

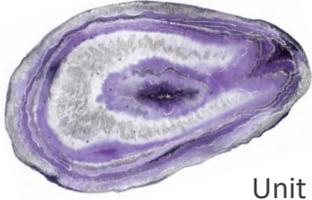
# GEOLOGY

3-8 Science Unit Study



# Geology

Created by The Good and the Beautiful Team



## Table of Contents

Unit Information . . . . .	ii
Read-Aloud Book Pack & Correlated Books . . . . .	iii
Grades 7–8 Lesson Extensions . . . . .	iv
Supplies Needed . . . . .	v
Vocabulary . . . . .	vii
Lesson 1: Introduction to Geology & Earth’s Composition . . . . .	1
Lesson 2: Plate Tectonics . . . . .	6
Lesson 3: Earthquakes . . . . .	11
Lesson 4: Volcanoes: Magma and Lava. . . . .	16
Lesson 5: Volcanoes: Types and Eruptions . . . . .	22
Lesson 6: Minerals . . . . .	29
Lesson 7: Crystals, Gems, Precious Stones, and Geodes . . . . .	34
Lesson 8: Rock Characteristics . . . . .	42
Lesson 9: Igneous Rock . . . . .	46
Lesson 10: Sedimentary Rock . . . . .	50
Lesson 11: Metamorphic Rock . . . . .	60
Lesson 12: The Rock Cycle. . . . .	64
Lesson 13: Geological Processes . . . . .	69
Lesson 14: Mountains and Other Landforms . . . . .	77



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# Unit Information

## Science Journal



All The Good and the Beautiful science units include activities in a student journal. Each student should have his or her own student journal, and the parent or teacher will direct the student regarding when to complete the activities as directed in the lessons. Science journals can be purchased by going to [goodandbeautiful.com/science](http://goodandbeautiful.com/science) and clicking on the *Geology* unit link.

## Science Wall



All The Good and the Beautiful science units include vocabulary words to be placed on your science wall, which is a wall or tri-fold presentation board in your learning area to which you can attach the vocabulary words and other images. **Cut out the vocabulary word cards at the beginning of the unit.** The course will indicate when to place them on the wall.

## Lesson Preparation

All The Good and the Beautiful science units include easy-to-follow lesson preparation directions at the beginning of each lesson.

## Activities and Experiments



Many of The Good and the Beautiful science lessons involve hands-on activities and experiments. An adult should always closely supervise children as they participate in the activities and experiments to ensure they are following all necessary safety procedures.



## Experiment Videos



Go to [goodandbeautiful.com/sciencevideos](http://goodandbeautiful.com/sciencevideos) and click on the *Geology* link or use the Good and Beautiful Homeschool app to see videos of experiments used in this unit. This is a convenient way to watch experiments that may be more complicated. Children often learn best through hands-on experience; therefore, this unit includes a

supply list and instructions for all experiments, and you may choose to do as many as you wish.

## Unit Videos



Some lessons include videos that were created by The Good and the Beautiful. Have a device available that is capable of playing the videos from [goodandbeautiful.com/sciencevideos](http://goodandbeautiful.com/sciencevideos) or from the Good and Beautiful Homeschool app.

## Content for Older Children



Some lessons include extra content that is more applicable for older children (grades 7–8). Parents or teachers may choose to skip this content if instructing only younger children.

## Content for Younger Children



Some lessons include extra content that is more applicable for younger children (grades 3–6). Parents or teachers may choose to skip this content if instructing only older children.

## Versions

New discoveries in geology are being made on an ongoing basis. This course is reviewed and revised periodically to keep the information as up-to-date as possible. This version is the second edition of this unit.

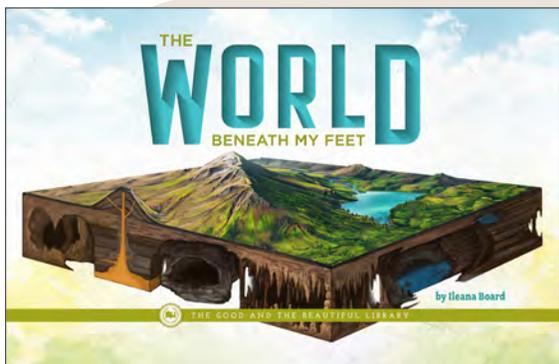
## Rocks and Minerals Kit

This unit incorporates *The Good and the Beautiful Rocks and Minerals Kit*. Using the testing tools, six minerals, and three rocks included in the kit, lessons will prompt children to observe and test different materials, providing hands-on experiences with geology. This kit is available at [goodandbeautiful.com](http://goodandbeautiful.com).

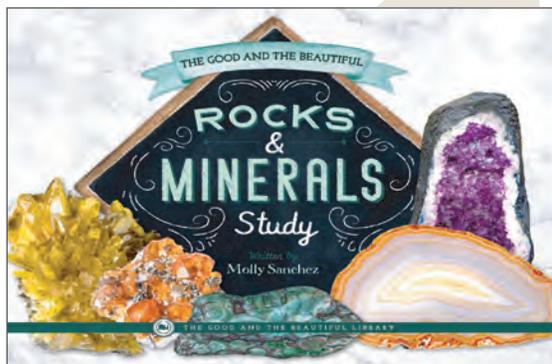


# Read-Aloud Book Pack

The two books below are optional read-aloud books that complement this unit. These books can be purchased as a book pack by going to [goodandbeautiful.com/science](http://goodandbeautiful.com/science) and clicking on the *Geology* link.



