

FOCUS ON

ELEMENTARY



3rd Edition

Preview Booklet

Featuring Chapters from:

- Student Textbook
- Laboratory Notebook
- Teacher's Manual
- Lesson Plan
- Study Notebook
- Quizzes
- Graphics Package

Rebecca W. Keller, PhD



Introduction

Welcome to the *Focus On Elementary Geology 3rd Edition Preview Booklet* where you can take our one semester unit study program for a test run!

The materials sampled in this booklet are taken from a full semester course, with two chapters from each part of the curriculum:

- The *Focus On Elementary Geology Student Textbook–3rd Edition* provides foundational science concepts presented in a way that makes it easy for students to read and understand. The many colorful illustrations make each chapter fun to look at and reinforce concepts presented.
- With two science experiments for each chapter, the Laboratory Notebook helps young students learn how to make good observations, an important part of doing science. Open-ended questions help students think about what they are learning, and information is provided to assist students with understanding what they observed while performing their experiments.
- The Teacher’s Manual includes instructions for helping students conduct the experiments, as well as questions for guiding open inquiry. The commonly available, inexpensive materials used for all the experiments can be seen in the complete materials lists included in this booklet.
- Using the *Lesson Plan* makes it easy to keep track of daily teaching tasks. A page for each chapter in the *Student Textbook* has the objectives of the lesson and questions for further study that connect science with other areas of knowledge, such as history; philosophy; art, music, and math; technology; and language. Forms are included for students to use to do a review of material they’ve learned and to make up their own test for the chapter. Also included are icons that can be copied onto sticker sheets and used to help plan each day of the week.
- Different types of fun activities are presented in the *Study Notebook*. These help reinforce the concepts students are learning and include making observations, some simple experiments, matching, fill in the blank, cut and paste, writing, following directions, and more.
- The one final and two midterm *Quizzes* are self-explanatory. For those who are not fans of quizzes, students can use the self-test at the end of the *Lesson Plan* instead.
- Another type of teaching aid is provided in the *Graphics Package*, which has two full-color images from each chapter of the *Student Textbook*. These graphics can be used to create additional teaching aids such as flash cards, wall posters, PowerPoint lectures, or overhead projections.

FOCUS ON

Grades K-4

ELEMENTARY



3rd Edition



Rebecca W. Keller, PhD





Real Science-4-Kids

Illustrations: Janet Money maker

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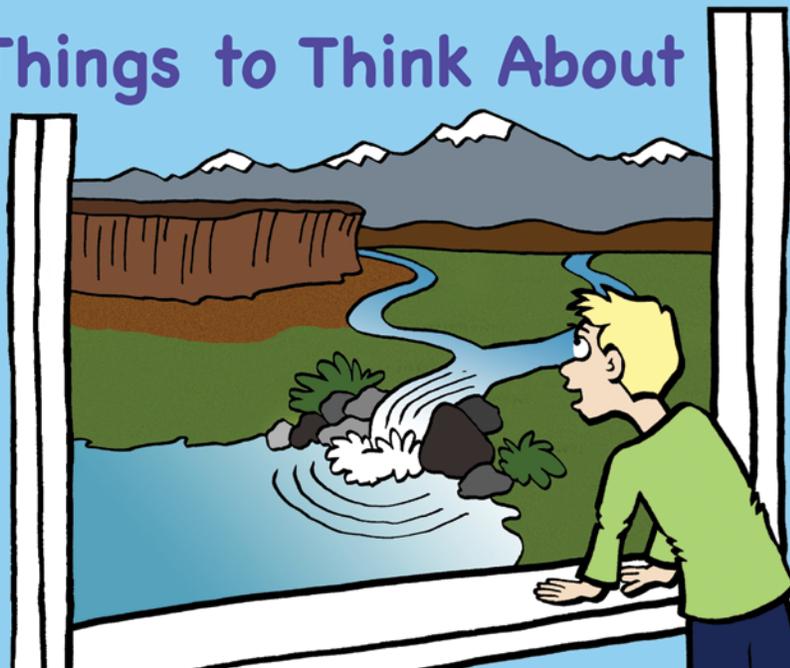
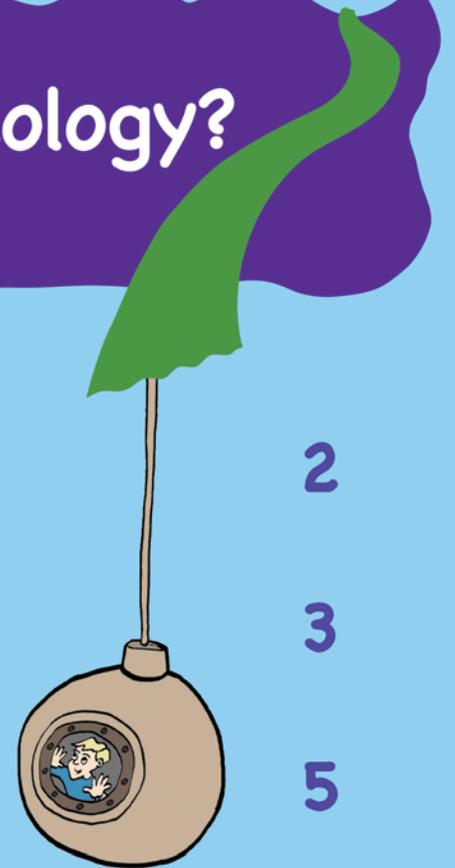
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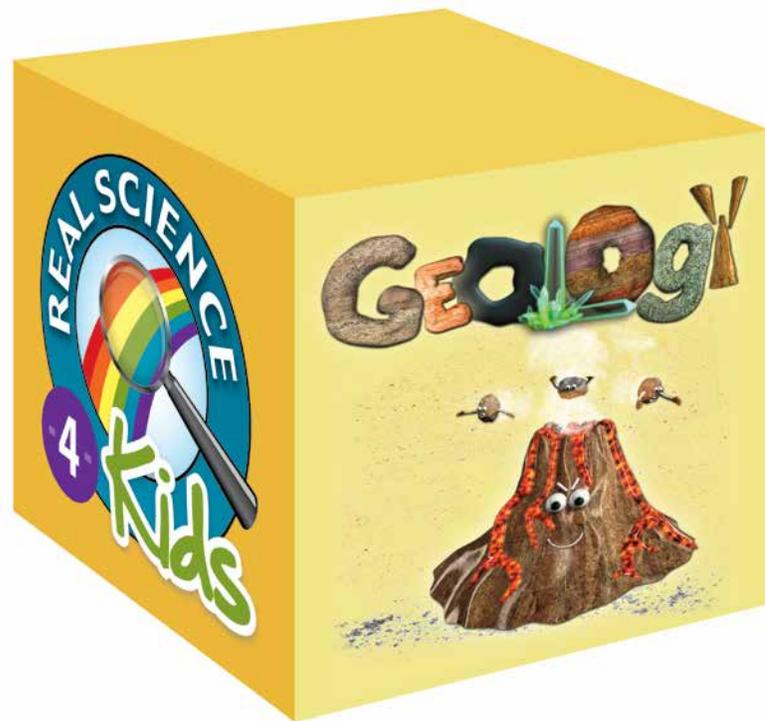
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1.1 Introduction

In this book we will take a look at the building block of science called **geology**. Geology is the study of the Earth. By studying the Earth, scientists attempt to understand what Earth is made of, how Earth came into being, how Earth has changed in the past, how it is changing now, and our role as we live on Earth.



Do you ever pick up rocks and wonder how they were made and what they are made of? Do you sometimes look at mountains and wonder how they were formed?



Have you wondered what's at the bottom of the ocean? Have you noticed how weather affects the landscape? Do you wonder why certain birds and wild animals live near you and others don't? These are all questions that are explored by scientists who study geology.

1.2 History of Geology

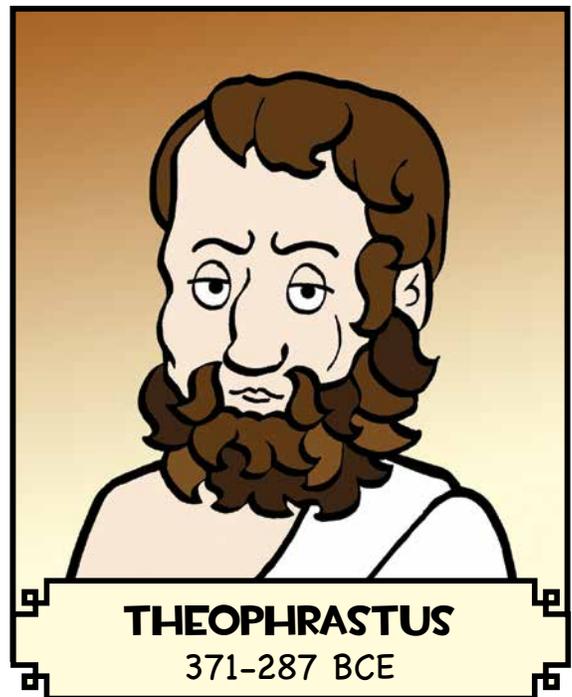
Depending on where you live, when you go outside and walk around, you'll see many different features of Earth. You might see mountains or rivers. You might see fields of dirt or fields of grass. You might see lakes or oceans, mesas or glaciers, forests or prairies.



Ancient people also saw many of the same features you see. Although lakes come and go and rivers might change course, many of the features you see today are the same features ancient people would have seen.

One of the first people to study Earth's features was the Greek philosopher **Theophrastus** who lived from about 371-287 BCE.

Theophrastus was a student of **Aristotle**, a Greek philosopher who was one of the first to study plants and animals. Like Aristotle, Theophrastus was interested in science. He studied rocks and explored what happens when rocks are heated.



Many of the first geologists also asked questions about how the Earth came into being and how many years the Earth has existed. All of these questions shaped the modern science we now call geology.

1.3 Modern Geology



Modern **geologists** continue to study rocks and what rocks are made of. They also ask questions about how mountains, rivers, and glaciers form. Modern geologists have an advantage over ancient geologists because modern geologists can use chemistry and physics to better understand how things work.

There are different kinds of modern geologists. Some modern geologists focus on the chemistry of Earth. These geologists are called **geochemists**. Geochemists study how **atoms** and **molecules** make rocks, soils, minerals, and fuels.



Other modern geologists focus on the structure of Earth. These geologists are called **structural geologists**. Structural geologists study how Earth is put together and how it changes. They are interested in how rocks change and what makes mountains and valleys.

There are also modern geologists who study how humans affect the water, air, and land quality of Earth. These geologists study Earth's environment and are called **environmental geologists**.



1.4 Everyday Geology

Even though you may not be a geologist yet, you can learn about the Earth by simply observing what happens around you.



What happens when it rains? Do the roads flood? Do you get mud slides, or does a river find a new path? What happens in the hot sun? Do you observe mud forming cracks or rocks crumbling? Have you ever been in an earthquake? Did you feel the ground move?

Paying attention to where you live, what happens during storms, and how the land around you changes over time are activities you can do every day.

1.5 Summary

- **Geology** is the study of Earth.
- The first **geologists** looked at rocks and minerals and asked questions about how Earth came into being.

