



Earth Science

Rocks, Minerals, and Soil

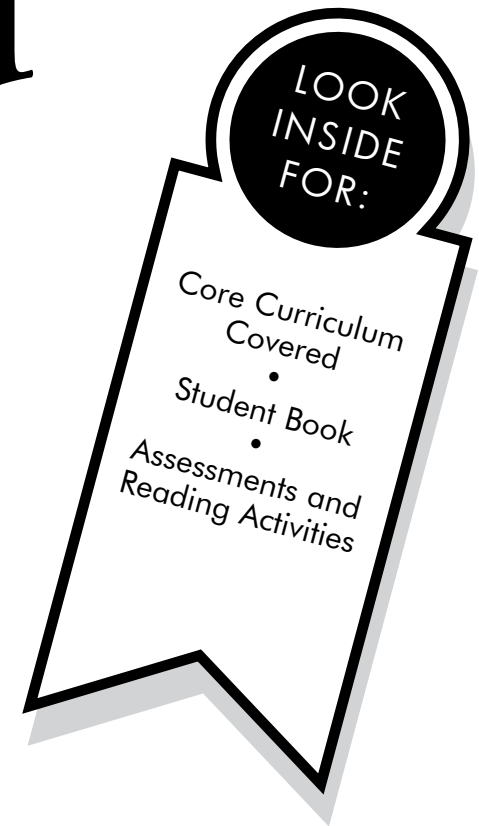
Basic Level

# Rocks and Minerals

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# Rocks and Minerals

What materials make up the Earth?

## CORE CURRICULUM STATEMENTS

**Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.**

Matter has properties (color, hardness, odor, sound, taste, etc.) that can be observed through the senses.

Objects have properties that can be observed, described, and/or measured: length, width, volume, size, shape, mass or weight, temperature, texture, flexibility, reflectiveness of light.

Measurements can be made with standard metric units and nonstandard units.

The material(s) an object is made up of determine some specific properties of the object (sink/float, conductivity, magnetism). Properties can be observed or measured with tools such as hand lenses, metric rulers, thermometers, balances, magnets, circuit testers, and graduated cylinders.

Objects and/or materials can be sorted or classified according to their properties.

Some properties of an object are dependent on the conditions of the present surroundings in which the object exists. For example:

- temperature - hot or cold
- lighting - shadows, color
- moisture - wet or dry



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Basic Level

# Student Book

*Rocks and Minerals*

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# Rocks and Minerals

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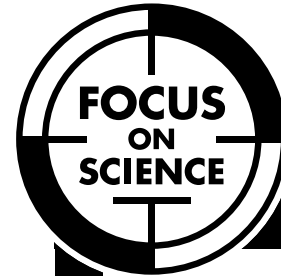
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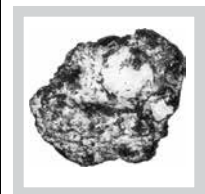
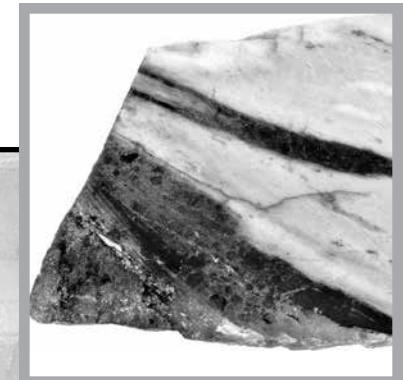
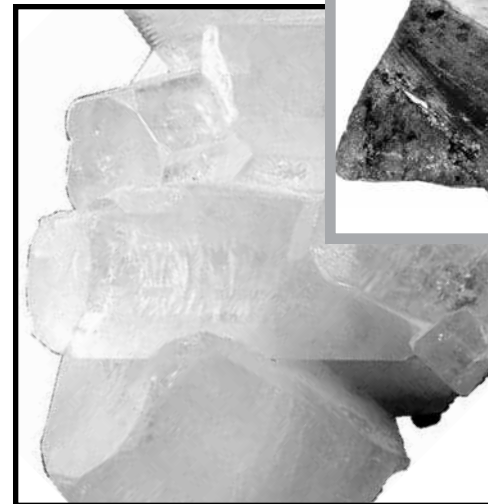


