



Earth Science

Rocks, Minerals, and Soil

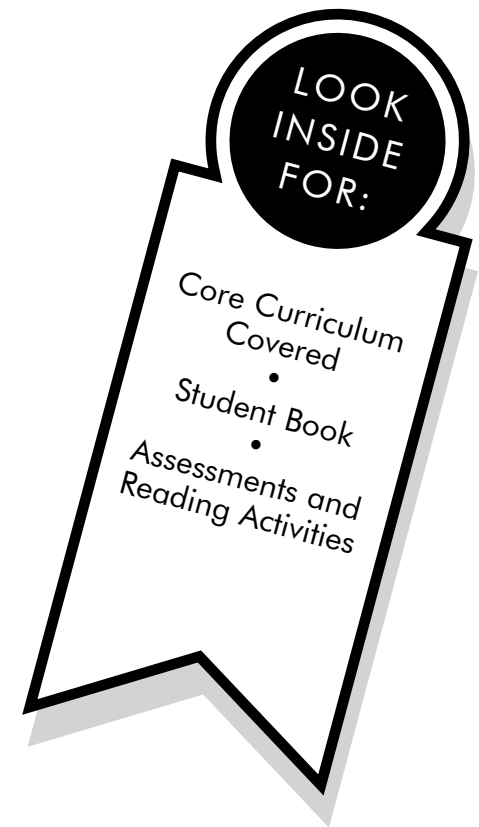
On Level

# 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.



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# Student Book

*What Is Soil?*

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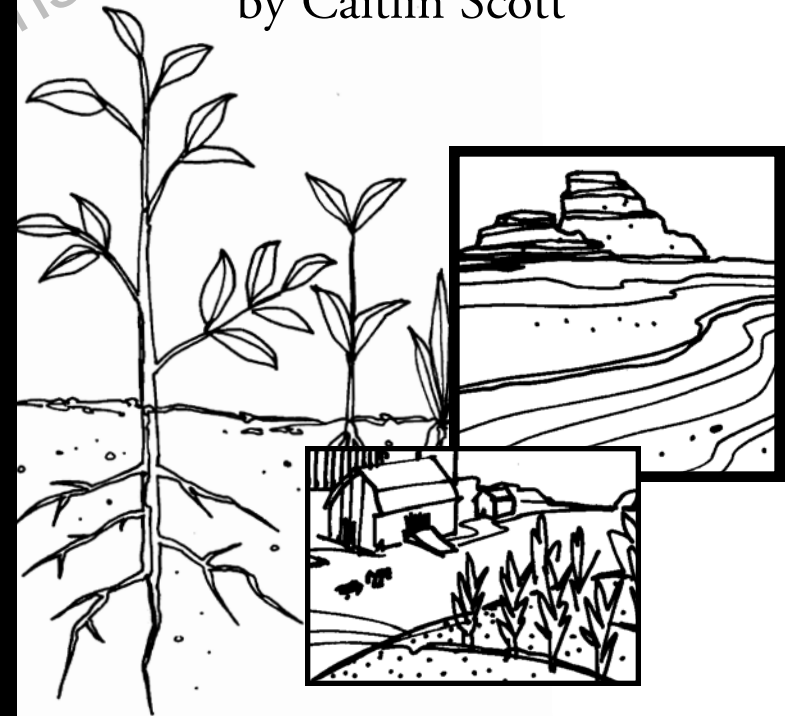


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# What Is Soil?

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. Sometimes it is dark and crumbly. Other times you can see pebbles or rocks in it.

Sometimes you might find living insects and animals in soil, like ants and earthworms. Other times you can see dead insects and animals in the soil. These dead animals break down, or **decay**. Eventually, they become part of the soil.

Often you see plant roots in the soil. When these plants die, they fall on the ground. Soon, they decay and become part of the soil as well.

**decay:** to rot or break down

Most soil also has some water in it. Very muddy soil has lots of water. Dry, crumbly, or sandy soil doesn't have much at all.

Most soil also has air in it. Some soil seems soft and breaks apart easily because it contains a lot of air. Other soil seems hard. It isn't easy to break apart. This soil has little air in it.

Soil is made of rocks; dead insects, animals, and plants; water; and air. How do these things get into the soil? They become soil in two ways—weathering and decomposition. Read on to learn what these are.

– Investigate –

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

*Describe the composition of the soil.*

---

## Weathering

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

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

Imagine rocks on the top of a mountain or on the bank of a river. Strong winds whip by the rocks, rain beats down on the rocks, and ice forms on the rocks. All these forces slowly break up the rock. Often the pieces that break off are very tiny. These pieces become soil.