*The World Beneath My Feet*  
by Ileana Board



*The Good and the Beautiful Rocks and Minerals Study*  
by Molly Sanchez

## CORRELATED BOOKS

The Good and the Beautiful Library has several books that correlate well with the *Geology* unit. It can be a wonderful experience for children to read books at their levels that are related to the subjects they are learning in science. The library includes both fiction and nonfiction books organized according to reading level. Find the correlated books by going to [goodandbeautiful.com/science](http://goodandbeautiful.com/science) and clicking on the *Geology* science unit product page.

# Lesson Extensions

## How the Extensions Work

Each lesson has an optional lesson extension for children in grades 7–8. Complete the lesson with all the children, and then have the older children complete the self-directed lesson extension. These extensions are located in the *Grades 7–8 Student Journal*.

## Answer Key

The answer key for the lesson extensions can be found on the free Good and Beautiful Homeschool app in the science section. Visit [goodandbeautiful.com/apps](http://goodandbeautiful.com/apps) for information on accessing the app. The app can be accessed from a computer, phone, or tablet.

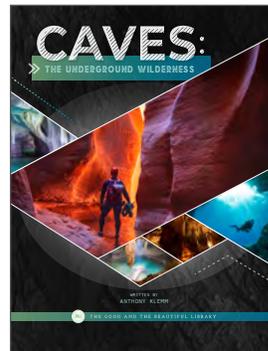
## Flexibility

The amount of time it will take to complete each lesson extension will vary for each child. The average time is about 10–15 minutes per extension. You and the children may choose to omit parts of the extension lesson if desired. Encourage the children to stretch their capabilities, but also reduce work if needed.

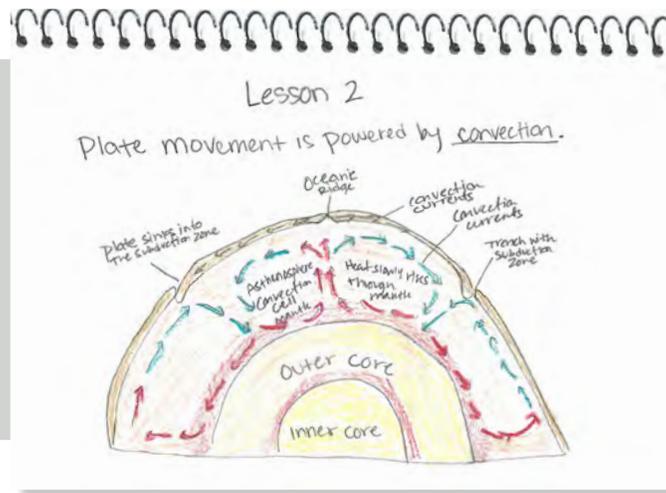
## Taking Notes

Some of the Grades 7–8 Lesson Extensions have the children summarize the material read. Teach the children to look for key information, summarizing the most important points. Students can also add notes with their thoughts and the facts that are most interesting to them.

## Optional Grades 7–8 Reading Book



We recommend the book *Caves: The Underground Wilderness* by Anthony Klemm as extra reading for students in grades 7–8. This book can be purchased at [goodandbeautiful.com](http://goodandbeautiful.com) on the *Geology* science unit product page or at [goodandbeautiful.com/library](http://goodandbeautiful.com/library).



# Supplies Needed

This section is divided into supplies needed for **activities** and supplies needed for **experiments**. If you would prefer to watch the experiments instead of perform them, you can watch all the experiments at [goodandbeautiful.com/sciencevideos](http://goodandbeautiful.com/sciencevideos). The activities, however, are not filmed.

## Lesson 1

- *The Good and the Beautiful Rocks and Minerals Kit* (or a rock of any kind)
- Hard-boiled egg
- Butter knife
- Bible (optional)

## Lesson 2

- Orange
- Bowl of water

*The following items are needed for each child (although it is possible to use only one set of supplies for the parent to demonstrate with):*

- 1 cup of frosting
- Butter knife
- 3 fruit leather pieces (at least 3x2 in)
- 5 graham cracker pieces
- 10-inch piece of tinfoil or parchment paper

## Lesson 3

- Brick or large stone (not too heavy for child to hold)
- Hammer
- One stick (per child), thin enough that a child can break it easily
- 2 sanding sponges (or other similar items that will grip when rubbed together, like tennis shoes)
- One rubber band (per child)

## Lesson 4

- Cup of water
- Towel
- Red marker, crayon, or colored pencil (per child)

## Lesson 5

- Optional: Visit [goodandbeautiful.com/volcanoes](http://goodandbeautiful.com/volcanoes) to find detailed instructions and supply lists for a volcano experiment that best suits your family or school group.

## Lesson 6

- 1 Tbsp salt
- 1 Tbsp salt mixed with dirt
- 3 sets of LEGO® bricks that each include 3 bricks that are the same shape, color, and size, but each set is different bricks
- *The Good and the Beautiful Rocks and Minerals Kit*: See the front of this unit for more information if needed.