Earth Science

Rocks, Minerals, and Soil

# Rocks and Minerals

by Caitlin Scott





Earth Science  
Rocks, Minerals, and Soil

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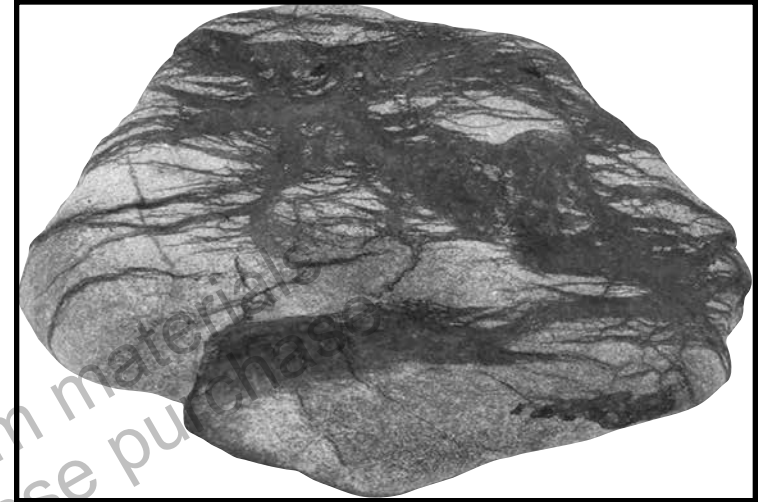
*– Predict –  
What do you think you will  
learn from reading this book?*

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INTRODUCTION

**What Are Rocks  
and Minerals?**

Rocks are everywhere. Some are big and some are small. If you look closely at rocks, you can see that they are made up of smaller parts. These parts are called minerals.



*This rock is made up of several different minerals.  
It has an irregular shape.*



*This is the mineral quartz. It has a crystal shape.*

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–Recall–

*What are rocks made from?*

## Identifying Rocks and Minerals

Go outside and gather different rocks. Then look closely at each one.

Some rocks you find might be small. They do not feel heavy. Some maybe large. They might feel heavier. Put each rock on a scale. Record the weight of each one.

Look at the color of your rocks. Then soak them in water overnight. Do the rocks look different when they are wet? Did they change color?

Next, wipe off the water from the rocks. Weigh them again. Did the weight change?

---

Next, put all the rocks that feel rough in one group. Put the rocks that feel smooth in another.

Are any of the rocks clear? Do any of them sparkle? Are some dull or shiny? Sort your rocks by how they look.

Are your rocks hard or soft? Scratch each rock with something hard, such as spoon. Did anything break off the rock?

This is how you learn about the properties of rocks and minerals. Scientists do similar activities to help identify the minerals in rocks.



---

Scientists use the following properties to tell minerals apart. You can, too.

## Hardness

The Mohs Scale of Hardness is a scale that ranks how hard minerals are.

The softest mineral is talc. The hardest mineral is diamond. A diamond can scratch glass. Any mineral with a rank greater than 6 can scratch glass.

---

### Mohs Scale of Hardness

Mohs Scale of Hardness	Mineral
1	Talc
2	Gypsum
3	Calcite
4	Fluorite
5	Apatite
6	Orthoclase
7	Quartz
8	Topaz
9	Corundum
10	Diamond

*–Apply–*  
*Will topaz cut glass? Will gypsum?*

---

## Luster

Luster is how shiny a mineral is. Some minerals shine like metals, such as a new penny. These minerals are called **metallic** minerals.

Other minerals do not shine at all. These are called **nonmetallic** minerals. Some look white. Some are clear. A diamond is an example of a clear, nonmetallic mineral.