---

## Decomposition

What happens when you leave something in the fridge too long? It rots. It gets moldy, soft, and slimy. After a while, it may turn a dark color like soil. That's because it is becoming soil. This is called decomposition.

To decompose is to rot. You know that food decomposes. Other things do, too. Wood decomposes. Insects decompose. In fact, all plants and animals eventually die and decompose.

**natural:** not caused by people



## Soil Types

There are many different types of soil. Is the soil on your playground different from the soil near your home? What about the soil on a beach? What about on a farm? What about the desert?

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. Silt has medium size particles.

**particles:** small pieces

---

## Clay

Have you used clay in art class? Clay is a type of soil. The small particles in clay have a regular shape. They can pack so tightly together that it is difficult for water and air to get through. Once water is in clay, the clay holds it inside.

If a soil is pure clay, most plants do not grow well in it. This is because it is difficult for the roots to grow in the tightly packed soil.

---

## Sand

The particles in sand are large. They have an **irregular** shape. Because of this shape, sand particles don't pack together well.

Sand has a lot of air in it trapped between the particles. Water moves through sand quickly. Plants that need a lot of water don't grow well in sand. Rain water moves too quickly away from the plant.

## Silt

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

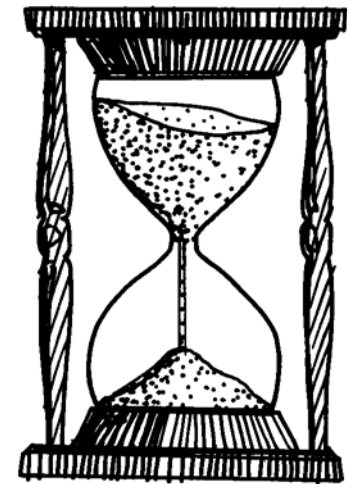
**irregular:** not shaped the same

---

How can you tell how much clay, sand, and silt is in your soil? Take a handful of soil and squeeze hard. Soils high in clay form a solid lump, but sandy soils stay loose. Silt will be somewhat lumpy but not a solid lump.

Then, wet the soil and rub it between your fingers. Clay feels slippery when wet, while 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?*



– Describe –  
*What are the characteristics of different types of soil?*

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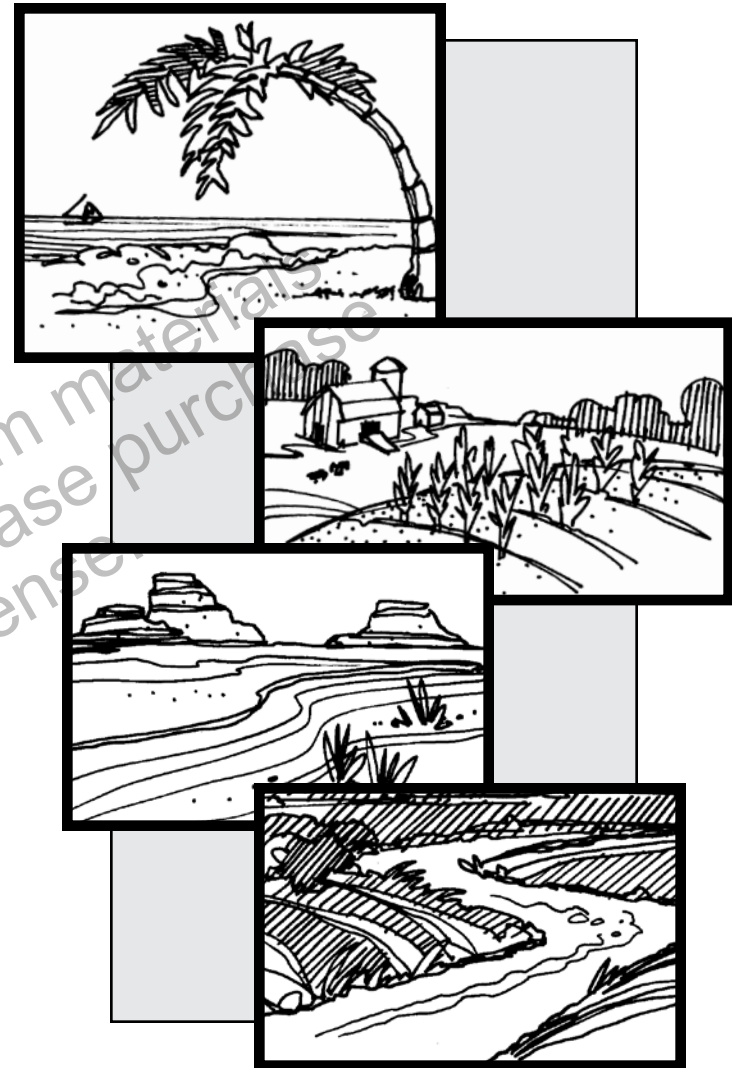
## Loam