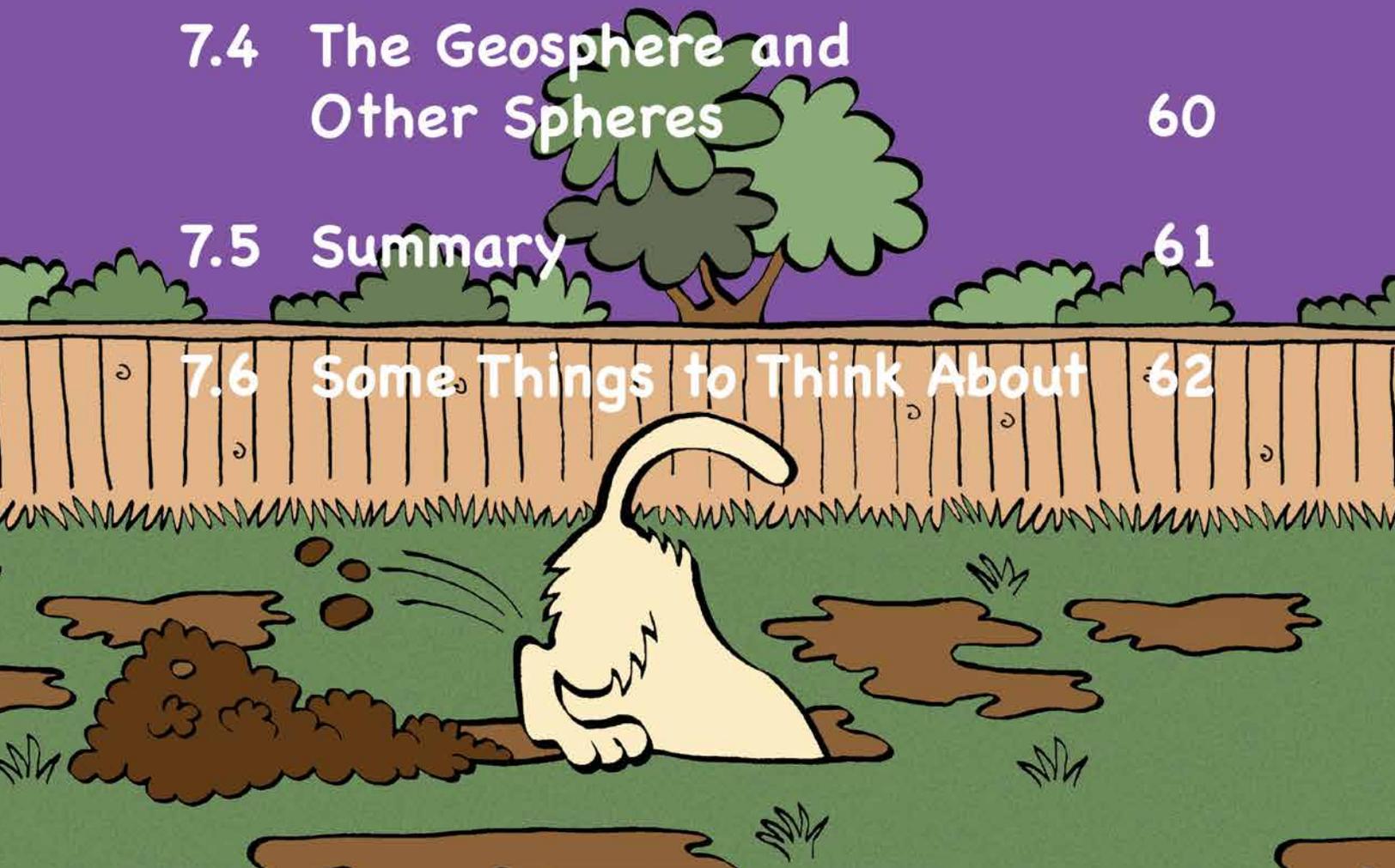
- **Geochemists** are modern **geologists** who study how **atoms** and **molecules** form Earth.
- **Structural geologists** look at how Earth is put together.
- **Environmental geologists** look at changes in the quality of the water, the air, and the land on Earth.

1.6 Some Things to Think About

- Go outside and look for rocks. How many different kinds can you see? Are they different colors? Are some smoother than others? What else can you notice?
- Go outside for a walk and look at what is around you. Write some questions about parts of the Earth you see and would like to find out more about.
- Which area of geology sounds most interesting to you? What would you like to learn about?
 - Geochemistry
 - Structural geology
 - Environmental geology
- Think about times when it has rained really hard. What changes to the Earth did you notice?

Chapter 7 The Geosphere

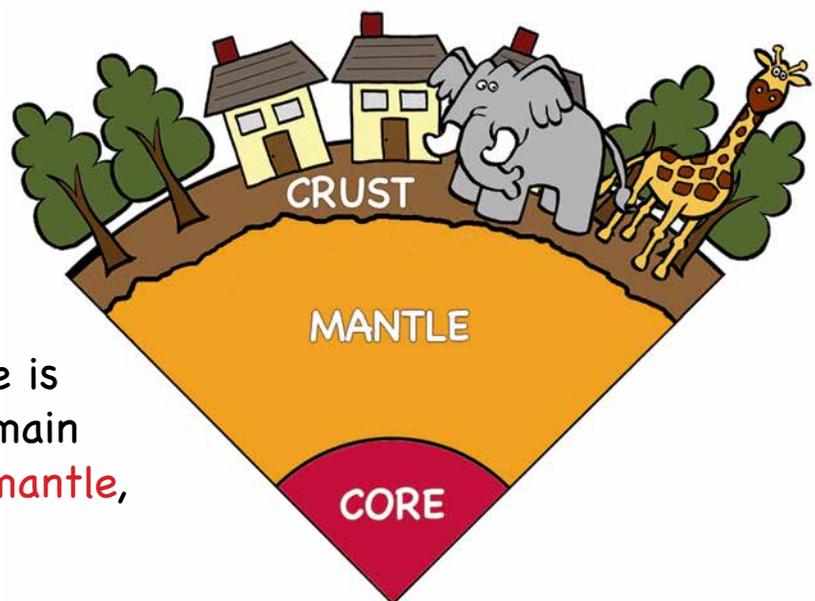
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7.1 Introduction

The term **geosphere** refers to the part of Earth that is made of rocks, minerals, and soils. The geosphere extends from the surface of Earth all the way to the very center. Geological activity occurs in the geosphere and includes earthquakes and volcanoes.

Scientists think the geosphere is made of several layers that are different from one another. One way to describe the geosphere is to divide it into three main layers: the **crust**, the **mantle**, and the **core**.

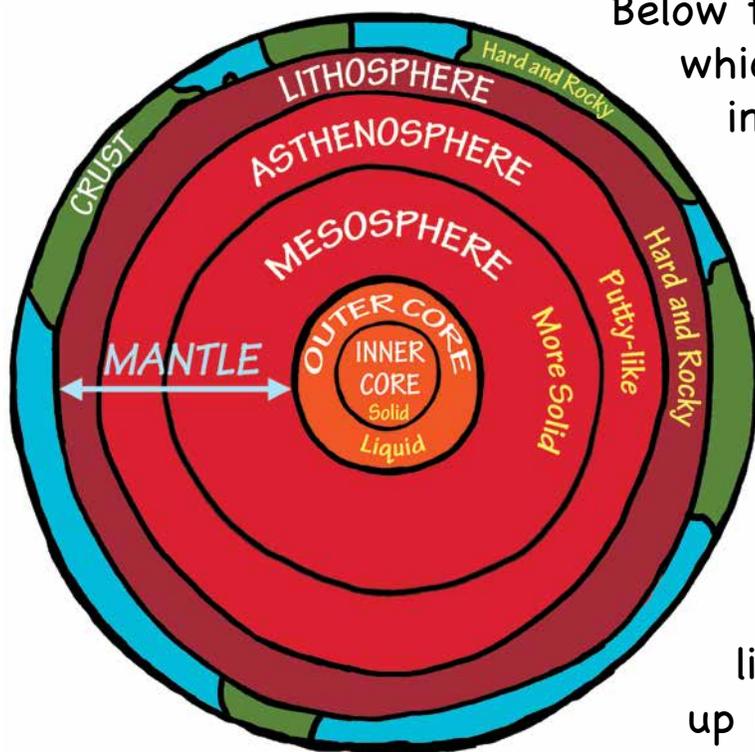


To create a more detailed picture of Earth's layers, geologists often subdivide the main layers of Earth into additional layers. This is helpful when more specific descriptions of the geosphere are needed. Scientists group and name the various layers in different ways according to what will be most helpful to them in studying the geosphere. There is no one right way to list Earth's layers. It just depends on what kinds of questions scientists want to answer.

7.2 More About Layers

Although scientists can use different names for the layers of the geosphere, in this book we will use the following names for the layers: the **crust**, the **mantle** (divided into the **lithosphere**, **asthenosphere**, and **mesosphere**), and the **core** (divided into the **outer core** and the **inner core**).

The **crust** is the outermost layer of Earth and is the part of the geosphere that we live on. The crust is hard and is made of rocks, soil, and minerals. The crust makes up mountains, the ocean floor, mesas, river beds, and other features.



Below the crust is the **mantle**, which is further subdivided into three layers called the **lithosphere**, **asthenosphere**, and **mesosphere**.

The **lithosphere** lies just below the crust and, like the crust, is a hard, rocky layer. Geologists believe the lithosphere is broken up into huge pieces called **plates**. It is thought that the lithosphere sits on top of a

soft, putty-like layer called the **asthenosphere** which is made of molten (melted) rock called **magma**. Heat in the asthenosphere causes the magma in this layer to move. As the magma moves, it carries the plates of the lithosphere along with it, causing earthquakes and volcanoes as the plates shift and push against each other.

Below the asthenosphere is the **mesosphere**. The mesosphere makes up the largest part of the mantle. Scientists believe that the mesosphere is more solid than the asthenosphere.



Below the mesosphere and at the very center of Earth is the **core**. The core is divided into the **outer core** and the **inner core**. The outer core is thought to be made of liquid rock and metal, and the inner core is thought to be solid. Since it isn't possible to drill to the center of the Earth, geologists don't

know exactly what the outer core and the inner core are like, but they can make educated guesses based on the data they collect from experiments.

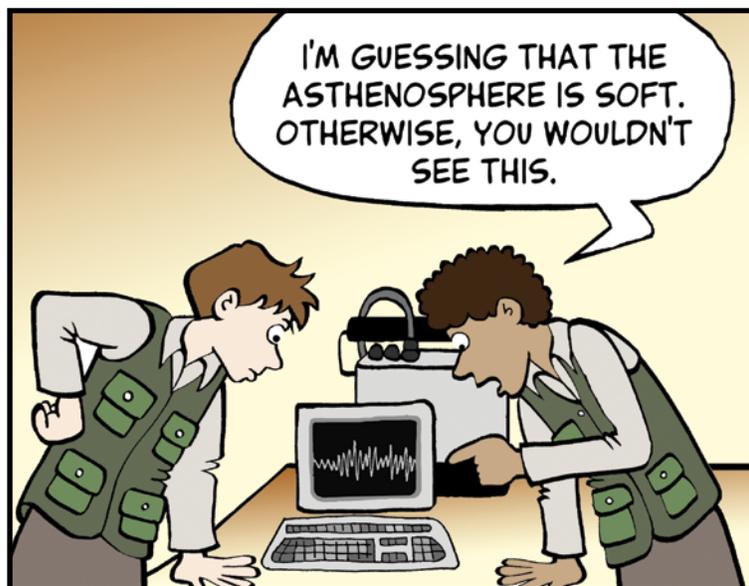


It's good to keep in mind that scientists sometimes use different groupings and names for the layers of Earth. For example, sometimes the lithosphere and asthenosphere are grouped together and called the **upper mantle** with the mesosphere being called the **lower mantle**. And at other

