center of the earth—the inner core—is solid instead of liquid. Despite the intense heat, there is simply too much pressure caused by the weight of the rest of the earth, so the center of the earth cannot melt, and it remains solid.[7]

7 Did you hear the word *pressure* again? Pressure causes the inner core to be solid rather than liquid.

Show image 3A-2: San Bernardino Mountains

The crust upon which we live is constantly being changed and reshaped due to heat and pressure caused by activity in the earth's mantle and core. The San Bernardino Mountains that you see in this picture, along with many other mountains along the West Coast of the United States, from Mexico to Alaska, were created by changes inside the earth.

Show image 3A-3: Diagram of a volcano

Remember, the parts of the mantle that are closest to the core are soft and gooey. That hot, gooey material in the mantle does not always stay in the mantle. Sometimes it rises up to the surface. Every so often, some of that extremely hot molten rock, or magma, pushes up through the mantle and forces its way into cracks and crevices in the crust.

Over time, the magma collects in a magma chamber, such as the one near the bottom of the picture. The heat in the magma chamber releases gas from the magma, which builds up and creates pressure. The pressure builds and builds until . . . one day . . . BOOM![8] The magma erupts in a **volcano** of lava, ash, gas, and fire. Once it is released from the earth, the magma becomes lava—flowing liquid rock, which flows across the ground until it cools and hardens into rock once again.[9]

8 Did you hear the words *heat* and *pressure* again? Heat and pressure cause volcanoes to erupt.

9 The eruption of lava, ash, gas, and fire forms a mountain called a volcano.

10 What do you see in this picture?

Show image 3A-4: Volcano [10]

Now that I have told you about volcanoes, let me explain one more thing. Thanks to geologists, we have a pretty good idea when and where these geologic events are likely to occur. Geologists help predict where volcanoes are most likely to occur, and this helps keep people safe by discouraging them from building homes close to dangerous areas. It is not always possible to predict when and where geologic **disasters** will occur, but geologists work hard to give people as much warning as we can. [11]

11 Disasters are sudden events that cause a lot of damage.

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 are the names of the layers of the earth? (The names of the layers of the earth are the crust, mantle, outer core, and inner core.)
2. *Literal* Describe the mantle. (The mantle contains most of the earth's rock; it gets hotter and softer closer to the core.)
3. *Literal* Describe the outer core. (The outer core of the earth is melted or molten liquid metal.)
4. *Inferential* Describe the inner core. (The inner core is a solid metal ball.) Why is the inner core solid rather than liquid? (The inner core is solid rather than liquid because of pressure from the weight of the rest of the earth.)
5. *Literal* What causes a volcano to form? (Hot molten rock or magma inside the earth makes its way to the surface of the earth, and causes a volcano to form.)

6. *Inferential* Why is it important for scientists to study volcanoes and keep people informed about them? (It is important for scientists to study volcanoes so they can learn more about them and help keep people safe from geological disasters.)

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

I am going to ask a question. I will give you a minute to think about the question, and then I will ask you to turn to your neighbor and discuss the question. Finally, I will call on several of you to share what you discussed with your partner.

7. *Evaluative* *Think Pair Share:* How are the crust, mantle, and core of the earth alike? (They are all layers of the earth and they all contain rock.) How are they different? (The crust, mantle, and core are different because some parts are solid and some parts are liquid. The crust, mantle, and core are also different because some parts are hotter than others.)
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: Solid

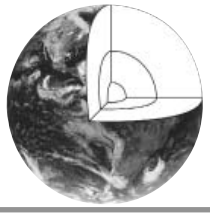
5 *minutes*

1. In the read-aloud you heard, "Heat closer to the core causes the rock inside the mantle to move around quite a bit. But in most places, it is still *solid* rather than liquid."
2. Say the word *solid* with me.
3. If something is solid, it keeps its shape.
4. It was so cold outside last night that the water puddle became solid ice.
5. What things have you seen that are solid? Try to use the word *solid* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "_____ is solid."]
6. What's the word we've been talking about?

Use a *Making Choices* activity for follow-up. Directions: I will name an object. If it is something that is solid, you will say, "The object is solid." If it is something that is not solid, you will say, "The object is not solid."

1. book (A book is solid.)
2. milk (Milk is not solid.)
3. water (Water is not solid.)
4. desk (A desk is solid.)
5. shoe (A shoe is solid.)
6. steam coming out of a hot bowl of soup (Steam coming out of a hot bowl of soup is not solid.)

Complete Remainder of the Lesson Later in the Day



The Earth Inside-Out, Part II

3B

Extensions

***20** minutes*

Syntactic Awareness Activity: Conjunction *and*

The purpose of these syntactic activities is to help students understand the direct connection between grammatical structures and the meaning of text. These syntactic activities should be used in conjunction with the complex text presented in the read-alouds.

Note: There may be variations in the sentences created by your class. Allow for these variations and restate students' sentences so that they are grammatical.

1. Conjunctions are a kind of word we use to connect words and phrases.
2. We use the conjunction ***and*** to join words and phrases that share similar ideas, or ideas that are alike.
3. Listen to this selection about one of the Earth's layers from the read-aloud. I will emphasize the word ***and*** as I read the selection to you:

   *The first stop is the layer beneath the crust, which is called the mantle. The mantle is a whopping 1,800 miles thick **and** contains most of the earth's rock. The closer to the crust, the cooler **and** harder the mantle tends to be. But as you go deeper, closer to the core, the mantle gets hotter **and** becomes soft **and** gooey.*
4. Notice that in this paragraph, Gerry the Geologist uses the word ***and*** when he talks about two facts or ideas that are both about the mantle. The word ***and*** helps us to not repeat the word *mantle* over and over again.

5. Let's listen to two sentences:

   David plays soccer.

   David plays basketball.

We can combine these sentences using the word ***and***.

*David plays soccer **and** basketball.*

6. Because David plays both sports, we do not have to say "David plays" twice and can just use the word *and*.

7. Let's listen to two more sentences:

   I have milk after school. I have cookies after school.

We can combine these sentences using the word *and*.

*I have milk **and** cookies after school.*

Because I have both things after school, we do not have to say "I have" twice and can just use the word ***and***.

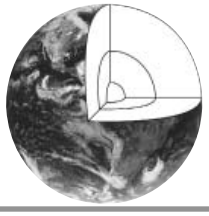
8. Discuss two things you will do after school today with your partner, using the word ***and***. Make sure you listen carefully to what your partner says so that you can share what they say with the class.

The Layers of the Earth (Instructional Master 3B-1)

Give each student a copy of Instructional Master 3B-1.

Explain that the worksheet has a diagram of the layers of the earth. Have students point to and name the crust on the diagram. Have students color the crust brown. Have students point to and name the mantle on the diagram. Have students color the mantle red. Have students point to and name the outer core on the diagram. Have students color the outer core orange. Have students point to and name the inner core on the diagram. Have students color the inner core yellow. Ask students which layer is coolest and which layer is hottest. Ask students which is the layer of the earth where we live. If time permits, have students draw people, plants, and animals on the surface of the crust.

Above and Beyond: On the back of the paper, have students write a sentence about each layer, using the sound-spelling correspondences taught thus far. Have students share their sentences with a partner.



The Earth Inside-Out, Part III

4

☑ *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
- ✓ Describe volcanoes and geysers
- ✓ Describe how heat, pressure, and time cause many changes inside the earth

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:

- ✓ Orally compare and contrast geysers and volcanoes (RI.1.9)
- ✓ Clarify information about "The Earth, Inside-Out, Part III," by asking questions that begin with *what* (SL.1.2)
- ✓ Orally retell important facts and information from "The Earth Inside-Out, Part III" (SL.1.4)

Core Vocabulary

destructive, *adj.* Causing damage or ruin
Example: He was a very destructive puppy and often ate through shoes and slippers.
Variation(s): none

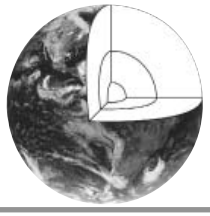
eruption, *n.* The act of exploding suddenly
Example: The volcanic eruption was very loud.
Variation(s): eruptions

geysers, *n.* Places on the earth where hot water and steam shoot up from inside the earth onto its surface
Example: Many people travel to see the geysers in Yellowstone National Park.
Variation(s): geyser

lava, *n.* Molten or liquid rock on the earth's surface
Example: After the lava rushed down the mountainside, it began to cool and harden.
Variation(s): none

magma, *n.* Molten or liquid rock that is deep inside the mantle of the earth
Example: The hot magma slowly made its way to the crust of the earth.
Variation(s): none

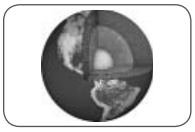
At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**What Have We Already Learned?**		10
	Purpose for Listening		
Presenting the Read-Aloud	**The Earth Inside-Out, Part III**	U.S. map, globe	15
Discussing the Read-Aloud	**Comprehension Questions**		10
	Word Work: Destructive		5
	Complete Remainder of the Lesson Later in the Day		
Extensions	**Venn Diagram**	Instructional Master 4B-1 (optional); chart paper, chalkboard, or whiteboard	20



The Earth Inside-Out, Part III

4A

Introducing the Read-Aloud — *10 minutes*



What Have We Already Learned?

Show image 3A-1: Diagram of the earth's layers

Using the diagram, have students name the layers of the earth: crust, mantle, outer core, and inner core. Remind students that heat causes hot rock to move around in the mantle, and sometimes rise up through the surface of the crust. This causes a volcano to form.

Show image 4A-1: Volcano

Tell students that this is an image of a volcano. Have students describe what they see in the image.

Ask students to chant and clap three times the three important words that Gerry the Geologist said to remember when studying geology. (*Heat! Pressure! Time!*) Tell students that heat, pressure, and time are important because they cause changes to the earth that may result in volcanoes.

Purpose for Listening

Tell students that Gerry the Geologist will be telling them more about volcanoes in today's read-aloud. Tell them to listen carefully to learn more about some famous hot spots.

Presenting the Read-Aloud — *15 minutes*

The Earth Inside-Out, Part III

Show image 4A-2: Hawaii

Ah, Hawaii. I just love this place. The land is beautiful, the people are friendly, the weather is perfect, and the surfing is terrific. Personally, however, my favorite part of Hawaii is the volcanoes. If you like volcanoes—and all geologists do—then there is really no better place than Hawaii!

When most people think of volcanoes, they think of the top blowing off a mountain and **lava** flowing out everywhere. [1] Volcanic activity actually comes in many different forms, not all of which are as spectacular as a mountaintop **eruption.** [2]

1 Lava is molten or liquid rock that has come to the earth's surface.

2 or explosion

Show image 4A-3: World map with Hawaii circled [3]

Hawaii is made up of eight major islands, seven of which are inhabited. [4] The islands of Hawaii were formed by volcanic activity. In other words, if it weren't for volcanoes, Hawaii would not be there at all.

3 [Show students where Hawaii is located on a globe.]

4 *Inhabited* means that people live there.

Show image 4A-4: Island volcano

Hawaii is one of the best known volcanic hot spots in the whole world. A hot spot is a place where there has been continuous volcanic activity for a long time. [5] In Hawaii's case, the volcanic activity started underwater. In fact, most volcanic activity occurs underwater, deep down near the ocean floor. Down there, the crust is fairly thin, so it's easier for **magma** to seep up from the mantle. [6]

When a volcano erupts underwater, the lava that it releases cools very quickly. Over time—millions of years—this lava piles up. [7] That is what happened in Hawaii. Over time, the lava continually erupting from the hot spot built up a pile that now reaches from the deep ocean floor all the way to the ocean surface, where it became new, dry land. [8]

5 Why do you think it's called a hot spot?

6 Magma is molten or liquid rock that is deep inside the earth in the mantle. What is it called once it comes to the surface of the earth? (lava)

7 Did you hear the word *time*? It takes a very long time for lava to pile up into mountains.

8 So, how did Hawaii form?

Show image 4A-5: Volcanoes National Park

Hawaiian volcanoes erupt gradually, or little by little. The lava bubbles and gurgles and sputters rather than shooting up out of the earth all at once. There is still plenty of volcanic activity on some Hawaiian islands, which means the island chain is still growing.

Show image 4A-6: Mount St. Helens prior to eruption

Now let's compare the Hawaiian volcano to another type of volcano—the kind where a mountaintop explodes! This volcano erupted in the state of Washington, which is on the West Coast of the United States.[9] This is what Mount St. Helens looked like until the year 1980. Mount St. Helens proves that it is generally fairly easy to predict where a volcano will erupt; the hard part is figuring out when.

9 [Point out the state of Washington on a U.S. map.]

Show image 4A-7: Eruption of Mount St. Helens

Mount St. Helens has erupted many times over the course of forty thousand or so years, and during this time the mountain's size and shape has changed. Magma is constantly building up within Mount St. Helens. Unlike the magma in the Hawaiian volcanoes, however, the magma in this area is much stickier than the magma in Hawaii, so it does not gurgle and sputter through little vents. Instead, the magma gets stuck, and incredible pressure builds up within the mountain. Eventually, the pressure becomes so intense that the mountain cannot hold it anymore, and . . . BOOM![10]

10 Did you hear the word *pressure*? Pressure caused the volcano to erupt.

The eruption of Mount St. Helens was the most **destructive** volcanic eruption in U.S. history.[11] Hundreds of homes were destroyed and thousands of acres of forest were leveled when this mighty volcano erupted. In an instant, the top and one side of the mountain were literally blown away. Lava was not the main problem with Mount St. Helens. Rather, it was the immense amount of rock and ash that exploded into the air, as well as the landslides that followed as the mountain came crashing down into the valley below.

11 The word *destructive* means causing damage.

Show image 4A-8: Mount St. Helens today

This is what Mount St. Helens looks like today. It's still tall enough to rise above the clouds, but if you compare this to the first picture you saw, you can see that it is not the same mountain it used to be. Mount St. Helens has erupted several more times after that day in 1980, and it still erupts occasionally to this day.

Show image 4A-9: Yellowstone Caldera

Here is another place in the United States where there is lots of volcanic activity. This place is called Yellowstone National Park. Yellowstone is mostly in Wyoming, with parts of it extending into Idaho and Montana. Yellowstone National Park is home to many interesting and beautiful sites. [12] Like Hawaii, Yellowstone is situated on top of a hot spot, a place where there is lots of magma close to the surface. In Yellowstone, the magma has stayed underground and has not erupted onto the surface.

12 [Point out Wyoming, Idaho, and Montana on a U.S. map.]

Show image 4A-10: Hot springs and geysers

Yellowstone is famous for its **geysers.** A geyser is a rare geologic event that occurs when water seeps down through cracks into the crust and meets up with hot rocks. When the water touches the hot rocks it turns into steam. [13] As more water seeps in, more steam is created, and pressure begins to build. Eventually, all this heat and pressure forces the steam to find a way back out. [14] As in other types of volcanic activity that you have learned about, this process is caused by the build-up and release of pressure underground.

13 Heat causes the liquid water to become a gas called steam, like the steam that comes out of a hot bowl of soup.

14 Did you hear the words *heat* and *pressure*? Heat and pressure cause geysers to erupt.

The result is a geyser—steam and water spewing up out of the earth. [15] These particular geysers are relatively small. They spurt and bubble all day long in water pools, or springs, which have a pretty, bluish-green color created by certain minerals that collect there.

15 Lava spews out of a volcano. What spews out of a geyser?

Show image 4A-11: Old Faithful

This geyser has a name: it's called Old Faithful. The word *faithful* means trustworthy or reliable. [16] Old Faithful got its name because you can count on the fact that it is going to erupt several times each day. It is not possible to predict exactly when it will erupt, but it typically blows its lid about every ninety minutes, give or take a few.

16 Why do you think the geyser might be called Old Faithful? What does it mean to be reliable?

Old Faithful spews out steam and hot water for anywhere from one to five minutes. It can spew as much as 8,000 gallons of water up to 185 feet in the air. Every day during the summer, when the park is full of visitors, hundreds of people gather around to watch the world's most famous geyser.

Show image 4A-12: Volcano

Although they come in many forms, shapes, and sizes, all volcanoes and geysers have two things in common: they are the earth's way of releasing heat and pressure from deep underground, and each one tells us a little more about the history of the earth. And one other thing: all volcanoes and geysers are extremely hot, so always keep a safe distance and admire them from afar!

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 a hot spot? (A hot spot is a place where there is lots of volcanic activity.)