---

## Cleavage

Cleavage is how a mineral breaks. Some break in just one direction. Others break in two or more directions.

## Color

Color may be the first thing you see when you look at a mineral. Some rocks have several colors. Others are just one color. If so, then color is a good clue to the mineral's identity.

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<p><b>metallic:</b> something that looks like metal <b>nonmetallic:</b> something that does not look like metal</p>
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## Streak

When you rub some minerals on a special plate, they leave a mark. This mark is called a streak. All minerals with a hardness of 6 or less leave a streak. This helps people identify these softer minerals.

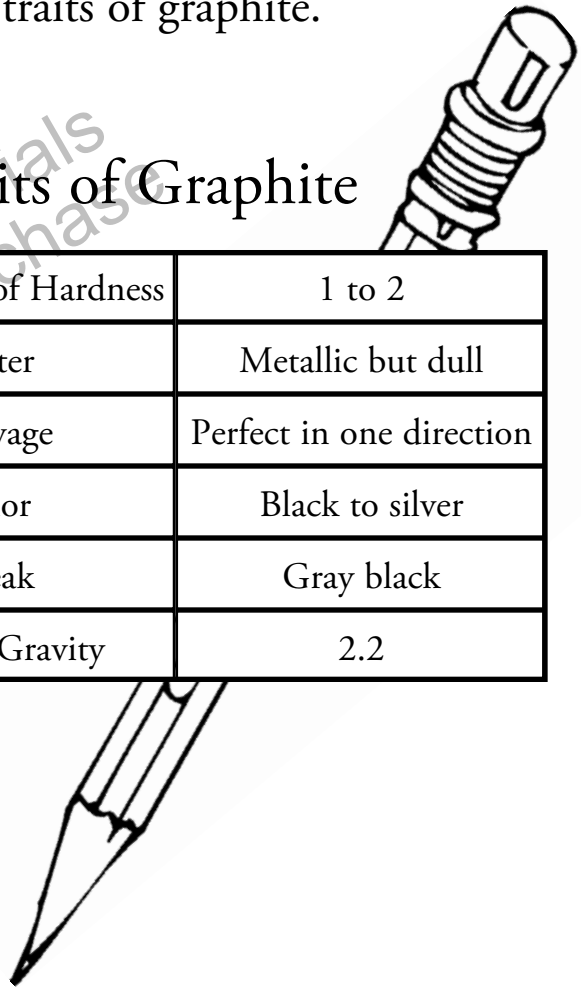
## Specific Gravity

Specific gravity measures the size and weight of a mineral. Each mineral has its own specific gravity value.

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The lead in your pencil is made of the mineral graphite. The table below shows the traits of graphite.

### Traits of Graphite



Mohs Scale of Hardness	1 to 2
Luster	Metallic but dull
Cleavage	Perfect in one direction
Color	Black to silver
Streak	Gray black
Specific Gravity	2.2

# Weathering

Here is another way you can classify rocks. Did you know that fossils are rocks?

## Fossils

When a plant or animal died long ago, mud and soil covered it. Over millions of years the mud and soil turned into rock. Water flowed through cracks in the rock. It **dissolved** the plant or animal. Left behind was an empty space in the rock. This space had the same shape as the plant or animal.

In time, minerals from the soil filled up the empty space. The minerals hardened. A rock formed in the shape of the plant or animal.

**dissolved:** changed from a solid to a liquid

You might think rocks last forever. But, they don't. Over thousands of years, they slowly wear away.

This **natural** process of wearing away is called weathering. Wind, water, and ice are all forces that cause weathering. It happens so slowly, we cannot see it happening.

**natural:** not caused by people

---

## Wind

Wind is a force that can weather rock over a long period of time.



*This rock was carved out by wind.*

## Water

Water can also wear down rocks slowly. For example, rain can wear down rocks over many years. Water can slowly wear down rocks in a river. Waves on the ocean can also wear away rocks.

