

Lesson 2: Rocks Rock!

Getting Started

? Big Ideas

- How are rocks similar and different?
- How do scientists discover and describe similarities and differences among Earth materials?



Facts and Definitions

- **Magma** is hot, melted (molten) rock below the Earth's surface.
- **Igneous rock** is formed by the solidification and cooling of magma.
- **Sedimentary rocks** are formed when small pieces of rock, called sediment, pile on top of one another and are pressed together until they harden.
- **Metamorphic rocks** are formed from rocks that have undergone extreme heat and pressure deep within the Earth.
- **Weathering** is the breaking of rocks into smaller pieces, often by wind, water, or extreme temperature.
- **Erosion** is when processes like water or wind carry worn-away rocks (sediment) from one place to another.
- The **rock cycle** is a process where, over time, rocks can change from one form to another (igneous to sedimentary, for example).

⦿ Skills

- Communicate the uses of rocks and minerals. (S)
- Show that different rocks and minerals have different properties. (S)
- Use appropriate tools to identify physical properties of matter.
- Identify effects of events and long-term changes including growth, erosion, dissolving, weathering, and flow. (S)

✂ Materials

- | | |
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| ✓ #3 pencil (included in Kit 7) | ✓ <i>Everything Rocks and Minerals</i> by Steve Tomecek |
| ✓ aluminum foil or aluminum muffin liner | ✓ booklet for Kit 7 |
| ✓ coin (included in Kit 7) | ✓ colored pencils or markers |
| ✓ crayon sharpener or plastic knife | ✓ disposable spoon |
| ✓ glass bowl | ✓ glass plate (included in Kit 7) |
| ✓ heavy book | ✓ iron |
| ✓ journal | ✓ leaves, twigs, or seashell bits* (Activity 3 - optional) |
| ✓ magnet (included in Kit 7) | ✓ magnifying glass |
| ✓ nail (included in Kit 7) | ✓ pebbles |
| ✓ permanent marker | ✓ ruler |
| ✓ sand | ✓ sand, soil, or gravel |
| ✓ small bowl | ✓ small scale or balance |
| ✓ streak plate (included in Kit 7) | ✓ string |
| ✓ thin towel | ✓ vinegar |
| ✓ wax crayons | ✓ wax paper |
| ✓ white school glue | |

Introduction

Ask your child if she knows the difference between a rock and a mineral. Explain that a rock is a solid that is typically formed when minerals combine. Most rocks are made up of one or more minerals. Tell your child that over the next few days she will explore the three types of rock — igneous, metamorphic, and sedimentary — and learn how rocks can transform into other rocks over time through the **rock cycle**.

Reading and Questions

Ask your child to read pp. 22-27 in *Everything Rocks and Minerals* and then answer the following questions.

1. What is magma? What type of rocks come from magma?
 - Magma is hot liquid rock beneath the Earth's surface. Magma forms igneous rocks.
2. What happens when magma makes it to the Earth's surface?
 - It erupts as lava.
3. How are metamorphic rocks formed?
 - Rocks deep underground are exposed to extreme heat and pressure and transform into new rock types.
4. How do sedimentary rocks form?
 - Sediment is deposited into lakes and oceans where bits of sediment pile on top of one another and become compacted together.
5. How is sediment created?
 - Wind, water, and other weather processes break down rocks into smaller pieces.

Activities

Activity 1: Igneous Rocks

Ask your child to look at the pictures of igneous rocks on p. 22 of the book. She can also search for images of igneous rocks on the Internet. Ask her to choose one igneous rock to draw, color, and label in her journal. In addition to its name, she should indicate whether the rock is volcanic (came from lava that erupted from a volcano) or plutonic (cooled underground).

In today's reading, your child learned how igneous rocks form. Remind her that one common way is for lava to erupt from a volcano, flow on the ground, and slowly cool to form volcanic igneous rocks. Ask her what she thinks would happen if the volcano were near the ocean and the hot lava flowed into cold water. After she makes her guess, share the following answer and website with her.

