



Essential Question

What Is Soil?

Engage Your Brain!

Find the answer to the following question in this lesson and record it here.

Why is soil important to these peach trees and to people?

Active Reading

Lesson Vocabulary

List the terms. As you learn about each one, make notes in the Interactive Glossary.

<hr/>	<hr/>
<hr/>	<hr/>
<hr/>	<hr/>

Compare and Contrast

Many ideas in this lesson are connected because they explain comparisons and contrasts—how things are alike and different. Active readers stay focused on comparisons and contrasts when they ask themselves, How are things alike? How are they different?

Soil Is Not Just Dirt

Soil is important. Why? Most plants need soil to grow. Without plants, there would be no food for animals or people.

Active Reading As you read these two pages, draw a star next to what you think is the most important sentence. Be ready to explain why you think so.

When you are in a forest or garden, or even a parking lot, what is under your feet? Below the sticks, rocks, plants, and pavement, there is soil. **Soil** is a mixture of water, air, tiny pieces of rock, and humus. **Humus** is a rich mixture of the decomposed, or broken down, remains of plants and animals.

There are many kinds of soil. Soil can be black, red, brown, gray, and even white. Soil can be moist or dry. It can contain different kinds of minerals—even gold!



Soil is a mixture of decomposing plants and animals, small bits of rock, air, and water.

Some kinds of soil are better for growing plants than other kinds. Soil that is very good for plants is *fertile*. It can take hundreds or even thousands of years to form. Because soil is such an important natural resource, it must be conserved.

The dead leaves on this forest floor will decompose and become part of the soil.



Farmers must take care of the soil so it will remain fertile.

Soil Is a Natural Resource

Why is soil important to people and animals?

How Does Soil Form?

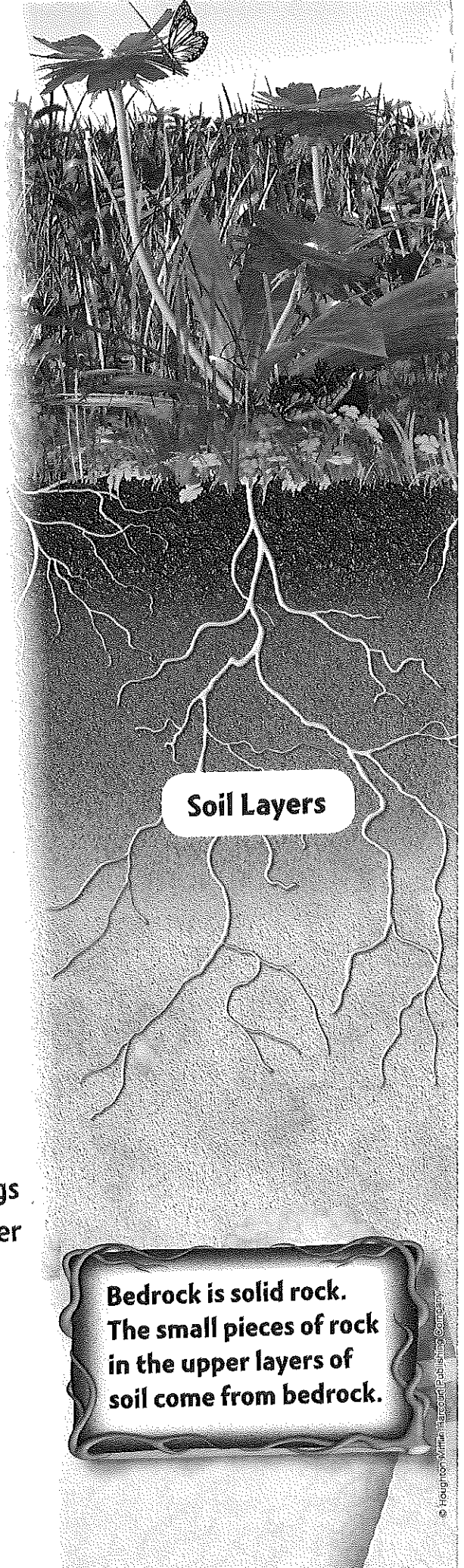
If you dig deep into the soil, you can see that soil has different layers.