Most soil isn't just 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

You've read about the size of the particles in soil. What about the decomposing plant and animal material in soil? This decomposing material is called humus. Humus breaks down readily in the soil. This releases **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?*

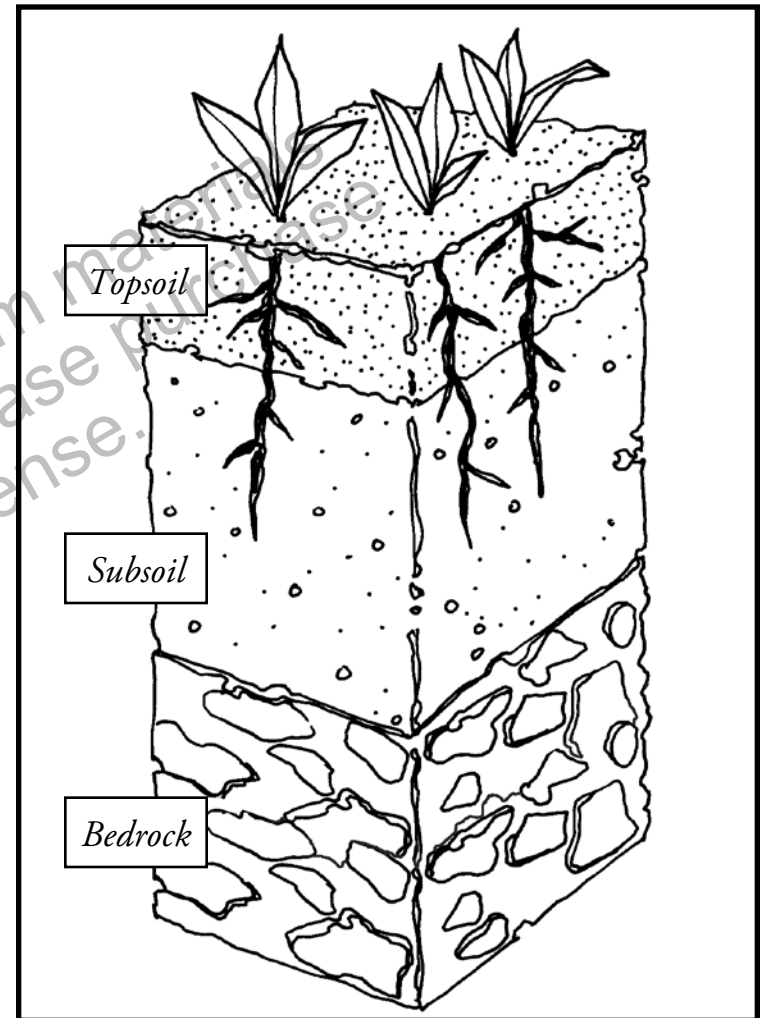
## Soil Layers

Have you ever been on a road that cuts into a hillside? If so, you may have seen layers in the soil beside the road.

Why does soil have layers? Soil is made of rocks, decomposing insects, animals, and plants. Water flows through the soil. This creates layers of these materials. 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 where plants grow. It is made mostly of dead plants and animals. These plants and insects are decomposing. That is why the soil is a dark color. This dark soil is often very good for growing things.

When you buy a bag of dirt in a garden store, you are buying topsoil. Putting topsoil in your garden can make the garden soil richer. This helps plants grow better.

*– Experiment –*

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

---

## Subsoil

The subsoil is underneath the topsoil. This layer often has a lot of clay and iron in it. Sometimes it is a rusty, red color due to the iron. Most of the time, the subsoil is lighter in color than the topsoil. It is also usually a little harder. Plants don't grow very well in this layer.

## Bedrock

Bedrock is the bottom layer of the soil. Bedrock is mostly rock. The rock might be broken up by weathering. It might also be a large, flat layer of rock. It is very hard. Plant roots don't grow easily in this layer.