In some volcanoes, when the extremely hot lava hits the cold water of the ocean, it quickly cools and explodes or shatters into little bits. The shattered rock, made mostly of a very dark mineral called basalt, washes to shore forming a beach made of black sand.

Punalu'u Black Sand Beach

www.movingbeyondthepage.com/link/3362/

Show your child these pictures of Punalu'u Black Sand Beach, one of several black sand beaches found on the islands of Hawaii. Black sand beaches can also be found in places like Iceland and New Zealand.

Activity 2: Metamorphic Rocks

Ask your child to look at the pictures of metamorphic rocks on p. 25 of the book or search for images online. She should choose one metamorphic rock to draw, color, and label in her journal.

Explain to your child that metamorphic rocks are described as either foliated or non-foliated. Foliated rocks have visible bands or layers stacked on top of one another, while non-foliated rocks do not. Ask her to look at the four rocks pictured on p. 25 of the book. In addition to looking at the picture, she should read the description. Ask her which ones she thinks are foliated and which are non-foliated. (Mica schist, banded gneiss, and slate are all foliated. Marble is non-foliated. The slate may not be obvious from the picture, but the word "layers" in the description should be a clue. You can also search for images of slate online, where the layers may be more visible.)

Activity 3: Sedimentary Rocks

Ask your child to look at the caption of the Grand Canyon on p. 26 of the book. Tell her that **weathering** is the breaking of rocks into smaller pieces. The book mentions wind, water, and ice, but weathering can also be caused by very hot or very cold temperatures and even things that aren't weather related such as an animal climbing on a rock and breaking off pieces. **Erosion** is when processes like water or wind carry the smaller pieces (sediment) to another location.

Ask your child to look at the pictures of sedimentary rocks on p. 26 of the book or search for images online. She should choose one sedimentary rock to draw, color, and label in her journal.

Next, tell her that today she will make her own sedimentary rock. Ask her to follow the instructions on the "Sedimentary Rocks" page. In the space at the bottom of the page, encourage her to write out the answer to the questions in #7 or to sketch a picture of the rock she created.

Reading and Questions

Let your child read about the rock cycle on pages 28-29 in *Everything Rocks and Minerals* and then ask her the following questions. The animation found at the following link may also help her better understand the rock cycle.

1. Page 28 describes two ways that sedimentary rocks can form — lithification and evaporation. Choose one and describe how it works in your own words.

- Refer to the descriptions on p. 28. Encourage your child to explain the process in her own words.

2. Name one way that a rock can be recycled.

- Answers may vary. (Examples may include one of the following: rocks can be eroded into sediment and then compacted together to form sedimentary rocks; rocks can melt into magma, which can form igneous rocks; rocks can be buried underground where they are heated and squeezed together to form metamorphic rocks.)

Study Jams: The Rock Cycle

www.movingbeyondthepage.com/link/3366/

Click the Play Video button to view an animated presentation about the rock cycle. Optionally, after the video your child can take a short quiz. (To do so, click "close" or the X in the upper right corner of the video window and then click the Test Yourself button.)

Activity 4: Colorful Rock Cycle

In this activity, your child will use crayons to help illustrate the rock cycle. You will need to assist her with some of the steps. Ask her to record her guesses and observations on the "Colorful Rock Cycle" page.

First ask your child to collect shavings from at least 3 different colors of wax crayons. She can produce the shavings using a

crayon sharpener or a plastic knife. Ask her to pile the shavings together on a piece of wax paper.

Part 1

Ask your child to fill out the first question under Part 1 of the activity page. Then ask her to take another sheet of wax paper and place it on top of the crayon shavings. She should then put a heavy book on top and press down firmly on the book (or even sit on it) for at least two minutes. Ask her to lift off the book and the top piece of wax paper and then fill out the next two lines on the activity page. (This represents sedimentary rock, where bits of rock are pressed together.)

Part 2

Heat up an iron. Replace the top piece of wax paper and put a thin towel on top. Ask your child to fill out the first question under Part 2 of the activity page. Then iron the towel and tell your child you are applying pressure and heat to the crayon shavings. Wait a minute for the crayons to cool a little and remove top sheet of wax paper. Ask your child to fill out the next two lines on the activity page. (This represents metamorphic rock, which transforms due to heat and pressure.)