Active Reading As you read these two pages, draw one line under a cause. Draw two lines under the effect.

The top layer of soil is called *topsoil*. It is the most fertile soil layer. Plants grow in the topsoil. Topsoil is fertile because it contains humus. Humus makes the soil darker.

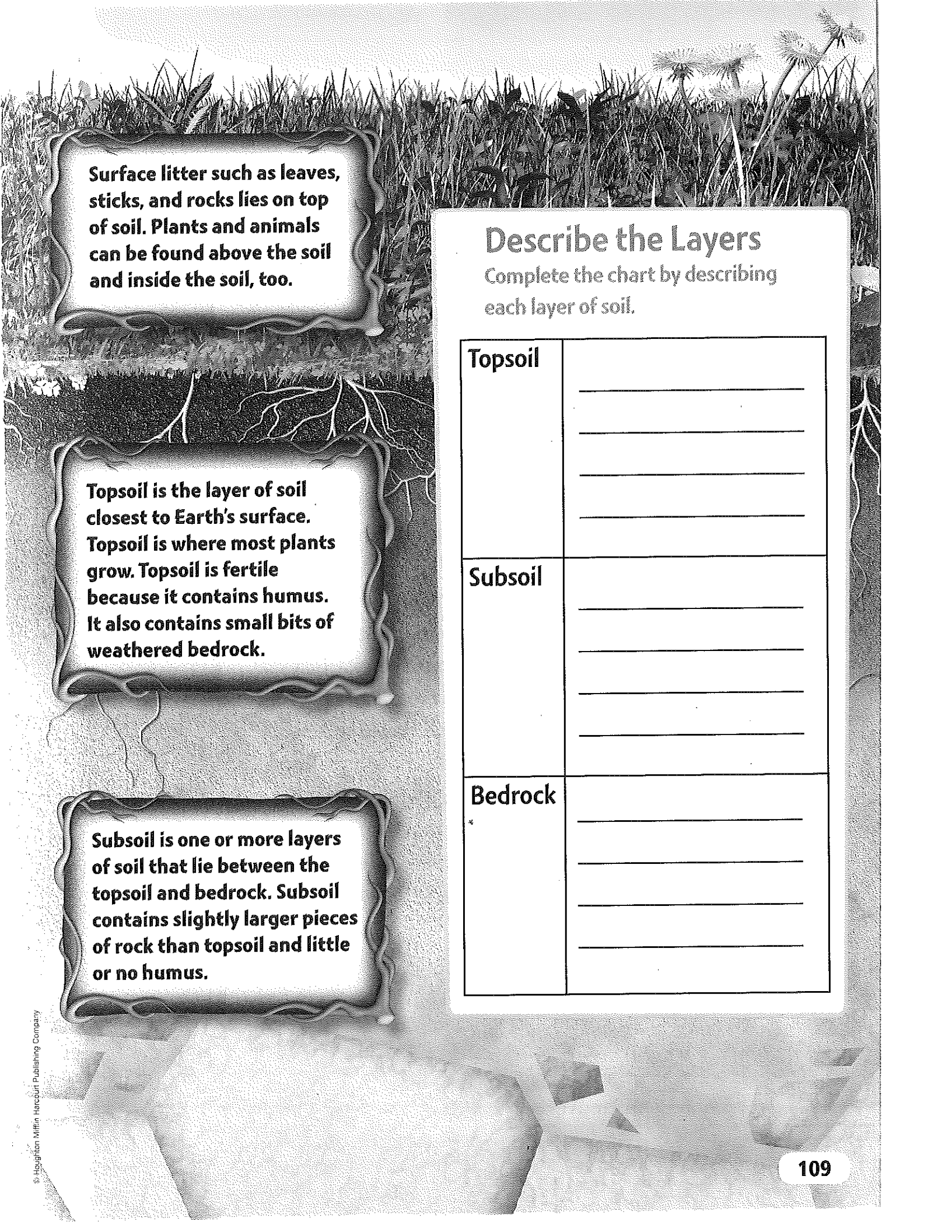
The layer beneath topsoil is called *subsoil*. Subsoil does not have a lot of humus, but it does have small pieces of rock. If you dig deep enough into the soil, you will reach solid rock. This is *bedrock*.