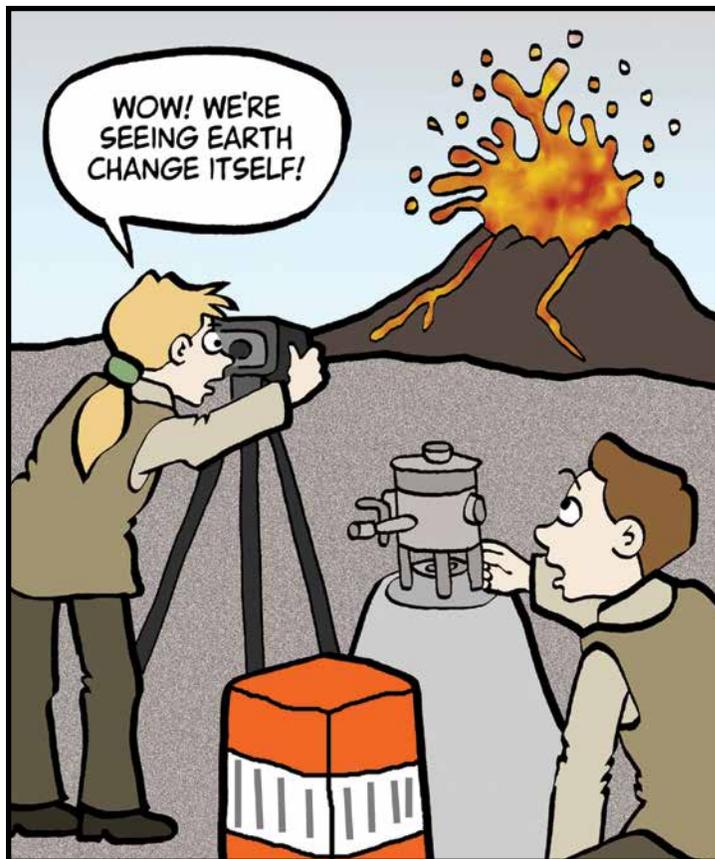
times, geologists may group the crust and lithosphere together into a layer they simply call the lithosphere.

7.3 Evidence and Guessing

There is much about the geosphere that geologists simply don't know. Because we have not been able to dig below the Earth's crust, we can't get samples of the Earth's interior. This means that some of the conclusions scientists make about how the geosphere works are more like **educated guesses**.



An educated guess is a guess based on scientific information. When there is enough information to suggest that an educated guess is correct, the guess can become a scientific theory. Sometimes an educated guess is discarded when new evidence suggests that the idea is incorrect. Either way, we gain more understanding of how the geosphere works by looking at evidence, making educated guesses, developing theories, and then discarding theories and guesses when new



information challenges old ideas.

For example, as we saw earlier, geologists have found evidence that supports the idea that the lithosphere is divided into plates and earthquakes are caused by the movement of these plates on the soft asthenosphere. Scientists also think that the magma in the asthenosphere can be forced through cracks

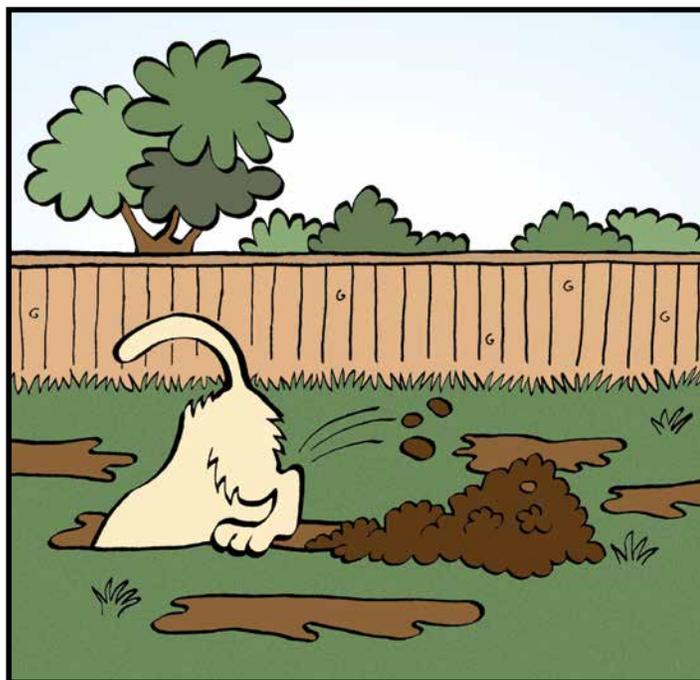
or thin places in the lithosphere, causing volcanoes to erupt.

There is no way to actually sample the lithosphere or the asthenosphere, so geologists don't know for certain that the lithosphere is hard and the asthenosphere is soft and

putty-like. However, they can use advanced tools to gather information, and based on that information they can make an educated guess about what the lithosphere and the asthenosphere are like.

7.4 The Geosphere and Other Spheres

The crust is one part of the geosphere that is affected directly by the other spheres, like the atmosphere, the biosphere, and the hydrosphere. The crust is shaped both by the lower layers of Earth where earthquakes and volcanoes begin and by wind, rain, storms, and animals.



For example, a volcano might erupt and create a tall mountain. Over time the mountain may erode and become smaller and smaller because of wind and rain. An earthquake may occur, creating a new passageway for water, and animals might build their homes in the new waterway, creating small ponds or lakes.

The magnetic field that surrounds Earth is believed to be created by the motion of liquid metals in the outer core. If Earth didn't have a core made mostly of metals, we would not have a magnetic field to form the magnetosphere.

The lower layers of the geosphere are not directly affected by the other spheres of the Earth. It doesn't rain on the asthenosphere, and animals can't dig homes in the mesosphere.

7.5 Summary

- The **geosphere** includes all the rock parts of Earth and extends from the surface of Earth all the way to the very center.
- The **geosphere** can be divided into three main layers: **crust**, **mantle**, and **core**. These main layers can be further subdivided into more layers.
- Geologists can only take samples of the outermost layer of the **geosphere** (the **crust**) and have to make **educated guesses** about the inner layers.
- The **crust** is the layer of the geosphere most affected by other spheres.

7.6 Some Things to Think About

- Have you ever created a layered cake or dessert? Describe what you did and what it looked like.
- Do you think we'll ever be able to drill to the Earth's core? Why or why not?
- How would you explain in your own words how scientists use evidence to make educated guesses
- How do you think animals change Earth's crust?

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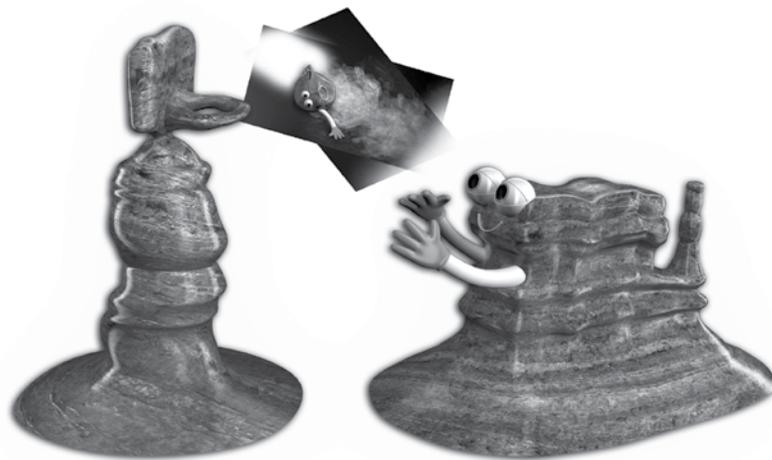
Grades K-4

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Laboratory Notebook

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Real Science-4-Kids

Illustrations: Janet Moneymaker

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A Note From the Author

Hi!

In this curriculum you are going to learn the first step of the scientific method:

Making good observations!

In the science of geology, making good observations is very important.

Each experiment in this notebook has several different sections. In the section called *Observe It*, you will be asked to make observations. In the *Think About It* section you will answer questions. There is a section called *What Did You Discover?* where you will write down or draw what you observed from the experiment. And finally, in the section *Why?* you will learn about the reasons why you may have observed certain things during your experiment.

These experiments will help you learn the first step of the scientific method and.....they're lots of fun!

Enjoy!

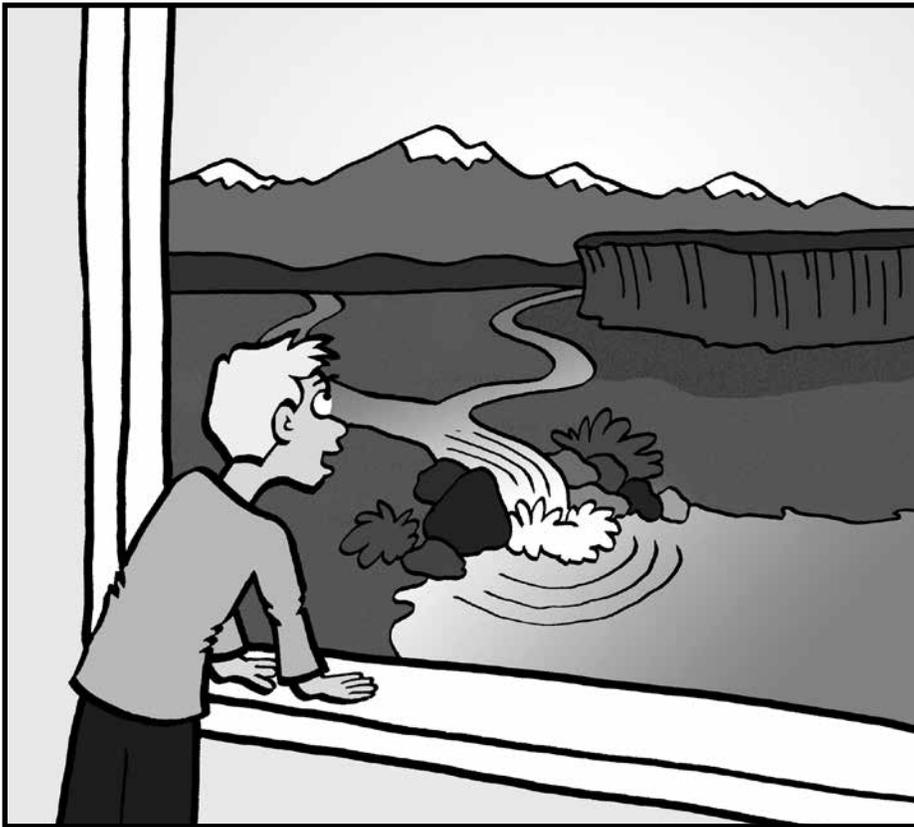
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Experiment 1

Geology Every Day



Even before geology became a science, people observed rocks and landscapes, mountains, lakes, and rivers. In this experiment you will make observations about how geology affects your daily life.

I. Think About It

Think about where you live.

❶ Do you live in a city or in the country?

❷ Is your house built with concrete, stone, brick, or some combination of these?

❸ Where did the builders find the concrete, stone, or brick for your house?

❹ Do you live near mountains or on the plains? Near a lake, the ocean, or in the desert? Describe what you think the area where you live is like.



5 What is the weather like where you live? Do you have lots of rain, tornadoes, or hurricanes? Describe some kinds of weather that happen where you live.

6 Do you live near a volcano? Are there earthquakes where you live? What do you think it is like to live in these areas?

7 How much does the geology of where you live affect your life? In what ways is your life affected?



II. Observe It

- ① Make a list of all the geological features you see in a day, such as mountains, rivers, lakes, or an ocean.

- ② Observe the weather where you live and write down what you experience—hot weather, cold weather, rain, fog, snow, drought, etc.



- ③ List the kinds of animals that live near you. Write down the names of any wildlife that you see, such as foxes, coyotes, squirrels, snakes, lizards, ants, bears, sparrows, or any other kind of wildlife.

- ④ List the types of plants that live near you. Write down the plants that grow around your home, such as green grass, flowers, cactus, or weeds.



