



Earth Science

Rocks, Minerals, and Soil

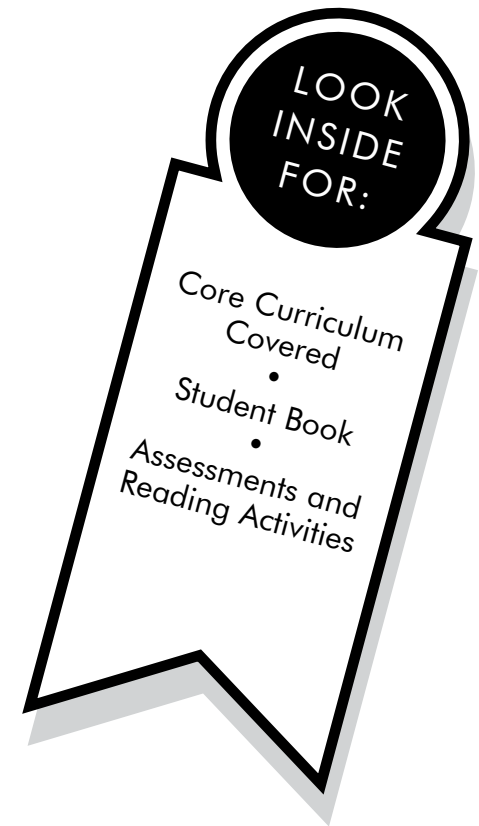
Basic Level

# What Is Soil?

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# What Is Soil?

What materials make up the Earth?

## CORE CURRICULUM STATEMENTS

**Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land.**

Erosion and deposition result from the interaction among air, water, and land.

- interaction between air and water breaks down earth materials
- pieces of earth material may be moved by air, water, wind, and gravity
- pieces of earth material will settle or deposit on land or in the water in different places
- soil is composed of broken-down pieces of living and nonliving earth material

Nonliving things can be human-created or naturally occurring.

Basic Level



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# Student Book

*What Is Soil?*

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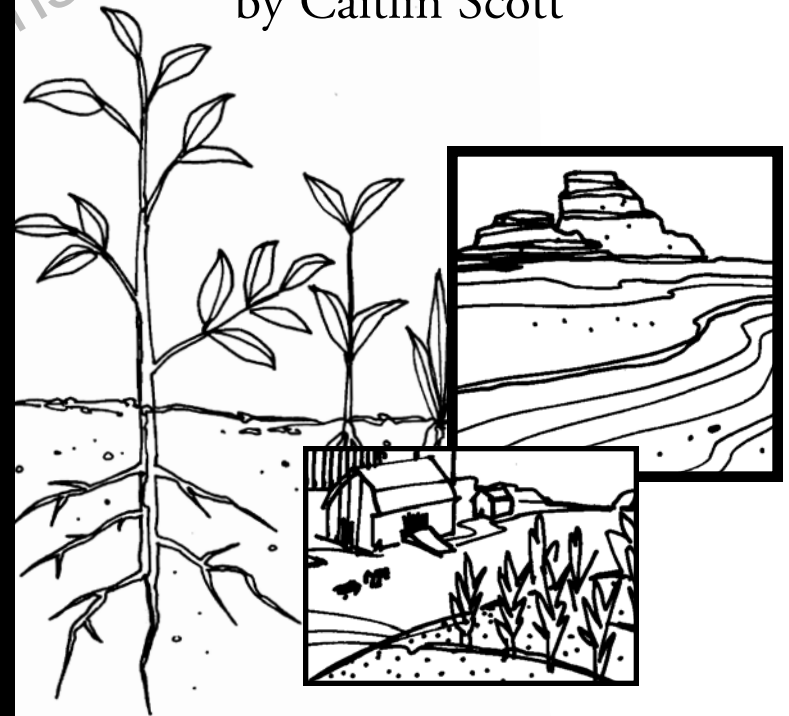


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Rocks, Minerals, and Soil

# What Is Soil?

by Caitlin Scott





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Curriculum materials for your content standards

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– Predict –

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

## What Is Soil?

Look closely at soil. It has many different things in it. Some soil is dark and crumbly. Other times, soil has pebbles or rocks in it.