How does soil form? It forms from bedrock. When bedrock is at Earth's surface, it breaks down by weathering. Rain, wind, and other things weather bedrock, so big pieces of rock get smaller and smaller. Eventually, bedrock is broken into small bits of rock. These mix with air, water, and humus to form soil.



Soil Layers

Bedrock is solid rock.
The small pieces of rock
in the upper layers of
soil come from bedrock.



Surface litter such as leaves, sticks, and rocks lies on top of soil. Plants and animals can be found above the soil and inside the soil, too.

Topsoil is the layer of soil closest to Earth's surface. Topsoil is where most plants grow. Topsoil is fertile because it contains humus. It also contains small bits of weathered bedrock.

Subsoil is one or more layers of soil that lie between the topsoil and bedrock. Subsoil contains slightly larger pieces of rock than topsoil and little or no humus.

Describe the Layers

Complete the chart by describing each layer of soil.

Topsoil	<hr/> <hr/> <hr/> <hr/> <hr/>
Subsoil	<hr/> <hr/> <hr/> <hr/> <hr/>
Bedrock	<hr/> <hr/> <hr/> <hr/> <hr/>

Types of Soil

There are more than 70,000 kinds of soil in the United States alone! What makes them different from one another?

Active Reading As you read these two pages, draw boxes around the names of things that are being contrasted.

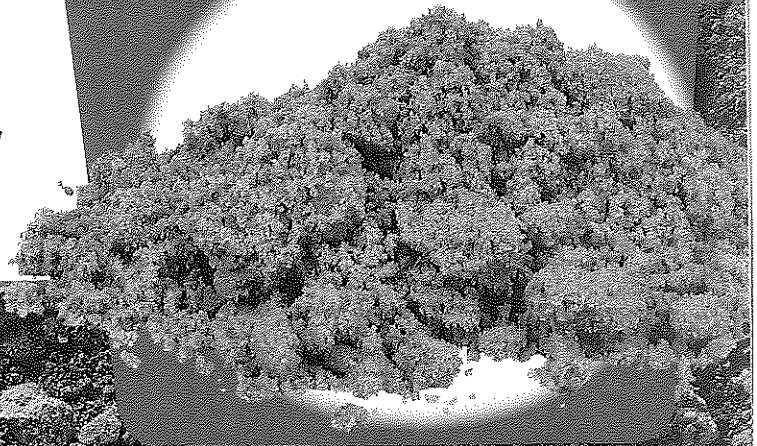
As you know, soil contains humus as well as water, air, and bits of rock. One way to distinguish among soils is by the sizes of their particles.

Tiny particles of rock that you can see with just your eyes are called **sand**. **Silt** is tiny particles of rock that are difficult to see with only your eyes. Particles of rock that are even smaller than silt are called **clay**.

The amounts of sand, silt, and clay in soil give it texture. Texture is how the soil feels in your hands. Soil with more sand feels rough, while soil with more clay feels smooth. Soils can be made up of different minerals, depending on the area where the soils formed. A soil's color also depends on where it formed.

Most soils contain all three kinds of soil particles.