## Lesson 7

- A few pieces of scrap paper
- Optional: Geode kit (or small\* geode, hammer, protective eyewear, cloth, flathead screwdriver or chisel) *\*Larger geodes may require power tools.* *Note: Some geodes are faulty and may not contain crystals.*
- 1 cup water (per child)
- 3 cups sugar, plus some extra for coating (per child)
- Clothespin (per child)
- Stick (skewer or craft stick; for each child)
- Clear glass jar or cup (for each child)
- Funnel (optional)
- Food coloring (optional)
- 1 tsp liquid flavoring extract (optional)
- Pot
- Stove

## Lesson 8

- An empty egg carton or compartment box OR a rock kit or collection of rocks
- Optional: Paint and paintbrushes or markers for decorating cartons or kits

## Lesson 9

- Candle and candleholder (it needs to be straight or tapered so the wax can drip down the side) OR use a birthday candle held in nonflammable clay
- Lighter or match
- Dominoes or wooden blocks (15–30 pieces)
- 2 small containers or boxes (big enough to hold the dominoes or blocks)
- *The Good and the Beautiful Rocks and Minerals Kit*



# Supplies Needed

This section is divided into supplies needed for **activities** and supplies needed for **experiments**. If you would prefer to watch the experiments instead of perform them, you can watch all the experiments at [goodandbeautiful.com/sciencevideos](http://goodandbeautiful.com/sciencevideos). The activities, however, are not filmed.

## Lesson 10

- Empty, clean plastic or glass container with a lid, like a pickle jar
- Water
- *The Good and the Beautiful Rocks and Minerals Kit*
- Ruler
- Two handfuls of soil and any or all of other various sediments: small pebbles or other rock fragments, sand, salt (rock or ice-cream salt, fine table salt, pink salt, and/or coarse salt), and baby powder

## Lesson 11

- Sediment jar from last lesson
- Ruler
- 3 STARBURST™ candies of different colors (per child)
- Rolling pin or kitchen mallet
- Aluminum foil
- Hair dryer
- *The Good and the Beautiful Rocks and Minerals Kit*
- Optional: Each child's rock collection box (from Lesson 8)

## Lesson 12

- Brick of milk or dark chocolate (or a HERSHEY'S™ chocolate bar)
- Brick of white chocolate
- Cheese grater
- Aluminum foil
- Access to a freezer (or an ice pack)
- Microwave
- 2 microwave-safe bowls
- 2 spoons
- 2 plates
- Hair dryer
- Rolling pin

## Lesson 13

- 11"x15" baking pan
- Bricks, blocks, or something else to raise one side of the pan
- Sand
- 3–4 ice cubes
- Pitcher of water
- Straw (per child)
- Optional: towel or pan to catch any overflow of water or sand

## Lesson 14

- Watercolor cakes or paint
- A sheet of blank or watercolor paper (per child)
- Paintbrush (per child)
- Water
- Pencil (per child)
- Palette or plate

# Vocabulary

**Instructions:** Cut out the vocabulary cards in this section. Place them on your science wall when prompted to do so in the lessons. Review the vocabulary words several times during this unit and, if desired, at various times throughout the school year.

## Geology

the study of the earth and its materials, structure, and processes and the history of how these things have changed over time



## Divergent Boundary

an area where two tectonic plates move away from each other



## Convergent Boundary

an area where two tectonic plates collide, often resulting in one plate sinking and sliding under the other (subduction)

# Introduction to Geology & Earth's Composition

## Objective

Help the children understand the study of geology and learn about the composition of the earth.



### Preparation:

None

### Activity Supplies:

- *The Good and the Beautiful Rocks and Minerals Kit* (or a rock of any kind)
- Butter knife
- Bible (optional)
- Hard-boiled egg

## Opening Activity



Pass around a rock (you may pick one or several out of *The Good and the Beautiful Rocks and Minerals Kit*). Let the children feel and observe the rock(s). As they do so, ask

the children the following: What are you holding? [a rock]

Where do you think this/these rock(s) could be found?

Show the children the page at the end of the lesson titled "Earth's Landscapes." Identify the rocks that are found in each image. Explain that mountains, the seafloor, sand, and even dirt are all made of rocks.

## If Rocks Could Talk

**Read to the children:** Rocks are elements that the earth is made of. Rocks are not born and do not die (although they may change shape and form); rocks and the minerals they are made of have been around since the creation of the earth. They have been present for every generation, civilization, and historical event. Wouldn't it be interesting if rocks could talk and tell you the stories of the earth and its people?

Imagine you are a stone that could be present for any time period or place in history. Where would you



like to be? What would you love to be able to observe?

**Allow the children to ponder and discuss together.**

Now, rocks can't actually speak and use words to tell us of (**repeat some of the things the children listed, or mention Christ's birth, the signing of the Declaration of Independence, etc.**), but there are things that they can tell us about the history of Earth. Geologists are scientists who study Earth, its processes, and its materials. They seek to understand the hidden mysteries of the earth and to discover what Earth and its components have to tell us about our home.

Geology includes the study of rocks and what they are made of. It also includes the study of many amazing land structures, such as tall mountains, deep canyons, and frozen tundra. The face of the earth has changed over time because of earthquakes, volcanoes, storms, floods, and erosion. Geologists study these events and how they affect and change our world.

Science Wall: Vocabulary Word



Place the vocabulary card **GEOLOGY** on your science wall. Read and discuss the word and definition.



Layers of the Earth Activity



Show the children the egg. Read to the children: Just like an egg, the earth is composed of three main layers.

**Crust:** The shell of this egg will represent Earth’s crust; it is a very thin layer of the earth. It is on top of the earth’s crust that soil and rocks rest and plants grow. **Gently crack open the egg and peel away the shell.**

**Mantle:** Beneath the earth’s crust is the mantle. This white layer of the egg will represent the mantle. **Using a butter knife, carefully cut the egg in half.**

**Core:** The very center of the earth is called the core. This yellow part of the egg represents Earth’s core.

Layers of the Earth Video



Watch the video titled “Layers of the Earth” at [goodandbeautiful.com/sciencevideos](http://goodandbeautiful.com/sciencevideos) or from the Good and Beautiful Homeschool app.