Some plants and animals live in soil. They die in the soil, too. These dead plants and animals **decay**. They become part of the soil.

**decay:** to rot or break down

---

Most soil has some water in it. Muddy soil has lots of water. Dry or sandy soil has little water in it.

Most soil also has air in it. Soil that is soft and breaks apart easily has a lot of air in it.

Other soil is hard. It isn't easy to break up. This soil has little air in it.

Now you know that soil is made of rocks, dead animals and plants, water, and air.

– Investigate –

*Go outside and dig up a handful of soil.*

*Describe the composition of the soil.*

---

## Weathering

Rocks last a long, long time. But, rocks don't last forever. Over thousands of years, rocks slowly wear away. This is called weathering. Wind, water, and ice all cause weathering.

Picture rocks on top of a mountain. Strong winds hit the rocks. Rain beats down on the rocks. Ice forms on the rocks. All these forces slowly break the rock into tiny pieces. These pieces become part of the soil.

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## Decomposition

When food gets old, it rots. It gets moldy, soft, and slimy. It turns a dark color like soil. That's because it is becoming part of the soil. This is called decomposition.

To decompose is to rot. Food rots. Wood rots. Paper rots. All plants and animals die and rot. What is left becomes part of the soil.



## Soil Types

There are many different types of soil. The soil on a beach is different from the soil on a farm. What is the soil around you like?

Scientists have ways of naming different soils. One way is by the size of the particles in the soil. Clay has the smallest **particles**. Sand has the largest particles.

---

## Clay

Have you used clay in art class? The small particles in clay have a regular shape. They can pack tightly together. It is difficult for water and air to get through. Once water is in clay, the clay holds it inside. Plants often have a hard time growing in clay.

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**particles:** small pieces

---

## Sand

The particles in sand are large.  
They have an **irregular** shape.  
Sand does not pack together well.

Sand has a lot of air in it. Water moves through sand quickly. Plants that need a lot of water don't grow well in sand.

## Silt

Silt has medium size particles. They are shaped like sand. But they are coated with clay. This makes them a little bit like sand and a little bit like clay. Soil near rivers has a lot of silt.

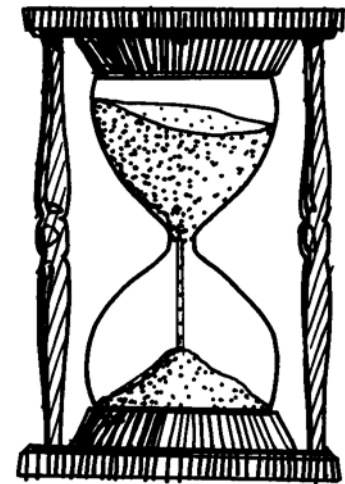
**irregular:** not shaped the same

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How much clay and sand is in your soil? Take a handful of soil. Squeeze it hard. Soils high in clay form a solid lump. Sandy soils stay loose.

Next, wet the soil. Rub it between your fingers. Clay feels slippery when wet. Sand feels rough.

*Sand is loosely packed, so it flows through an hourglass easily. If an hourglass were filled with tightly packed clay, what would happen?*