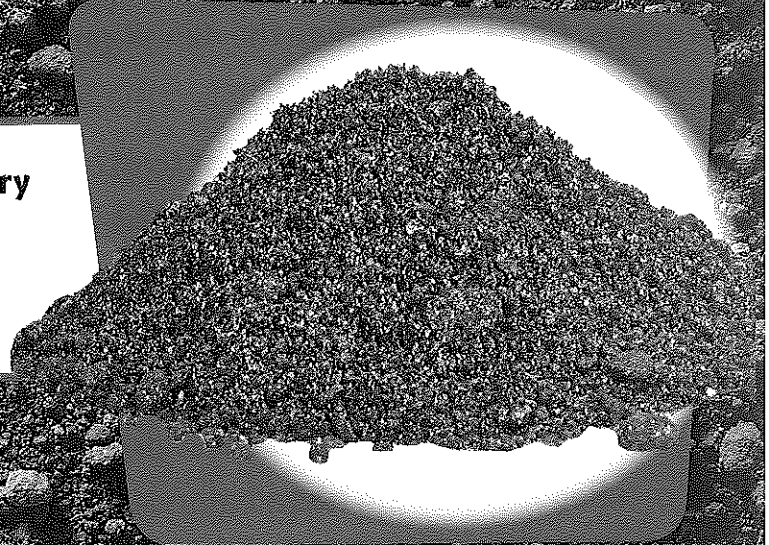
Soils that contain a lot of clay particles are fertile but heavy and sticky. They hold moisture well. They get very cold in winter, but dry out and get hard in the summer.



Sandy soils let water pass through easily. They dry out quickly. Sandy soils are usually light and easy to dig.



Soils that are mostly silt feel slippery when they are wet. They hold moisture for a long time. They also hold nutrients very well.



► Why does water pass through sandy soils more quickly than through soils that contain mostly clay or silt?

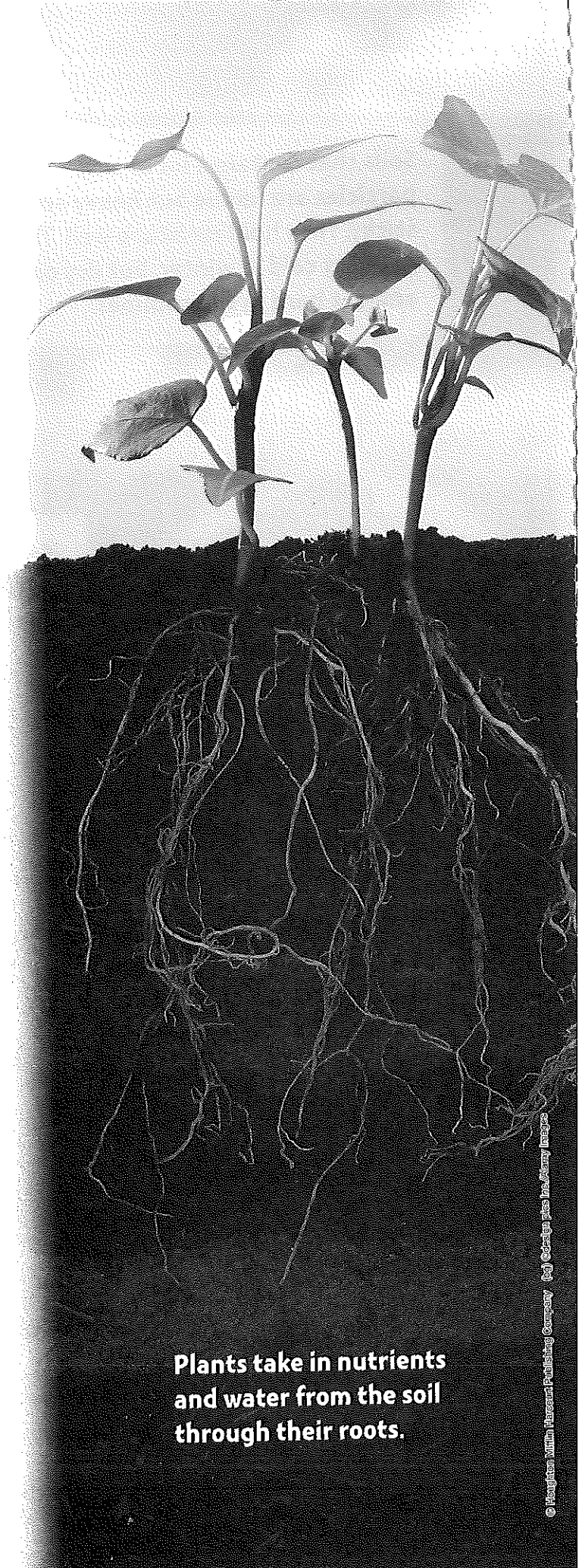
Plants Need Soil

What do plants get from soil? They get nutrients, water, and a place to live.