*– 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.**

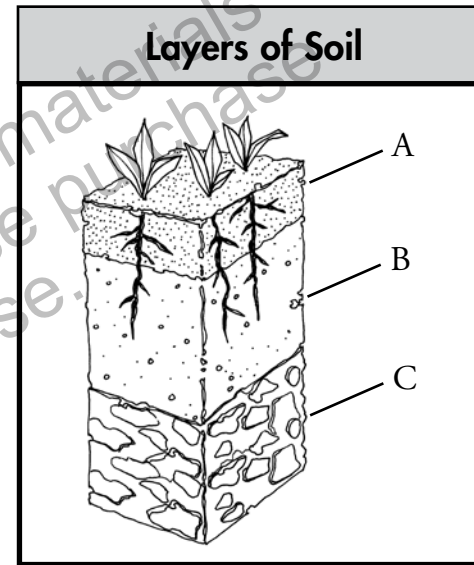
1. Which type of soil is best for growing plants?

- Ⓐ silt
- Ⓑ clay
- Ⓒ sand
- Ⓓ loam

2. When plants and animals die, they

- Ⓐ decompose
- Ⓑ weather
- Ⓒ disappear
- Ⓓ form layers

3. The diagram below shows the three layers of soil. The layers are labeled A, B, and C.



Identify the three layers of soil.

Layer A: \_\_\_\_\_

Layer B: \_\_\_\_\_

Layer C: \_\_\_\_\_

# Check Understanding

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

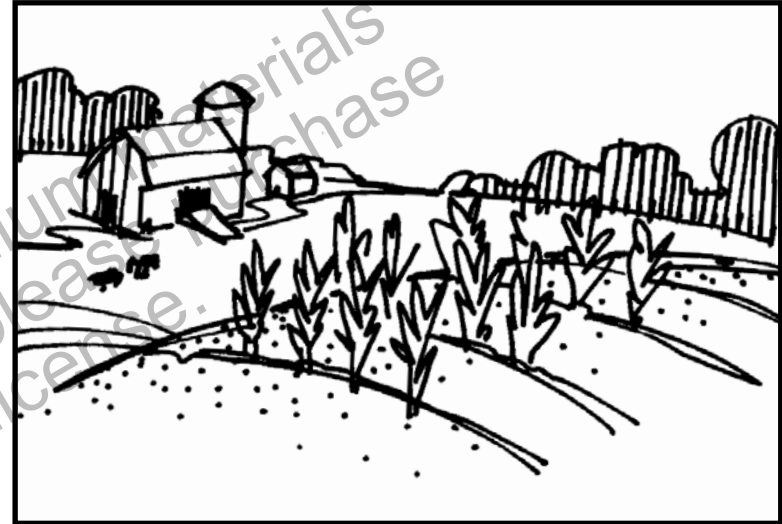
4. Soil that packs tightly together and holds water inside is called

- Ⓐ silt
- Ⓑ clay
- Ⓒ sand
- Ⓓ loam

5. What causes weathering?

- Ⓐ wind, rain, and ice
- Ⓑ clay, silt, and sand
- Ⓒ decomposition and decay
- Ⓓ animals and plants

6. The picture below shows a farm.



Identify **two** things that this soil contains.

- (1) \_\_\_\_\_
- (2) \_\_\_\_\_

What Is Soil?

# Assessment Scoring Guidelines

1. Answer D is correct.
2. Answer A is correct.
3. Layer A: Topsoil; Layer B: Subsoil;  
Layer C: Bedrock
4. Answer B is correct.
5. Answer A is correct.
6. Dead insects, animals, and plants; water; air;  
loam; humus

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# English Language Arts Activities

*What Is Soil?*

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

# Main Idea and Supporting Details

## TRY THE SKILL

A main idea is the author's main point. The author supports this point with details.

**Read this paragraph from *What Is Soil?* The graphic organizer below shows the main idea and the details that support this idea.**

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. Silt has medium size particles.

### Main Idea

Scientists name soils based on particle size.

### Supporting Details

- Clay has the smallest particles.
- Sand has the largest particles.
- Silt has medium size particles.

**Read this paragraph from *What Is Soil?* Then complete the graphic.**

Topsoil is the top layer of soil where plants grow. It is made mostly of dead plants and animals. These plants and insects are decomposing. That is why the soil is a dark color. This dark soil is often very good for growing things.