Part 3

Ask your child to fill out the first question under Part 3 of the activity page. Peel the "rock" from Part 2 from the wax paper and put it in an aluminum muffin liner or aluminum foil molded into a small cup. Then pour very hot or boiling water into a glass bowl and carefully place the aluminum foil/liner on top. Ask your child to watch what happens. Once the "rock" has started to melt, remove the foil from the water and set out to cool. Ask your child to complete the last two lines of the activity page. (This represents igneous rock, which melts and then hardens.)

Activity 5: A Rock's Journey

Ask your child to look closely at some sand, soil, or small pieces of gravel and find the smallest pieces possible. Encourage her to look at these bits with a magnifying glass. Tell your child that in this activity she will reflect on what she has learned about the rock cycle and imagine a journey through part of the rock cycle that one little piece of rock could undertake. Here's an example you can share with your child:

The rock started its journey as some magma that erupted as lava from a volcano. The lava cooled and hardened to form igneous rock. Wind and rain caused some small pieces to break off and run down into a lake where, over many years, it was pressed together with other bits of sediment to create sedimentary rock. An alligator pushed the rock onto the shore. Years later an iguana kicked it toward a large crack in the ground, and the rock fell in. Over hundreds of years the rock got buried deeper and deeper beneath the ground where heat and pressure eventually molded it into metamorphic rock.

Your child can now come up with her own rock journey using one of the following options. She can start anywhere in the rock cycle but does not have to go all the way around the cycle. She can refer to pp. 28-29 in the book, the Study Jams video, or other resources to view the stages in the rock cycle. Encourage her to be creative with the journey — the rock can be moved by lava, wind, water, volcanoes, earthquakes, animals, or even people.

Option 1

For this option, your child will use the page called "A Rock's Journey" (Option 1) to write a paragraph that describes what happens next on the rock's journey. She can then illustrate the setting of the story at the bottom of the page.

Option 2

Your child can use the page called "A Rock's Journey" (Option 2) to draw illustrations of her rock's journey. If she prefers, she can base four of the panels on the story provided as an example for this activity, but at least two of the panels should be her own ideas of what happens next to the rock.

Activity 6: Rock Hunt

Ask your child to look over pp. 30-31 to learn more about the amazing variety of rocks and minerals found around the

world. Next, take her outside and ask her to go on a rock hunt. She should find at least four or five different rocks. Ask her what might be some ways the rocks could be sorted (by type, size, weight, properties, etc.).

Explain that the tests your child performed on minerals can also be done on rocks. Since these rocks were found outside, we don't know exactly what minerals they are made of, but they can still be tested for hardness, streak, acidity, and magnetism.

Activity 7: Testing Rocks

Ask your child to test some of the rocks she gathered from her rock hunt. Let her pick 3-5 rocks that are very different from one another — some smooth, some rough, some light, some dark. Tell her to assign each rock a letter. If possible, she can write the letter on the rock with a permanent marker.

She will do the scratch, hardness, magnetic, and the acid tests on the rocks, just as she did in Lesson 1. She can review the directions and necessary materials for the tests in her Science Kit 7 booklet. For the hardness test, she will record what object scratched each rock and then assign it a hardness number. Remind her to start with the pencil and work her way to the glass. Charts have been provided on the student activity pages "Testing Rocks," where she can record her results.

Activity 8: Pick a Rock

Tell your child to pick her favorite rock she discovered during the hunt. Now give her the sheet called "Pick a Rock" so that she can answer the questions about the rock. To measure the rock, give her a piece of string and ask her how the string could be used to measure the distance around the rock (wrap it around the rock, cut it when it is wrapped around, and then measure the distance from one end to the next). She can use a small scale or balance to weigh the rock. Finally, ask her to draw a picture of the rock. Optionally, she can illustrate the location where she found the rock.