Active Reading As you read these two pages, find and underline the definition of *nutrients*.

Plants need water and light to grow. They also need nutrients. **Nutrients** are substances that plants take in from the soil through their roots to help them live and grow.

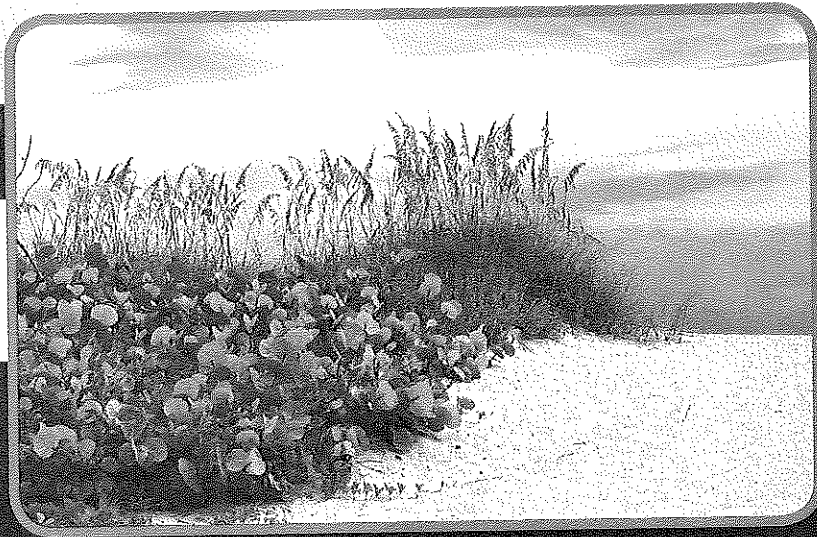
The best kind of soil for most plants is called *loam*. Loam has a balance of silt, sand, and clay. It is rich in nutrients and humus, it stays moist, and it is easy to dig. Some plants, though, grow better in other types of soil.



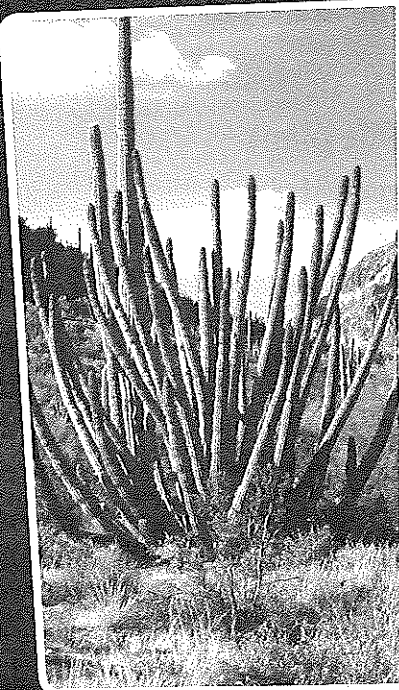
Plants take in nutrients and water from the soil through their roots.



Cabbage grows well in clay soils.



**Sea grapes and sea oats
grow on sandy beaches.**



Which Soil Matches the Plant?

Look at the images above. What can you conclude about the soil requirements of these plants?

In which of these soils do most types of cactus grow? What does this tell you about cactuses?