Student Journal: Layers of the Earth



Have the children turn to the “Layers of the Earth” page in Lesson 1 of their student journals and complete the page. (Answer keys are provided at the end of this lesson.)



Build Our Foundation on Christ

**Read to the children:** There is so much we can learn from rocks; they are the foundation of the earth we stand on. Christ taught us that wise men build their foundations upon rock. (If desired, see **Matthew 7:24–27.**) There is only one True Rock that is strong enough to withstand the storms of this life. The foundation on which we need to build our lives is Jesus Christ.

Recite the following scripture together:

“The Lord is my rock, and my fortress, and my deliverer. . . . In him will I trust.”

–2 Samuel 22:2–3

As we learn about geology and study the incredible earth that God created for us, let’s remember that God created all things for us to lead us to Him and help us learn more about Him. All that we study and learn can open the door for us to more deeply ponder God, His love for us, and how we can better build our foundation on the true and sure Rock: our Savior, Jesus Christ.



Lesson 1 Extension



Have the children grades 7–8 complete the self-directed Lesson 1 extension titled “Discovering Earth’s Interior” in their student journals.

Earth's Landscapes



# Volcanoes: Magma and Lava

## Objective

Help the children learn about the Ring of Fire and how magma emerges to create different types of volcanoes.



### Preparation:

- None

### Activity Supplies:

- Cup of water
- Towel
- Red marker, crayon, or colored pencil (per child)

## Volcanoes in Art



Have the children turn to the “Mount Semeru Art” page in Lesson 4 of their student journals and

observe it while you read aloud the page “Story of Semeru” included at the end of this lesson.



Volcanoes can have huge impacts on our earth. Eruptions send gas, ash, and debris high into the air, which can even block out the sun and affect other parts of the world. As the lava cools and hardens, new rocks form, changing the very face of the planet. We will learn more about these kinds of rocks later on.

## Magma



**Read to the children:** We know that the upper mantle is made of mostly solid rock, but pockets of molten (melted) lava called *magma* can travel through it and escape through to the surface. **Have the children cup their hands and place a towel under to catch any excess**

**water. Slowly pour water in their cupped hands and have the children observe how water leaks through the cracks in between their fingers.** Magma flows through the cracks between plate boundaries out toward the crust just like water can leak between your fingers. When this happens, a volcano forms and is released through a crack in the earth’s crust. Once magma has reached the earth’s surface, it’s called *lava*.



## Science Wall: Vocabulary Words



Place the vocabulary cards **VOLCANO** and **MAGMA** on your science wall. Read and discuss the words and definitions.



## Ring of Fire



Have the children turn to “The Ring of Fire” (map page) in Lesson 4 of their student journals. (An answer key is provided at the end of this lesson.) **Read to the children:**



This is a map of tectonic plates that make up the earth’s crust. Do you see how the view of this map is different than most maps? Most

## Story of Semeru



The cool breeze brushed across the trees on the island of Java, making them come to life. White clouds sweetly glided over the merchants' heads. In the distance dense smoke began to puff through the sky. This thick cloud may have alarmed a visitor to this Indonesian island. Was it a forest fire? Did a hut in the mountains catch fire? No, with a closer look, one sees the thick smoke is gently puffing directly out of the top of the tallest peak—a volcano! Why do the merchants and farmers continue on with their work and the children continue to run about with their chores and games? A tourist rushes to a man nearby to warn him of the impending danger, but he soon realizes that the volcano is nothing new to the local people.

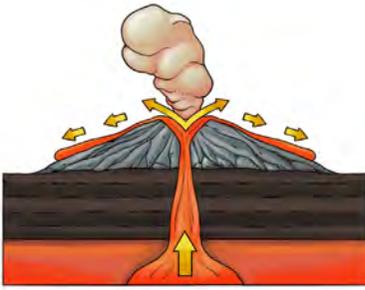
After a few minutes, the small amount of ash and smoke is blown away with the breeze, and it seems, for a moment, that the mountains are still. The gusts of smoke don't stay away for long though. Every 20–40 minutes, a small rush of smoke and ash erupts once again, reminding us that the earth and the mountains are active and that respect is due for all of God's creations.



While Mount Semeru's constant volcanic activity has become a part of daily life and often causes no harm, devastating eruptions from this volcano have taken place, sending destructive lava and mudflows across land and property. The first recorded eruption was in 1818, but in over 200 years, only about 10 of the eruptions have caused significant devastation.

# Types of Volcanoes

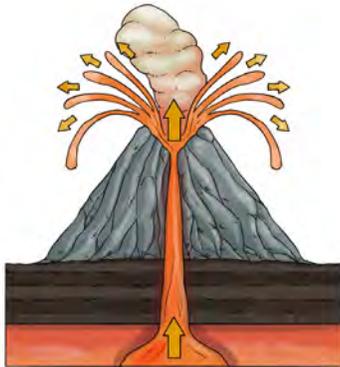
## Shield Volcano



Mauna Loa, Hawaii, USA

#1: These volcanoes have shallow, sloping sides and are short but very wide. Their shape resembles a warrior's shield. They are formed from much thinner lava than other types of volcanoes, which allows the lava to spill out in all directions rather than in a massive, violent eruption. This lava can travel quite far before it cools and hardens.