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## Ice

When water freezes around rocks, it **expands**. This causes pressure in cracks in the rock. As the pressure increases, the crack widens and the rock breaks.

## Plants

Plants can weather rocks and minerals, too. Plant roots grow into cracks. As the roots grow, they slowly wedge the rock apart.

**expands:** gets bigger

---

## Glossary

**dissolved**—changed from a solid to a liquid

**expands**—gets bigger

**geologist**—someone who studies rocks

**metallic**—something that looks like metal

**natural**—not caused by people

**nonmetallic**—something that does not look like metal

---

## To Find Out More . . .

Want to learn more about rocks and minerals?

### Try these books

*The Best Book of Fossils, Rocks, and Minerals* by Chris Perrault. King Fisher, 2000.

*The Rock Factory: A Story about the Rock Cycle* by Jacqui Bailey. Picture Window Books, 2006.

### Access these Web sites

Mineralogy 4 Kids

[http://www.minsocam.org/MSA/K12/K\\_12.html](http://www.minsocam.org/MSA/K12/K_12.html)

The Mineral and Gemstone Kingdom

<http://www.minerals.net/index.htm>

### Write for more information

Mineralogical Society of America  
3635 Concorde Pkwy Suite 500  
Chantilly, VA 20151-1125

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# Assessments

## *Rocks and Minerals*

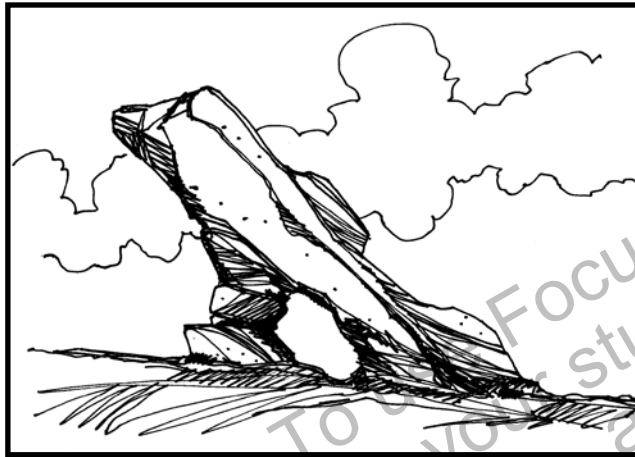
Print pages 18–20 of this PDF for the assessments.



# Check Understanding

Shade the circle next to the correct answer.

1. The picture below shows a rock in the desert. It was shaped by weathering.



Which force caused this wearing away?

- (A) ice
- (B) wind
- (C) water
- (D) plants

2. Minerals with a hardness of 6 or less leave a streak. Topaz has a hardness of 8.

What statement is correct?

- (A) Topaz is nonmetallic.
- (B) Topaz has perfect cleavage.
- (C) Topaz does not leave a streak.
- (D) Topaz has a low specific gravity.

3. How a mineral breaks is called

- (A) streak.
- (B) luster.
- (C) hardness.
- (D) cleavage.

# Check Understanding

Shade the circle next to the correct answer.

Note that question 4 has only three choices.

4. A fossil is a kind of

- Ⓐ mineral
- Ⓑ rock
- Ⓒ weathering

5. A student finds a hard, black rock and a clear, soft rock. This suggests that

- Ⓐ they are two different minerals
- Ⓑ they are the same mineral
- Ⓒ they are not minerals
- Ⓓ they are fossils

6. The chart below shows traits of the mineral graphite.

**Traits of Graphite**

Mohs Scale of Hardness	1 to 2
Luster	Metallic but dull
Cleavage	Perfect in one direction
Color	Black to silver
Streak	Gray black
Specific Gravity	2.2

Which property measures size and weight?

- Ⓐ Mohs Scale of Hardness
- Ⓑ cleavage
- Ⓒ streak
- Ⓓ specific gravity

# Assessment Scoring Guidelines

1. Answer B is correct.
2. Answer C is correct.
3. Answer D is correct.
4. Answer B is correct.
5. Answer A is correct.
6. Answer D is correct.