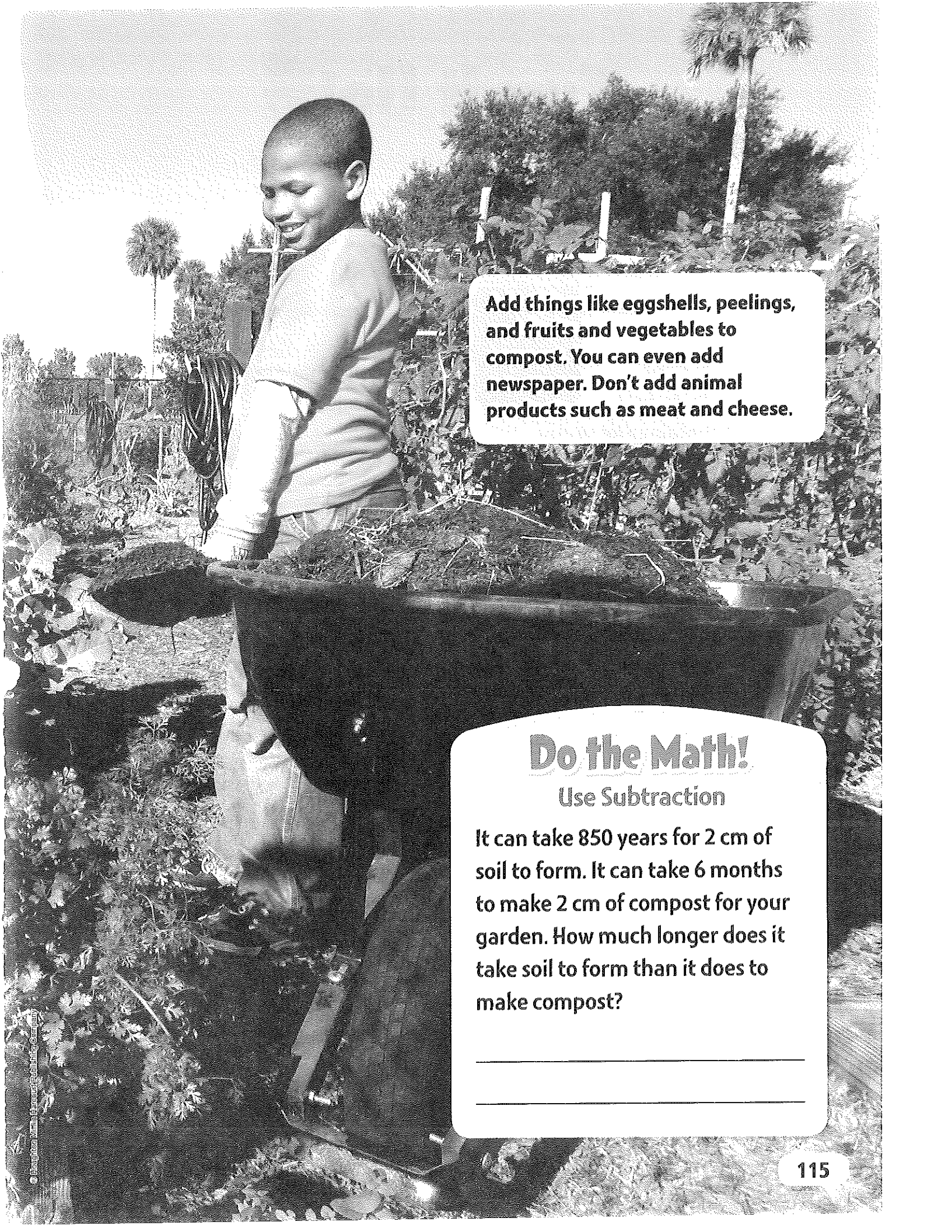
Composting

Don't throw away that banana peel! You can use fruit peels and other kitchen scraps to help plants grow.

Active Reading As you read these two pages, find and underline two facts about compost.

Compost is humus that you make yourself. Pile plant parts, such as dried leaves and grass, into a big container. Then add scraps of fruits and vegetables. Tiny organisms too small to see will decompose the scraps to make humus. Spread compost on your plants so they will grow quickly and stay healthy.