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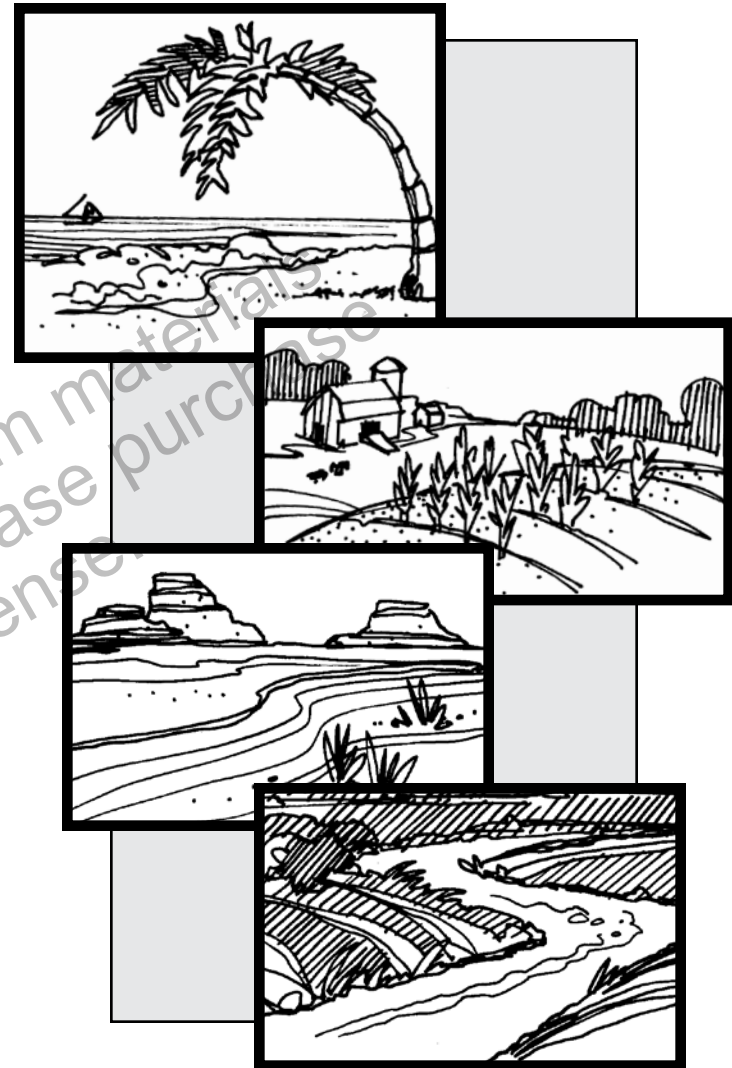
## Loam

Most soil isn't all clay, all sand, or all silt. Most is a mix. A mix that is equal parts sand, clay, and silt is called loam. Loam is good for growing plants.

## Humus

Rotting plants and animals in soil are called humus. Humus breaks down in the soil. This gives the soil **nutrients** that plants need for growth. Soils with lots of humus are called rich soils.

**nutrients:** things needed by people, plants, and animals to stay healthy



*A beach, a farm, a desert, and a river each have different types of soil. What is the soil likely to be like in each place? Will the soil be sand, silt, or clay? How much humus might be in it?*