2. *Inferential* How did volcanoes form the islands of Hawaii? (The islands were formed because of lava from volcanoes. The lava built up a pile over time that reaches from the ocean floor all the way to the ocean surface, where it became dry land.)

3. *Literal* In which layer of the earth does magma form? (Magma forms in the mantle.)

4. *Literal* Once magma erupts to the surface of the crust, what is it called? (Once magma erupts to the surface of the crust, it is called lava.)

5. *Literal* What is a geyser? (A geyser is a place where steam and water erupt from the earth.)

6. *Evaluative* What is Old Faithful? (*Old Faithful* is a well-known geyser in Yellowstone National Park.) Do you think *Old Faithful* is a good name for this geyser? Why or why not? (Answers may vary.)

7. *Evaluative* How is a volcano like a geyser? How are they different? (Volcanoes and geysers are both eruptions caused by heat and pressure inside the earth. They are different because a volcano is an eruption of lava, whereas a geyser is an eruption of steam and hot water.)

8. *Inferential* Why do scientists study volcanoes and geysers? (Scientists study volcanoes and geysers to learn more about the history of the earth and to help keep people safe.)

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

9. *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.

10. 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: Destructive

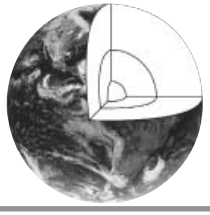
5 *minutes*

1. In the read-aloud you heard, "The eruption of Mount St. Helens was the most *destructive* volcanic eruption in U.S. history."
2. Say the word *destructive* with me.
3. *Destructive* means causing damage.
4. The destructive winds of the thunderstorm took some tiles off the roof of our school.
5. Have you observed events in nature that were destructive? Try to use the word *destructive* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "The _____ was very destructive."]
6. What's the word we've been talking about?

Use a *Making Choices* activity for follow-up. Directions: I will describe a situation. If I describe something that is destructive, you will say, "That's destructive." If I describe something that is not destructive, you will say, "That's not destructive."

1. The forest fire burned the homes of many animals. (That's destructive.)
2. The winds of the hurricane blew a tree onto my neighbor's car. (That's destructive.)
3. We saw a beautiful rainbow after the thunderstorm. (That's not destructive.)
4. The tornado blew the roof off the grocery store. (That's destructive.)
5. The grass changed from brown to green after the spring rains. (That's not destructive.)

Complete Remainder of the Lesson Later in the Day



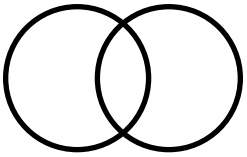
The Earth Inside-Out, Part III

4B

Extensions

***20** minutes*

Venn Diagram (Instructional Master 4B-1, optional)



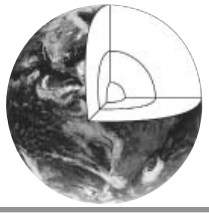
Create a Venn diagram with two overlapping circles on chart paper, a chalkboard, or a whiteboard. Label the circles with simple drawings of a volcano and a geyser. Ask students to think about how volcanoes and geysers are alike. (Both have eruptions; both are caused by heat, pressure, and time; etc.) Record students' responses in the overlapping part of the circles. 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.

Next, ask students to think about volcanoes and how they are different from geysers. (Volcanoes erupt with lava; volcanoes create mountains; etc.) Record these responses in the "volcano" circle.

Next, ask students to think about geysers and how they are different from volcanoes. (Geysers erupt with steam and hot water; geysers may not be as destructive; etc.) Record these responses in the "geyser" circle. As students share, expand their responses using richer and more complex language, including, if possible, any read-aloud vocabulary.

Read the completed Venn diagram to the class.

Above and Beyond: Instructional Master 4B-1 has been included if you have students who are ready to create the Venn diagram on their own, using the sound-spelling correspondences taught thus far.



Pausing Point

PP

Note to Teacher

You should pause here and spend one day reviewing, reinforcing, or extending the material taught thus far.

You may have students do any combination of the activities listed below, but it is highly recommended you use the Mid-Domain Student Performance Task Assessment to assess students' knowledge of the layers of the earth. The other activities may be done in any order. You may also choose to do an activity with the whole class or with a small group of students who would benefit from the particular activity.

Core Content Objectives Up to This Pausing Point

Students will:

- ✓ Identify geographical features of the earth's surface: oceans and continents
- ✓ Locate the North Pole, the South Pole, and the equator on a globe
- ✓ Describe the shape of the earth
- ✓ 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
- ✓ Describe the mantle and core inside the earth
- ✓ Describe volcanoes and geysers
- ✓ Describe how heat, pressure, and time cause many changes inside the earth

Student Performance Task Assessment

⑩ The Layers of the Earth (Instructional Master PP-1)

Directions: Label the layers of the earth. Color the crust brown, the mantle red, the outer core orange, and the inner core yellow.

Activities

The Earth's Surface

Materials: Globe

Use the globe to review the shape of the earth. Have students locate the continents, oceans, North Pole, South Pole, and equator.

Image Review

Show the Flip Book images from any read-aloud again, and have students retell the read-aloud using the images.

Image Card Review

Materials: Image Cards 1–6

In your hand, hold Image Cards 1–6 fanned out like a deck of cards: 1 (Heat), 2 (Pressure), 3 (Time), 4 (Earth's layers), 5 (Volcano), 6 (Geyser). Ask a student to choose a card but not show it to anyone else in the class. The student must then perform an action or give a clue about the picture s/he is holding. For example, for *pressure*, a student may use his/her hand to put pressure on a table. The rest of the class will guess what is being described. Proceed to another card when the correct answer has been given.

Domain-Related Trade Book or Student Choice

Materials: Trade book

Read a trade book to review a particular concept; refer to the books listed in the Introduction. You may also choose to have students select a read-aloud to be heard again.

Layers of the Earth: Peach

Materials: Peach

Bring in a fresh peach that has been cut into halves, and use it as a model of the layers of the earth. Point to the skin of the peach and ask students what it might represent. (crust) Point to the fleshy fruit and ask students what it might represent. (mantle) Point to the pit and ask students what it might represent. (core)

Note: Be sure to follow your school's policy regarding food distribution and allergies.

Layers of the Earth: Hardboiled Egg

Materials: Hardboiled egg

Bring in a hardboiled egg and use it as a model of the layers of the earth. Point to the eggshell and ask students what it might represent. (crust) Point to the white interior and ask students what it might represent. (mantle) Point to the yellow yolk and ask students what it might represent. (core)

Note: Be sure to follow your school's policy regarding food distribution and allergies.

You Were There: Volcanoes and Geysers

Materials: Chart paper, chalkboard, or whiteboard

Have students pretend that they witnessed the eruption of a volcano or geyser. Ask students to describe what they saw and heard. For example, for "volcano," students may talk about seeing the red-hot lava or ash in the air. They may talk about hearing the loud explosion. Consider also extending this activity by adding group or independent writing opportunities associated with the "You Were There" concept. For example, ask students to pretend they are newspaper reporters describing the eruption of a volcano or geyser. As reporters they might use as writing anchors the question words *who, what, when, where,* and *why.*

Note: You may wish to display the question words on chart paper, a chalkboard, or a whiteboard.

Key Vocabulary Brainstorming

Materials: Chart paper, chalkboard, or whiteboard

Give students a key domain concept or vocabulary word such as *mantle.* Have them brainstorm everything that comes to mind when they hear the word, such as *beneath the crust*, *very thick*, etc. Record their responses on chart paper, a chalkboard, or a whiteboard for reference.

Class Book: The History of the Earth

Materials: Drawing paper, drawing tools

Tell the class or a group of students that they are going to make a class book to help them remember what they have learned thus far in this domain. Have students brainstorm important information about features of the earth's surface, the layers of the earth, volcanoes, and geysers. Have each student choose one idea to draw a picture of, and then write a caption for, the picture. Bind the pages to make a book to put in the class library for students to read again and again. You may choose to add more pages upon completion of the entire domain before binding the book.

Heat, Pressure, and Time

Teach students a "signal" for each of the words *heat, pressure,* and *time.*

For *heat,* have students rub their hands together. Explain that rubbing their hands together quickly produces a little bit of heat.

For *pressure*, have students use their hands to press against their thighs. Ask the students if they can feel the pressure on their legs.

For *time,* have students say, "tick-tock, tick-tock" to pretend to be a clock.

Practice these "signals" until students are comfortable using them.

Tell students that you are going to say a word. They may then give any one of the three signals as long as they can explain how the two are connected. For example, if you say the word *volcano*, one student may give the signal for *heat* and say, "Heat makes the magma very hot." A second student may give the signal for

pressure and say, “Pressure forces the magma to the surface of the earth.” A third student may give the signal for *time* and say, “It takes a long time for the magma to make its way to the surface of the earth.”

Letter to a Geologist

Materials: Writing paper, writing tools

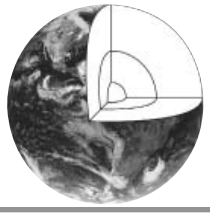
As a class, brainstorm ideas and then write a letter to Gerry or a real geologist. The students may talk about the cool things that geologists do, or ask questions that they still have about the history of the earth.

You may also ask students to write individual letters if they are ready to do this activity on their own.

Internet Resources

There are many websites that give directions for building a model of a volcano.

Two excellent resources are the Geological Society of America at www.geosociety.org and the website www.geology.com.



Minerals

5

☑ *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 common minerals in the earth
- ✓ Explain how minerals are used by people

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:

- ✓ Compare and contrast different types of rocks (RI.1.9)
- ✓ Draw pictures and write sentences to describe the characteristics of a classmate (W.1.2)
- ✓ With assistance, categorize, and organize facts and information within a given domain to answer questions (W.1.8)
- ✓ Describe different kinds of rocks in detail (SL.1.4)
- ✓ Write and illustrate detailed descriptions of different types of rocks and discuss with one or more peers (SL.1.5)

Core Vocabulary

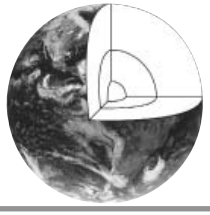
characteristics, *n.* Ways we can describe and group people or things
Example: Two characteristics of winter are that it is the coldest season and that it can snow.
Variation(s): characteristic

gemstones, *n.* Precious stones that can be cut, polished, and used in jewelry
Example: We were amazed at the sizes and brilliant colors of the gemstones on display in the museum.
Variation(s): gemstone

minerals, *n.* Natural substances found in rocks or in the ground
Example: Minerals such as diamonds and gold come in many shapes and sizes.
Variation(s): mineral

traces, *n.* Very small amounts
Example: Even after cleaning, there were still traces of dust on his glasses.
Variation(s): trace

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**What Have We Already Learned?**		10
	Essential Background Information or Terms	cookies with at least two visible ingredients (chocolate chips, nuts, berries, raisins, etc.)	
	Purpose for Listening		
Presenting the Read-Aloud	**Minerals**	salt	15
Discussing the Read-Aloud	**Comprehension Questions**		10
	Word Work: Characteristics	drawing paper, drawing tools	5
 **Complete Remainder of the Lesson Later in the Day**			
Extensions	**Rock Sort**	Instructional Master 5B-1; drawing tools; bins for sorting rocks; 4 different kinds of small/ medium-sized rocks for each student [This exercise requires advance preparation.]	20
Take-Home Material	**Family Letter**	Instructional Master 5B-2	*



Minerals

5A

Introducing the Read-Aloud *10 minutes*

What Have We Already Learned?

Review with students what they learned about rocks in the previous read-alouds. Most of the earth is made of rocks, and there are many different types of rocks on the earth.

Essential Background Information or Terms

Note: Be sure to follow your school's policy regarding food distribution and allergies.

Tell students that rocks are made of minerals. Show students a cookie with at least two visible ingredients, such as chocolate chips, nuts, berries, etc. Tell them to pretend that the cookie is a rock. The chocolate chips, nuts, berries, raisins, etc., are the minerals that make up the rock. Sometimes we find minerals by themselves in nature, just like chocolate chips can be eaten by themselves. Mostly, minerals are found in rocks, just like when there are chocolate chips in cookies. Most rocks contain several different minerals. You may wish to pass out cookies to students and have them describe the size, shape, color, and texture of the cookies to their partners. Remind students that the cookie is similar to a rock and the chocolate chips, etc., are similar to minerals found in rocks or by themselves in nature.

Purpose for Listening

Tell students that in the next read-aloud, Gerry the Geologist is going to share some special rocks and minerals with them. Tell students to listen carefully to hear all of the different ways rocks can be described.

Presenting the Read-Aloud — *15 minutes*

Minerals

Show image 5A-1: Gerry with his rock collection

As a geologist, it is my job to study rocks. There are many, many different kinds of rocks out there in the world. And I have collected quite a few rocks during my time as a geologist!

Show image 5A-2: Polished gemstones [1]

Here are some of the rocks and minerals from my collection. I have polished these in a special machine called a rock tumbler, which makes them shiny and really brings out the color. In this pile alone, I can see amethyst, tiger's eye, rose quartz, turquoise, red jasper, agate, unakite, onyx . . . whoa! Sorry, I get carried away sometimes.

1 What colors do you see?

Show image 5A-3: Milky quartz

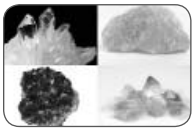
Minerals are the building blocks of rocks. All rocks contain minerals. Sometimes you can find pure minerals unmixed with other minerals, but most rocks contain several different minerals. There are over three thousand different types of minerals, and scientists still discover new ones from time to time.

Minerals come in all different shapes, sizes, colors, and textures. We use these different **characteristics** to divide minerals into groups. [2] Some of these mineral groups are quite common, whereas others are very unusual and even difficult to describe. I will tell you about a few of the best-known minerals.

2 Characteristics are ways we can describe and group things.

For instance, this is a picture of the mineral quartz. Quartz is the most common mineral in the earth's crust—not the most common in the whole earth, just the most common mineral in the crust. [3] This picture shows a type of quartz called milky quartz.

3 What is the crust of the earth?



Show image 5A-4: Varieties of quartz

Quartz comes in many varieties. Those are clear quartz crystals on the top left. [4] Some minerals form into perfect crystals like

4 Crystals are small pieces of minerals and rocks that have many sides and distinct shapes.

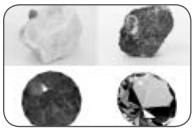
these, and some don't. It all depends on where and how they are formed within the earth.

Crystals can come in all different sizes. Some are as small as a pea; some are the size of your arm or longer.

As for the color variations in different types of quartz, these are largely caused by the addition of very small amounts of various types of metals into the mineral.[5] For instance, the beautiful purple color of amethyst is caused by **traces** of iron and aluminum metal.[6]

5 Color variations are color differences. *Variations* is another form of the word *vary,* just like *varies*.

6 Traces are small amounts.



Show image 5A-5: Ruby and sapphire

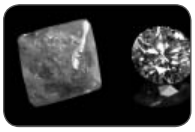
Examples of rare **gemstones** are some varieties of corundum—a mineral composed mostly of aluminum and oxygen.[7] Red corundum is known as ruby, and blue corundum is known as sapphire. Rubies and sapphires are among the most beautiful mineral crystals on earth.

7 A gemstone is a stone that is cut and polished to be used in jewelry. Can you find the gemstones in the image?

Show image 5A-6: Emerald

Here is another beauty. This is called emerald. Emerald is a variety of the mineral beryl, which also comes in many different colors, including green, blue, yellow, and red. Deep-green emerald is my favorite.[8]

8 [Have a student point to the gemstone.]



Show image 5A-7: Diamonds

And here is one of the most famous minerals. Do you know what these beauties are called?[9] These are diamonds. A diamond is the hardest mineral in the whole world. A diamond is hard enough to cut through glass or scratch other minerals. The diamond on the left is a raw diamond, fresh from the earth. The diamond on the right has been cut and polished. The sides of a cut diamond are called facets.

9 [Pause for students to answer.]

Show image 5A-8: Jeweler looking at diamond

You need special equipment and skills to cut and polish diamonds or other gemstones such as rubies and emeralds. People who cut diamonds look through powerful magnifying glasses as they do their work. This is so they can see all the tiny little facets, or sides.[10]

10 [Explain that the inset shows what the jeweler sees through the magnifying glass.]

Show image 5A-9: Salt

Here is one mineral that we use every day! Have you ever heard of salt?[11] Salt, or sodium chloride, is a common mineral that is found in the oceans and in the earth. Sodium chloride is called table salt when we use it in food and rock salt when we use it to make roads safer during winter storms.

