

Sample Pages for CHALLENGE THE

PALMETTO **A**CHIEVEMENT **C**HALLENGE **T**EST

❖ 2007 EDITION ❖

THIRD GRADE SCIENCE

This series of books were written specifically for South Carolina.
They cover all the strands in the South Carolina Curriculum.

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EARTH'S MATERIALS

Standard 3-3: The student will demonstrate an understanding of Earth's composition and the changes that occur to the features of Earth's surface. (Earth Science)

Have you ever dashed across the burning sand to get to the Atlantic Ocean? Have you ever strolled across a cool, hard marble floor at a museum? While these surfaces are very different, they have something in common. They are both made of rock.

You probably think all rocks are the same, but they're not. Some rocks, like sand on the beach, exist as fine powder. Others, like the marble floor at a museum, are found in giant slabs. Our planet is made of many different types of rock.

If you look closely at the rocks in your playground, you will see different colors. You may also notice that some rocks are smooth and others are rough. Try smashing the rocks against the ground. You will find that some break easily while others do not.

Properties of rocks depend on the minerals they contain. **Minerals** are hard, non-living substances formed inside the Earth long ago. There are about 4,000 kinds of minerals. They can be shiny or dull or hard or soft. Minerals come in many beautiful colors.



Rocks are made of minerals.

ROCKS AND SOIL

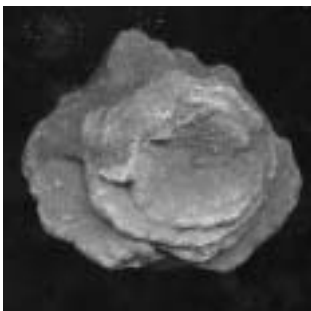
Indicator 3-3.1: Classify rocks (including sedimentary, igneous and metamorphic) and soils (including humus, clay, sand and silt) on the basis of their properties.

TYPES OF ROCK

1. IGNEOUS

Igneous comes from **magma**. Magma is hot, melted rock found deep inside the Earth. Magma reaches the surface of the Earth through volcanoes. Once at the surface, it cools and hardens into solid rock.

Granite is a hard, durable rock with many practical purposes. Granite is used in bathrooms, buildings, monuments, and sculptures. When it is polished, granite is beautiful. You may have seen granite counter tops in very nice kitchens. The Washington Monument in Washington D.C. is made completely of granite.

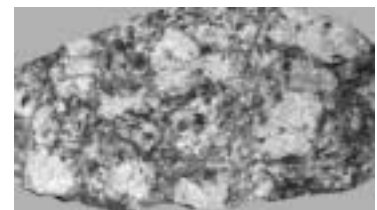


2. SEDIMENTARY

Another type of rock is sedimentary rock. This type of rock is made when layers of sand pile up. The weight of the upper layers pressing down on the lower layers turns them into rock. **Sandstone** is a type of layered rock made from sand. Many brownstone buildings in cities like Charleston are made of sandstone.

3. METAMORPHIC

Metamorphic rock has been transformed by millions of years of heat and pressure. Gneiss is a metamorphic rock that actually means “like new.” Gneiss may have been granite or sandstone at one time. Gneiss is very hard and it is used as pavement and in building foundations.



SOIL

Have you ever planted seeds in your garden? If so, you had to dig into the soil. Soil is made partly of tiny rock pieces. But how did rocks get to be so small? This was accomplished through a process called **weathering**. During weathering, rocks are exposed to wind and water. Over thousands of years, they break down and crumble into very small pieces.

Have you ever raked leaves in your yard? If so, you may have put them into a compost pile. Over time, decomposers in the soil broke down the leaves. The result was **humus**. Humus is made of completely rotted plants and animals. It is an important part of soil. It is crumbly, sweet-smelling, and full of nutrients. Humus is very good food for the plants in your garden.

Living animals are also an important part of the soil. Worms and snails dig holes in the ground, and these holes allow air and water to seep in. Plants depend on these animals because they need air and water to live.

TRY THIS!

Dig a small hole in your backyard. Sift through the soil and describe its contents. What color is the soil? Did you find plants? Animals? Record your observations.

THREE KINDS OF SOIL

1. CLAY SOIL

Clay soil is made of tiny rocks packed tightly together. Water does not pass easily into or through clay soil. This type of tightly packed soil is also hard for worms to dig through. This means there is less air in clay soil. Less air and less water means that most plants do not grow very well in clay soil.

2. SANDY SOIL

Sandy soil is made of loosely packed rocks. While there is plenty of air in sandy soil, water, minerals, and nutrients wash right through it. Most plants cannot grow in this kind of soil either. However sea oats do a good job of catching water before it washes through sandy soil. They have a shallow, wide-spread root system, perfectly adapted for life on a sandy beach.