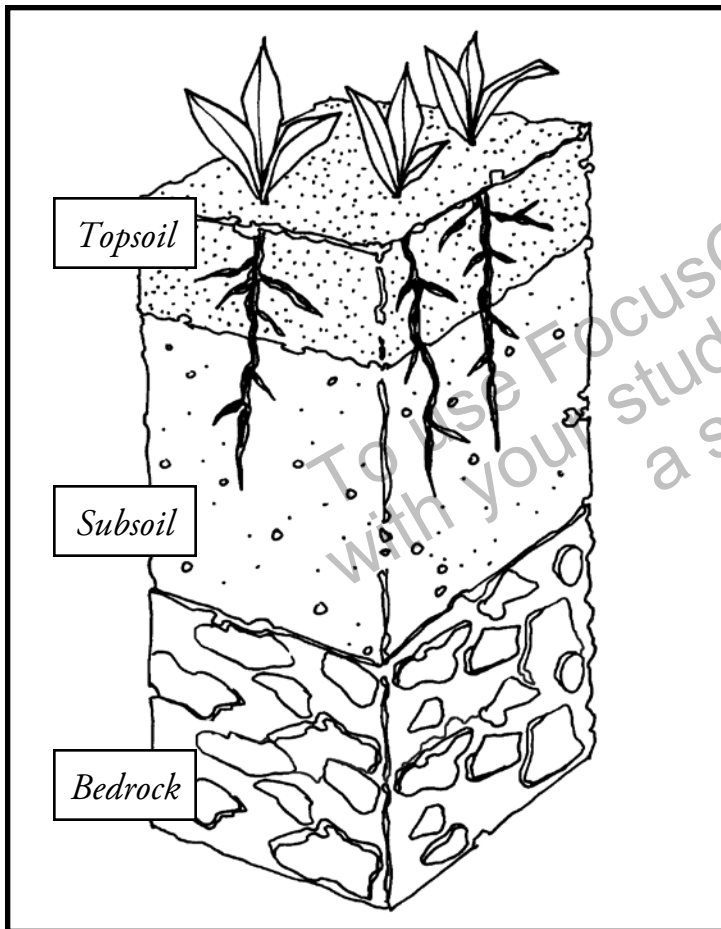
### Main Idea

### Supporting Details

# Interpret Graphics

## TRY THE SKILL

Graphics, or pictures, can give you information quickly. They can help you understand things better. Look at this graphic from *What Is Soil?*



Use the graphic to the left to answer the following questions. Shade the circle next to the correct answer.

1. What layer has the largest rocks in it?  
 (A) topsoil  
 (B) subsoil  
 (C) bedrock
2. Which layer has the lightest color?  
 (A) topsoil  
 (B) subsoil  
 (C) bedrock
3. Which is the thinnest layer?  
 (A) topsoil  
 (B) subsoil  
 (C) bedrock

# Context Clues

## TRY THE SKILL

What should you do if you don't know what a word means? Look for words in the same sentence or nearby sentences that give you clues.

### Read this paragraph.

Without soil, plants could not grow tall. In addition, soil gives plants food and water. Plants suck these nutrients up through their roots. Without soil, most plants would not be able to live.

### What does the word *nutrients* mean?

The things that plants need to live. The second sentence gives you a clue. It tells you that soil provides food and water for plants.

### Read this paragraph. Then, answer the questions.

It's hard for plants to grow in places where the topsoil has been removed. It's also hard for plants to grow in soil that is contaminated. Both can happen due to mining.

Scientists are working to restore the soil in old mining towns. They want plants to grow again.

1. What does the word contaminated mean?
  - Ⓐ rich
  - Ⓑ growing
  - Ⓒ polluted
2. What does the word restore mean?
  - Ⓐ to change
  - Ⓑ to study closely
  - Ⓒ to make something like it was before

# Question and Answer

## TRY THE SKILL

Check your understanding as you read. Ask questions and then read to find the answer. Sometimes authors will even write a question and then answer it.

**Read this paragraph from *What Is Soil?***

How can you tell how much clay, sand, and silt is in your soil? Take a handful of soil and squeeze hard. Soils high in clay form a solid lump, but sandy soils stay loose. Silt will be somewhat lumpy but not a solid lump.

**What is the question?**

How can you tell how much clay, sand, and silt is in your soil?

**What is the answer?**

Take a handful of soil and squeeze hard. Soils high in clay form a solid lump, but sandy soils stay loose. Silt will be somewhat lumpy but not a solid lump.

**Read this paragraph from *What Is Soil?* Then, answer the questions.**

What happens when you leave something in the fridge too long? It rots. It gets moldy, soft, and slimy. After a while, it may turn a dark color like soil. That's because it is becoming soil. This is called decomposition.

**1. What is the question?**

---

---

**2. What is the answer?**

---

---

---



# Answer Key

## Main Idea and Supporting Details

### Main Idea:

Topsoil is the top layer of soil where plants grow.

### Supporting Details:

- It is made mostly of dead plants and animals.
- The soil is dark because the plants and animals are decomposing.

## Interpret Graphics

1. C
2. B
3. A

## Context Clues

1. C
2. C

## Question and Answer

1. What happens when you leave something in the fridge too long?
2. It rots. It gets moldy, soft, and slimy. After a while, it may turn a dark color like soil.