11 [Pause for students to answer. Sprinkle some table salt in each student's hand so that each student can taste salt.]

Some people put table salt on food to make it taste better. In fact, salt is an extremely important nutrient for people as well as animals. Your body needs salt—not too much, but just enough. Too much salt is bad for you. If you eat too much salt, your body will tell you so because you will feel thirsty.

Salt appears in many forms in nature. Rock salt can be found in the form of halite crystals, like the rectangular-shaped crystal pictured on the left in the image. You can't see salt in water because it dissolves, but you'll know it's there if you ever taste ocean water.[12]

12 When salt mixes with water, the salt dissolves in the water to form saltwater.

Show image 5A-10: Gerry pointing to a blackboard

Why do all these different minerals look the way they do? Each has its own story—and it gets pretty complicated—but you can bet that there were three basic things in common:[13] heat, pressure, and time. These three factors play a role in the formation of every mineral.

13 Do you know what three things Gerry is thinking of?

Show image 5A-11: Gerry with his rock collection

An important thing to remember about the rocks you find in nature is that you should leave them there so that other people can also enjoy them. If every person took even one rock, there soon would not be very many rocks left! Without rocks, environments change dramatically.[14] If the environment changes, the plants and animals that live there might have a hard time finding food and shelter.

14 Environments are places where living things live.

Now I've told you a bit about some of my favorite minerals. Take a look at the ground the next time you go outside, and you might actually see something interesting!

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. *Inferential* Why does Gerry the Geologist have so many rocks? (Gerry the Geologist studies rocks.)
2. *Literal* What are minerals? (Minerals are what rocks are made of.)
3. *Literal* What were the names of some of the minerals that you heard about? [You may want to show images 5A-3 through 5A-7 and image 5A-9 as clues.] (Some of the minerals were quartz, ruby, sapphire, emerald, diamond, and salt.)
4. *Literal* What is a gemstone? (A gemstone is a stone that is cut and polished to be used as jewelry.)
5. *Literal* Where might you find the mineral salt? (Salt is found in the oceans and in the earth.)
6. *Inferential* How is salt used by people? (Table salt is used to flavor food and rock salt is used to make roads safer during winter storms.)

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

I am going to ask a question. I will give you a minute to think about the question, and then I will ask you to turn to your neighbor and discuss the question. Finally, I will call on several of you to share what you discussed with your partner.

7. *Evaluative* *Think Pair Share:* Which of the minerals that you heard about is your favorite? Why? (Answers may vary.)
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.]

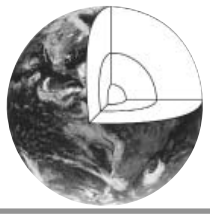
Word Work: Characteristics *5 minutes*

1. In the read-aloud you heard Gerry say, "Minerals come in all different shapes, sizes, colors, and textures. We use these different *characteristics* to divide minerals into groups."
2. Say the word *characteristics* with me.
3. *Characteristics* means more than one characteristic. A characteristic is something that makes a person, thing, or group different from others.
4. Some characteristics of diamonds are that they are colorless and that they can scratch other minerals. Some characteristics of Gerry the Geologist are that he has black hair and a mustache, and loves to study rocks.
5. What are some characteristics of your neighbor? Remember that characteristics can include the way your neighbor looks and the way your neighbor acts. Try to use the word *characteristics* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "Characteristics of _____ are . . ."]
6. What's the word we've been talking about?

Use a *Drawing/Writing* activity for follow-up. Directions: I am going to give you a piece of drawing paper. I would like for you to draw your neighbor, including their characteristics. For example, if your neighbor has brown hair and loves to play soccer, include brown hair and soccer in your drawing. After you have drawn your picture, write a sentence about your neighbor using the sound-spelling correspondences you have learned thus far.

Give students time to share their drawings and sentences with a partner or the entire class.

Complete Remainder of the Lesson Later in the Day



Minerals

5B

Extensions — *20 minutes*

Rock Sort

Note: This activity can also be completed in partners or small groups.

Give each student or group four small/medium-sized rocks of different types. Have students use their five senses to describe their rocks to partners. Prompt students to use descriptive vocabulary as they describe their rocks, if applicable: smooth, rough, shiny, dull, striped, _____-colored, etc. Next, have students use Instructional Master 5B-1 to draw each rock (including identifying characteristics) and write a sentence describing the rock using the sound/spelling correspondences taught thus far.

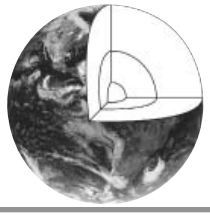
After students have finished drawing and coloring their rocks, tell students that they are going to sort their rocks as a class. Place different-colored bins around the classroom and label them with the most common words used to describe students' rocks, such as smooth, rough, shiny, dull, striped, _____-colored, etc. Tell students that you are going to name a characteristic of rocks, or a way to describe them. If students have a rock that matches the named characteristic, they should raise it into the air. Confirm that all raised rocks match the named characteristic. Students should then place their rocks into the appropriate bin for that named characteristic. Repeat this process until all rocks have been sorted into the correct bin. If time permits, students can then compare the rocks within each bin to determine which rock is the most or least of the characteristic within the sorted group.

Have students share with their neighbors and with the class how they described each rock and determined in which bin to place each rock. Students can also discuss the similarities and differences they observed among rocks.

Take-Home Material

Family Letter

Send home Instructional Master 5B-2.



The Three Types of Rocks 6

☑ *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 three types of rocks: igneous, sedimentary, and metamorphic
- ✓ Describe how heat, pressure, and time cause the formation of igneous, sedimentary, and metamorphic rocks

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:

- ✓ Compare and contrast the three types of rocks (RI.1.9)
- ✓ With assistance, categorize and organize rocks into the following categories: igneous, sedimentary, and metamorphic (W.1.8)
- ✓ Clarify information about "The Three Types of Rocks," by asking questions that begin with *what* (SL.1.2)
- ✓ Orally retell important facts and information from "The Three Types of Rocks" (SL.1.4)

Core Vocabulary

artifacts, *n.* Items from long ago made by people
Example: There were many artifacts at the museum, including jars and bowls.
Variation(s): artifact

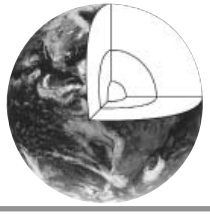
igneous, *adj.* A type of rock that forms when molten rock cools, hardens, and turns solid
Example: Obsidian and granite are two types of igneous rocks.
Variation(s): none

metamorphic, *adj.* A type of rock that has formed from another rock as a result of heat and/or pressure
Example: Marble is a metamorphic rock formed from limestone, a sedimentary rock.
Variation(s): none

sedimentary, *adj.* A type of rock that has formed as the result of layers of sediment pressed together
Example: Coal is a type of sedimentary rock used as an energy source.
Variation(s): none

sediments, *n.* Small, solid pieces of material often carried and moved around by the wind and weather
Example: Sediments settled at the bottom of the swimming pool.
Variation(s): sediment

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**What Have We Already Learned?**	Image Cards 1–3	10
	Interactive Read-Aloud		
	Purpose for Listening		
Presenting the Read-Aloud	**The Three Types of Rocks**	dirt; small rocks; glass of water; U.S. Map	15
Discussing the Read-Aloud	**Comprehension Questions**		10
	Word Work: Sediments	sediment; water in plastic container	5
	Complete Remainder of the Lesson Later in the Day		
Extensions	**Three-Column Chart: Types of Rocks**	Instructional Master 6B-1 (optional); chart paper, chalkboard or whiteboard; Image Cards 7–9	20
	Forming Three Types of Rocks	different colored chocolate chips; aluminum foil; plastic bags; clear jar, pan of hot water; hot plate [This exercise requires advance preparation.]	



The Three Types of Rocks 6A

Introducing the Read-Aloud *10 minutes*

What Have We Already Learned?

Review with students the three words that Gerry the Geologist said they should always keep in mind when thinking about rocks: *heat*, *pressure*, and *time*. Use Image Cards 1–3 as clues. Ask students to share how heat, pressure, and time affect things on the earth, such as volcanoes, geysers, and the layers of the earth. Remember to repeat and expand upon each response using richer and more complex language, including, if possible, any read-aloud vocabulary.

Tell students that all rocks can be sorted into three categories because of how they were formed by heat, pressure, and time.

Interactive Read-Aloud

Tell students that you will need their help during the read-aloud. Preview actions that you would like students to do whenever you say certain words during the read-aloud:

- *Igneous:* Whenever students hear the word *igneous,* they should hold up their index finger like it is a candle and pretend to blow out the flame to demonstrate the heat of fire.
- *Sedimentary:* Whenever students hear the word *sedimentary,* they should continuously place one flattened hand on top of the other to demonstrate the formation of layers.
- *Metamorphic:* Whenever students hear the word *metamorphic,* they should hold out both hands and then clasp them tightly together to demonstrate pressure.

Purpose for Listening

Tell students to listen carefully to learn about the three types of rocks and how they were formed.

Presenting the Read-Aloud — **15** *minutes*

The Three Types of Rocks

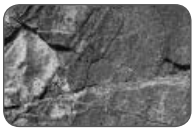
Show image 6A-1: Gerry pointing to a blackboard

The right amount of heat can turn a solid rock or metal into a liquid.[1] Pressure from the weight of the earth and movement of materials inside the earth can crush rocks. Over time, the effects of heat and pressure create the rock formations and other geologic phenomena that we find in the world.

1 What is the difference between solid rock and liquid rock?

Working together, heat, pressure, and time create the three types of rocks that exist in the world. Every rock in the world can be placed into one of three categories. The three types of rocks are **igneous, sedimentary,** and **metamorphic.** Try saying each of these rock types out loud: igneous . . . sedimentary . . . metamorphic.[2]

2 [Say each word and have students repeat it.] What are the three types of rock?



Show image 6A-2: Granite surface

The first rock type, igneous, is the most common.[3] Igneous rocks come in many forms. Some form entire mountains, and some appear as boulders jutting from the earth. This picture shows a close-up of one type of igneous rock. This plain, old, gray rock contains different types of minerals, and it hasn't always been a plain, old, gray rock.

3 Whenever you hear the word *igneous,* hold up your finger like it is a candle and pretend to blow out the flame.

Show image 6A-3: Diagram of magma movement

The word *igneous* comes from the Latin word for *fire,* because igneous rocks begin deep down in the heat of the earth's mantle.[4] As you have heard, the earth's mantle is full of a hot, gooey, oozing substance known as magma, or melted rock. The magma is constantly being forced toward the surface by pressure from within the earth. As it travels upward from the mantle through the crust, the magma begins to cool and harden. Sometimes, the magma will erupt from a volcano, but sometimes, the conditions aren't quite right for an eruption.[5]

4 The word *igneous* sounds similar to the word *ignite,* which means to light something on fire. Both come from *ignis,* the Latin word for fire. Making connections between word parts will help you to learn more words!

5 Over time, heat forms magma, and pressure moves the magma. When the magma cools, it forms what type of rock? (igneous)

Show image 6A-4: Half Dome, Yosemite National Park

This formation is called Half Dome, and it is located in Yosemite National Park in California. When you look at Half Dome, you are looking at an old magma chamber. A magma chamber is a pocket, or place, in the earth's crust where magma collects. As more magma enters the chamber, it gets hotter and pressure builds, and the magma can force its way up to the surface in the form of a volcano.

Or, sometimes, as in the case of Half Dome, the magma just gathers in the chamber and stays there without erupting. For whatever geologic reason, the heat and pressure did not get great enough to force the magma through the crust and onto the surface in the form of lava. Instead, the magma cooled and hardened within the chamber. Over time, the rocks and soil around the chamber eroded away, leaving beautiful Half Dome alone sticking high up above the earth. Half Dome is certainly a big igneous rock![6]

6 Did you hear the word *igneous*? Blow out the fire!

Show image 6A-5: Sill

Another type of igneous formation occurs when magma intrudes, or pushes itself, between two existing layers of rock. This means that not all the layers in this mountain were formed one on top of the other. Rather, some of the layers forced their way in between other rocks.

Show image 6A-6: Obsidian

This is my favorite type of igneous rock: obsidian, better known as volcanic glass. Volcanic glass forms when certain types of lava cool and harden, becoming smooth, shiny, and glass-like.[7] Only certain types of lava under certain conditions become volcanic glass.

7 Characteristics of volcanic glass are smooth, shiny, and glass-like.

Show image 6A-7: Obsidian spearhead

Some Native Americans used volcanic glass to make arrowheads and spearheads. If you break a piece of volcanic glass, you will find that it is incredibly sharp and strong. Every now and then I find ancient **artifacts** like this when I'm out rock hunting.[8]

8 Artifacts are objects made by people long ago. Which type of rock have you heard about so far: igneous, sedimentary, or metamorphic? [Prompt students to repeat *igneous* in unison and pretend to blow out the flame.]

Show image 6A-8: Bryce Canyon

After igneous, the second major rock type is sedimentary.[9] Sedimentary rocks are not formed like igneous rocks, which form from cooled magma. In fact, heat does not play much of a role at all in the formation of sedimentary rocks. Instead, pressure and time are the most important factors in the formation of sedimentary rocks.[10]

9 Whenever you hear the word *sedimentary,* place one flattened hand over the other over and over again.

10 Of heat, pressure, and time, which two are most important in forming sedimentary rocks?

Show image 6A-9: Sediments

The word ***sediments*** refers to tiny little particles, such as dirt or rock, which are carried along in water, ice, wind, or landslides.[11] If you dump a spoonful of sand into a glass of water, for instance, you will see the sand gradually sink[12] down and settle on the bottom of the glass, much in the same way that sediments settle on the bottoms of lakes and oceans.[12] Sediments are always floating around in lakes, oceans, and rivers. Over time, sediments in lake water settle and form a thick sludge on the bottom of a lake. As more and more sediments settle on the bottom, more and more weight presses down on the sludge. Over time, the pressure from the weight of the upper sediments can cause the sludge to harden into rock. Through time and pressure, layers of sediments are turned into sedimentary rock.[13]

11 Sediments are little tiny pieces of dirt and rock. Do you hear the word *sediment* in *sedimentary*? [Demonstrate for students how sediments sink to the bottom by dropping bits of dirt and rock into a glass of water. Have students watch how the dirt slowly sinks to the bottom of the glass.]

12 Here, the word *sink* means to go below the surface of water or mud. The word *sink* also has other meanings. The word *sink* also means a wide bowl in the kitchen or bathroom that has a faucet for water and a drain at the bottom.

13 How are sedimentary rocks formed? (Time and pressure turn layers of sediment into sedimentary rock.) [Prompt students to repeat the word *sedimentary* in unison and place their hands one over the other.]

Show image 6A-10: Coal

Coal is a type of sedimentary rock that comes from decayed plants that have been under pressure for many years.[14] Coal is an important energy source. People burn coal in order to create electricity for homes and to make energy to power machines in

14 Remember that decayed means that the plants have died and their remains have gone back into the soil.

factories. People get coal and other important rocks, minerals, and metals by mining them from the earth. One way to mine coal is by digging a mineshaft, or tunnel, deep down into the earth.

Show image 6A-11: Iron ore

Another sedimentary rock is called iron **ore.** An ore is a rock that contains valuable minerals or metals. There are many different types of ores in the world, but iron ore is one of the most important. Iron ore is the source of iron, a strong metal which is used to make steel. Steel, in turn, is used to build bridges, cars, buildings, tools, and other things you see and use every day.

Show image 6A-12: Bryce Canyon

Sandstone is one common type of sedimentary rock. [15] Wherever you find sandstone, there is a good chance that you are walking in a place that used to be completely underwater. At one time or another, every place on earth has been completely submerged in water. Thus, sandstone is quite common throughout the world. This photo was taken in Bryce Canyon, in the state of Utah, which is known for its unique sandstone formations. [16]

15 Did you hear the word *sedimentary*? Make layers of sediments with your hands!

16 [Locate Utah on a map for students.]

Show image 6A-13: Antelope Canyon

Here is another sandstone canyon I thought you would like to see. Antelope Canyon, in Arizona, is a very special place. [17] It is known as a slot canyon, which is formed over many, many years as water from rain and floods rushes through the sandstone, causing it to erode.

17 [Locate Arizona on a map for students.]