3. LOAM

Loam is a crumbly kind of soil. It has very little clay, and it holds water and nutrients well. Many plants grow well in loam. Farmers use it to plant crops and potting soil is made mostly from loam.

TRY THIS!

Examine the soil from your backyard again. Do you think it is clay soil, sandy soil, or loam? Why?

SOIL MOVES

You might think that soil stays in one place. This is not true. Many forces cause soil to move. For example, soil is blown by the wind and washed away by the rain. Animals gently nudge soil as they walk across it. Gravity even causes soil to move downhill. Recall that gravity is a force that pulls objects down.

Plants are important to soil because they help hold it in place. Their roots prevent rich soil from being washed away, which is called **erosion**. In addition, their leaves and branches shelter soil from the wind. This means that less soil is blown away.

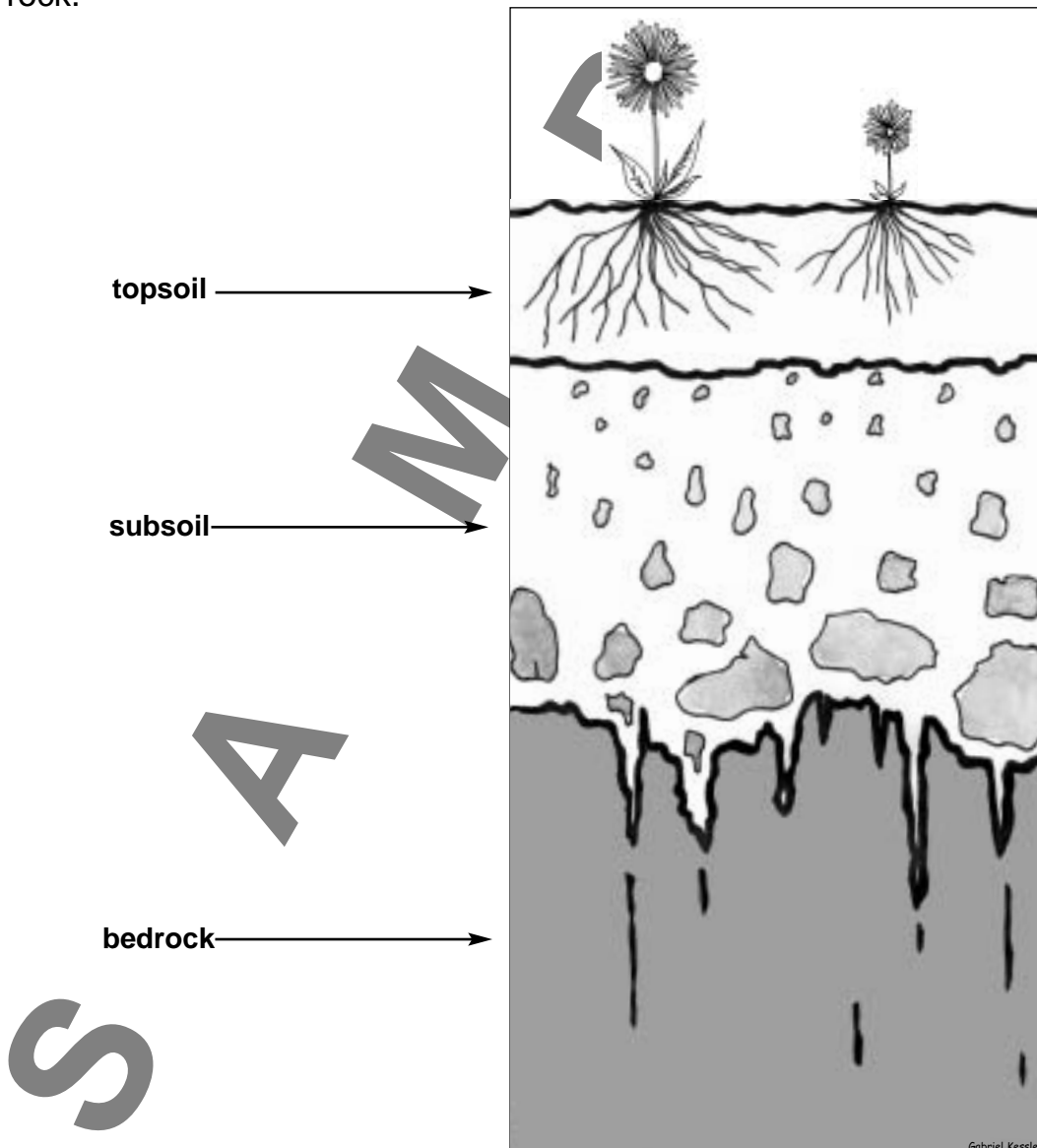


THREE LAYERS OF SOIL

Soil is made up of three different layers. The uppermost layer is called **topsoil**. This is probably what you think of when you hear the word soil. Topsoil is where plants grow and where worms and snails dig.