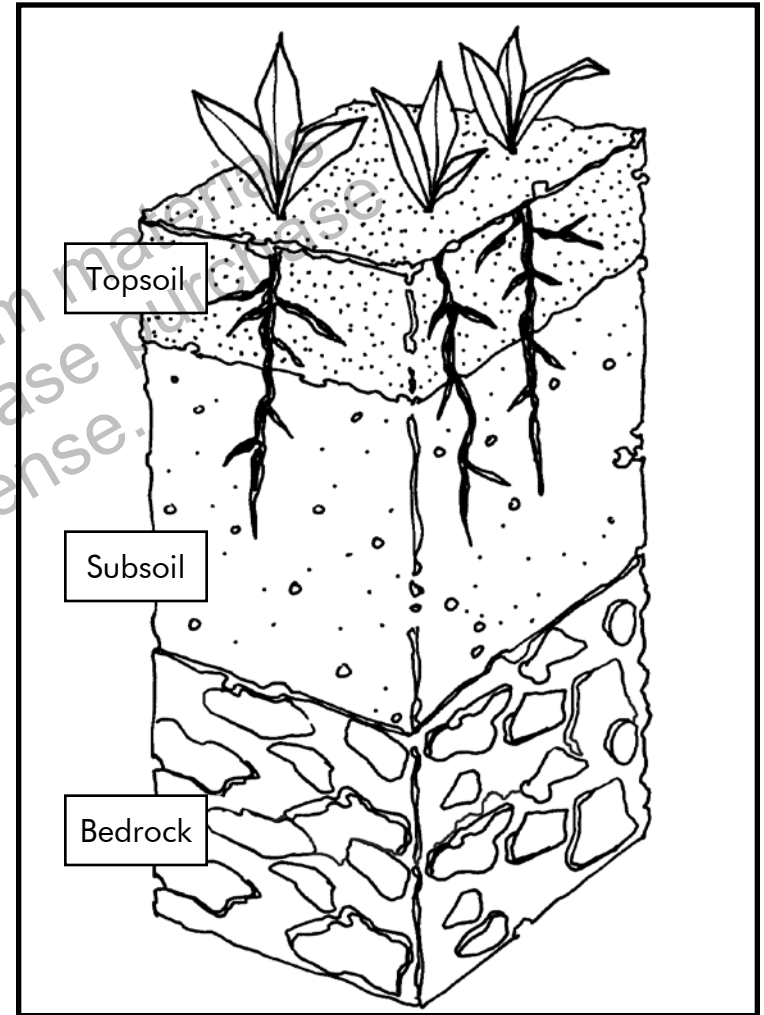
## Soil Layers

Have you seen a road that cuts into a hill? This can show the layers in the soil.

Why does soil have layers? Soil is made of rocks and decomposing insects, animals, and plants. When water flows through these materials they form layers. Heavier rocks often settle to the bottom.

Most soil has three layers. They are called topsoil, subsoil, and bedrock.

### Layers of Soil



*Soil has several layers. Topsoil is on top.  
Subsoil is underneath.  
Bedrock is the bottom layer.*

---

## Topsoil

Topsoil is the top layer of soil. It is where plants grow. It is made mostly of dead plants and animals. These plants and animals are rotting. That is why the soil is a dark color. In fact, the darker the soil is, the richer it is.

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## Subsoil

The subsoil is beneath the topsoil. This layer has a lot of clay and iron in it. Subsoil is a lighter color than topsoil. It is also harder. Plants don't grow as well in this layer.

## Bedrock

Bedrock is the bottom layer. It is mainly rock. The rock might be broken into many pieces. It might also be a large, flat layer of rock. It is very hard. Plant roots don't grow easily in bedrock.

*– Experiment –*

*Go outside and dig down about three inches into the soil. Investigate the properties of the soil and record your observations.*

*– Review –*

*How do the three layers of soil differ?*

---

## Glossary

**decay**—to rot or break down

**irregular**—not shaped the same

**nutrients**—things needed by people, plants, and animals to stay healthy

**particles**—small pieces

---

## To Find Out More . . .

Want to learn more about soil?

### Try these books

*Soil* (True Books: Natural Resources)  
by Christin Ditchfield. Children's Press,  
2003.

*Soil* (Early Bird Earth Science) by Sally  
Walker. Lerner Publications, 2006.

### Access these Web sites

Just for Kids: Soil Biological Communities  
<http://www.blm.gov/nstc/soil/Kids/index.html>

Natural Resources Conservation Service:  
Tidbits for Teachers and Students  
<http://www.nrcs.usda.gov/feature/education/>

### Write for more information

U.S. Bureau of Land Management  
Office of Public Affairs  
1849 C Street, Room 406-LS  
Washington, DC 20240

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# Assessments

## What Is Soil?

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



# Check Understanding

Shade the circle next to the correct answer or write your answer on the lines provided.

1. Rotting plants and animals in soil are called

- Ⓐ clay
- Ⓑ silt
- Ⓒ humus
- Ⓓ sand

Note that question 2 has only three choices.