Show image 6A-14: Limestone cliffs

These cliffs are made of limestone, another type of sedimentary rock. Limestone is interesting because it is composed mainly of minerals left over from ancient sea creatures like clams, oysters, and other shellfish. When these creatures died, their shells sank down to the ocean floor and settled with the other sediments. Over time, the churning oceans ground the shells into a fine white powder. The powder settled and more shells and sediments put pressure on it. It took many, many years, but eventually all the powdery shell leftovers were compressed into limestone. [18]

18 Did you hear the words *pressure* and *time*? With pressure and a long, long period of time, the shells of sea creatures turned into sedimentary rock. Which two types of rocks have you learned about so far? Hint: One is formed by cooled magma and the other is made of sediments.

Show image 6A-15: Limestone to marble

If limestone is subjected to intense pressure for an even longer period of time, it can turn into another kind of rock called marble.

Marble is very hard, and it often has a beautiful, pure white color. People have used marble for thousands of years to make fine buildings and sculptures.

19 Whenever you hear the word *metamorphic,* hold out both hands and then clasp them tightly together.

20 What's the third type of rock, formed when heat and pressure change igneous and sedimentary rocks into new kinds of rocks?

Marble is known as a metamorphic rock, which is the third and least common type of rock.[19] *Metamorphic* comes from the Greek word for transformation, or change. Metamorphic rocks are formed when other types of rocks undergo intense heat and pressure and change, or metamorphose, into new kinds of rocks.[20]

Show image 6A-16: Three types of rock

Congratulations! You are becoming a geologist! Now you know about the three rock types: igneous, sedimentary, and metamorphic. Won't everyone be impressed when you tell them about the new words you learned?

Discussing the Read-Aloud **15** *minutes*

Comprehension Questions **10** *minutes*

1. *Literal* What are the three types of rocks? (The three types of rocks are metamorphic, sedimentary, and igneous.)
2. *Inferential* How are igneous rocks formed? Remember: *igneous* means "fire." (Igneous rocks are formed from hot magma or lava that cools and hardens.)
3. *Inferential* How are sedimentary rocks formed? (Sediments settle and form a thick sludge on the bottom of a lake that thickens over time. The pressure from the weight of the sediments makes it harden into sedimentary rocks.)
4. *Inferential* How are metamorphic rocks formed? (Metamorphic rocks are formed when heat and pressure change igneous and sedimentary rocks into new rocks.)

5. *Evaluative* How are the three types of rocks similar? How are they different? (The three types of rocks are similar because they are all found in the earth and are formed over time. The three types of rocks are formed differently. Igneous rocks are formed when heat forms magma and pressure moves the magma towards the surface of the earth. Sedimentary rocks are formed when layers of sediments are pressed together over time. Metamorphic rocks are formed when other types of rocks undergo intense heat and pressure.)

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

6. *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.

7. 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.]

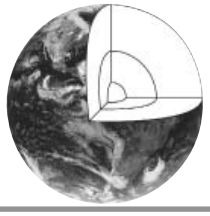
Word Work: Sediments *5 minutes*

1. The read-aloud said, "*Sediments* are always floating around in lakes, oceans, and rivers."
2. Say the word *sediments* with me.
3. Sediments are tiny particles of dirt or rock that are moved by wind or water. [You may want to put some sediment in a plastic container of water for students to observe.]
4. When you go swimming in a lake, your feet kick up sediments that are on the bottom of the lake.
5. What are some other places that you might see sediments? Try to use the word *sediments* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "I saw sediments in . . . "]
6. What's the word we've been talking about?

Use a *Making Choices* activity for follow-up. Directions: I will describe some objects. If I describe sediments, you will say, "Those are sediments." If I do not describe sediments, you will say, "Those are not sediments."

1. I noticed tiny specks of dirt in my glass of water. (Those are sediments.)
2. The ants crawled through the blades of grass. (Those are not sediments.)
3. The wind blew small bits of dust all over the car. (Those are sediments.)
4. Dad cleaned the small grains of sand out of the bathtub. (Those are sediments.)
5. The museum has many large gemstones. (Those are not sediments.)

Complete Remainder of the Lesson Later in the Day

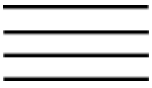


The Three Types of Rocks 6B

Extensions — *20 minutes*

Three-Column Chart: Types of Rocks (Instructional Master 6B-1, optional)

On a large piece of chart paper, a chalkboard, or a whiteboard, create a chart similar to the one below, using Image Cards 7, 8, and 9 (Igneous), (Sedimentary), and (Metamorphic) to label each column.

		
Image Card 7 (Igneous)	Image Card 8 (Sedimentary)	Image Card 9 (Metamorphic)

Ask students to think about what they learned from the read-aloud about the three types of rocks. Have students share what they learned about igneous rocks. Record students' responses on the chart paper, chalkboard, or 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 the other types of rocks.

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

Above and Beyond: Instructional Master 6B-1 has been included if you have students who are ready to fill in the chart on their own, using the sound/spelling correspondences taught thus far.

Forming Three Types of Rocks

Note: This activity requires adult supervision and you may desire the assistance of parents or a teacher's aide. In the interest of time, you may wish to complete this activity during the Domain Review or Culminating Activities section at the end of the domain. This activity can be completed with crayon shavings instead of chocolate chips.

Note: Be sure to follow your school's policy regarding food distribution and allergies.

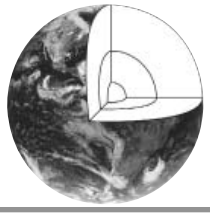
Review with students the three types of rocks and how each is formed. Tell students that you are going to use different-colored chips (white chocolate chips, semi-sweet chocolate chips, peanut butter chips, etc.) to demonstrate how each type of rock is formed, using heat, pressure, and time.

To create igneous rocks, melt one color of chocolate chips. This can be done using a stove or hot plate, if available, or by placing the chips on aluminum foil in a pan of very hot water. Please exercise caution when completing this activity with your class. Allow the melted chips to cool. Tell students that igneous rocks are formed from magma (melted rock) that has been heated and then cooled, similar to how these chocolate chips have been melted and then cooled.

To create sedimentary rocks, place each color of chocolate chips into separate plastic bags. Students can crush these chips using their feet or hands. Next, layer each color of crushed chips into a clear jar. Have students help you press down on these layers using their hands or feet to simulate the formation of sedimentary rocks.

To create metamorphic rocks, remind students that metamorphic rocks are rocks that undergo extreme amounts of heat and pressure. First, layer each color of crushed chocolate chips onto a piece of aluminum foil. Next, have students apply pressure to the layers using hands or feet. Place the pressed layers on aluminum foil in a pan of very hot water to melt the layers. Allow the melted layers to cool. Tell students that metamorphic rocks have undergone intense heat and pressure, similar to how these chips have been layered, pressed together, melted, and then cooled.

Lead students in a discussion of how each type of "rock" was formed, using heat, pressure, and/or time.



Fossils

7

☑ *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
- ✓ Describe how heat, pressure, and time cause many changes inside the earth
- ✓ Describe fossils
- ✓ Explain how fossils provide information about the history of the earth

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:

- ✓ Describe the connection between layers of sediment and sedimentary rock and fossils (RI.1.3)
- ✓ Write and illustrate details about something the student thinks should be preserved and explain the reason for his or her choice (W.1.1)
- ✓ Clarify information about "Fossils," by asking questions that begin with *what* (SL.1.2)
- ✓ Write and illustrate details from the read-aloud "Fossils" and discuss with one or more peers (SL.1.5)
- ✓ Use frequently occurring conjunctions, such as *or*

✓ Evaluate and select read-alouds on the basis of personal choice for rereading

Core Vocabulary

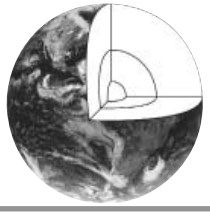
fossil, *n.* The print or remains preserved in rock of a plant or animal that died many years ago
Example: The scientists found a large fish fossil.
Variation(s): fossils

impression, *n.* A mark or shape left on a surface formed by pressure
Example: Their mother always knew when they jumped on the bed because of the impression their feet left on the mattress.
Variation(s): impressions

paleontologist, *n.* Someone who studies living things from long ago by looking at fossils
Example: As a paleontologist, she was able to travel to many different places to study fossils.
Variation(s): paleontologists

preserved, *v.* Kept in excellent condition; unchanged over time
Example: The cold temperature of the refrigerator preserved the fruits and vegetables.
Variation(s): preserve, preserves, preserving

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**What Have We Already Learned?**		10
	What Do We Know?		
	Purpose for Listening		
Presenting the Read-Aloud	**Fossils**	ruler or yardstick	15
Discussing the Read-Aloud	**Comprehension Questions**		10
	Word Work: Preserved	drawing paper, drawing tools	5
	Complete Remainder of the Lesson Later in the Day		
Extensions	**Syntactic Awareness Activity: Conjunction *or***		20
	Domain-Related Trade Book or Student Choice	trade book	



Fossils

7A

Introducing the Read-Aloud *10 minutes*

What Have We Already Learned?

Review with students the type of scientist Gerry is and what he studies. Have students share the things that Gerry the Geologist has taught them, such as the three types of rocks, various minerals, volcanoes, geysers, etc. Tell students that all of these things are not living; they are not plants or animals.

Explain that there are other scientists called paleontologists, who study things that were living on the earth many years ago. Have students say the word *paleontologist* three times. Remind students that plants and animals are living things.

What Do We Know?

Have students name plants or animals that live on the earth now. Tell them that today they will meet a friend of Gerry's who will tell them about plants and animals that lived on the earth many, many years ago.

Purpose for Listening

Tell students to listen carefully to find out how paleontologists learn about plants and animals that lived on the earth many years ago.

Presenting the Read-Aloud **15** *minutes*

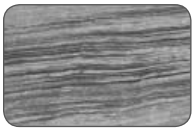
1 Let's call her "Pam the Paleontologist!"

Fossils

Show image 7A-1: Pam the Paleontologist

Hi everyone. My name is Pam and I am a paleontologist.[1] Gerry the Geologist is a friend of mine. He called me this morning and asked me to come in and finish teaching you about the history of the earth. He is sorry he can't be here, but all this rock-talk has him itching to see some neat rocks himself, so he is off hiking in the mountains.

A **paleontologist** is a scientist who studies paleontology, which is the study of life that existed on earth in the distant past. Can you say *paleontologist*? Paleontologists study bones to learn about life on earth long ago. This isn't just any bone; it's a dinosaur bone! I'll be teaching you about dinosaurs in the near future.

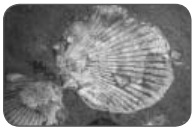


2 What type of rock do you see in this picture? How do you know?

Show image 7A-2: Sedimentary rock[2]

Gerry told me that you already know about basic geologic factors: heat, pressure, and time. You also know that sedimentary rocks such as sandstone and limetone are formed from layers of sediments that have been pressed together over time.[3] These layers of sediment offer many clues about the history of *life* on the earth. The history of life on earth is my specialty as a paleontologist.

3 Sediments can be tiny pieces of dirt and rock, or even decayed plants and animals.



Show image 7A-3: Fossilized shell

Paleontologists need to know a lot about rocks and geology in order to study living things because of something called a fossil. A **fossil** is the **preserved** body or imprint of a plant or animal that lived thousands, millions, or even billions of years ago.[4] Most fossils, like this fossil of a seashell, show you where the body of an animal or plant died and was buried under layer after layer of sediment. Over many, many years, with more and more sediment pressing down on it, this shell became part of the stone that formed as a result of geologic pressure. You are only seeing the **impression,** or shape of it, not the actual shell.[5] The creature itself and its shell decayed and rotted away, but its shape stayed imprinted in the rock.

4 If something is preserved, it is kept in good condition over a long period of time.

5 Think of the shapes you can make when you push an object into clay—when you remove the object, the shape still remains in the clay!

Show image 7A-4: Fossil hunter

As you dig down into the earth, the soil and rocks are divided into layers. These layers represent different geologic periods, or times during which the crust and surface of the earth changed. For instance, if you find a layer of sandstone on dry land, then you know that there may have been an ocean or river over land at some point in the distant past. [6] We can estimate how old certain fossils may be thanks to our understanding of geology and rock layers.

6 That means that by examining rocks in our area, scientists can tell if there used to be an ocean where our city is now and how long ago that was.

Fossils are usually found in layers of sedimentary rocks, though they can be found in other rock formations as well. It looks like the paleontologist in this picture has found a good place for fossil hunting. He has to dig very carefully to make sure he keeps the fossils in good condition.

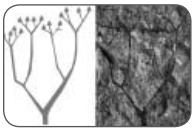
Every fossil is part of the earth's fossil record. The fossil record includes everything we have learned about the history of life from studying fossils. The fossil record is what paleontologists study in order to figure out what life on earth was like many years ago. Paleontologists can determine when the animals and plants imprinted in the fossils lived based on the rock layers in which they were found. They use information from all fossils to create a timeline of life on earth. [7] Today, I would like to show you several different fossils from different time periods during the history of the earth.

7 A timeline shows the order in which plants and animals existed, from long ago to today.

Show image 7A-5: Trilobite

This is a fossil of a trilobite, an animal that some scientists believe lived about 550 million years ago. Trilobites may look like insects, but they are more closely related to lobsters and crabs. Trilobites came in many varieties, from a half-inch up to twenty-eight inches in length. [8] They had antennas, lots of legs, and a hard outer shell called an exoskeleton. That exoskeleton is important because it meant that dead trilobites were easily fossilized when they became buried in the sand.

8 [Show these lengths with a ruler or yardstick.]



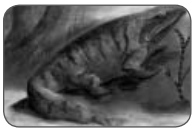
Show image 7A-6: Cooksonia fossil

At about this same time, the fossil record estimates that the first plants appeared on land. Back then, there was no soil on the land, because soil contains dead, decayed plants. Since these were the first plants on land, no plants had yet died in order to create soil. The first plants did not have the same characteristics as plants today. These plants were less than half an inch tall and they had no roots, leaves, flowers, or seeds, but they were plants nevertheless.[9]

9 [Show the height of less than half an inch with a ruler.]

Show image 7A-7: Fish fossils

Soon came the Age of Fish. Many different types of fish ruled the waters.

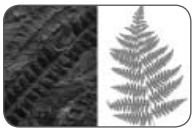


Show image 7A-8: Tetrapod recreation

Also during this time, plant and animal life on land began to spread rapidly. The first soils developed on land, allowing new types of plants with leaves, stems, and roots to grow. With new plants came new land creatures ready to eat those plants. Tetrapods, the first amphibians, made their way onto the beaches. An amphibian is an animal that lives part of its life in water and part on land, like a frog.

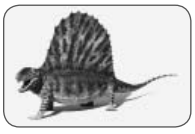
Paleontologists have found many tetrapod fossils. An artist drew this picture using a tetrapod fossil, which shows what a real tetrapod might have looked like. Do you think any of this tetrapod's body parts look like they belong to a fish?[10]

10 [Pause for students to answer.]



Show image 7A-9: Fern fossil

Then, lush forests full of trees and plants, such as ferns, began to grow.



Show image 7A-10: First reptiles

As forests increased, so too did the variety and sizes of animals. The first giant reptiles appeared. Of course, the one in this picture—called a dimetrodon—is just a model that someone made, but they based this model on fossilized dimetrodon bones found in the earth. Paleontologists call the body part sticking up on its back a sail because it looks like the sail on a boat.

Dimetrodon was not a dinosaur, but it certainly looked like one, and dinosaurs were soon to follow. We will learn more about dinosaurs next time. That is as far as the fossil record will take us today!

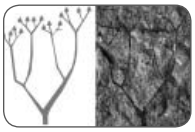
Discussing the Read-Aloud — *15 minutes*

Comprehension Questions — 10 minutes

1. *Literal* What do paleontologists like Pam study? (Paleontologists study the history of life on the earth.)
2. *Literal* What is a fossil? (A fossil is the preserved body or imprint of a plant or animal that lived long, long ago.)
3. *Literal* Are fossils formed over a short period of time or a very long period of time? (Fossils are formed over a very long period of time.)

Show image 7A-5: Trilobite

4. *Inferential* What does this fossil tell us about the history of the earth? (Animals called trilobites lived long, long, long ago.)

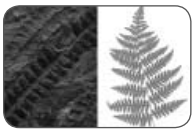


Show image 7A-6: Cooksonia fossil

5. *Inferential* What does this fossil tell us about the history of the earth? (The first plants lived on the earth long, long ago.)

Show image 7A-7: Fish fossils

6. *Inferential* What does this fossil tell us about the history of the earth? (Fish lived on the earth long, long ago.)