Wrapping Up

Ask your child to describe how rocks and minerals are different. Then ask her to name the three types of rocks (igneous, metamorphic, and sedimentary) and to describe how these types of rocks are different from one another. Ask her to explain what the rock cycle is.

Life Application

Let your child identify examples of rocks or minerals in or around your home or town. Around the house she may find marble countertops, rocks used in gardens, or pumice stone used for foot care. Around town she should look for buildings with exteriors made from slate, marble, granite, sandstone, or limestone. If your child is interested, the following archived website illustrates buildings covered in a variety of stones.

Stone Buildings

www.movingbeyondthepage.com/link/3367/

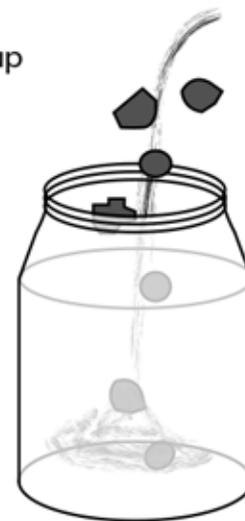
Click any link in a row to view larger images of a building and the stone used to build it.

Sedimentary Rocks

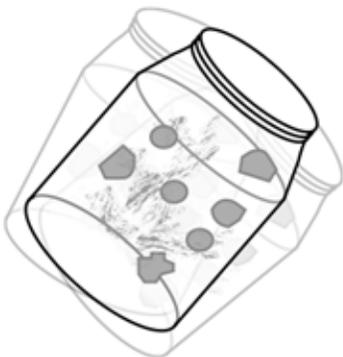
Materials:

clear plastic storage container with lid or glass jar with lid
pebbles
leaves, twigs, or seashell bits (optional)

sand
measuring cup
Epsom salts

**Directions:**

1. Add sand and pebbles to the container or jar. You can also add other natural materials, such as bits of seashell, leaves, or small twigs. The container should be 1/4 to 1/3 full.
2. Measure 1/4 cup of Epsom salt and pour it into the container. (Epsom salt contains minerals that will help glue the materials together.)
3. Add water so that the container is 3/4 full, and then place the lid on tightly.



4. Shake the container several times and then set it on a table or counter. Carefully remove the lid.
5. Check on the container several times over the next couple of hours and notice how the materials settle. Are they evenly mixed? Are some layered on others?
6. After 2-3 hours, gently and carefully pour out as much of the water as possible.
7. Let your rock dry completely. Once it is dry, remove it from the container and inspect it. (If you are using a glass jar, you may have to gently break the rock before removing it.) Does it look like you expected it to? How is it similar to or different from pictures of sedimentary rocks you have seen?



Part 1:
What do you think will happen when you press the shavings between the pieces of wax paper?

What kind of rock does this represent?

Part 2:
What do you think will happen when your parent irons the crayon shavings?

What kind of rock does this represent?

Part 3:
What do you think will happen when the crayon shavings are put into hot water?

What kind of rock does this represent?

A Rock's Journey

Directions: Write a paragraph to describe your rock's journey. Illustrate the setting of the story in the box provided.



A series of horizontal lines for writing, starting with a dashed line that curves across the top of the page.

A large, empty rectangular box with rounded corners, intended for illustrating the setting of the story.

A Rock's Journey

Directions: Illustrate your rock's journey as a comic strip. You can use part of the sample story your parent read to you for 4 of the boxes, but at least 2 boxes should be your own original idea of what happens next in the story.



Testing Rocks

Directions: Use these charts to record information from your rock tests.

Hardness Test



Rock	Scratched by	Hardness Number

Acid Test



Rock	Reaction (yes or no)

Testing Rocks

Directions: Use these charts to record information from your rock tests.

Magnetic Test



Rock	Magnetic (yes or no)

Streak Test



Rock	Streak (light or dark)

Pick a Rock

Is the rock smooth or rough? _____

The rock is _____ inches long and _____ inches around

The rock weighs _____

Other notable properties (hardness, magnetism, etc.) _____

Directions: Draw a picture of your rock. If you'd like, you can illustrate the location where you found the rock.