Below topsoil is a layer called **subsoil**. Subsoil is rich in minerals. Water carrying dissolved minerals passes through topsoil and settles into the layer of subsoil. The subsoil contains bigger rocks than the topsoil layer.

Below the subsoil is the **bedrock layer**. This layer contains the largest, unbroken pieces of rock.



The three layers of soil.

REVIEW

Choose which type of soil is being described below—**clay soil**, **sandy soil**, or **loam**. Write your answer in the space provided.

1. Worms cannot easily dig through it. _____
2. Soil in which plants grow easily. _____
3. Soil that is tightly packed. _____
4. Water, nutrients, and minerals wash right through it. _____
5. Soil that holds water well. _____
6. Would you like to live at the bottom of a steep hill? Why or why not?

(7-11) Fill in the blank. Is the rock described below **igneous**, **sedimentary** or **metamorphic**?

7. _____ Made from magma.
8. _____ type of rock called Gneiss, which means “like new.”
9. _____ Made from layers.
10. _____ Can be found in brownstone buildings.
11. _____ Used in sculptures and monuments.
12. What is rock made of?

13. Why don't plants grow well in sandy soil?

14. Compare clay soil and loam.

15. What is found in subsoil?

16. Which has the largest rocks; topsoil, subsoil, or bedrock?

17. In what layer of soil will you find worms digging?

18. Name 3 things that cause soil to move.

1.

2.

3.

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MINERAL IDENTIFICATION

Indicator 3-3.2: Identify common minerals on the basis of their properties by using a minerals identification key.

Scientists called **geologists** use the properties of minerals, like shininess, hardness, and color, to infer how the mineral was formed. They also use these properties to identify unknown minerals.

MINERAL IDENTIFICATION CHART

Hardness	Luster	Color	Cleavage	Special Property	Mineral
1	Waxy	Light	Poor	Smooth, greasy feel	Talc
1 1/2	Dull	Light	Crumbly like chalk	Smells clayey on fresh surface	Kaolin
2	Waxy	Light	One good	Can be clear	Gypsum
2 1/2	Metallic	Lead	None	Occurs as cubes, Feels very heavy	Galena
2 1/2	Glassy	Clear	3, excellent, cubes (90 degrees)	Light, tastes salty	Halite
2 1/2	Metallic	Clear	1, excellent	Transparent, flakes	Muscovite
2 1/2	Metallic	Black	1, excellent	Transparent, flakes	Biotite
3	Glassy	Clear	3, excellent, in a rhombus (not 90 degrees)	Fizzes in dilute acid	Calcite
5 1/2 - 6 1/2	Glassy to pearly	Pink, green, white, light to very dark gray	2, good at right angles	Potassium feldspar is pink, green, and white to very light gray. Plagioclase is white to very dark gray. Plagioclase has striations (small scratches or grooves) on one cleavage.	Potassium Feldspar Plagioclase
7	Glassy	Clear, white, pink, green, yellow, purple, smoky, gray	None. Fractures like glass.	May be a perfect six sided crystal	Quartz

Help a scientist at the University of South Carolina identify three unknown rocks from your playground. Collect three rocks and record data about them in the table below.

PROPERTIES OF ROCKS IN MY PLAYGROUND

	Rock 1	Rock 2	Rock 3
What colors do you see?			
Which colors are shiny?			
Describe the rock's texture.			
How hard is the rock? Can you scratch it with your fingernail?			
Can you scratch it with a penny?			
Can you scratch it with a nail?			

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Indicator 3-3.3 & 3-3.4

FOSSILS

Indicator 3-3.3: Recognize types of fossils (including molds, casts and preserved parts of plants and animals).

Indicator 3-3.4: Infer ideas about Earth's early environments from fossils of plants and animals that lived long ago.

Many plants and animals that used to live on Earth have become extinct. Rocks tell stories of these extinct organisms, many of which lived millions of years ago. The remains or traces of them are trapped in rock and are called **fossils**.

For example, dinosaurs left huge foot prints in the mud. Over the years, the mud hardened into rock. The foot prints were perfectly preserved and, from these fossils, scientists can tell how the dinosaurs walked. Scientists who study fossils are called **paleontologists**.