Show image 7A-9: Fern fossil

7. *Inferential* What does this fossil tell us about the history of the earth? (Ferns lived on the earth long, long ago.)

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

8. *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.

9. 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: Preserved

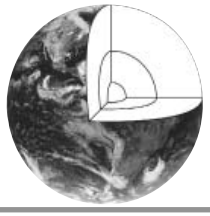
5 *minutes*

1. In the read-aloud you heard, "A fossil is the *preserved* body or imprint of a plant or animal that lived thousands, millions, or even billions of years ago."
2. Say the word *preserved* with me.
3. If something is preserved, it is kept in good condition over time.
4. My mother preserved the pictures by putting them in a photo album.
5. Why is it important that things be preserved? Try to use the word *preserved* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: " _____ should be preserved because . . ."]
6. What's the word we've been talking about?

Use a *Drawing/Writing* activity for follow-up. Directions: We often talk about how important it is that the earth be preserved for everyone to enjoy. For example, the oceans, the trees, and the rocks should be preserved. Choose one thing that you think should be preserved for everyone to enjoy. Draw a picture and write a sentence that describes your drawing and explains why it should be preserved for everyone to enjoy. Use the sound/spelling correspondences you have been taught thus far.

Give students the opportunity to share their drawings and writing with a partner or the entire class.

Complete Remainder of the Lesson Later in the Day



Fossils

7B

Extensions

***20** minutes*

Syntactic Awareness Activity: Conjunction *or*

The purpose of these syntactic activities is to help students understand the direct connection between grammatical structures and the meaning of text. These syntactic activities should be used in conjunction with the complex text presented in the read-alouds.

Note: There may be variations in the sentences created by your class. Allow for these variations and restate students' sentences so that they are grammatical.

1. Conjunctions are a kind of word we use to connect words and phrases.
2. We use the conjunction ***or*** to join words and phrases that are choices.
3. Listen to this selection about diamonds from the read-aloud. I will emphasize the word ***or*** as I read the selection to you:

   *A fossil is the preserved body **or** imprint of a plant **or** animal that lived thousands, millions, **or** even billions of years ago.*
4. Notice that in this paragraph, Pam the Paleontologist uses the word ***or*** when she talks about two possibilities or choices.
5. You hear the word ***or*** a lot when making choices:

   *Would you like a red crayon **or** a blue crayon?*
6. The word ***or*** tells us that we must choose only one crayon.
7. Let's listen to another example:

   *Do you prefer chocolate ice cream **or** vanilla ice cream?*
8. The word ***or*** tells us that we must make a choice and choose one ice cream flavor.

Use a *Making Choices* activity for follow-up. Directions: Listen to the following questions that contain choices, and choose one. Use complete sentences and explain why you would choose this option to your partner.

1. Do you like hot weather or cold weather better?
2. Would you rather eat an apple or an orange?
3. Would you rather play soccer or basketball?

Domain-Related Trade Book or Student Choice

Domain-Related Trade Book

Refer to the list of recommended trade books in the Introduction at the front of this Anthology, and choose one (preferably about fossils) to read aloud to the class. As you read, use the same strategies that you have been using when reading the read-aloud selections in this Anthology—pause and ask occasional questions; rapidly clarify critical vocabulary within the context of the read-aloud; etc. After you finish reading the trade book aloud, lead students in a discussion as to how the story or information in this book relates to the read-alouds in this domain. Discuss whether the trade book was fiction or nonfiction, fantasy or reality, historical or contemporary.

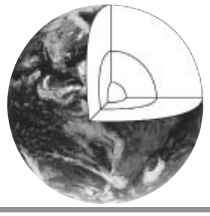
You may also ask students to write about the most interesting thing they learned from the trade book. You may suggest how to begin the sentence by writing on the board, "The most interesting thing that I learned was . . ."

Student Choice

Ask students which one of the read-alouds they have heard recently that they would like to hear again. If necessary, reread the titles of recent read-alouds to refresh the students' memories. You may also want to choose one yourself.

Reread the text that is selected. Feel free to pause at different places in the read-aloud this time and talk about vocabulary and information that you did not discuss previously during the read-aloud.

After the read-aloud, ask students if they noticed anything new or different during the second reading that they did not notice during the first reading. Also, ask them to try to express why they like this read-aloud. Remember to repeat and expand upon each response using richer and more complex language, including, if possible, any read-aloud vocabulary.



Dinosaurs

8

☑ *Lesson Objectives*

Core Content Objectives

Students will:

- ✓ Understand that much of our knowledge of the earth and its history is the result of the work of many scientists
- ✓ Describe fossils
- ✓ Explain how fossils provide information about the history of the earth
- ✓ Explain how we know about dinosaurs
- ✓ Describe various dinosaurs

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:

- ✓ Describe the connection between layers of sediment, sedimentary rock, fossils, and dinosaurs (RI.1.3)
- ✓ Compare and contrast different types of dinosaurs (RI.1.9)
- ✓ Write and illustrate details about a favorite dinosaur and explain the reason for their choice (W.1.1)
- ✓ Write and illustrate details from the read-aloud "Dinosaurs" and discuss with one or more peers (SL.1.5)
- ✓ Identify new meanings of familiar words, such as *plate,* and apply them accurately

Core Vocabulary

debris, *n.* The scattered remains of an object that has been broken or destroyed
Example: Debris from the broken canoe floated downriver.
Variation(s): none

excavating, *v.* Removing or exposing something by digging
Example: Archaeologists and paleontologists have lots of experience excavating objects from long ago.
Variation(s): excavate, excavates, excavated

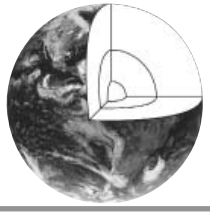
extinct, *adj.* No longer living or existing
Example: Dinosaurs are extinct.
Variation(s): none

fossilized, *adj.* Made into a fossil
Example: The fossilized remains of dinosaur bones are often dug up and studied to learn about this ancient animal.
Variation(s): none

meteor, *n.* A piece of rock from space that usually burns up as it enters the earth's atmosphere
Example: The meteor left a bright trail as it streaked through the sky.
Variation(s): meteors

meteorite, *n.* A piece of rock that falls from space to the earth's surface
Example: A meteorite was found in the desert.
Variation(s): meteorites

At a Glance	Exercise	Materials	Minutes
Introducing the Read-Aloud	**What Have We Already Learned?**	Image Cards 10–13	10
	Purpose for Listening		
Presenting the Read-Aloud	**Dinosaurs**	yardstick; U.S. map	15
Discussing the Read-Aloud	**Comprehension Questions**		10
	Word Work: Extinct	drawing paper, drawing tools	5
	Complete Remainder of the Lesson Later in the Day		
Extensions	**Multiple Meaning Word Activity: Plate**	Poster 4M (Plate)	20
	Domain-Related Trade Book	trade book	



Dinosaurs

8A

Introducing the Read-Aloud — *10 minutes*

What Have We Already Learned?

Review with students that a fossil can be either the preserved body or the imprint of a plant or animal that lived long, long ago. Explain that even though paleontologists are interested in the history of life on earth, they still need to know a lot about geology in order to determine how old fossils are and where they fit in the history of life on earth. Remind students that the soil and rocks are divided into layers, and that the layers represent different geologic times when changes happened to the crust of the earth. Tell students that we determine how old certain fossils are based on our understanding of geology and rock layers. Use Image Cards 10–13 to talk about the order in which these living things inhabited the earth.

Purpose for Listening

Tell students to listen carefully to learn more about dinosaurs.

Presenting the Read-Aloud — **15** *minutes*

Dinosaurs

Hey there, fellow scientists! It's Pam the Paleontologist again. Last time I was here, I gave you a whirlwind tour of the history of life on earth right up through the time of the dimetrodons, the first giant reptiles that had big sails on their backs. The age of the dimetrodons was followed by a time known as the Age of Reptiles. This era, according to some scientists, began approximately 245 million years ago.[1]

1 This is a very, very long time ago—long before humans existed. Dinosaurs and humans never lived on the earth together.

Show image 8A-1: Tyrannosaurus Rex skeleton

This is a Tyrannosaurus Rex, or T. Rex as some people call it. It was one of the largest and most fearsome predators ever to walk the earth.[2] We can tell by its teeth that the T. Rex was a meat eater. We also know that it was over forty feet long and up to twenty feet tall. Judging by the size of its bones, it weighed about seven tons, or more than two average-sized cars.

2 A predator is an animal that eats other animals.

Show image 8A-2: T. Rex and Triceratops[3]

This painting shows T. Rex facing off against a triceratops, a dinosaur with long horns and a shield-like plate on its head.[4] Keep in mind when you look at artwork like this, that nobody today really knows what dinosaurs looked like. We have only seen their bones. Artists use information supplied by scientists today to try to make good guesses about what dinosaurs looked like when they were alive. They do all this based on their bones! Many people think of dinosaurs as giant reptiles, and in fact, the word *dinosaur* means "terrifying lizard." However, many paleontologists now believe that dinosaurs are more closely related to birds than they are to lizards. Whatever the case may be, there are no dinosaurs on earth anymore. They have all been **extinct**—dead and gone—for many, many years.[5] Now there are just fossilized bones of dinosaurs buried in the earth's crust.

3 How are these two dinosaurs alike, and how are they different?

4 Here, the word *plate* means a flat, hard piece that covers the bodies of some animals. The word *plate* also has other meanings. The word *plate* can also mean a flat and usually round dish that is used for eating or serving food.

5 If something is extinct, is it still around today?

6 How would you describe this dinosaur?

Show image 8A-3: Stegosaurus[6]

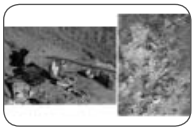
Here is my personal favorite: the stegosaurus. Like the triceratops, the stegosaurus was a herbivore, or plant eater, but it had some pretty good ways of defending itself against the likes of T. Rex and other meat eaters. Stegosaurus had hard, sharp plates on its back, which would have made it difficult to bite. But just in case anyone tried, the stegosaurus also had a spiky tail that could really do some damage.

Show image 8A-4: Excavating dinosaur bones

How do we find and learn about these incredible animals? Some scientists believe that dinosaurs ruled the earth for more than 100 million years, and their **fossilized** bones can be found in many parts of the world, including the United States.[7] Dinosaur fossils are hard to find, and **excavating**—or digging up—their bones is not as easy as you might think.

7 *Fossilized* means that over a long period of time the bones have become like a fossil or rock.

Once paleontologists find an area that is likely to have dinosaur bones, we move in with our tools and begin careful excavation. Paleontologists must use sharp little knives and small brushes to gradually scrape away the sedimentary rock surrounding the fossils. It will take this paleontologist days and maybe even weeks to excavate this one bone. It's slow work, but to me there is nothing more exciting in the world than carefully uncovering a bone that may have been buried in rock for 100 million years.



Show image 8A-5: Large excavation

Here a paleontologist is excavating a large collection of bones from the sandstone cliffs of Dinosaur National Monument, an area located in the states of Colorado and Utah, where we have uncovered hundreds and thousands of dinosaur bones.[8]

8 [Locate Colorado and Utah on a U.S. map for students.]

Can you see all the bones in this picture? That was one big dinosaur! But what did it really look like? It's hard to tell because, over time, the bones have moved around and become broken. As a paleontologist, I sometimes feel like I spend half my life putting puzzles together. Often we only find a few bones—the rest of the

skeleton was long since destroyed or perhaps even dragged away by a predator many, many years ago. Other times, lots of different dinosaur bones can be mixed in together. We paleontologists have to use our detective skills to figure out which bones belonged to which type of dinosaur.

Show image 8A-6: Excavating Camarasaurus

In fact, those bones belonged to a mighty Camarasaurus. I knew as soon as I saw its head. This plant eater was sixty feet long and weighed about twenty tons.[9] A real whopper!

9 A ton is a unit of weight equal to 2,000 pounds. That means this dinosaur weighed the same amount as 10 cars when it was alive! [Show students a yardstick and tell them that this dinosaur was as long as twenty yardsticks.]

Show image 8A-7: Camarasaurus illustration

Here is one artist's idea of what the Camarasaurus looked like. It could use its long tail to fend off predators. Good thing you don't have to worry about these things anymore!

Show image 8A-8: Compsognathus[10]

Not all dinosaurs were huge. In fact, some were really small. Take the compsognathus. This little critter stood just two feet tall and scurried around on two little bird-like legs.[11] Compsognathus was a meat eater that fed on little lizards. We know this because paleontologists found parts of fossilized lizard in the stomach cavity of a compsognathus fossil.

10 How would you describe this dinosaur?

11 Two feet is less than the length of one yardstick.

Show image 8A-9: Tyrannosaurus Rex skeleton

What happened to the dinosaurs? You can't go and see a live T. Rex today at the zoo because dinosaurs are extinct.[12] Some scientists believe dinosaurs all died about 65 million years ago. According to fossil records, the extinction of the dinosaurs was quite sudden. Why? That's something paleontologists have been trying to answer ever since the first dinosaur bones were discovered and identified nearly two hundred years ago.

12 Remember, *extinct* means that there are no more dinosaurs left.

Show image 8A-10: Meteor

For years, many scientists believed that extraordinary geologic events, such as super volcanoes, must have had something to do with it. These days, however, many scientists believe that the dinosaur extinction was caused by a giant **meteorite** from outer space. [13] There are billions of meteors, or burning chunks of debris in outer space. Some meteors are quite large, but most are tiny, between the size of a sand grain and a baseball. Meteors are whizzing around all over the place in outer space. Occasionally, a **meteor** crashes toward Earth. When this happens, the meteor hits the atmosphere at an incredible speed and usually burns up as it enters the uppermost parts of earth's atmosphere. [14] Occasionally, bits and pieces of meteors survive their trip through the atmosphere and actually fall to earth. This is very rare, but it does happen from time to time, and it is possible to find pieces of them on the ground. When part of a meteor survives the trip through the atmosphere and lands on Earth, the meteor becomes a meteorite, or space rock that has landed on Earth.

13 A meteorite is a piece of rock that falls from space to the earth.

14 [Remind students that they learned in the *Astronomy* domain that this creates a streak of light in the night sky that some people think is a shooting star.]

Show image 8A-11: Recovered meteorite

Now, let's go back to dinosaur extinction. Some scientists think that the dinosaur extinction was caused by a giant meteorite from outer space. When the meteorite struck the earth, it sent massive plumes of **debris** up into the atmosphere. [15] This debris would have blocked out the light and energy of the sun, causing much of the earth's plant life to die and severely lowering the temperature. Most creatures at the time would have been unable to adapt, and they would have died out before the skies had a chance to clear.

15 It sent large amounts of bits and pieces of objects from the earth up into the atmosphere.

Whether this is true or not remains to be seen, though geologists have discovered at least one very large crater that was caused by a meteorite impact about the time the dinosaurs became extinct. Whatever the case, we know that dinosaurs became extinct, making way for new kinds of life on earth. I, for one, will continue to study the earth's fossil record, and I am sure

we will find the answer some day, because the clues about the history of the earth are all there in the rocks. Ask my friend Gerry the Geologist, and he will tell you the same thing!

Discussing the Read-Aloud **15** *minutes*

Comprehension Questions **10** *minutes*

Show image 8A-1: Tyrannosaurus Rex skeleton

1. *Inferential* What is the name of this dinosaur? (The name of this dinosaur is Tyrannosaurus Rex.) Pretend that you are a paleontologist. How would you describe a Tyrannosaurus Rex to someone? (A Tyrannosaurus Rex was a very large dinosaur. It was a predator and ate meat.)
2. *Inferential* What does it mean when someone says that dinosaurs are extinct? (When someone says that dinosaurs are extinct, it means that there are no living dinosaurs left.)

Show image 8A-3: Stegosaurus

3. *Literal* What is the name of this dinosaur? (The name of this dinosaur is Stegosaurus.) Pretend that you are a paleontologist. How would you describe a Stegosaurus to someone? (A Stegosaurus was a plant eater with sharp plates on its back and a spiky tail.)
4. *Inferential* Do we know what dinosaurs really looked like? (No, we do not know what dinosaurs really looked like.) Why not? (Dinosaurs are extinct. They lived many, many years ago and only their bones have been found.)
5. *Inferential* How do we know anything about dinosaurs if they are extinct? (Paleontologists have found and studied fossilized dinosaur bones.)
6. *Evaluative* What do some scientists think caused dinosaurs to become extinct? (Some scientists think a meteorite caused dinosaurs to become extinct.) Do you think scientists will ever be sure? (Answers may vary.)