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# English Language Arts Activities

*Rocks and Minerals*

Print pages 22–26 of this PDF for the reading activities.

# Read for a Purpose

## TRY THE SKILL

Here are the main reasons for reading:

- to gain information or understanding
- to learn how to do something
- to be entertained

For example, you read this book to gain information. You learned about the properties of rocks.

When you are choosing what to read, pay attention to titles. They can help you decide whether the book will fit your purpose.

**Read the list of titles. Then write the correct letters beside each purpose for reading.**

- A. *The Rock Cycle*
- B. *Rocky Strikes Out*
- C. *The Rock Hunter's Guide to Collecting*
- D. *Turning Rocks into Gems*
- E. *Earth's Most Valuable Rocks*
- F. *Lost in Dead Man's Cave!*

1. Which two titles would you read for information? \_\_\_\_\_
2. Which two titles would you read to learn how to do something? \_\_\_\_\_
3. Which two titles would you read to be entertained? \_\_\_\_\_

# Summarize

## TRY THE SKILL

Summarizing means retelling. You can read a passage and summarize it. Summaries are short. They help you understand what you read.

**Read this paragraph. Then, summarize it.**

Luster is how shiny a mineral is. Some minerals shine like metals, such as a new penny. These minerals are metallic.

**Is this a good summary?**

*Some minerals shine like metals, such as a penny.*

No! This statement is too specific. It does not tell the main idea.

**Is this a good summary?**

*Luster is how shiny a mineral is.*

Yes! This is the main idea.

**Read these paragraphs from *Rocks and Minerals*. Shade the letter of the best summary.**

1. Water can wear down rocks slowly. For example, rain can wear down rocks over many years. Water can slowly wear down rocks in a river. Waves on the ocean can also wear away rocks.  
Ⓐ Water can wear down rocks slowly.  
Ⓑ Water can slowly wear down rocks in a river.  
Ⓒ Waves on the ocean can also wear away rocks.
2. Cleavage is how a mineral breaks. Some break in just one direction. Others break in two or more directions.  
Ⓐ Others break in two or more directions.  
Ⓑ Cleavage is how a mineral breaks.  
Ⓒ Some break in just one direction.

# Question and Answer

## TRY THE SKILL

You can check your reading by asking questions. Then, you can read to find the answers.

**Read this passage about streak.**

When you rub some minerals on a special plate, they leave a mark. This mark is called a streak. All minerals with a hardness of 6 or less leave a streak. This helps people identify these softer minerals.

**Answer the question, “What is streak?”**

*Streak is the mark left by some minerals when rubbed on a special plate.*

**Read this passage from *Rocks and Minerals*. Then answer the question by shading the circle next to the correct answer.**

Luster is how shiny a mineral is. Some minerals shine like metals, such as a new penny. These minerals are metallic.

1. Why do some minerals look shiny?
  - (A) They are metallic.
  - (B) They are pennies.
  - (C) They are nonmetallic.

# Use the Index

## TRY THE SKILL

The index is located in the back of a book. Topics are listed in alphabetical order. Next to each topic is the page number where you can find more information.

**Look at the index of *Rocks and Minerals*.**

### Index

cleavage, 11

color, 11

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luster, 10

specific gravity, 12

streak, 12

**Use the index to answer the questions.**

1. Where can you find information about fossils?

- Ⓐ page 11
- Ⓑ page 12
- Ⓒ page 14

2. Where can you find information about graphite?

- Ⓐ pages 8–9
- Ⓑ page 13
- Ⓒ page 14

3. Which topics are discussed on page 11?

- Ⓐ cleavage and color
- Ⓑ hardness and luster
- Ⓒ specific gravity and streak



# Answer Key

## Read for a Purpose

1. A, E
2. C, D
3. B, F

## Summarize

1. A
2. B

## Question and Answer

1. A

## Use the Index

1. C
2. B
3. A

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