2. A student wants to plant a garden. What soil should she use?

- Ⓐ topsoil
- Ⓑ subsoil
- Ⓒ bedrock

3. Identify the **two** ways that soil forms.

(1) \_\_\_\_\_

(2) \_\_\_\_\_

4. Soil that is difficult to pack together and does not hold water is called

- Ⓐ clay
- Ⓑ silt
- Ⓒ humus
- Ⓓ sand

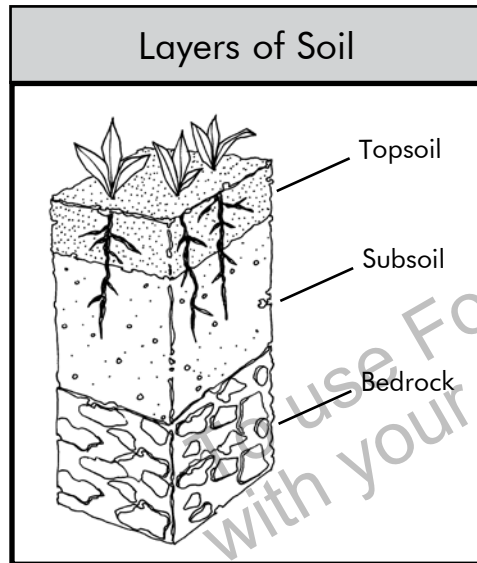
What Is Soil?

# Check Understanding

Shade the circle next to the correct answer.

Note that question 5 has only three choices.

5. The diagram below shows the three layers of soil.



Which soil layer contains large rocks?

- Ⓐ topsoil
- Ⓑ subsoil
- Ⓒ bedrock

6. Most soil contains rocks, water, dead animals and plants and

- Ⓐ iron
- Ⓑ air
- Ⓒ ice
- Ⓓ mold

What Is Soil?

# Assessment Scoring Guidelines

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

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# English Language Arts Activities

## *What Is Soil?*

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

# Prefixes

## TRY THE SKILL

In this book, you learned many new words. Now you can use what you learned to figure out even more words. For example, you learned that:

- *subsoil* is the soil under topsoil.  
The prefix *sub-* means “under.”
- *irregular* means “not shaped the same.”  
The prefix *ir-* means “not.”
- *decompose* means “to rot” or “to break down.”  
The prefix *de-* means “the opposite of.”

**Think about the meanings of the words below.**  
**Pay attention to each prefix.**

irresponsible    submerged    deflated

**Read each sentence. Shade the circle next to the word that correctly completes the sentence.**

1. After the air is let out of a balloon it is  
 (A) irresponsible  
 (B) submerged  
 (C) deflated
2. When a rock sinks into the water, it is  
 (A) irresponsible  
 (B) submerged  
 (C) deflated
3. Not studying for a test is  
 (A) irresponsible  
 (B) submerged  
 (C) deflated

# Compare and Contrast

## TRY THE SKILL

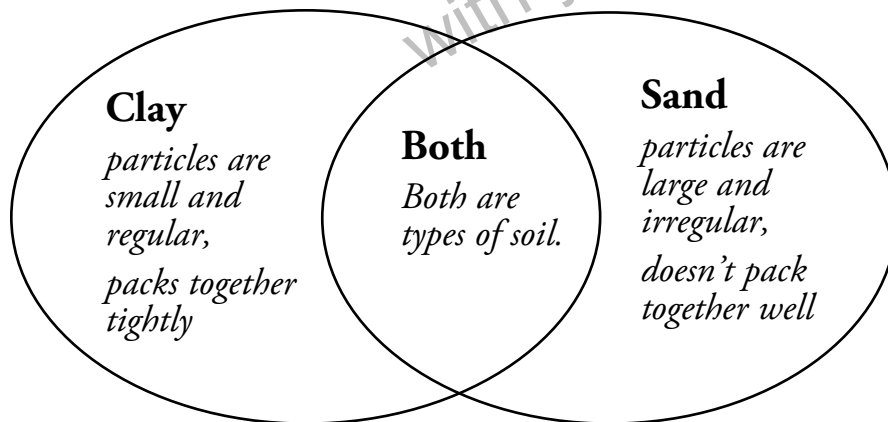
Comparing and contrasting can help you understand what you read.