III. What Did You Discover?

❶ Do the mountains, rivers, oceans, or plains affect the kinds of wildlife you see? Why or why not?

❷ Does the weather affect the mountains, rivers, or oceans? Why or why not?

❸ Does the kind of soil you live near affect what kinds of plants can grow? Why or why not?

❹ Does the area where you live affect the kind of house you live in? Why or why not?



IV. Why?

If you live near a volcano, or if the place where you live experiences earthquakes, you might be very aware of the geology around you. However, it is easy to forget that geology affects our daily lives even without earthquakes and volcanoes. Where your house is located, the kind of plants and animals you see, the weather you experience, and the view from your house are all determined by geology.

V. Just For Fun

Imagine what it might be like to live on the Moon. What would the landscape look like—flat, mountainous, or...? Where would you want your house to be located? What would it be made of? Would you have any weather? Would you see animals and plants, and if so, what kinds?

On the next page, draw a picture of your home on the Moon. If you would like to write down some of your ideas first, you can use the lines below.

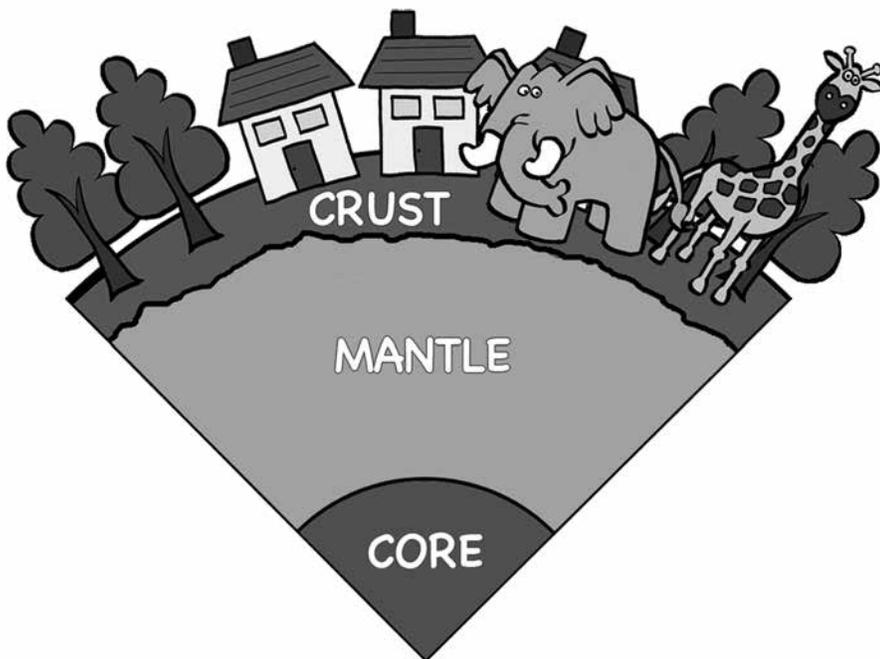


Home on the Moon

A large rectangular frame with a decorative border, intended for a drawing or illustration. The frame has a light gray background and a dark gray border with small square notches at the corners.

Experiment 7

Edible Earth Parfait



Introduction

Scientists use many different materials to make models. Do you think you could make a model of Earth and then eat it?

I. Think About It

Think about Earth and its different layers. Now imagine that Earth's layers are made of sugar, salt, flour, gelatin, graham crackers, and ice cream. What if you could make Earth from some of your favorite food items?

❶ What food items could you use to make the hard crust of an edible Earth?

❷ Would you use two different kinds of food items for an edible crust and an edible lithosphere? Why or why not?

❸ What food items could you use to make the soft asthenosphere of an edible Earth?

❹ What food items could you use to make an edible mesosphere?

❺ What food items could you use to make an edible outer core?

❻ What food items could you use to make an edible inner core?



II. Observe It

- 1 Decide which food items you will use to make an edible Earth. List each item and which of Earth's layers it represents.

- 2 Is your modeling of Earth limited by the food items that are available to you? Why or why not?

- 3 Take a tall, clear glass and assemble the layers of your edible Earth in the same order they are found in the Earth.

- 4 When you finish assembling your edible Earth, observe how well the layers remain separate. Note if any layers are moving down the sides and mixing with other layers. Also note if layers that are more solid behave differently than softer layers.

- 5 Eat your Edible Earth Parfait before it melts!

- 6 Look up the word *parfait*. Does your Edible Earth qualify as a parfait? Why or why not?



III. What Did You Discover?

❶ How many layers did you make? _____

❷ Why did you decide on this number of layers?

❸ Was it easy or difficult to assemble the layers? Why or why not?

❹ Did any of the layers overlap or mix into one or another? Why or why not?

❺ Did the layers change over time as you were assembling them? Why or why not?

❻ Do you think doing this experiment helped you better understand Earth's layers? Why or why not?



IV. Why?

Creating a model is a great way to explore the educated guesses about how Earth might be layered. Making a model is helpful in gaining an understanding of how Earth's layers could fit together and might change. Even though the food items you used to build an edible Earth are very different from the actual materials that make up the Earth, you may be able to observe some similar events.

For example, if you used a top crust made of graham crackers, an outer core of hot fudge, and a mesosphere and asthenosphere of ice cream, it's possible that some of the ice cream melted into the hot fudge. Geologists don't know if layers move into each other at Earth's core, but because layers in models behave this way, it can be seen as a good educated guess. Also, the ice cream in the middle may melt and push through small cracks in the graham cracker crust above. This is similar to what happens when lava pushes through the Earth's crust. By observing what happens in models, even edible models like an Earth parfait, scientists are able to make educated guesses about what happens with Earth's layers.

V. Just For Fun

Make an Inedible Earth Parfait! Review the questions in *I. Think About It* and decide what inedible items you could use for each layer. In the following box draw your Inedible Earth Parfait and label each layer with the materials you used.



Inedible Earth Parfait

A large rectangular frame with decorative corners, intended for a drawing or notes.



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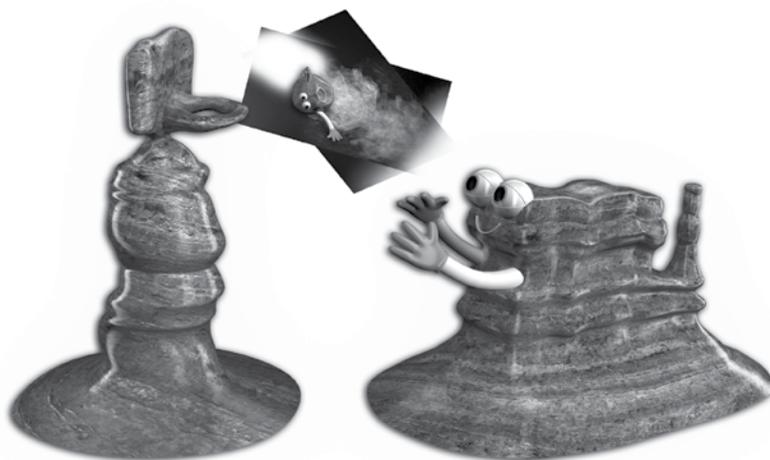
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Rebecca W. Keller, PhD





Real Science-4-Kids

Illustrations: Janet Money maker

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www.realscience4kids.com



A Note From the Author

This curriculum is designed to provide an introduction to geology for students in the elementary level grades. *Focus On Elementary Geology—3rd Edition* is intended to be used as the first step in developing a framework for the study of real scientific concepts and terminology in geology. This *Teacher's Manual* will help you guide students through the series of experiments in the *Laboratory Notebook*. These experiments will help the students develop the skills needed for the first step in the scientific method — making good observations.

There are several sections in each chapter. The section called *Observe It* helps the students explore how to make good observations. The *Think About It* section provides questions for the students to think about and use to make further observations. In every chapter there is a *What Did You Discover?* section that gives the students an opportunity to summarize the observations they have made. A section called *Why?* provides a short explanation of what students may or may not have observed. And finally, in each chapter there is a section called *Just For Fun* that contains an additional activity.

The experiments take up to 1 hour. The materials needed for each experiment are listed on the next page and also at the beginning of each experiment.

Enjoy!

Rebecca W. Keller, PhD

Materials at a Glance

| Experiment 1 | Experiment 3 | Experiment 4 | Experiment 5 | Experiment 6 |
|--|--|--|--|--|
| colored pencils | small shovel or garden trowel | baseball or similar hard-centered ball | 2 liters (8 cups) or more of dirt for mud pies | a toy, small music box, or toy car that can be taken apart |
| Experiment 2 | small pail or plastic container | balloon | 1.75 liters (7 cups) or more of water | a second similar item that can be taken apart |
| measuring cup | dirt that contains rocks (.25 liter [1 cup]) | water | 15 milliliters (1 Tbsp.) baking soda | screwdriver |
| plastic hammer | 1 tall clear glass container (approx. size: .5 liter [2 cups]) | piece of string to tie balloon closed | 15 milliliters (1 Tbsp.) vinegar | small hammer |
| regular metal hammer | flour (60 ml [1/4 cup]) | colored pencils | measuring cup | other tools as needed |
| 3 pieces of banana | water | Optional | measuring spoon | |
| 3 hardboiled eggs in the shell | cake mix and items needed to make the cake | funnel | 3 containers (about 1.75 liter [7 cups] size) | |
| 3 raw potato halves | nuts, gumdrops, chocolate chips, and/or M&Ms | | spoon | |
| 3 rocks of the same type and size (students can collect these) | | | garden trowel | |
| safety glasses | | | bucket | |
| Optional | | | paper | |
| 8 pieces of paper | | | marking pen | |
| marking pen | | | pencil | |
| | | | colored pencils | |

| Experiment 7 | Experiment 8 | Experiment 9 | Experiment 10 | Experiment 12 |
|---|-----------------------|---|--|--|
| 2 clear, tall glasses (drinking or parfait glasses) | outdoor thermometer | 3 Styrofoam cups: 355 ml (12 oz.) size | pencil | seeds (student selected) |
| spoon (1 or more) | helium-filled balloon | about 240 ml (1 cup) each: | colored pencils | a garden bed or containers and potting soil |
| 3-6 student-chosen food items for parfait model of Earth's layers (such as: graham crackers, peanut brittle, cookies, hot fudge, Jell-O, pudding, ice cream, cream cheese, cherry, nut, jelly bean, etc.) | string | sand | Experiment 11 | tools for tending plants |
| student-chosen inedible items that can be used to build a parfait model of Earth's layers (such as: rocks, mud, dirt, clay, dog or cat food, Legos, etc.) | | pebbles | 2 bar magnets (narrow magnets work best) | herb seeds or small herb plants (student selected) |
| colored pencils | | small rocks | small, flat-bottomed, clear plastic box (big enough for 2 magnets to fit underneath with some space around them) | |
| | | 3 containers for collecting sand, pebbles, and small rocks | corn syrup | |
| | | garden trowel or small shovel | iron filings, about 5 ml (1 teaspoon)** | |
| | | pencil | Optional | |
| | | 1-2 measuring cups | tape | |
| | | water | 2 plastic bags for collecting iron filings | |
| | | enough dirt, pebbles, rocks, water, etc. to make a mud city | | |
| | | Optional | | |
| | | stopwatch or clock with second hand | | |

* Student-collected or purchased from a place that sells aquarium supplies

** See *Experiment* section for how students can collect iron filings — or iron filings may be purchased at www.hometrainingtools.com