Compost does more than help plants in your garden. Making compost means that you don't throw away as much garbage. When people throw away less garbage, that's good for everyone!



Add things like eggshells, peelings, and fruits and vegetables to compost. You can even add newspaper. Don't add animal products such as meat and cheese.

Do the Math!

Use Subtraction

It can take 850 years for 2 cm of soil to form. It can take 6 months to make 2 cm of compost for your garden. How much longer does it take soil to form than it does to make compost?

Sum It Up!

When you're done, use the answer key to check and revise your work.

The blue words in each summary statement are incorrect. Write words to replace the blue parts.

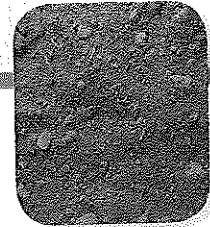
1

Compost is material that helps plants grow because it contains a lot of clay.



2

Soil is made quickly in nature.



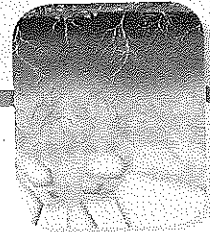
3

Plants need soil for support and light.



4

Weathering causes humus below the soil to break into smaller pieces.



5

Silty soil contains the largest particles of rock.



6

Topsoil is so important to plant growth around the world that people do not need to conserve it.



Answer Key: 1. humus 2. slowly 3. nutrients 4. bedrock 5. sandy 6. must (or should)

Name _____

Word Play

1 Use the words in the box to complete the puzzle.

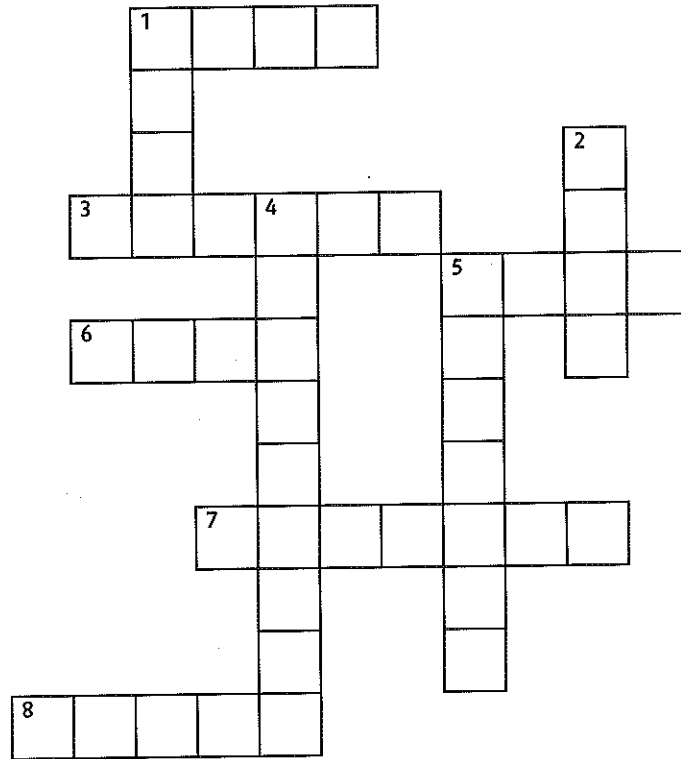
soil* humus* sand* silt* clay* nutrients*
bedrock loam compost plants *Key Lesson Vocabulary

Across

1. The type of soil that drains water most quickly _____
3. Living things that need soil for support _____
5. The type of soil that holds water for the longest time _____
6. The type of soil that has tiny particles of rock bigger than clay but smaller than sand _____
7. This is weathered by wind and water to make soil. _____
8. Something found in soil that is made of dead plants and animals _____