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

I am going to ask a question. I will give you a minute to think about the question, and then I will ask you to turn to your neighbor and discuss the question. Finally, I will call on several of you to share what you discussed with your partner.

7. *Evaluative* ***Think Pair Share:*** What would it be like to find a dinosaur bone? (Answers may vary.)

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: Extinct

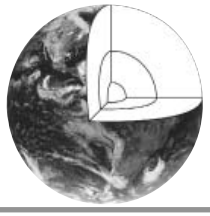
***5** minutes*

1. In the read-aloud you heard, "[Dinosaurs] have all been *extinct*—dead and gone—for many, many years."
2. Say the word *extinct* with me.
3. If a plant or an animal is extinct, there are none left or living.
4. Some animals are protected so that they don't become extinct.
5. Are there some animals that you think are in danger of becoming extinct? What can we do to protect animals today from becoming extinct? Try to use the word *extinct* when you tell about it. [Ask two or three students. If necessary, guide and/or rephrase the students' responses: "We can protect animals today from becoming extinct by . . ."]
6. What's the word we've been talking about?

Use a *Drawing/Writing* activity for follow-up. Directions: Think about the dinosaurs you heard about in the read-aloud. Draw a picture of your favorite dinosaur. Then write a sentence that describes your drawing and explains what you like best about this dinosaur and why, using the sound-spelling correspondences you have been taught thus far.

Give students the opportunity to share their drawings and writing with a partner or the entire class.

Complete Remainder of the Lesson Later in the Day



Dinosaurs

8B

Extensions — *20 minutes*

Multiple Meaning Word Activity: Plate

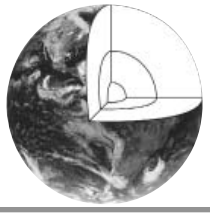
Sentence in Context

1. [Show Poster 4M (Plate).] In the read-aloud you heard, "This painting shows T. Rex facing off against a triceratops, a dinosaur with long horns and a shield-like *plate* on its head." Here, *plate* means one of the usually flat, hard pieces that covers the bodies of some animals. [Have students hold up one or two fingers to indicate which image on the poster shows this meaning.]
2. *Plate* can also mean a flat and usually round dish that is used for eating or serving food. [Have students hold up one or two fingers to indicate which image on the poster shows this meaning.]
3. Now with your neighbor, make a sentence for each meaning of *plate*. Remember to use complete sentences. I will call on some of you to share your sentences. [Call on a few students to share their sentences.]

Domain-Related Trade Book

Refer to the list of recommended trade books in the Introduction at the front of this Anthology, and choose one about dinosaurs to read aloud to the class. As you read, use the same strategies that you have been using when reading the read-aloud selections in this Anthology—pause and ask occasional questions; rapidly clarify critical vocabulary within the context of the read-aloud; etc. After you finish reading the trade book aloud, lead students in a discussion as to how the story or information in this book relates to the read-alouds in this domain. Discuss whether the trade book was fiction or nonfiction, fantasy or reality, historical or contemporary.

You may also ask students to write about the most interesting thing they learned from the trade book, using the sound/spelling correspondences taught thus far.



Domain Review

DR

Note to Teacher

You should spend one day reviewing, reinforcing, or extending the material taught thus far. You may have students do any combination of the activities provided, in either whole-group or small-group settings.

Core Content Objectives Addressed in This Domain

Students will:

- ✓ Identify geographical features of the earth's surface: oceans and continents
- ✓ Describe the shape of the earth
- ✓ Locate the North Pole, the South Pole, and the equator on a globe
- ✓ 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
- ✓ Describe the mantle and core inside the earth
- ✓ Describe volcanoes and geysers
- ✓ Describe how heat, pressure, and time cause many changes inside the earth
- ✓ Identify common minerals in the earth
- ✓ Explain how minerals are used by people
- ✓ Identify the three types of rocks: metamorphic, sedimentary, and igneous
- ✓ Describe fossils

- ✓ Explain how rocks and fossils provide information about the history of the earth
- ✓ Explain how we know about dinosaurs
- ✓ Describe various dinosaurs

Activities

Image Review

Show the Flip Book images from any read-aloud again and have students retell the read-aloud using the images.

Image Card Review

Materials: Image Cards 10–14

Divide the class into six groups. Give each group one of the Image Cards. Give the groups a few minutes to brainstorm everything they remember about the Image Card. Then come together as a class and give each group a chance to share.

Domain-Related Trade Book or Student Choice

Materials: Trade book

Read a trade book to review fossils or dinosaurs; refer to the books listed in the Introduction. You may also choose to have students select a read-aloud to be heard again.

Fossils

Materials: Clay; objects with distinct shapes to press into the clay

Have students create their own fossils by pressing common objects into clay, such as plastic dinosaurs, etc. Have students remove the object and allow the clay to harden for a few hours. Have students discuss what the imprint left in the clay could tell someone who has never seen the actual object. You may also find directions on various websites for more sophisticated projects.

Be sure to talk about what fossils are, how they are formed, and what information they give.

Key Vocabulary Brainstorming

Materials: Chart paper, chalkboard, or whiteboard

Give students a key domain concept or vocabulary word such as *fossil.* Have them brainstorm everything that comes to mind when they hear the word, such as *trilobite, dinosaur bones,* etc. Record their responses on chart paper, a chalkboard, or a whiteboard for reference.

Riddles for Core Content

Ask students riddles such as the following to review core content:

- I am extinct but scientists believe that I lived millions of years ago because of my fossilized bones that have been found. What am I? (dinosaur)
- I study plants and animals that lived on the earth long, long ago. Who am I? (paleontologist)
- I am the preserved body or imprint of a plant or animal that lived in the distant past. What am I? (fossil)

Rock Cycle Song (Tune: Row, Row, Row Your Boat)

Sedimentary rock

has been formed in layers—

Often found near water sources

with fossils from decayers.

Then there's igneous rock,

here since Earth was born.

molten lava, cooled and hardened—

that is how it's formed.

These two types of rocks

can also be transformed;
with pressure, heat, and chemicals

metamorphic they'll become.

Class Book: The History of the Earth

Materials: Drawing paper, drawing tools

Tell the class or a group of students that they are going to make a class book to help them remember what they have learned in this domain. Have students brainstorm important information about fossils, dinosaurs, and paleontologists. Have each student choose one idea to draw a picture of, and then write a caption for, the picture. Bind the pages to make a book to put in the class library for students to read again and again.

Heat, Pressure, and Time

Materials: Image Cards 1–3

Give three students the Image Cards for heat, pressure, and time. Review what the Image Cards represent. Have the three students stand in various locations around the room.

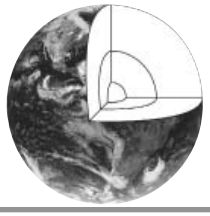
Tell the class that you are going to say a word. They will decide how heat, pressure, or time are connected to the word, and then walk to and stand with the person holding that Image Card. After the students have walked to the various locations, have them explain how the two words are connected. For example, if you say the word *fossil,* one student may walk to the Image Card of "pressure" and say, "It takes pressure to form a fossil." A second student may walk to the Image Card of "time" and say, "It takes a very long time for a fossil to form."

Another variation is to use the signals explained in the Pausing Point.

Letter to a Paleontologist

As a class, brainstorm ideas and then write a letter to Pam or a real paleontologist. The students may talk about the cool things that paleontologists do or ask questions that they still have about the history of the earth.

You may also ask students to write individual letters if they are ready to do this activity on their own.



Domain Assessment

DA

This domain assessment evaluates each student's retention of domain and academic vocabulary words and the core content targeted in *The History of the Earth.* The results should guide review and remediation the following day.

There are three parts to this assessment. You may choose to do the parts in more than one sitting if you feel this is more appropriate for your students. Part I (vocabulary assessment) is divided into two sections: the first assesses domain-related vocabulary and the second assesses academic vocabulary. Parts II and III of the assessment address the core content targeted in *The History of the Earth.*

⑩ Part I (Instructional Master DA-1)

Directions: I am going to say a sentence using a word you have heard in the read-alouds and the domain. First I will say the word and then use it in a sentence. If I use the word correctly in my sentence, circle the smiling face. If I do not use the word correctly in my sentence, circle the frowning face. I will say each sentence two times. Let's do number one together.

1. **Extinct:** Dinosaurs are extinct because there are no more dinosaurs left on the earth. (smiling face)
2. **Mantle:** The mantle is the outermost layer of the earth where we live. (frowning face)
3. **Inner Core:** The inner core is a solid metal ball in the center of the earth. (smiling face)
4. **Sediments:** Layers of sediments, or pieces of dirt and rock, pressed on top of one another form sedimentary rocks. (smiling face)
5. **Destructive:** Some volcanoes can be destructive when their lava and ash damage the land around them. (smiling face)
6. **Crust:** The crust is a layer of liquid rock deep inside the earth. (frowning face)

7. **Geologist:** A geologist is a scientist who studies clouds and the sky. (frowning face)
8. **Fossils:** Fossils are the imprint of the remains of animals and plants that died long ago. (smiling face)
9. **Solid:** Something is solid when it takes the shape of whatever container it is in. (frowning face)
10. **Pressure:** Pressure happens when two forces push on each other. (smiling face)

Directions: Now I am going to read more sentences using other words you have heard and practiced. First I will say the word and then use it in a sentence. If I use the word correctly in my sentence, circle the smiling face. If I do not use the word correctly in my sentence, circle the frowning face. I will say each sentence two times.

11. **Varies:** When something varies, it always stays the same. (frowning face)
12. **Characteristics:** The characteristics of rocks include their colors, textures, shapes, and sizes. (smiling face)
13. **Surface:** The surface of the earth is all of the liquid rock that is deep inside. (frowning face)
14. **Layer:** When it is cold outside, we wear many layers of clothing to keep warm. (smiling face)
15. **Preserved:** When you want to save something for the future, you keep it preserved in a safe place. (smiling face)

⑩ Part II (Instructional Master DA-2)

Directions: I am going to read some sentences to you. If the sentence is correct, circle the smiling face. If the sentence is not correct, circle the frowning face. I will say each sentence two times.

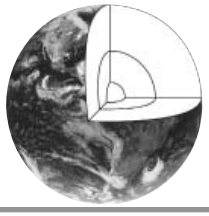
1. The earth's surface is covered by continents and oceans. (smiling face)
2. The equator is an imaginary line that runs from the North Pole to the South Pole. (frowning face)
3. The earth is shaped like a sphere or a ball. (smiling face)

4. We know about the history of the earth because of the work of many scientists who study rocks and fossils. (smiling face)
5. Heat, pressure, and time cause many changes inside the earth. (smiling face)
6. The earth has two layers: the crust and the core. (frowning face)
7. We live in the core of the earth. (frowning face)
8. A volcano is caused by an eruption of magma making its way to the surface of the earth. (smiling face)
9. A geyser is an eruption of lava. (frowning face)
10. Salt is an important mineral that is used by people. (smiling face)
11. All rocks can be put into three groups: igneous, sedimentary, and metamorphic. (smiling face)
12. We know that dinosaurs lived on the earth because of fossilized bones that have been found. (smiling face)
13. Fossils are pieces of rock that come from the eruption of a geyser. (frowning face)

⑩ Part III (Instructional Master DA-3)

Directions: Label the North Pole, the South Pole, and the equator on the globe. Tell students to place a star on the North Pole and a circle on the South Pole. Have students color the equator red.

On the back of the paper, draw a picture of and write a sentence about the most interesting thing that you learned about the history of the earth.



Culminating Activities

CA

Note to Teacher

Please use this final day to address class results of the Domain Assessment. Based on the results of the Domain Assessment and students' Tens scores, you may wish to use this class time to provide remediation opportunities that target specific areas of weakness for individual students, small groups, or the whole class.

Alternatively, you may also choose to use this class time to extend or enrich students' experiences with domain knowledge. A number of enrichment activities are provided below in order to provide students with opportunities to enliven their experiences with domain concepts.

Remediation

You may choose to regroup students according to particular area of weakness, as indicated from Domain Assessment results and students' Tens scores.

Remediation opportunities include:

- targeting Review Activities
- revisiting lesson Extensions
- rereading and discussing select read-alouds
- reading the corresponding lesson in the *Supplemental Guide,* if available

Enrichment

Image Review

Show the Flip Book images from any read-aloud again and have students retell the read-aloud using the images.

Image Card Review

Materials: Image Cards 10–14

Divide the class into six groups. Give each group one of the image cards. Give the groups a few minutes to brainstorm everything they remember about the image card. Then come together as a class and give each group a chance to share.

Domain-Related Trade Book or Student Choice

Materials: Trade book

Read an additional trade book to review fossils or dinosaurs; refer to the books listed in the Introduction. You may also choose to have the students select a read-aloud to be heard again.

Fossils

Materials: Clay, objects with distinct shapes to press into the clay

Have students create their own fossils by pressing common objects into clay, such as plastic dinosaurs, etc. Have students remove the object and allow the clay to harden for a few hours. Have students discuss what the imprint left in the clay could tell someone who has never seen the actual object. You may also find directions on various websites for more sophisticated projects.

Be sure to talk about what fossils are, how they are formed, and what information they give.

Syntactic Awareness Video: Conjunction Junction

Show students the Schoolhouse Rock! "Conjunction Junction" video, widely available on a number of teaching websites.

Rock and Mineral Collections

If your school has a rock or mineral collection, you may want to share it with your class.

If feasible, you may invite students to bring in interesting rocks to share with the class.

Class Book: The History of the Earth

Materials: Drawing paper, drawing tools

Tell the class or a group of students that they are going to make a class book to help them remember what they have learned in this domain. Have the students brainstorm important information about fossils, dinosaurs, and paleontologists. Have each student choose one idea to draw a picture of, and then write a caption for, the picture. Bind the pages to make a book to put in the class library for students to read again and again.

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Another variation is to use the signals explained in the Pausing Point.

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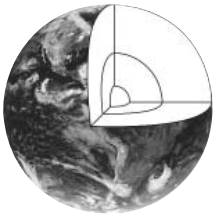
As a class, brainstorm ideas and then write a letter to Pam or a real paleontologist. The students may talk about the cool things that paleontologists do or ask questions that they still have about the history of the earth.

You may also ask students to write individual letters if they are ready to do this activity on their own.

For Teacher Reference Only:

Copies of *Tell It Again! Workbook*



1B-1

Dear Family Member,

During the next several days, your child will be learning about the history of the earth. S/he will learn about the earth's surface, the layers of the earth (crust, mantle, and core), as well as volcanoes and geysers. Below are some suggestions for activities that you may do at home to reinforce what your child is learning about this science topic.

1. The Earth's Surface

Use a globe or map to help your child locate and identify the earth's continents and oceans. Also locate the North Pole, the South Pole, and the equator. Share with each other any knowledge that you have of these.

2. Make a Model

Make a model of the earth's layers or a volcano.

3. Draw and Write

Have your child draw and/or write about what has been learned about the layers of the earth, volcanoes, or geysers, and then share the drawing with you. Ask questions to keep your child using the vocabulary learned at school.

4. If You Were There

With your child, imagine what it would be like to witness a volcanic eruption. Talk about what you would see and hear, and how you would feel.

5. Read Aloud Each Day

It is very important that you read to your child each day. The local library has many books on geology and a list of books and other resources relevant to this topic is attached to this letter.

Be sure to let your child know how much you enjoy hearing about what s/he has been learning about at school.