Materials: Quantities Needed for All Experiments

| Equipment | Materials | Foods |
|---|---|--|
| baseball or similar hard-centered ball box, small, flat-bottomed, clear plastic (big enough for 2 magnets to fit underneath with some space around them) bucket containers (about 1.75 liter [7 cups] size), 3 containers for collecting sand, pebbles, and small rocks, 3 garden bed, or containers and potting soil garden trowel glass container, clear, tall (approx. size: .5 liter [2 cups]) glasses (drinking or parfait glasses), clear, tall, 2 hammer, metal hammer, plastic hammer, small magnets, bar, 2 (narrow magnets work best) measuring cup, 1-2 measuring spoons pail, small, or plastic container safety glasses screwdriver shovel, small, or garden trowel spoon thermometer, outdoor tools, misc. as needed tools for tending plants toy, small music box, or toy car that can be taken apart, 2 Optional bags, plastic, for collecting iron filings, 2 funnel stopwatch or clock with second hand | balloon balloon, helium-filled cups, Styrofoam, 355 ml (12 oz.) size, 3 dirt for mud pies, 2 liters (8 cups) or more dirt that contains rocks (.25 liter [1 cup]) dirt, pebbles, rocks, water, etc. to make a mud city inedible items, student-chosen, that can be used to build a parfait model of Earth's layers (such as: rocks, mud, dirt, clay, dog or cat food, Legos, etc.) iron filings, about 5 ml (1 teaspoon) [see <i>Experiment</i> section for how students can collect iron filings. Or iron filings may be purchased: www.hometrainingtools.com] paper pebbles, about 240 ml (1 cup)* pen, marking pencil pencils, colored rocks, 3 of the same type and size (students can collect these) rocks, small, about 240 ml (1 cup)* sand, about 240 ml (1 cup)* seeds (student selected) seeds, herb, or small herb plants (student selected) string water Optional paper, 8 pieces pen, marking tape | baking soda, 15 milliliters (1 Tbsp.) banana, 3 pieces cake mix and items needed to make the cake corn syrup eggs, hardboiled in the shell, 3 flour (60 ml [1/4 cup]) food items, student-chosen, such as: graham crackers, peanut brittle, cookies, hot fudge, Jell-O, pudding, ice cream, cream cheese, cherry, nut, jelly bean, etc. foods, assorted, such as nuts, gumdrops, chocolate chips, and/or M&Ms potato halves, raw, 3 vinegar, 15 milliliters (1 Tbsp.) |

* Student-collected or purchased from a place that sells aquarium supplies

Contents

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Experiment 1

Geology Every Day

Materials Needed

- colored pencils

Objectives

In this experiment students will explore their surroundings and observe how geology affects their daily lives.

The objectives of this lesson are:

- To encourage students to observe their surroundings.
- To help students explore the different aspects of geology (rock-part, air-part, water-part, and bio-part) and note how these aspects are interconnected.

Experiment

I. Think About It

Read this section of the *Laboratory Notebook* with your students.

Have the students think about where they live. Help them think about their local surroundings, noting the weather, types of wildlife, landforms, and any other features that stand out.

- ①-⑦ Have them answer the questions in this section. There are no right answers for these questions. Just allow the students to explore their own ideas about the geology of their surroundings.

II. Observe It

Read this section of the *Laboratory Notebook* with your students.

- ①-④ Have your students make a list of all the geological features they see in a day. They can make the list as they travel during the day, or they can take a walk outside and make observations.

They are directed to make lists that include the various types of geological aspects: rock-part, water-part, air-part, and bio-part. Have them note features such as parks, trees, lakes, rivers, mountains, the weather, and any other features that stand out.

III. What Did You Discover?

Read the questions with your students.

- ①-④ Have the students answer the questions. These can be answered orally or in writing. Again, there are no right answers and their answers will depend on what they actually observed.

IV. Why?

Read this section of the *Laboratory Notebook* with your students.

Discuss any questions that might come up.

V. Just For Fun

Read this section of the *Laboratory Notebook* with your students.

Help the students think about the various aspects of geology they have explored in this experiment and what those features might be like on the Moon.

Have them draw their ideas and encourage them to use their imagination. There are no right or wrong ideas in this exercise.

Experiment 7

Edible Earth Parfait

Materials Needed

- 2 clear, tall glasses (drinking or parfait glasses)
- spoon (1 or more)
- 3–6 student-chosen food items that can be used to build a parfait model of Earth's layers (such as: graham crackers, peanut brittle, cookies, hot fudge, Jell-O, pudding, ice cream, cream cheese, cherry, nut, jelly bean, etc.)
- student-chosen inedible items that can be used to build a parfait model of Earth's layers (such as: rocks, mud, dirt, clay, dog or cat food, Legos, etc.)
- colored pencils

Objectives

In this experiment, students will explore how models help scientists make educated guesses about how things work.

The objectives of this lesson are for students to:

- Use suitable tools to study an object.
- Observe how tools help scientists make better observations.

Experiment

I. Think About It

Read this section of the *Laboratory Notebook* with your students.

Help your students think about different foods they could use for the crust, lithosphere, asthenosphere, mesosphere, outer core, and inner core. Students may combine layers with similar qualities. Solid, thin food items like crackers, peanut brittle, or cookies might be good items for the crust. Softer food items like hot fudge, Jell-O, pudding, or ice cream might be good items for the inner layers. A cherry, nut, jelly bean, or similar item could be used for the inner core. Help your students think about the consistency of different foods and whether or not they might make a good representation of a particular layer of an edible Earth.

Explore open inquiry with the following:

- *What are some solid food items you like?*
- *What are some soft food items you like?*
- *What are some combinations of food items you like?*
- *How well do you think different food items will fit together and taste?*
- *Which layers of Earth do you want to include in your parfait? All of them? If not all, which ones? Why?*
- *Which layers would you represent with solid (hard) food? Which would you make with softer foods? Why?*

II. Observe It

Read this section of the *Laboratory Notebook* with your students.

- 1 Help the students plan a layered Edible Earth Parfait. This experiment requires that the students use a variety of food items. Guide students to pick foods that work for you and for them. Have them list the foods and which layer each food represents.
- 2 Have students think about whether they were able to find foods to represent the properties of the different the layers of Earth.
- 3-4 Have the students assemble their Edible Earth Parfait and make careful observations about it. Help them observe whether the layers are interacting.
- 5 The students can now eat their model of Earth's layers.
- 6 Have the students look up the definition of parfait in a dictionary or online. Ask them if they think their edible Earth model fits the definition of a parfait. Why or why not?

III. What Did You Discover?

Read this section of the *Laboratory Notebook* with your students.

Have the students answer the questions. There are no right answers, and their answers will depend on what they actually observed.

IV. Why?

Read this section of the *Laboratory Notebook* with your students.

Discuss any questions that might come up.

V. Just For Fun

Have the students review the *Think About It* section and choose inedible items to create another model of Earth's layers. A box is provided for them to draw and label their model. Have them observe any similarities or differences between the edible and inedible models. Are the layers interacting in this model?

FOCUS ON

Grades K-4

ELEMENTARY



LESSON PLAN
3rd Edition



Rebecca W. Keller, PhD





Real Science-4-Kids

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Focus On Elementary Geology Lesson Plan—3rd Edition

Published by Gravitas Publications Inc.
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www.realscience4kids.com



LESSON PLAN INSTRUCTIONS

This *Lesson Plan* accompanies *Focus On Elementary Geology Student Textbook, Laboratory Notebook, and Teacher's Manual—3rd Edition*. It is designed to be flexible to accommodate a varying schedule as you go through the year's study. And it makes it easy to chart weekly study sessions and create a portfolio of your student's yearlong performance. The PDF format allows you to print pages as you need them.

This Lesson Plan file includes:

- Weekly Sheets
- Sticker Templates
- Self-Review Sheet
- Self-Test Sheet

Materials recommended but not included:

- 3-ring binder
- Indexing dividers (3)
- Labels—24 per sheet, 1.5" x 1.5" (Avery 22805)

Use the Weekly Sheets to map out daily activities and keep track of student progress. For each week you decide when to read the text, do the experiment, explore the optional connections, review the text, and administer tests. For those families and schools needing to provide records of student performance and show compliance to standards, there is a section on the Weekly Sheets that shows how the content aligns to the National Science Standards.

To use this Lesson Plan:

- Print the Weekly Sheets
- Print Self-Review Sheets
- Print Self-Test Sheets
- Print the stickers on 1.5" x 1.5" labels
- Place all the printed sheets in a three-ring binder separated by index dividers

At the beginning of each week, use the squares under each weekday to plan your daily activities. You can attach printed stickers to the appropriate boxes or write in the daily activities. At the end of the week, use the Notes section to record student progress and performance for that week.

WEEKLY LESSON PLAN SAMPLES

LESSON PLAN—Exploring the BUILDING BLOCKS of SCIENCE BOOK 1
CHAPTER 1: WHAT IS SCIENCE?

Week _____

| | | | | |
|-------------|-------------------|--------------------|---------------|-------------|
| Monday | Tuesday | Wednesday | Thursday | Friday |
| READ | EXPERIMENT | CONNECTIONS | REVIEW | TEST |

Objectives To introduce students to the basic building blocks of science: chemistry, biology, physics, geology, and astronomy.

Educational Standard* Content Standard A: Science as Inquiry—Grade K-4
Scientists experiment to investigate and develop explanations.

*From the National Science Educational Standards (1996) and the Framework for K-12 Science Education (2012) National Academies Press

Activity
 Laboratory Experiment 1
 Other _____

Connections
 Ask your child about their own history. When were they born? Where were they born? What time were they born? Explain that this is their "history" and that science also has a history.

History

Philosophy Look up the word "philosophy" in a dictionary, encyclopedia, or online resource. Discuss the meaning of the word "philosophy."

Art, Music, Math Pick one area and discuss how science is connected to art, music, or math. For example, scientists use math to understand data, artists use points that are made with chemistry, understanding sound helps us make music, and so on.

Technology Discuss how the understanding of science helped people invent the airplane, computer, or cell phone.

Language Look up the word science in a dictionary, encyclopedia, or online resource. Discuss the meaning of the word science.

Assessment
 Self-review
 Self-test
 Other _____

Notes *This week we decided to explore the art connection. We looked up the chemistry of red paint and found out what makes it red. This was a great week - lots of fun!*

Here is a sample of a normal week.

The recommended sequence is

- 1 - Read the student textbook on the first day.
- 2 - Do the laboratory experiment on the second day.
- 3 - Pick one or more connections to explore on the third day.
- 4 - Do the self-review sheet on the fourth day.
- 5 - Administer the self-test or another exam on the fifth day.



Here is a sample of a week with other activities

- 1 - Find at least one day to READ the text.
- 2 - Find a day to perform the EXPERIMENT.
- 3 - Find a day to do the REVIEW or TEST.

Any activity that is missed can be rescheduled for the following week. However, keep to the main sequence of reading the text, doing the experiment, and reviewing what has been covered. If an activity needs to be missed, choose the CONNECTIONS or SELF-TEST.



LESSON PLAN—Exploring the BUILDING BLOCKS of SCIENCE BOOK 1
CHAPTER 1: WHAT IS SCIENCE?

Week _____

| | | | | |
|-------------|-----------------|-------------------|-------------------|---------------|
| Monday | Tuesday | Wednesday | Thursday | Friday |
| READ | BIRTHDAY | EXPERIMENT | FIELD TRIP | REVIEW |

Objectives To introduce students to the basic building blocks of science: chemistry, biology, physics, geology, and astronomy.

Educational Standard* Content Standard A: Science as Inquiry—Grade K-4
Scientists experiment to investigate and develop explanations.

*From the National Science Educational Standards (1996) and the Framework for K-12 Science Education (2012) National Academies Press

Activity
 Laboratory Experiment 1
 Other _____

Connections
 Ask your child about their own history. When were they born? Where were they born? What time were they born? Explain that this is their "history" and that science also has a history.