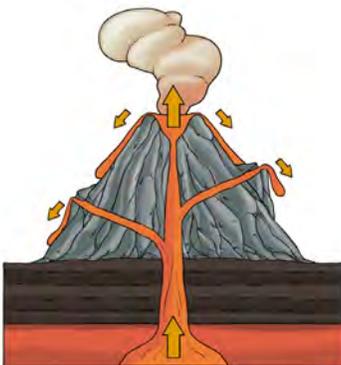
## Cinder Cone



Parícutin, Mexico

#2: These volcanoes are cone-shaped and often look like smooth sand dunes. Despite their smooth look, they expel rough, hardened lava rocks during very explosive eruptions. These eruptions happen quickly and with a lot of built-up pressure that shoots the rocks, lava, and ash high into the air. The lava and debris fall straight down and cool quickly and, therefore, often endanger fewer lives and less property.

## Composite Volcano



Mount Kilimanjaro, Tanzania

#3: These cone-shaped volcanoes often end up being some of the tallest volcanoes in the world. Composite volcanoes have extremely thick lava that traps gas until it finally breaks through in a humongous explosion that throws burning rocks and gas into the air. These volcanoes can have many side vents where the thick lava can ooze out and slowly move down the sides of the volcano, traveling quite a distance before it cools.

## Lava Dome



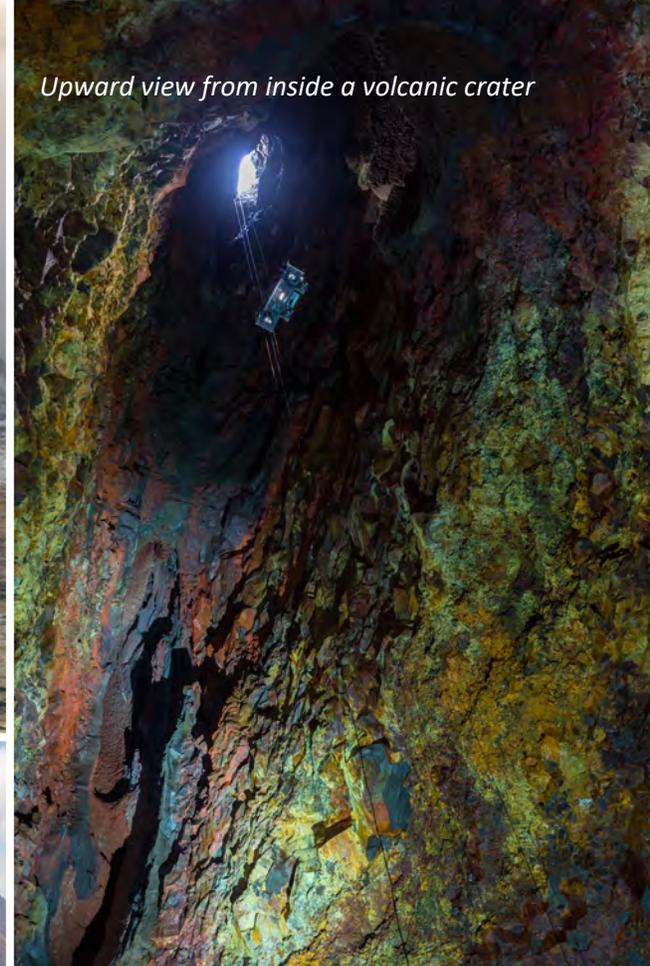
Lava dome in crater of Mount St. Helens, Washington, USA

#4: These types of volcanoes can vary in shape and size, being short and circular or tall and pointed. They form as thick lava slowly erupts underneath the ground. The underground eruption causes a large mound to form as the volcanic materials build up without breaking through the surface. Lava that does spill out does not move quickly or far before hardening. These volcanoes can form on their own or within the crater of a previous volcanic eruption.

Volcanic Structures



Upward view from inside a volcanic crater



# Minerals

## Objective

Help the children learn about what a mineral is and the physical properties used to identify types of minerals.



### Preparation:

- None

### Activity Supplies:

- 1 Tbsp salt
- 1 Tbsp salt mixed with dirt
- 3 sets of LEGO® bricks that each include 3 bricks that are the same shape, color, and size, but each set is different bricks
- *The Good and the Beautiful Rocks and Minerals Kit: See the front of this unit for more information if needed.*

## Ye Are the Salt of the Earth

Show the children the sample of salt and the sample of salt mixed with dirt. Read to the children: Which one would you use to salt your food? Why? It seems pretty clear that we wouldn't want to add salt mixed with dirt into our food. In the Bible salt is frequently used to teach godly principles. For example, Matthew 5:13 says, "Ye are the salt of the earth: but if the salt have lost his savour, wherewith shall it be salted?" Salt is a **mineral** and has been used since biblical times. When salt is added to food, it helps prevent the growth of bacteria, which decays the food. In a similar way, God wants us to add spiritual salt into our lives and into the world to prevent moral decay.

## Science Wall: Vocabulary Word



Place the vocabulary card MINERAL on your science wall. Read and discuss the word and definition.