Dinosaur track in the Southwest U.S.

Rocks can also reveal what the Earth was like a long time ago. For example, fossils of sea shells have been found in rocks on high mountain tops. This means that the mountain was actually under water at one time. These fossils help scientists understand where oceans once were.

Sometimes whole organisms are found. In 1999, a giant woolly mammoth was dug from the frozen soil in Siberia. The coldness of the soil kept the animal perfectly preserved. You can see many fossils from South Carolina at the South Carolina State Museum in Columbia. Here you can learn about what life was like in South Carolina millions of years ago.

Most fossils are found in layers of sedimentary rock. Over long periods of time, sand, mud and small pieces of rock are compressed or squeezed as they are buried under more and more layers of sediment. The layers that are farther down in the earth are older than the top layers and fossils found there can tell us what life was like long ago.

There are three main types of fossils:

1. **MOLD FOSSILS**—an impression made in a soft material (like the picture on the previous page of a footprint)
2. **CAST FOSSILS**—made when sediment fills in a mold



3. **PRESERVED PARTS**—fossils of the actual animal or plant part found in sedimentary rock. Parts are often used to reconstruct the animal or plant.



TRY THIS!

Go on a fossil hunt in your neighborhood. Look for unusual patterns in rocks. Record your findings.

REVIEW

1. What can you infer from the fossil in the picture?



2. A fossil foot print was found in the desert. The foot was webbed. What could you infer from this fossil?

3. John made his own fossil using clay. He pressed his hand into the clay and carefully removed it. Pretend you are a scientist of the future observing John's handprint. What could you infer about the way John lived?

4. A dinosaur skull with sharp, long, jagged teeth was found. Do you think the dinosaur ate plants or animals? Why?

5. A dinosaur skull with rows of short, flat teeth was found. Do you think the dinosaur ate plants or animals? Why?

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STANDARD 3-3 REVIEW

Complete each sentence by matching it with the letter of the correct word.

- | | |
|---------------|----------|
| a. mineral | f. humus |
| b. loam | g. plain |
| c. topsoil | h. magma |
| d. plateau | i. lava |
| e. earthquake | j. flood |

1. A crumbly kind of soil with little clay is called _____.
2. A _____ is a hard, non-living material that formed inside the Earth long ago.
3. _____ is the uppermost layer of soil where worms and snails dig.
4. A _____ is like a _____ in that it is a large, flat landform, only it is higher up.
5. When slipping or breaking rock releases a lot of energy, we say we are having a(n) _____.
6. Fast-moving waters from a _____ cause a lot of erosion.
7. Red-hot rock that has left a volcano is called _____.
8. Red-hot rock under the Earth's surface is called _____.
9. _____ is made of dead plants and animals.

- ___ 10. How do worms and snails make good soil for plants?
- They attract birds.
 - They bury seeds.
 - They dig holes to let in air and water.
 - They turn clay soil into sandy soil.
- ___ 11. What is a property of a mineral?
- A property is the place where a mineral builds its house.
 - A property is where a mineral is originally formed.
 - A property is a characteristic of a mineral.
 - A property is when magma becomes lava.
- ___ 12. Which of the following is NOT a kind of soil?
- loam
 - sandy
 - mineral
 - clay
- ___ 13. A tree root grew into a small crack in bedrock and split the rock. This is an example of
- weathering.
 - erosion.
 - adaptation.
 - germination.

___ 14. Which word is under the wrong heading?

Landform

mountain
subsoil
plain

Rock

granite
gneiss
sandstone

Soil

humus
rock
worms

- a. subsoil
- b. granite
- c. worms
- d. plain

___ 15. What is humus made from?

- f. minerals
- g. clay
- h. hot, melted rock
- i. dead plants and animals

___ 16. Huge blocks of moving ice found in high mountain ranges are known as

- a. plateaus.
- b. glaciers.
- c. valleys.
- d. lakes.

___ 17. Which of these human activities negatively changes the environment?

- f. cutting down forests
- g. planting trees
- h. cleaning a park
- i. building a dam to reduce erosion

- ____ 18. Deltas in Louisiana are created when soil is carried downstream in a process known as
- deposition.
 - erosion.
 - weathering.
 - flooding.
- ____ 19. A fossil of a sea creature is found many miles away from the ocean. You can infer
- there is water nearby.
 - at one time the land was covered by water.
 - it was placed there by someone.
 - the fossil is another type of creature.
- ____ 20. Soil made of tiny rocks packed tightly together is known as
- humus.
 - loam.
 - clay.
 - magma.