History

Philosophy Look up the word "philosophy" in a dictionary, encyclopedia, or online resource. Discuss the meaning of the word "philosophy."

Art, Music, Math Pick one area and discuss how science is connected to art, music, or math. For example, scientists use math to understand data, artists use points that are made with chemistry, understanding sound helps us make music, and so on.

Technology Discuss how the understanding of science helped people invent the airplane, computer, or cell phone.

Language Look up the word science in a dictionary, encyclopedia, or online resource. Discuss the meaning of the word science.

Assessment
 Self-review
 Self-test
 Other *Oral quiz*

Notes *We had a birthday this week and decided to go on the field trip. We did the self-review and I had the kids take an oral quiz in the car on the way home from the field trip.*

Week _____

CHAPTER 1: WHAT IS GEOLOGY?

Monday

Tuesday

Wednesday

Thursday

Friday

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

Objectives To introduce students to the scientific discipline of geology.

Educational Standard* **Content Standard 2-ESS1.C**
Some events happen quickly; others occur slowly over time.

*From the Next Generation Science Standards (NGSS)

Activity

- Laboratory Experiment 1
- Other _____

Connections

- History Explore how the history of the student's neighborhood, city, or local area has changed over time. Discuss whether these changes are due to changes in the Earth's landscape, e.g., rivers, eroding mountains, earthquakes, mud slides, etc.
- Philosophy Look up the philosopher Theophrastus on the internet or in the library. Discuss how Theophrastus studied rocks and minerals.
- Art, Music, Math Discuss how geology inspires artists, and how photography is used to explore Earth's natural habitats.
- Technology Explore how students can study Earth by making observations while riding in the car. How could they use these observations to take walks outdoors?
- Language Look up the word *geology* in a dictionary, encyclopedia, or online resource. Discuss the meaning of the word *geology*.

Assessment

- Self-review
- Self-test
- Other _____

Notes



Week _____

CHAPTER 7: THE GEOSPHERE

| Monday | Tuesday | Wednesday | Thursday | Friday |
|--------|---------|-----------|----------|--------|
| | | | | |

Objectives To give students an overview of the geosphere.

Educational Standard* **Content Standard K-2-ETS1.C**
It is useful to compare and test designs.

*From the Next Generation Science Standards (NGSS)

Activity

- Laboratory Experiment 7
- Other _____

Connections

- History** Explore how our understanding of the geosphere has changed over time.
- Philosophy** Explore how educated guesses help us understand the geosphere.
- Art, Music, Math** Explore how artists use the concept of layers in their artworks.
- Technology** Discuss how modern technology helps geologists study the geosphere.
- Language** Look up the word *lithosphere* in a dictionary or encyclopedia.
Discuss the meaning of the word *lithosphere*.

Assessment

- Self-review
- Self-test
- Other _____

Notes



READ



READ



READ



READ



REVIEW



REVIEW



REVIEW



REVIEW



EXPERIMENT



EXPERIMENT



EXPERIMENT



EXPERIMENT



CONNECTIONS



CONNECTIONS



CONNECTIONS



CONNECTIONS



TEST



TEST



TEST



TEST



READ



READ



READ



READ



HOLIDAY



HOLIDAY



HOLIDAY



HOLIDAY



FIELD TRIP



FIELD TRIP



FIELD TRIP



FIELD TRIP



BIRTHDAY



BIRTHDAY



BIRTHDAY



BIRTHDAY



REST DAY



REST DAY



REST DAY



REST DAY



REST DAY



REST DAY



REST DAY



REST DAY



SICK DAY



SICK DAY



SICK DAY



SICK DAY



FOCUS ON

Grades K-4

ELEMENTARY



STUDY NOTEBOOK
3rd Edition



Rebecca W. Keller, PhD



(Print this page and glue to the front of your Study Notebook.)



Real Science-4-Kids

Illustrations: Janet Money maker

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Focus On Elementary Geology Study Notebook—3rd Edition

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FOCUS ON ELEMENTARY GEOLOGY STUDY NOTEBOOK

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This Study Notebook has activities for you to do that will help you learn the ideas presented in each chapter of the Student Textbook.

Materials you will need

- 8.5 x 11 white paper
- color printer
- scissors
- glue or clear tape
- colored pencils
- 1 manila file folder
- 3 brad paper fasteners or 3-ring binder
- 3-hole punch

STEP 1 Printing

- Download the Study Notebook file for the chapter you are reading.
- Use the printer settings: portrait, letter, 8.5 x 11.
- Print the pages single sided.

STEP 2 Activities

- The little blue boxes on the left-hand side of the main pages show you which section of the Student Textbook has the information for that activity.
- For the chapter you are studying, do the activities on the two main pages (those that have page numbers at the bottom): fill in the blanks, answer questions, and follow the directions for other types of activities.
- On the **Stuff to Cut Out** pages, follow the directions for cutting out the pieces and gluing or taping them to the main pages.

STEP 3 Make the Study Notebook pages into a Book

- Cut the file folder in half along the fold.
- Use a 3-hole punch to make holes along the cut edge of the file folder pieces.
- Use the two pieces for the front and back covers.
- As you complete each chapter, punch holes in the pages and insert them between the front and back covers of your Study Notebook.

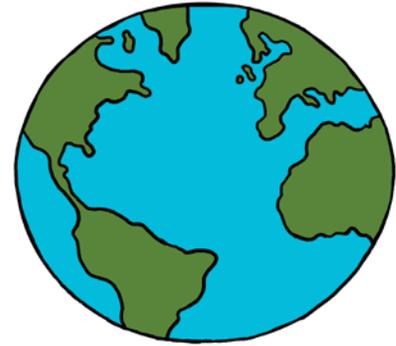


This is **YOUR** book! Add color to the pages along with doodles, squiggles, and notes in the margins. The backs of the pages are great for writing observations and ideas. Add your own pages with more ideas, observations, questions, science news you have heard about, and anything else you want to remember.

1. What Is Geology?

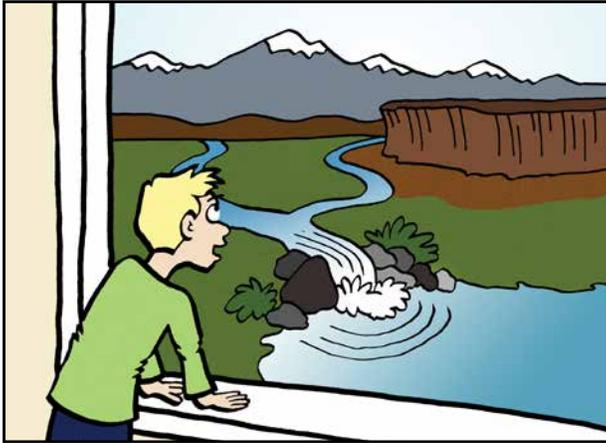
Geology

is the st _ d _
of the **EARTH!**



1.1

Punch holes on this edge.



What **features of EARTH**
do **YOU** see in this drawing?

M _ _ nta _ n _

Ri _ _ rs

L _ ke

Pl _ _ ts

Do **YOU** think **GEOLOGISTS** study **ALL** of
these **features of EARTH**?

NO!

YES!

1.2

Glue **TAB 1.2** Here



TH _ _ PHRA _ _ US!

What are some questions **YOU**
want to **ask** about **GEOLOGY**?

(Hint—walk around outside and
wonder about what you see.)

1.3 Name that geologist!

Follow the instructions on the next page.

Punch holes on this edge.



Which one of these **geologists** do **YOU** think has the most interesting things to study? Why?

1.4

Be a GÉOLOGIST!

Every day this week when you go outside or look out a window, observe what is around you. What things do you observe that might be studied by a geochemist? By a structural geologist? By an environmental geologist? Record your ideas on the back of this page.

Stuff to Cut Out for Chapter 1

Cut out the piece below on the solid outline. Put glue on the back of the yellow **TAB 1.2** bar. Fasten this piece to the green **Glue TAB 1.2 Here** bar on page 1.

TAB 1.2

It's Ancient History!

WHO AM I?

I live in Gr _ _ ce in ancient times.

I am a student of Ar _ st _ _ le.

I am interested in science.

I like studying rocks and what happens to rocks that are heated.

I ask lots and lots of Q _ _ _ _ _ _ _ _ _ _ !

Name that geologist!

Cut out the three pieces that have a **Geologist TAB**. Match each geologist's description to the correct picture on page 2. Put glue on the back of the yellow **Geologist TAB** bar. Fasten this piece to the correct green **Glue Geologist TAB Here** bar on page 2.

Geologist TAB

Who Am I?

I love to learn how things are put together, and I love the Earth!

I study how rocks change and what makes mountains and valleys.

I'm a

**STR _ _ _ UR _ L
G _ _ _ _ _ IST**

Geologist TAB

Who Am I?

I love to learn how humans interact with the Earth that we all love!

I study how humans affect Earth's water, air, and land quality.

I'm an

**ENV _ _ _ _ MENTAL
G _ _ _ _ _ IST**

Geologist TAB

Who Am I?

I love chemistry, and I love the Earth!

I study the atoms and molecules in rocks, soils, minerals, and fuels.

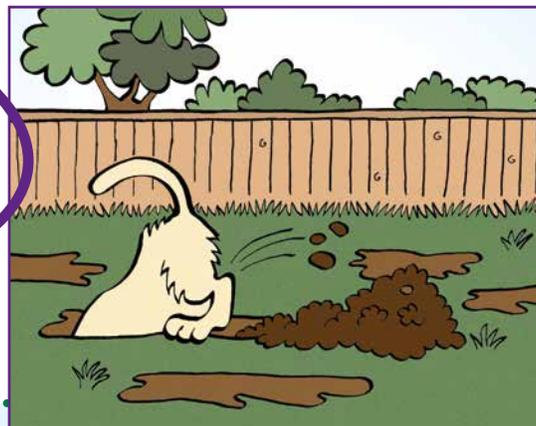
I'm a

G _ _ CH _ _ IST

7. The Geosphere!

7.1

What is the **PART** of the **EARTH** that is made of **rocks, minerals, and soils?**



7.1



How is the **GE _ S _ _ _ _** like a birthday cake?

It has **L _ _ _ _ !**

7.2

The main layers of the **GE _ S _ _ _ _** are called the **CR _ _ _**, the **ma _ _ _**, and the **C _ _ _**.

Which **main layers** of the **GE _ S _ _ _ _** are divided into **more layers?** _____

7.2

Glue TAB 7.2 Here

What have **you** discovered about **THE CORE?**



Divide the **CORE** into its **2 layers**. Color and label the **2 layers**.

The **layers** of the **CORE!**

Name _____

Description _____

Name _____

Description _____

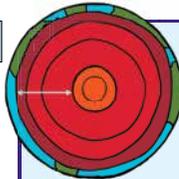
What does the **CORE** have to do with **EARTH'S magnetic field?**

(Write your answer over **THERE**.)

Punch holes on this edge.

Punch holes on this edge.

7.2



Draw a line from the layer of the mantle to its description. Some layers have more than one description.

lithosphere

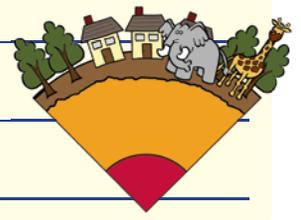
asthenosphere

mesosphere

- soft, putty-like
- cracked into plates
- made of molten rock called magma
- the largest part of the mantle
- hard and rocky
- its moving magma causes Earth's plates to move

7.4

Why do **YOU** think the **CRUST** is the **layer** of the **GE _ S _ _ _** that is **most affected** by other **spheres** of the **Earth**?