1B-2

Recommended Resources for The History of the Earth

Trade Book List

1. *Dave's Down-to-Earth Rock Shop,* by Stuart J. Murphy and illustrated by Cat Bowman Smith (HarperCollins, 2005) ISBN 978-0064467292
2. *Digging Up Dinosaurs (Let's-Read-and-Find-Out Science 2)*, by Aliki (HarperCollins, 1988) ISBN 978-0064450782
3. *Dinosaurs (Magic Tree House Guide*), by Will Osborne, Mary Pope Osborne, and Sal Murdocca (Random House Books for Young Readers, 2000) ISBN 978-0375802966
4. *Dinosaurs Before Dark (Magic Tree House, No. 1),* by Mary Pope Osborne and illustrated by Sal Murdocca (Random House Books for Young Readers, 1992) ISBN 978-0679824114
5. *Earthquake in the Early Morning (Magic Tree House, No. 24)*, by Mary Pope Osborne and Sal Murdocca (Random House Books for Young Readers, 2001) ISBN 978-0679890706
6. *Earthquakes (Let's-Read-and-Find-Out Science 2)*, by Franklyn M. Branley and Megan Lloyd (HarperCollins, 2005) ISBN 978-0064451888
7. *Exploring Rocks and Minerals (Exploring Earth and Space),* by Greg Roza (Powerkids Press, 2012) ISBN 978-1448885763
8. *Fossils Tell of Long Ago (Let's-Read-and-Find-Out Science 2)*, by Aliki (HarperCollins, 1990) ISBN 978-0064450935
9. *Hill of Fire,* by Thomas P. Lewis and pictures by Joan Sandin. (HarperCollins, 1983) ISBN 978-0064440400
10. *Home on Earth: A Song about Earth's Layers,* by Laurie Purdie Salas and illustrated by Viviana Garofoli (Picture Window Books, 2009) ISBN 978-1404852969

11. *How to Dig a Hole to the Other Side of the Earth*, by Faith McNulty and illustrated by Marc Simont (HarperCollins, 1992) ISBN 978-0874992335
12. *If You Find a Rock*, by Peggy Christian and photographs by Barbara Hirsch Limber (Sandpiper, 2008) ISBN 978-0152063542
13. *Kids Who Walk on Volcanoes,* by Paul Otteson (Avalon Travel Publishing, 1996) ISBN 978-1562613082
14. *Let's Go Rock Collecting (Let's-Read-and-Find-Out Science 2)*, by Roma Gans and Holly Keller (HarperCollins, 1997) ISBN 978-0064451703
15. *The Magic School Bus Inside the Earth,* by Joanna Cole and illustrated by Bruce Degen (Scholastic, 1989) ISBN 978-0590407601
16. *The Magic School Bus in the Time of the Dinosaurs*, by Joanna Cole and illustrations by Bruce Degen (Scholastic, 1995) ISBN 978-0590446891
17. *Magic Tree House Fact Tracker #1: Dinosaurs: A Nonfiction Companion to Magic Tree House #1: Dinosaurs Before Dark,* by Will Osborne, Mary Pope Osborne, and illustrated by Sal Murdocca (Random House Books for Young Readers, 2000) ISBN 978-0375802966
18. *My Visit to the Dinosaurs (Let's-Read-and-Find-Out Science 2),* by Aliki (HarperCollins, 1985) ISBN 978-0064450201
19. *The Pebble in My Pocket: A History of Our Earth*, by Meredith Hooper and illustrations by Chris Coady (Viking Juvenile, 1996) ISBN 978-0670862597
20. *Planet Earth/Inside Out*, by Gail Gibbons (Morrow Junior Books, 1995) ISBN 978-0688096809
21. *Rocks in His Head*, by Carol Otis Hurst and James Stevenson (HarperCollins, 2001) ISBN 978-0060294038

22. *Sabertooths and the Ice Age: A Nonfiction Companion to Sunset of the Sabertooth*, by Mary Pope Osborne, Natalie Pope Boyce, and Sal Murdocca (Random House Books for Young Readers, 2005) ISBN 978-0375823800

23. *Sunset of the Sabertooth (Magic Tree House, No. 7)*, by Mary Pope Osborne and Sal Murdocca (Random House Books for Young Readers, 1996) ISBN 978-0679863731

24. *Vacation Under the Volcano (Magic Tree House, No. 13)*, by Mary Pope Osborne and Sal Murdocca (Random House Books for Young Readers, 1998) ISBN 978-0679890508

25. *Volcanoes (Let's-Read-and-Find-Out Science 2)*, by Franklyn M. Branley and Megan Lloyd (Collins, 2008) ISBN 978-0064451895

26. *Volcanoes: Mountains That Blow Their Tops*, by Nicholas Nirgiotis (Grosset and Dunlap, 1996) ISBN 978-0448411439

27. *Wonderful World of Dinosaurs,* by Christina Wilsdon (Disney Press, 2012) ISBN 978-1423168485

Websites and Other Resources

Student Resources

1. Earth from Space
   http://visibleearth.nasa.gov/view_cat.php?categoryID=1484
2. Caillou the Paleontologist
   http://pbskids.org/caillou/immersivegames/?gameID=4
3. American Museum of Natural History
   http://www.amnh.org/
4. Animated Geyser
   http://www.classzone.com/books/earth_science/terc/content/visualizations/es1403/es1403page01.cfm
5. Science Kids
   http://www.sciencekids.co.nz/

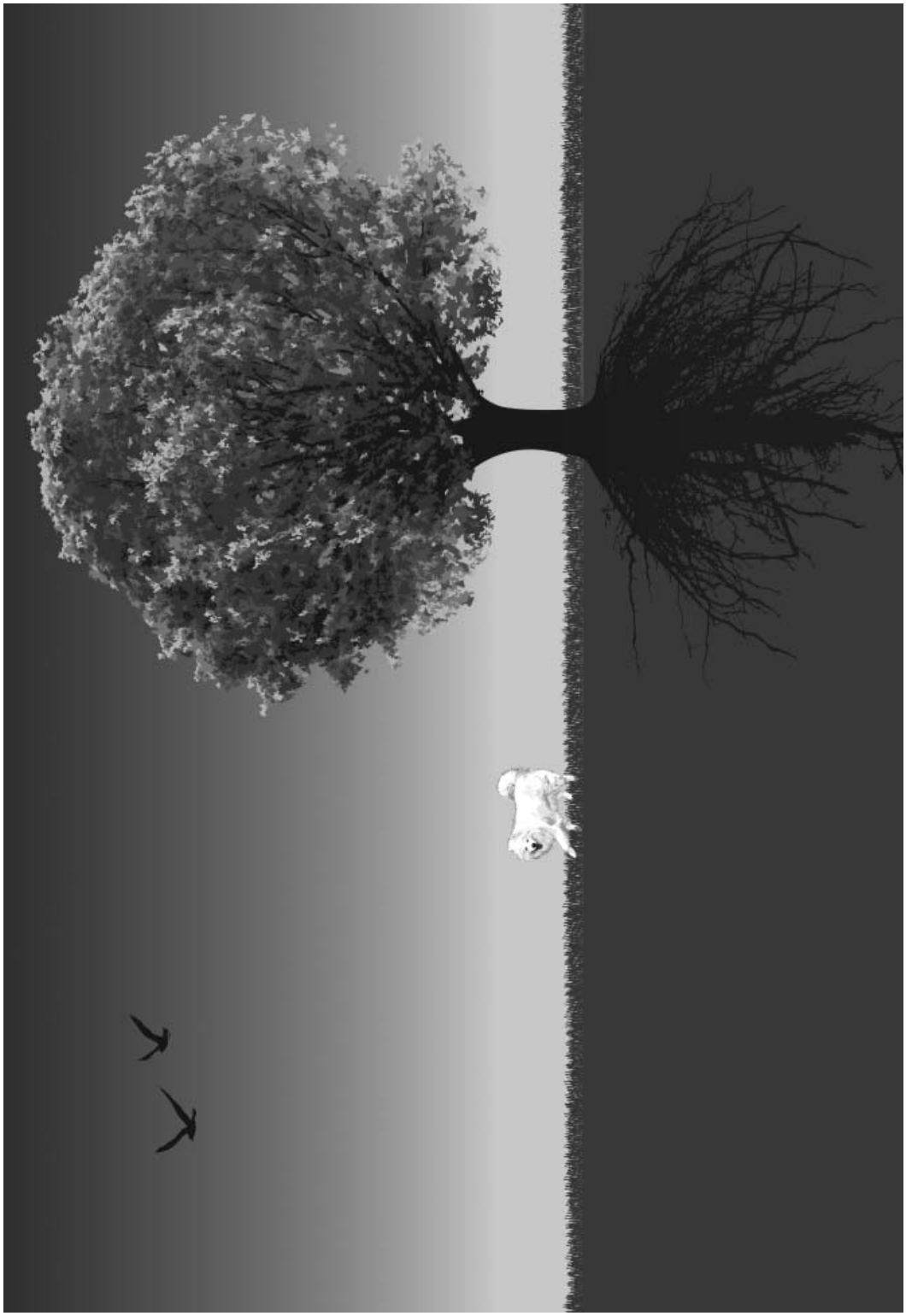
Family Resources

1. Minerals
   http://www.rocksforkids.com/RFK/identification.html
2. Rocks
   http://www.geography4kids.com/files/earth_rocktypes.html
3. Geological Society of America
   http://www.geosociety.org
4. Geology
   http://www.geology.comGeology
   http://www.geology.com

2B-1

Name _____

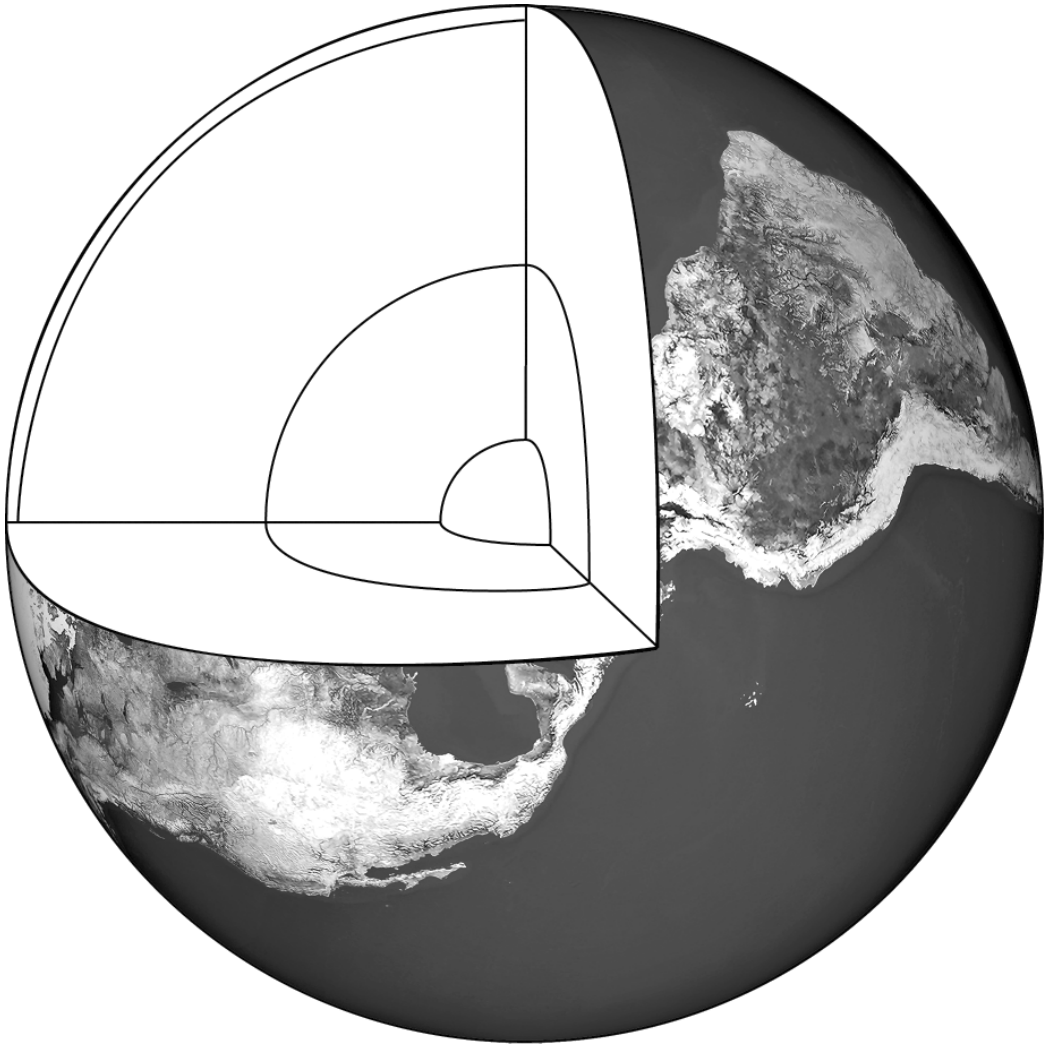
Directions: Draw pictures of or write about things that are found above the crust, on the crust, or in the crust of the earth.



3B-1

Name _____

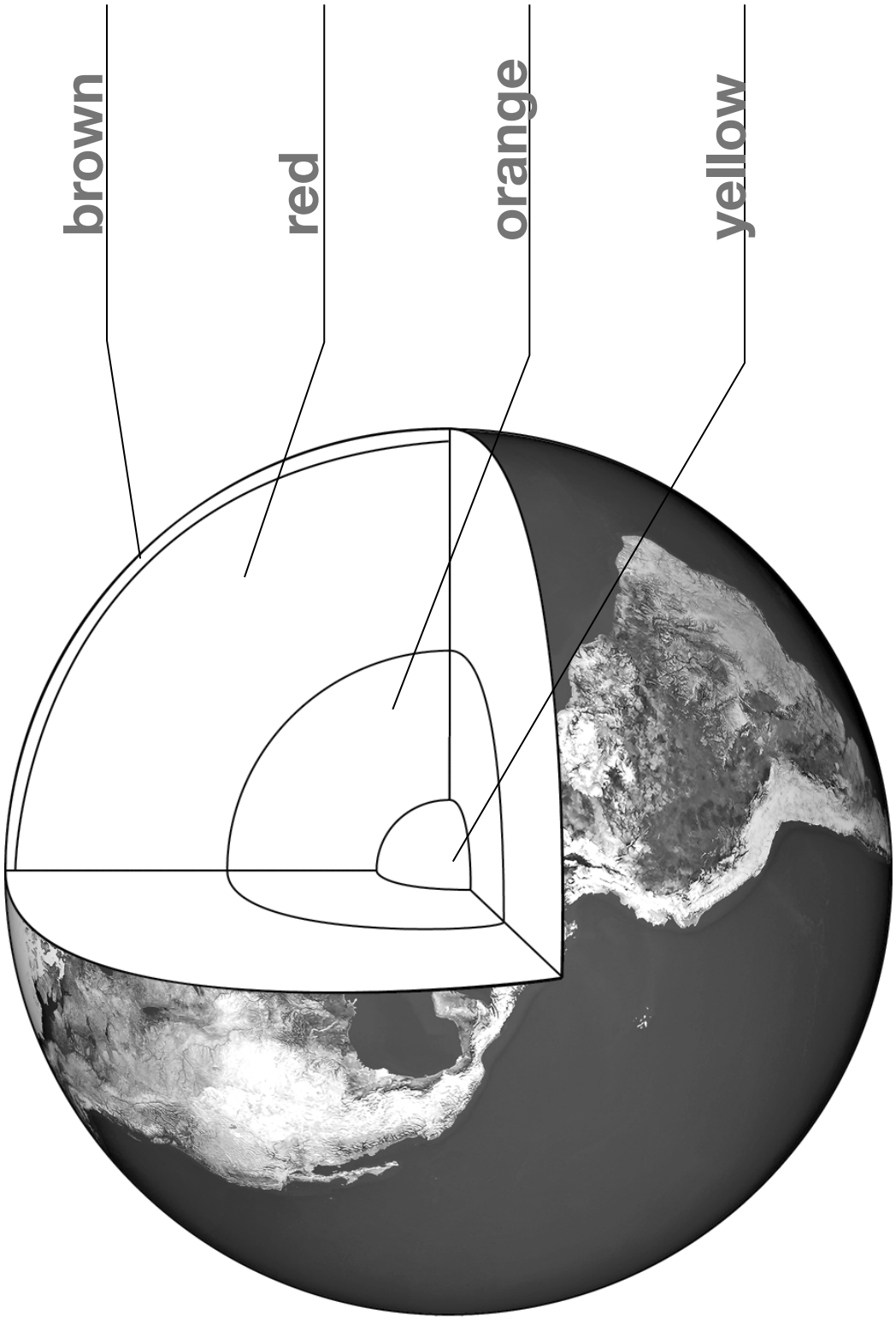
Directions: Point to and name each layer with the teacher. Then, color the crust brown, the mantle red, the outer core orange, and the inner core yellow.



3B-1

Name **Answer Key**

Directions: Point to and name each layer with the teacher. Color the crust brown, the mantle red, the outer core orange, and the inner core yellow.