- Comparing tells how things are alike.
- Contrasting tells how things are different.

**Read these paragraphs. Then, read the Venn diagram that compares and contrasts.**

The small particles in clay have a regular shape. They can pack tightly together.

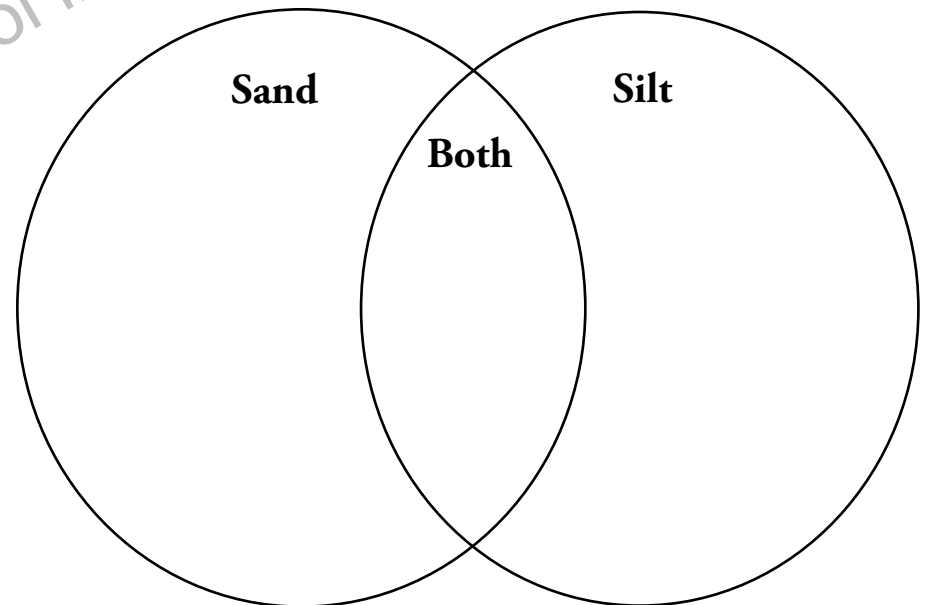
The particles in sand are large. They have an irregular shape. Sand does not pack together well.



**Read the paragraphs. Then complete the Venn diagram.**

The particles in sand are large. They have an irregular shape. Sand does not pack together well.

Silt has medium size particles. They are shaped like sand. But they are coated with clay.



# Use a Glossary

## TRY THE SKILL

What should you do if you don't know what a word means? Look in the glossary. The glossary is usually in the back of a book.

**Read these words from *What Is Soil?* Draw a line to match each word with its meaning. If you don't know the meaning, look in the glossary on page 18.**

### Words

decay

particles

nutrients

irregular

### Meanings

small pieces

not shaped the same

to rot or break down

things needed by people, plants, and animals to stay healthy

# Use Graphic Organizers

TRY THE SKILL

Graphic organizers put information in the form of a picture. The facts may make more sense than when you read them in the text.

Use this organizer to show the differences between different types of soil. Use the facts in the box to complete the organizer.

Topsoil	Subsoil	Bedrock

mostly rock • plants grow well • made of dead plants and animals • bottom layer  
dark in color • top layer • has clay and iron • light in color  
directly beneath the topsoil • plants don't grow • plants don't grow well



# Answer Key

## Prefixes

1. C
2. B
3. A

## Compare and Contrast

**Sand:** Large particles; does not pack together well

**Both:** Types of soil; irregular shape

**Silt:** Medium size particles; coated in clay

## Use a Glossary

*decay*—to rot or break down

*particles*—small pieces

*nutrients*—things needed by people, plants, and animals to stay healthy

*irregular*—not shaped the same

## Use Graphic Organizers

**Topsoil:** top layer, made of dead plants and animals, dark in color, plants grow well

**Subsoil:** directly beneath the topsoil, has clay and iron, light in color, plants don't grow well

**Bedrock:** bottom layer, mostly rock, plants don't grow