Do **YOU** think the **MANTLE** can affect the **CRUST**? If so, **how**?

(Write your answer on the back of the page. Add some drawings.)

7.3

Glue **TAB 7.3** Here

7.4

Be a geologist!

Do this little experiment.



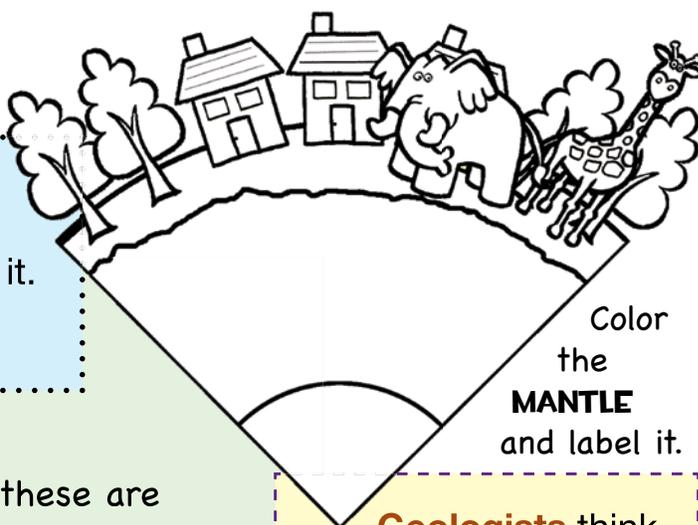
1. Go outside and walk around your neighborhood. Observe ways in which the geosphere has been changed. For example, you might notice that the bottom of a house goes into the ground, and you might make an educated guess that a hole was dug in the geosphere for building the house.
2. What caused each change to the geosphere? Humans? Animals? Water? Weather? Something else? Did this change happen recently or long ago?
3. How many changes can you observe? Record your observations in writing and drawings on separate paper.

7.3

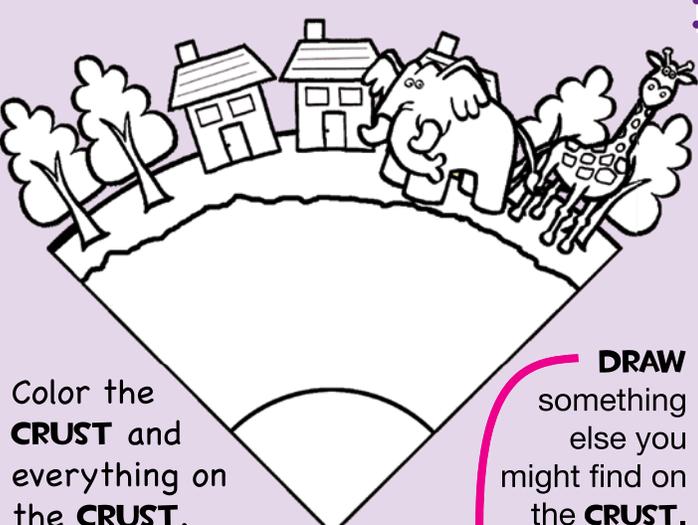
Do **YOU** think the **theory** about what causes Earth's magnetic field is an **EDUCATED GUESS**? Why or why not?

Stuff to Cut Out for Chapter 7

Cut out this piece on its solid outline and match yellow TAB 7.2 to the green Glue TAB 7.2 Here on page 13.

| | | | | | | | | | |
|---|---|-------------------------------------|-------------------------------------|--|-------------------------------------|--------------------------------------|------------------------------------|--------------------------------|---|
| TAB 7.2 | Glue TAB 7.2A Here | | | | | | | | |
| <p>What are the secrets of THE MANTLE?</p> | | | | | | | | | |
| <p>Geologists know exactly what the MANTLE is like because they have drilled into it.</p> <p style="text-align: center;">TRUE! FALSE!</p> | | | | | | | | | |
| <p>The MANTLE is made up of even more l _ _ ers! Which of these are layers of the mantle? (Check ✓ your answers.)</p> <table style="width: 100%;"> <tr> <td><input type="checkbox"/> inner core</td> <td><input type="checkbox"/> mesosphere</td> </tr> <tr> <td><input type="checkbox"/> asthenosphere</td> <td><input type="checkbox"/> outer core</td> </tr> <tr> <td><input type="checkbox"/> lithosphere</td> <td><input type="checkbox"/> geosphere</td> </tr> <tr> <td><input type="checkbox"/> crust</td> <td><input type="checkbox"/> educated guess</td> </tr> </table> | | <input type="checkbox"/> inner core | <input type="checkbox"/> mesosphere | <input type="checkbox"/> asthenosphere | <input type="checkbox"/> outer core | <input type="checkbox"/> lithosphere | <input type="checkbox"/> geosphere | <input type="checkbox"/> crust | <input type="checkbox"/> educated guess |
| <input type="checkbox"/> inner core | <input type="checkbox"/> mesosphere | | | | | | | | |
| <input type="checkbox"/> asthenosphere | <input type="checkbox"/> outer core | | | | | | | | |
| <input type="checkbox"/> lithosphere | <input type="checkbox"/> geosphere | | | | | | | | |
| <input type="checkbox"/> crust | <input type="checkbox"/> educated guess | | | | | | | | |
|  <p>Color the MANTLE and label it.</p> | | | | | | | | | |
| <p>Geologists think the entire MANTLE is somewhat squishy, kind of like putty.</p> <p style="text-align: center;">YES! NO! DON'T BE SILLY!</p> | | | | | | | | | |

Cut out this piece on its solid outline and match yellow TAB 7.2A to the green Glue TAB 7.2B Here on page 13.

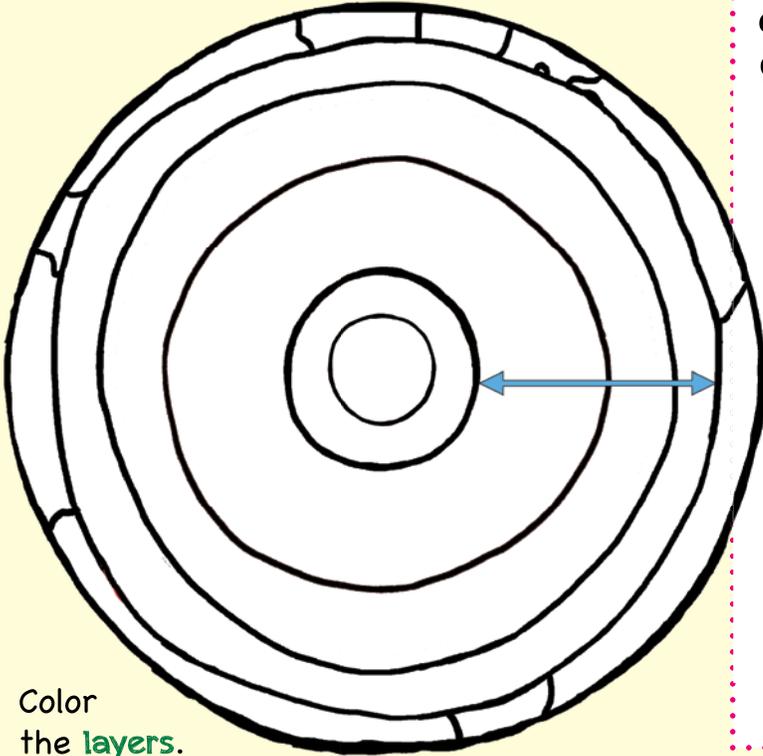
| | |
|--|--------------------|
| TAB 7.2A | Glue TAB 7.2B Here |
| <p>What do you know about THE CRUST?</p> | |
|  <p>Color the CRUST and everything on the CRUST.</p> <p>DRAW something else you might find on the CRUST.</p> | |
| <p>Circle the statements that are true for the CRUST.</p> <ul style="list-style-type: none"> Soft and putty-like. The outermost layer of Earth. The middle layer of Earth. The part we live on. Does not make up mountains, ocean floors, river beds, or mesas. Made of magma. Made of rocks, soil, and minerals. | |
| Drawing area for the crust | |

More Stuff to Cut Out for Chapter 7

Cut out this piece on its solid outline and match yellow TAB 7.2B to the green Glue TAB 7.2B Here on page 13.

TAB 7.2B

The GEOSPHERE has layers!



Color the layers.

Draw a line from the **name of a layer** to the part of the drawing it describes.

- Outer core
- Mesosphere
- Mantle
- Lithosphere
- Inner core
- Asthenosphere
- Crust

Cut out this piece on its outline and match yellow TAB 7.3 to the green Glue TAB 7.3 Here on page 14.

TAB 7.3 Glue **TAB 7.3A** Here

Educated Guess Number 3

You are hiking in the mountains. It's pretty cold out, but when you go around a bend in the trail, you see people in bathing suits sitting in a pond of steaming water. What do you think is happening geologically?

Even More Stuff to Cut Out for Chapter 7

Cut out the piece below on its outline and match
yellow TAB 7.3A to the green Glue TAB 7.3A Here on page 14.

| | |
|----------|--------------------|
| TAB 7.3A | Glue TAB 7.3B Here |
|----------|--------------------|

Educated Guess Number 2

You are enjoying a day in your garden when you see particles of ash falling from the sky. What geological event do you think is happening, and why do you think it is happening?

Cut out the piece below on its outline and match
yellow TAB 7.3B to the green Glue TAB 7.3B Here on page 14.

| | |
|----------|--------------------|
| TAB 7.3B | Glue TAB 7.3C Here |
|----------|--------------------|

Educated Guess Number 1

You are sitting in the kitchen and suddenly the dishes in the cabinet begin to rattle and you feel the floor shaking. What geological event do you think is happening, and why do you think it is happening?

The Last Stuff to Cut Out for Chapter 7

Cut out the piece below on its outline and match yellow TAB 7.3C to the green Glue TAB 7.3C Here on page 14.

TAB 7.3C



Be a geologist!



Educated guessers needed!

On each of the following flaps a geological event is described. For each one, make an educated guess about what the geological event is and why it is happening.



Name _____

Date _____

Focus On Elementary Geology 3rd Edition, Midterm 1

Chapters 1-6, 18 questions, 10 points each

1. Paying attention to what the area around you looks like, what happens during storms, and how the land around you changes over time are ways to learn more about the geology of your area. (10 points)
 - True
 - False

2. Which geologists look at changes in the quality of the water, air, and land on Earth? (10 points)
 - Geochemists
 - Structural geologists
 - Geophysicists
 - Environmental geologists
 - This is not part of geological study.

3. Theophrastus... (Check all that apply.) (10 points)
 - Was a Roman philosopher.
 - Was a student of Aristotle.
 - Studied mostly plants and animals.
 - Studied rocks and explored what happens when rocks are heated.
 - Studied Earth's features.

Focus On Elementary Geology 3rd Edition, Midterm 2

Chapters 7-12, 18 questions, 10 points each

1. Put the layers of the geosphere in order starting with the outermost layer. Use the numbers 1-6. (10 points)
 - _____ Outer core
 - _____ Lithosphere
 - _____ Asthenosphere
 - _____ Crust
 - _____ Inner core
 - _____ Mesosphere

2. Because geologists can't dig below Earth's crust, they must make educated guesses about Earth's interior based on... (Check all that apply.) (10 points)
- The use of advanced tools to gather information.
 - Observations of earthquakes.
 - The use of rock hammers.
 - Observations of volcanoes.
 - The use of a GPS.
3. The crust is divided into three layers. (10 points)
- True
 - False

Focus On Elementary Geology 3rd Edition, Final Quiz

Chapters 1-12, 24 questions, 10 points each

1. What do geochemists study? (10 points)
- Changes in the quality of water, air, and land.
 - How atoms and molecules form Earth.
 - How mountains are formed.
 - How earth is put together.
 - How volcanoes happen.
2. Geologists use chemistry and physics to better understand how things work. (10 points)
- True
 - False
13. The geosphere... (Check all that apply.) (10 points)
- Refers to the part of the Earth that is made of rocks, minerals, and soils.
 - Includes all the spheres of Earth.
 - Can be affected by the other spheres of Earth.
 - Includes the crust, mantle, and core.
 - Is where volcanoes and earthquakes are created.
14. Which layers make up the mantle? (10 points)
- Inner core and outer core.
 - Crust and asthenosphere.
 - Lithosphere, magma, and core.
 - Lithosphere, asthenosphere, and mesosphere.
 - Mesosphere, outer core, and inner core.