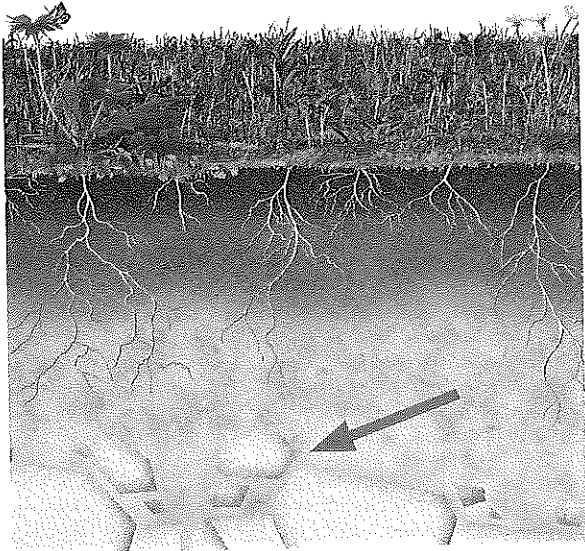
Down

1. This provides plants with the water and nutrients they need to survive. _____
2. This is the best kind of soil for plants. It is made of the three soil types. _____
4. Substances in soil that plants need to grow _____
5. Can be made using kitchen scraps and dead plants _____



Apply Concepts

2 Answer the questions about the picture.



Explain why you can see darker soil toward the top of the soil layers.

What is happening where the red arrow is pointing?

3 Fill in the blanks to make the statements true.

When bedrock breaks down for a long time and mixes with air, water, and the decomposed remains of _____, soil is formed.

Soil is a resource because plants need it to _____, and we depend on plants for our _____. Soil supports plants and gives them the _____ they need to grow.



Take It Home!

With an adult, look at the soil in your yard or at a park. Which type of soil is it? Is it a mixture? Write down your observations and share them with the class.

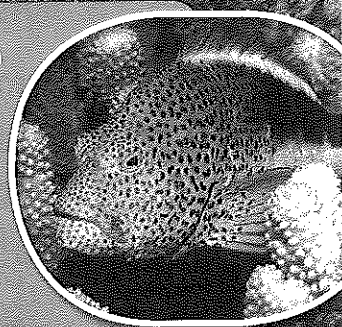
Meet the Environmental Scientists

Noah Idechong



Noah Idechong grew up in a small fishing village on the island nation of Palau. Palauan children are taught to take special care of the ocean. The ocean provides their families with food. Idechong worked to conserve ocean life. Boats can damage coral on the coast. When the coral dies, many fish leave, and the fish populations get smaller. Idechong helped make rules to protect the coastal environment.

Many kinds of fish swim in island waters. By putting limits on fishing in certain areas, more fish can survive and reproduce.

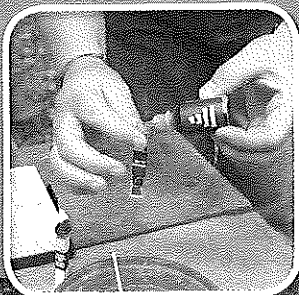


Lena Qiying Ma



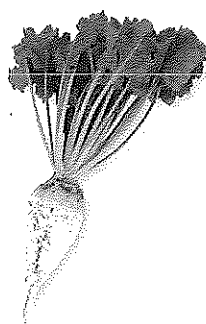
Lena Qiying Ma was a soil scientist. She studied how some plants take in arsenic [AR•suh•nik]. Arsenic is used as a poison to keep weeds away from crops. During her research, Ma found a fern growing in an industrial site. It was green even though the soil was polluted with arsenic. Ma discovered that ferns remove arsenic from soil. She studied how the fern can be used to clean up pollution in soil and groundwater.

This scientist is measuring a soil property called pH. Different types of plants grow best at different pH ranges. This property is important for brake ferns, because it can affect the amount of arsenic these plants can take in.



Be a Soil Scientist!

A farmer is planting his crops. He tests the pH of the soil from different fields on his farm. He wants to know which crop to plant in each field.



Sugar beets grow best in soil that has a pH around 8.



Blueberries grow best in soil that has a pH around 4.



Broccoli grows best in soil that has a pH around 6.

Use the pH scale below to match the soil from each field with the best crop to plant in that field. Write the name of the crop on the line for the correct soil.