4B-1

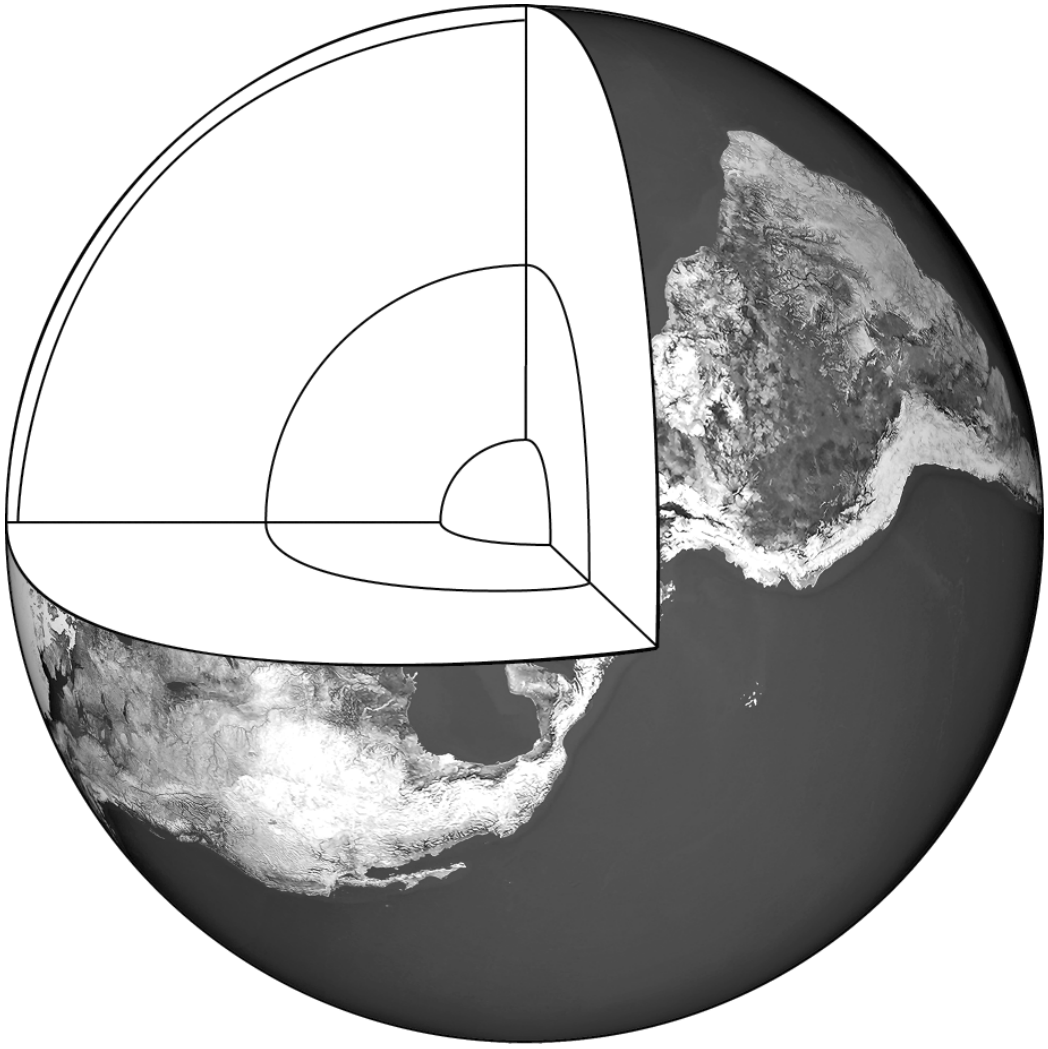
Name _____

Directions: Think about how volcanoes and geysers are similar and how they are different. Draw or write how they are alike in the overlapping part of the two circles. Draw or write how volcanoes are different from geysers in the circle under the volcano. Draw or write how geysers are different from volcanoes in the circle under the geyser.

PP-1

Name _____

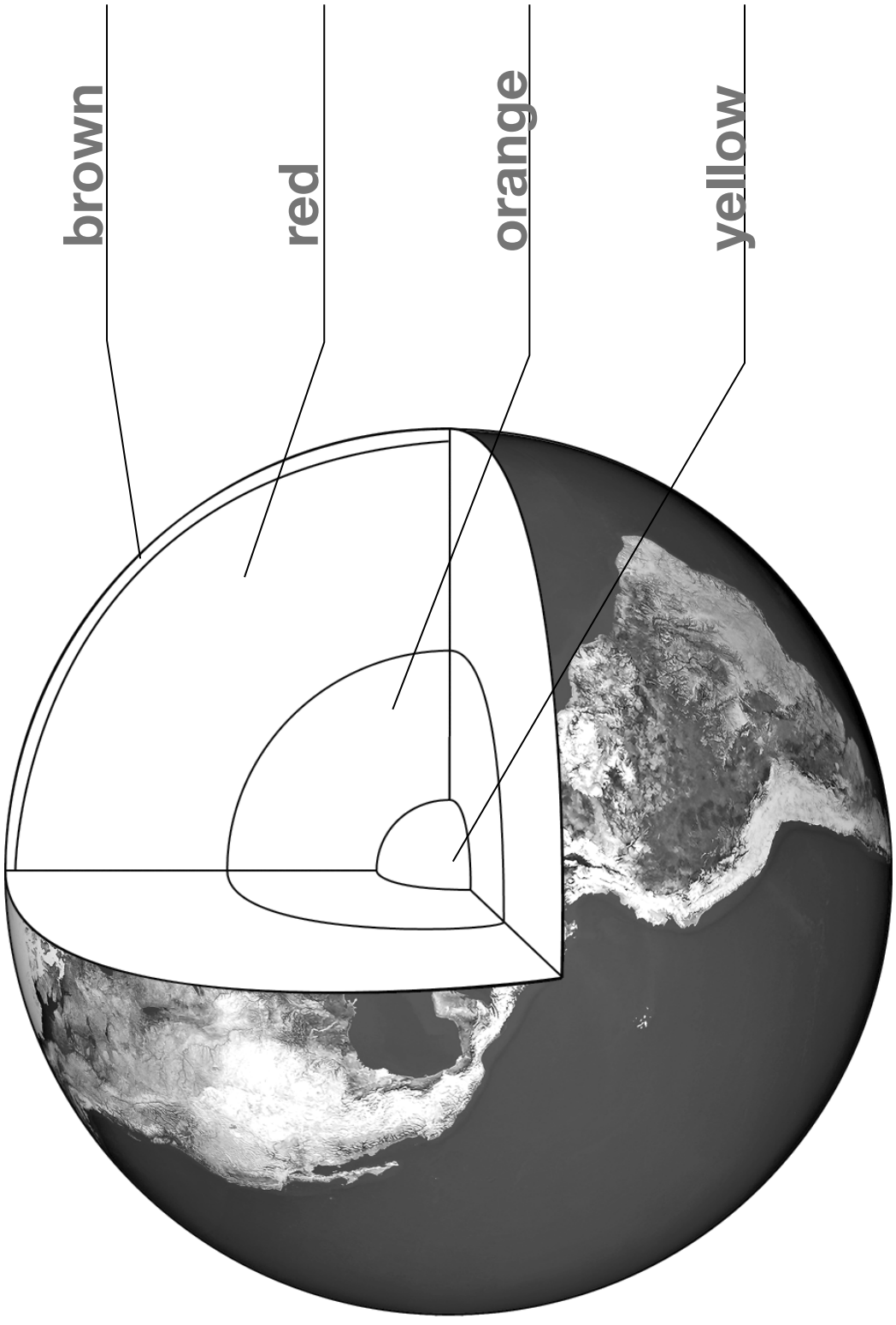
Directions: Label the layers by coloring the crust brown, the mantle red, the outer core orange, and the inner core yellow.



PP-1

Name **Answer Key**

Directions: Label the layers by coloring the crust brown, the mantle red, the outer core orange, and the inner core yellow.



5B-1

Name _____

Directions: Draw and color each rock. Write a sentence describing each rock underneath each picture.

1	2
3	4

5B-2

Dear Family Member,

I hope you and your child have been enjoying talking about the history of the earth. Today, your child learned about minerals and how they are useful to people. Soon, s/he will learn that all rocks can be sorted into three groups: igneous, sedimentary, and metamorphic. S/he will also learn about fossils and what they tell us about life on the earth many, many years ago. Below are some suggestions for activities that you may do at home to reinforce what your child is learning about this science topic.

1. Rock Descriptions

If possible, have your child view some rocks from nature and talk about their characteristics. If you do not have access to real rocks, look for pictures of rocks that can be described.

2. Draw and Write

Have your child draw and/or write about what has been learned about minerals, the three types of rocks, fossils, or dinosaurs and then share the drawing with you. Ask questions to keep your child using the vocabulary learned at school.

3. If You Were There

With your child, imagine what it would be like to discover a fossil. Talk about what you would see and hear and how you would feel.

4. Minerals

Talk about the ways that minerals such as coal or salt are important to you or other people.

5. Read Aloud Each Day

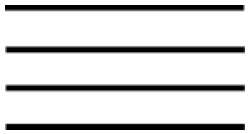
It is very important that you read to your child each day. Please refer to the list of books and other resources sent home with the previous family letter, recommending resources related to the history of the earth.

Be sure to let your child know how much you enjoy hearing about what s/he has been learning about at school.

6B-1

Name _____

Directions: In the first column, draw pictures of and/or write about igneous rocks. In the second column, draw and/or write about sedimentary rocks. In the last column, draw and/or write about metamorphic rocks.

DA-1

Name _____

1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Directions: Listen to your teacher's instructions.

11.  

12.  

13.  

14.  

15.  

DA-1

Name **Answer Key**

Directions: Listen to your teacher's instructions.

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10. 










11.  

12.  

13.  

14.  

15.  

DA-2

Name _____

Directions: Listen to the sentence read by the teacher. Circle the smiling face if the sentence is correct. Circle the frowing face if the sentence is not correct.

1.  
2.  
3.  
4.  
5.  
6.  
7.  
8.  
9.  
10.  

11.  

12.  

13.  

DA-2

Name **Answer Key**

Directions: Listen to the sentence read by the teacher. Circle the smiling face if the sentence is correct. Circle the frowing face if the sentence is not correct.

1. 


2. 


3. 


4. 


5. 


6. 


7. 


8. 


9. 


10. 


11.  

12.  

13.  

DA-3

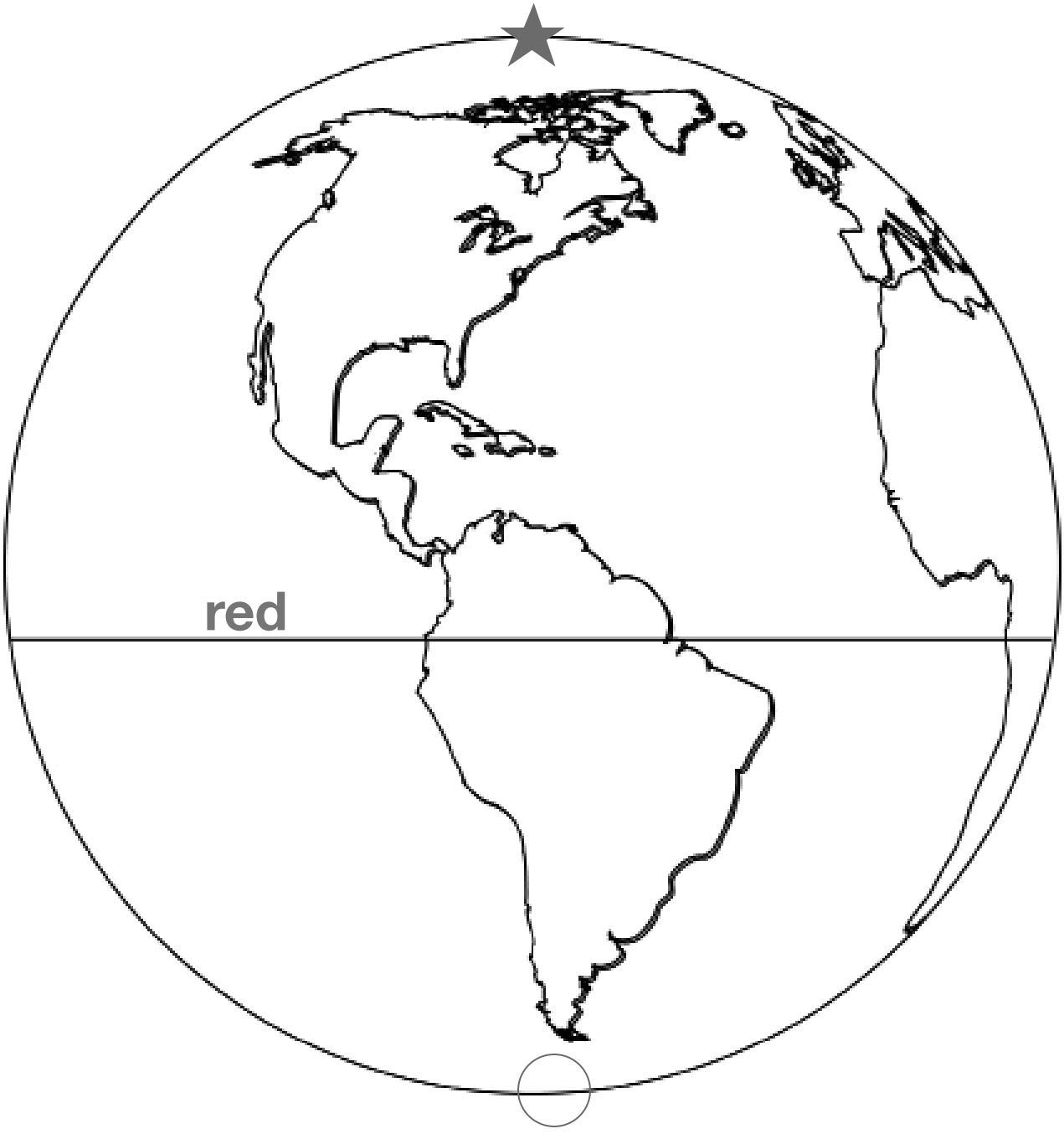
Name _____

Directions: Label the North Pole with a star and the South Pole with a circle. Label the equator by coloring it red. On the back of the paper, write a sentence and draw a picture of the most interesting thing you learned about the history of the earth.

DA-3

Name **Answer Key**

Directions: Label the North Pole with a star and the South Pole with a circle. Label the equator by coloring it red. On the back of the paper, write a sentence and draw a picture of the most interesting thing you learned about the history of the earth.



Tens Recording Chart

Use this grid to record Tens scores. Refer to the Tens Conversion Chart that follows.

Name							

Tens Conversion Chart

Number Correct

Number of Questions	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	0	10																			
2	0	5	10																		
3	0	3	7	10																	
4	0	3	5	8	10																
5	0	2	4	6	8	10															
6	0	2	3	5	7	8	10														
7	0	1	3	4	6	7	9	10													
8	0	1	3	4	5	6	8	9	10												
9	0	1	2	3	4	6	7	8	9	10											
10	0	1	2	3	4	5	6	7	8	9	10										
11	0	1	2	3	4	5	5	6	7	8	9	10									
12	0	1	2	3	3	4	5	6	7	8	8	9	10								
13	0	1	2	2	3	4	5	5	6	7	8	8	9	10							
14	0	1	1	2	3	4	4	5	6	6	7	8	9	9	10						
15	0	1	1	2	3	3	4	5	5	6	7	7	8	9	9	10					
16	0	1	1	2	3	3	4	4	5	6	6	7	8	8	9	9	10				
17	0	1	1	2	2	3	4	4	5	6	6	7	7	8	8	9	9	10			
18	0	1	1	2	2	3	3	4	4	5	6	6	7	7	8	8	9	9	10		
19	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	
20	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10

Simply find the number of correct answers the student produced along the top of the chart and the number of total questions on the worksheet or activity along the left side. Then find the cell where the column and the row converge. This indicates the Tens score. By using the Tens Conversion Chart, you can easily convert any raw score, from 0 to 20, into a Tens score.

Please note that the Tens Conversion Chart was created to be used with assessments that have a defined number of items (such as written assessments). However, teachers are encouraged to use the Tens system to record informal observations as well. Observational Tens scores are based on your observations during class. It is suggested that you use the following basic rubric for recording observational Tens scores.

9–10	Student appears to have excellent understanding
7–8	Student appears to have good understanding
5–6	Student appears to have basic understanding
3–4	Student appears to be having difficulty understanding
1–2	Student appears to be having great difficulty understanding
0	Student appears to have no understanding/does not participate

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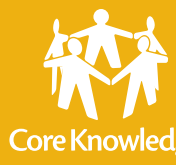

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