Focus On Elementary Geology 3rd Edition, Midterm 1

Chapters 1-6, 18 questions, 10 points each

1. True
2. Environmental geologists
3. Was a student of Aristotle., Studied rocks and explored what happens when rocks are heated., Studied Earth's features.

Focus On Elementary Geology 3rd Edition, Midterm 2

Chapters 7-12, 18 questions, 10 points each

1. 5, 2, 3, 1, 6, 4
2. The use of advanced tools to gather information., Observations of earthquakes., Observations of volcanoes.
3. False

Focus On Elementary Geology 3rd Edition, Final Quiz

Chapters 1-12, 24 questions, 10 points each

1. How atoms and molecules form Earth.
2. True
13. Refers to the part of the Earth that is made of rocks, minerals, and soils., Can be affected by the other spheres of Earth., Includes the crust, mantle, and core., Is where volcanoes and earthquakes are created.
14. Lithosphere, asthenosphere, and mesosphere.

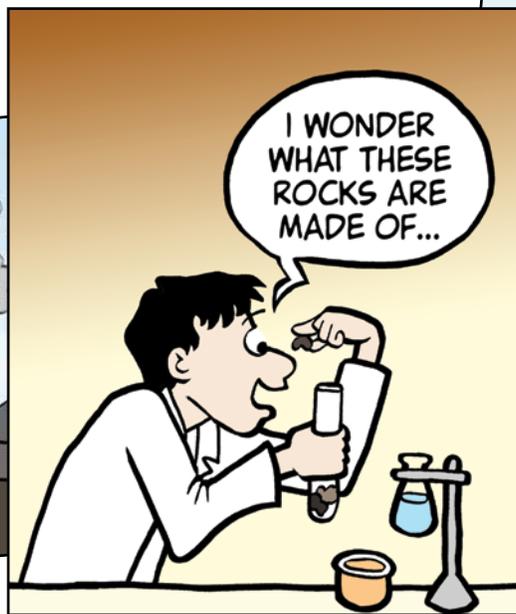
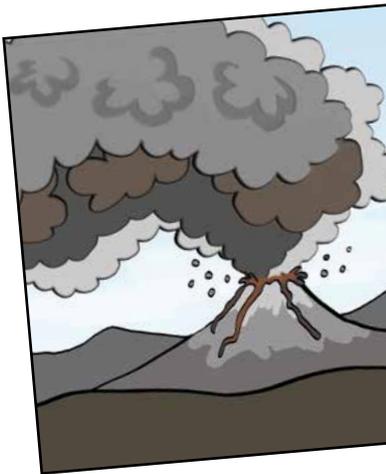
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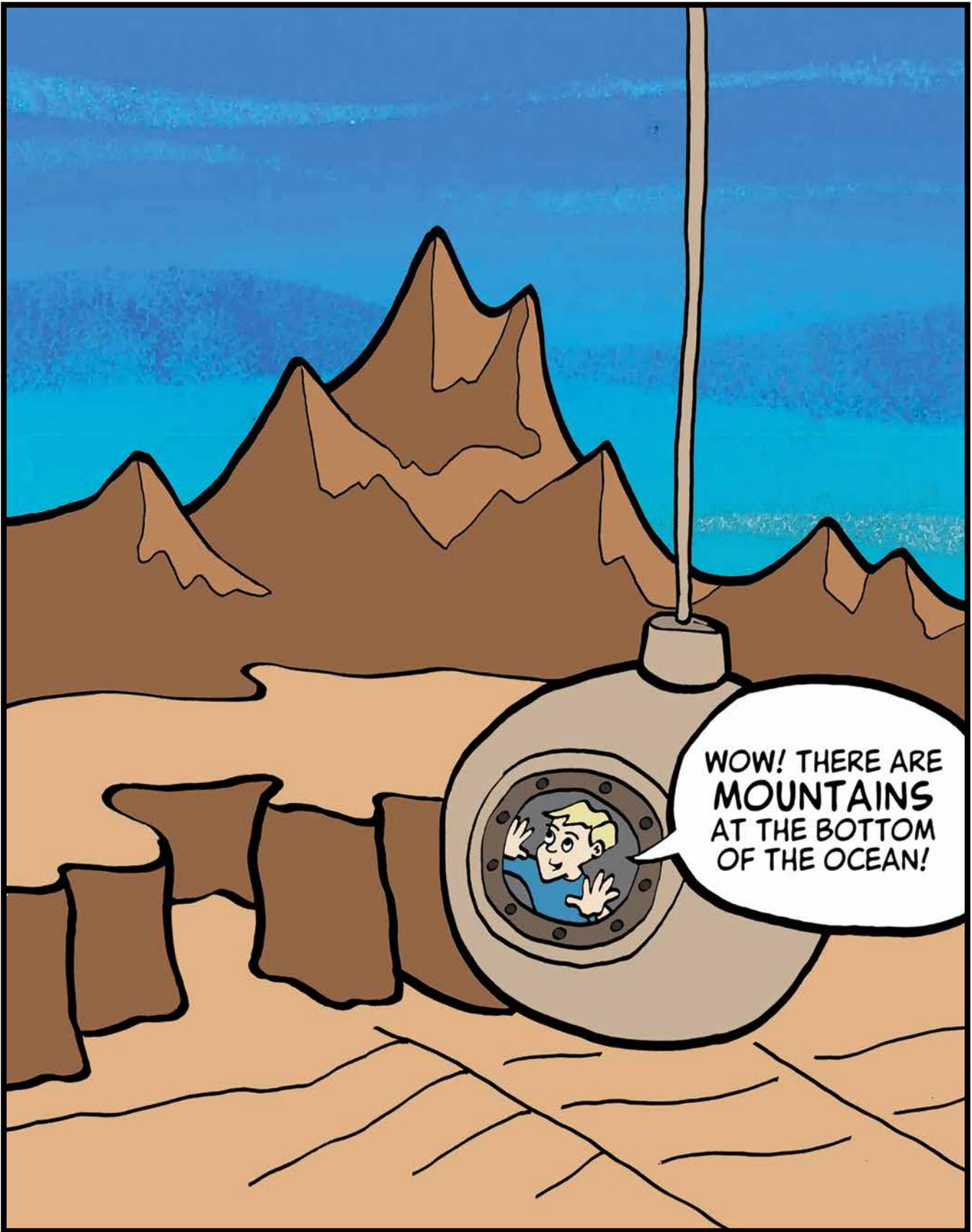
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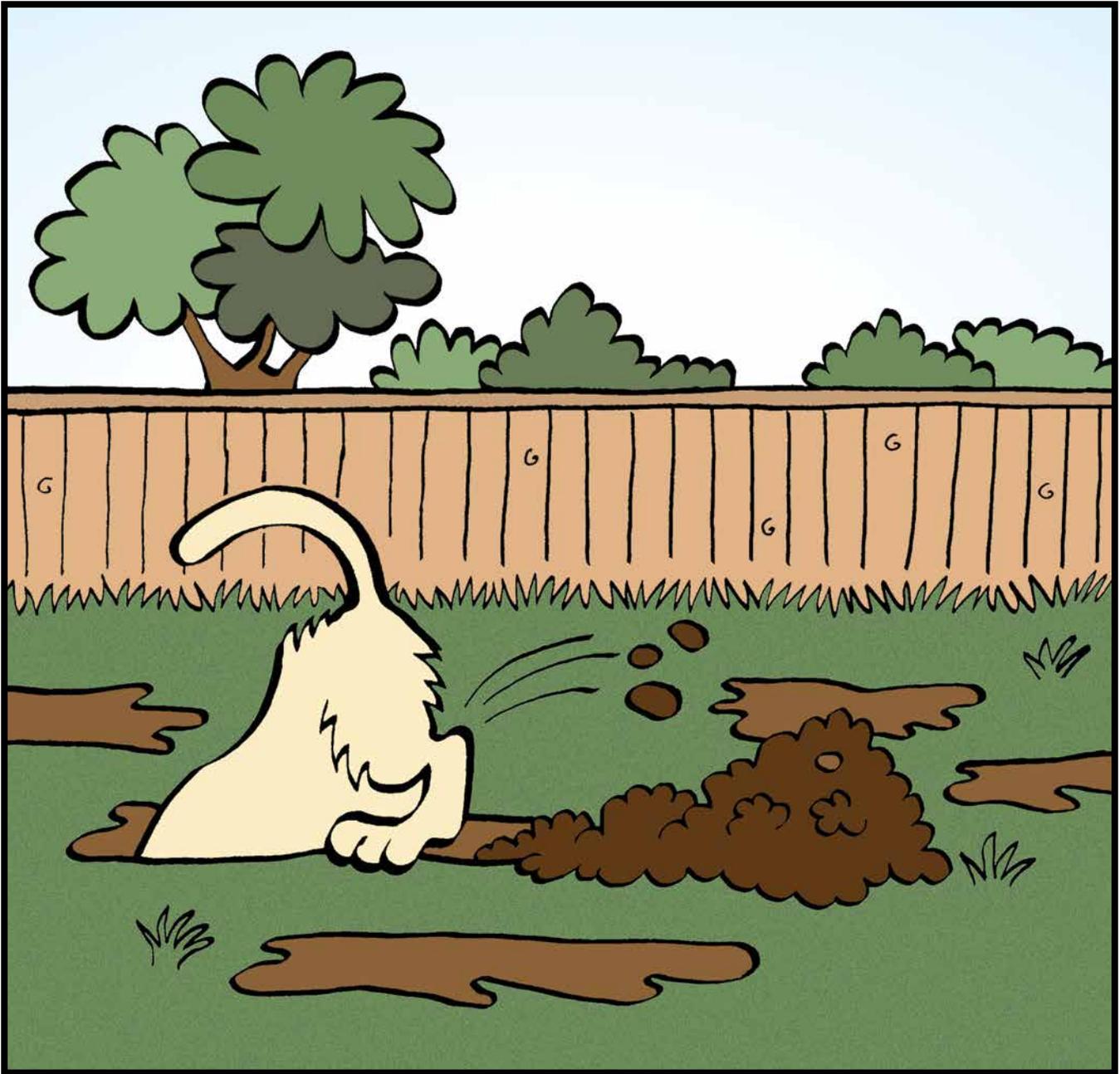
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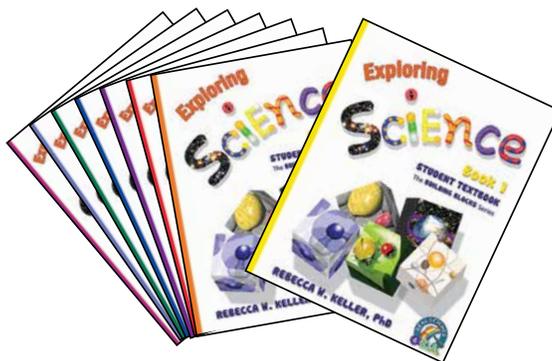


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