## Atoms and Elements



**Read to the children:** In science, substances such as salt must meet five requirements in order to be called minerals. Before we can understand what those requirements are, we need to know a little bit of chemistry. All things are made of building blocks called *atoms*. You can think of atoms as LEGO® pieces. **Hold up a single LEGO® piece.**

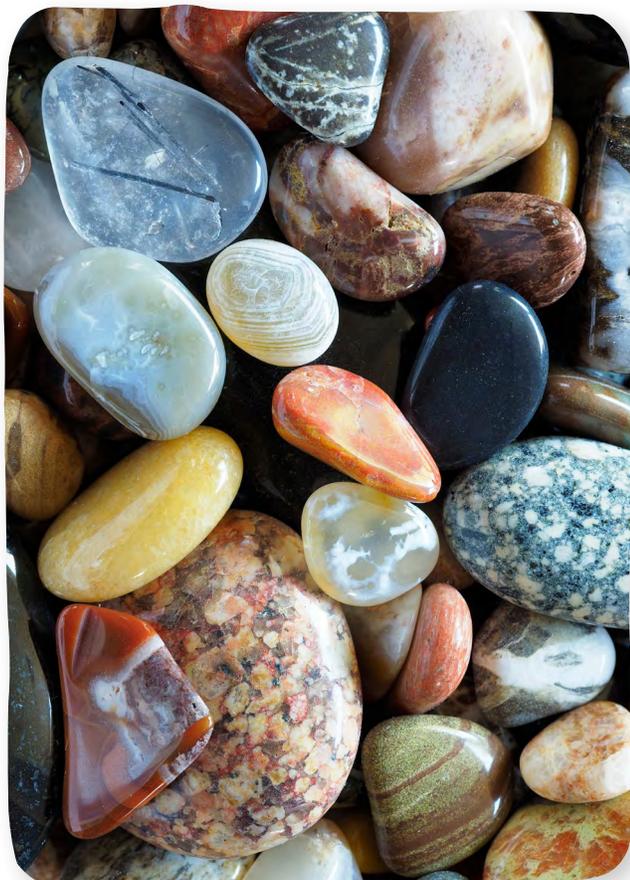
There are many different types of LEGO® pieces (and atoms!). **Show a few other different-shaped LEGO® pieces one at a time.**

An *element* is a substance made of one specific type of atom. **Using three LEGO® pieces of the exact same size, shape, and color, build a small structure.**

Each different type of atom makes up a different element. **Grab a different LEGO® piece than before and build another structure of three LEGO® pieces that are the same size, shape, and color as the new LEGO®.**



watches because when it's near electricity, it vibrates at a consistent frequency. This helps regulate watches and keeps them ticking at a steady rate. [Yes, it fits all the requirements.]



### ■ Observing Mineral Properties



**Read to the children:** If you had a collection of rocks or gems, how could you tell each of them apart? Geologists identify minerals by the minerals' physical properties. These properties include features such as color, hardness, and appearance.



**Have the children turn to the "Observing Mineral Properties" page in Lesson 6 of their student journals.** For this activity we will be using the following minerals from our rocks and minerals kit: talc, selenite, chalcophyrite, fluorite, quartz, and aquamarine. **Point to each of those minerals in the kit.** We will start with talc.

1. **Have the older children write "talc" in one of the boxes on the "Mineral Observations" page in Lesson 6 of their student journals.**
2. **Read (or have a child read) the section "Color" in their student journals. Determine the color of talc and record it on the "Mineral Observations" page.**
3. **Continue by reading the sections "Luster" and "Fracture + Cleavage." Then read, observe, and discuss the details of those properties and have the children record their descriptions.**
4. **Read (or have a child read) the section "Streak." Demonstrate how to streak the mineral across the streak plate in the same way you would draw a straight line with a crayon. Then observe and have the children record the color of talc's streak dust. Be sure to dust off the streak plate before it is used again. *NOTE: Some minerals cannot be streaked if they are harder than the streak plate; instead, the mineral just scratches the plate.***

**Read to the children:** Have you ever gone shopping for a new couch? You test out couches by sitting on each one to feel how comfortable it is. Some are too soft; some are too hard. Geologists do a similar test for the hardness of minerals. In 1812, German geologist Friedrich Mohs invented the Mohs Hardness Scale. He performed a scratch test on basic minerals of different hardness and ordered them with 1 being the softest and 10 being the hardest. A mineral only leaves a scratch mark on another mineral if that mineral is softer than itself. For example, quartz is harder than apatite because quartz can scratch apatite, but quartz is softer than topaz because quartz cannot scratch topaz. The Mohs Hardness Scale is a standard still used today.



Rather than ranking our minerals on a scale of 1–10 like Mohs did, we are going to decide if our minerals are soft, medium, or hard.

5. Read (or have a child read) the section “Hardness,” and then complete the hardness test and have the children record their findings.
6. Read the section “Other” and allow the children to add any additional observations they have and draw sketches of the rock.

Have the children complete steps 1–6 with the other minerals. You may do this as a group or allow the

children to complete the rest of the minerals on their own by taking turns with remaining minerals (selenite, chalcopyrite, fluorite, quartz, and aquamarine).

#### Lesson 6 Extension



Have the children grades 7–8 complete the self-directed Lesson 6 extension titled “Minerals and Mud Pots” in their student journals.



# Sedimentary Rock

## Objective

Help the children learn about the processes that form sedimentary rocks and learn about rock strata.



### Preparation:

- Cut out the “Rock Identification Memory Cards.”
- Place two handfuls of soil into the plastic/glass container.

### Activity Supplies:

- Empty, clean plastic or glass container with a lid, like a pickle jar
- Water
- *The Good and the Beautiful Rocks and Minerals Kit*
- Ruler
- Two handfuls of soil and any or all of other various sediments: small pebbles or other rock fragments, sand, salt (rock or ice-cream salt, fine table salt, pink salt, and/or coarse salt), and baby powder

## Sedimentary Rock Video



Watch the video called “Sedimentary Rock” at [goodandbeautiful.com/sciencevideos](http://goodandbeautiful.com/sciencevideos) or from the Good and Beautiful Homeschool app.

After watching the video, discuss the following questions with the children: What are sedimentary rocks made from? [pieces of other rocks] How do sedimentary rocks form? [from the compaction and cementation of pieces of other rocks (called sediments)]

## Rock Strata

Show the children the “Rock Strata” page included at the end of this lesson. Read to the children: What do you notice about these rocks? These different layers form from different types of sedimentary rock that are compacted on each other.

## Science Wall: Vocabulary Words



Place the vocabulary cards **SEDIMENTARY ROCK**, **SEDIMENT**, and **STRATA** on your science wall. Read and discuss the words and definitions.

**Sedimentary Rock**

**Sediment**

**Strata**



## ■ Sediment Types

**Read to the children:** The smallest particle (or sediment) size is known as clay. It is often chunky because the particles are so small that they are not distinguishable, and they clump together.



Silt is like small dust particles that are still so small that individual particles are difficult to see. Dry silt is soft like flour, and when it gets wet it is more slippery than grainy, but it is grainy enough that if some blew into your mouth, you would notice the grains on your tongue.



Sand is big enough that you can see individual particles in your hand, but it is still so small that it would be nearly impossible to pick up a single piece of sand with your fingers.



A pebble is between 4–64 mm (0.2–2.5 in) long. The smallest pebbles are a little smaller than the eraser end of a pencil.



Cobble is a stone that is between 64–256 mm (2.5–10 inches).



A boulder is any fragmented rock that is bigger than 256 mm (10 in). So, boulders can range from about a foot long to taller than a building. Giant Rock in California, USA, (shown below) is the largest known boulder in the world and is seven stories high!

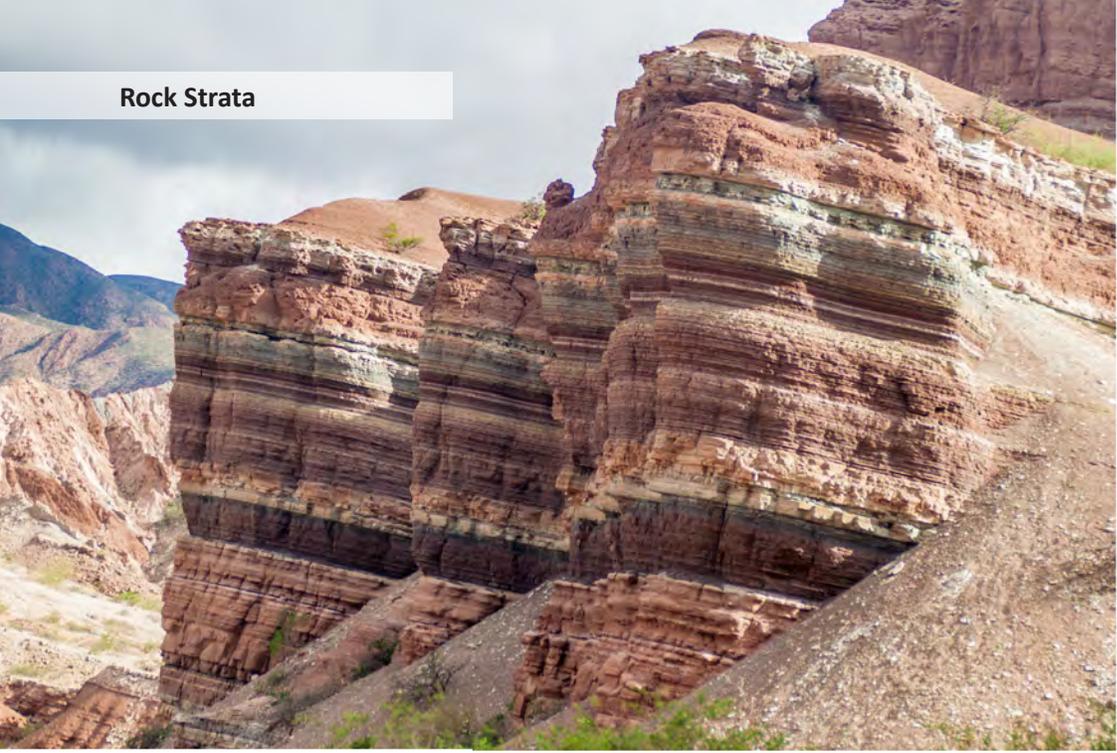


## ■ Sediment Jar Activity

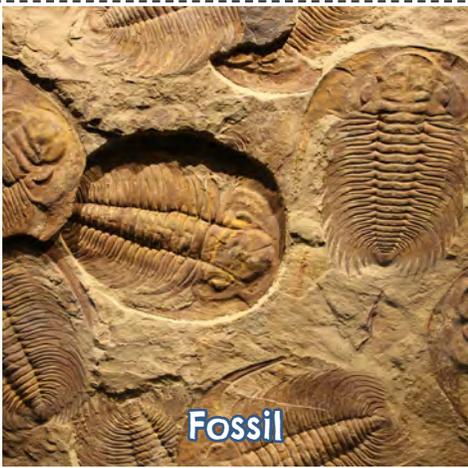


**Read to the children:** Today we are going to make our own model of sedimentary rocks. **Help the children complete the following instructions:**

Rock Strata



# Rock Identification Memory Cards



**Fossil**



**Conglomerate**



**Sediment**



**Siltstone**



**Shale**



**Breccia**



**Coquina**



**Sandstone**



**Limestone**



**Rock Salt**



**Gypsum**



**Coal**

# Mountains and Other Landforms

## Objective

Help the children learn about the major and minor landforms and how they form.



### Preparation:

- Cut out the “Major Landforms Match” cards.

### Optional Activity Supplies:

- Watercolor cakes or paint
- A sheet of blank or watercolor paper (per child)
- Paintbrush (per child)
- Water
- Pencil (per child)
- Palette or plate

## I Spy



Have the children turn to the “I Spy” page in Lesson 14 of their student journals. Take a few minutes outside to look at the surroundings. Have the children imagine and discuss how the landscape would look without any buildings and then sketch and/or label in their journals what it would look

like. (Depending on where you live, you may see mountains, hills, ocean, streams, ponds, lakes, etc., or it may be flat with grasses, shrubs, and trees.)



## Science Wall: Vocabulary Words



**Read to the children:** Our earth is covered with incredible diversity. Areas around the world greatly vary in their *landforms* and *terrain*. Place the vocabulary cards

**LANDFORM** and **TERRAIN** on your science wall. Read and discuss the words and definitions.



**Read to the children:** Throughout this unit we have learned that these landforms have been created through movement of tectonic plates, earthquakes, volcanoes, and water.

## Art and Poetry Study



Have the children turn to the artwork by Nicholas Chevalier in Lesson 14 of their student journals. Read the following poem to the children while they observe the artwork.

### The Hills by Madison Cawein

There is no joy of earth that thrills  
My bosom like the far-off hills!  
Th' unchanging hills, that, shadowy,  
Beckon our mutability  
To follow and to gaze upon  
Foundations of the dusk and dawn.  
Meseems the very heavens are massed  
Upon their shoulders, vague and vast  
With all the skyey burden of  
The winds and clouds and stars above.

### Volcanic Mountains

In our study of volcanoes, we've learned that volcanic mountains can form as lava cools and hardens. We know that volcanic mountain chains are also found on the seafloor. It is common to find volcanic mountains along subduction zones where magma can break through the crust. Mount St. Helens in Washington, USA, and Mount Fuji in Japan are beautiful, grand volcanic mountains. **Have the children find these mountains in their student journals and observe the characteristics of the mountains. Then have them label them or draw a line to VOLCANIC MOUNTAINS.**

### Optional Mountain Painting Activity



**Read to the children:** The Blue Ridge Mountains in the eastern United States (pictured to the right) are part of the Appalachian Mountain Range. Notice how the peaks of these mountains seem to go on endlessly into the distance.

**Give each child a blank piece of paper (or watercolor paper) and have him or her complete the following steps to create a watercolor mountain landscape.**

1. **With a pencil, lightly sketch 5–8 layers of mountains similar to the examples shown here.**



2. **Then select one or more watercolor cakes to dilute. Do this by adding a few drops of water onto a palette or plate. With a wet paintbrush, rub the brush on the cake to extract color, and mix the color with the water on a palette or plate.**
3. **Then paint the layer that is closest to the bottom of the paper first. Mix more water into the colors already on the palette so that the color lightens, and paint the next layer with the lightened color. Dilute the color even more for the next layer. Repeat this process so that the colors get progressively lighter as they move farther into the distance.**

### Lesson 14 Extension



**Have the children grades 7–8 complete the self-directed Lesson 14 extension titled “Earth’s Resources” in their student journals.**



# Major Landforms Match

## MOUNTAINS

Mountains are land that is lifted up higher than the surrounding area. While some mountains have very steep sides and others are more rounded, all mountains have high elevations with a defined summit. A summit is the highest peak on the mountain. Mountains can have several jagged, rounded, or flat peaks.



## HILLS

Hills are mounds of land that rise above the surrounding area. They are usually rounded and are not as high as mountains. This makes hills much easier to climb. You could run up a hill, but you would have to climb or hike up a mountainside.



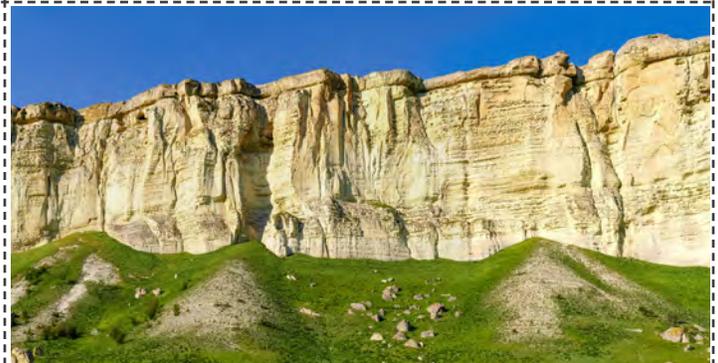
## PLAINS

Plains are areas of mostly flat land that can have trees, grasses, or shrubs. They can be dry, wet, hot, or cold. When plains are found between mountains or hills, they are called valleys.



## PLATEAUS

Plateaus are elevated landforms with very steep sides and a flat top. They look like mountains with the tops cut off, and that is precisely what makes them different from mountains; instead of summits, they have flat surfaces.



## GLACIERS

Glaciers are large masses of ice, snow, rock, and sediment that have compacted together over time to form a frozen landmass.

