

# **Rocks and Soil**

## **Unit of Study**

**Wendy Brady**  
**Allyson Stine**  
**OCI 2006**

## Rocks and Soil Unit Pre-Test

### **DIRECTIONS:**

This is a pre-test designed to test your prior knowledge. Please read each question carefully and choose the best answer. Only one answer is correct so please read all choices before selecting the answer. Take your time!!

1. Rocks are made up of \_\_\_\_\_.
  - A. minerals
  - B. plants
  - C. animals
  - D. water
  
2. Scientists who study the physical properties of rocks to tell how the rocks may have formed years ago are called \_\_\_\_\_.
  - A. biologists
  - B. geologists
  - C. archeologists
  - D. anthropologists
  
3. The property that refers to the way light bounces off a mineral is called \_\_\_\_\_.
  - A. reflection
  - B. refraction
  - C. luster
  - D. streak
  
4. Which one of these is not a way to identify rocks?
  - A. streak plate
  - B. hardness
  - C. luster
  - D. weight
  
5. This type of rock is formed when hot, molten rock material has cooled and hardened.
  - A. igneous
  - B. metamorphic
  - C. sedimentary
  - D. gravel

6. A rock formed from bits or layers of other rocks cemented together is called a \_\_\_\_\_.
- A. igneous rock
  - B. sedimentary rock
  - C. metamorphic rock
  - D. gravel
7. A rock that has been changed by heat, pressure or both is called a \_\_\_\_\_.
- A. igneous rock
  - B. sedimentary rock
  - C. metamorphic rock
  - D. gravel
8. The never-ending process by which rocks are changed from one type into another is called \_\_\_\_\_.
- A. the water cycle.
  - B. the soil cycle.
  - C. the rock cycle.
  - D. the Earth's cycle.
9. Scientists use clues from these to learn about the past.
- A. Animals
  - B. plants
  - C. soil
  - D. fossils
10. Many fossils are found in this type of rock.
- A. igneous
  - B. metamorphic
  - C. gravel
  - D. sedimentary
11. Sap can harden into this, trapping insects inside.
- A. amber
  - B. casts
  - C. rock
  - C. dirt

12. Which of these body parts is **LEAST** likely to become a fossil?
- A. feather
  - B. bone
  - C. shell
  - D. tooth
13. A vertical section of soil from the surface down to the bedrock is called a \_\_\_\_\_.
- A. rock profile
  - B. picture
  - C. soil profile
  - D. layers
14. Soil begins to form when this starts to break down.
- A. sand
  - B. dirt
  - C. bedrock
  - D. air
15. The rate at which water can pass through a substance is called \_\_\_\_\_.
- A. flow
  - B. fast
  - C. permeability
  - D. slow
16. Humus comes from \_\_\_\_\_.
- A. bedrock
  - B. heavy rainfall
  - C. dead plants and animals
  - D. clay soil
17. A layer of soil differing from the layers above and below it is called a \_\_\_\_\_.
- A. crust
  - B. fault
  - C. fragment
  - D. horizon

18. The space between the soil particles is called\_\_\_\_\_.
- A. pore space
  - B. faults
  - C. cracks
  - D. crust
19. The layer of soil that is rich in humus and minerals and is usually the darkest in color is the \_\_\_\_\_.
- A. subsoil
  - B. topsoil
  - C. undersoil
  - D. horizon
20. In which horizon will you find broken-down bedrock in a soil profile?
- A. Horizon A
  - B. Horizon B
  - C. Horizon C
  - D. Horizon D

## **LESSON # 1: Introducing Rocks**

**Objective:** Students will explore the physical properties of rocks.

**Context:** This is the first lesson in this unit of study. It will allow the students to participate in a hands-on lab activity where they will explore how rocks are identified and classified.

### **Connections:**

SC-04-2.3.1

### **Materials:**

- 5 different rock samples (basalt, sandstone, limestone, gneiss, granite)
- hand lens
- streak plates
- pennies and iron nails
- Science Journal
- Lab Questions
- Rock Test worksheet Grid

### **PROCEDURE:**

#### **Guided Practice:**

Students will begin this first lesson by having a teacher-led discussion about rocks. Some of the questions to inquire will be:

1. What do you know about rocks?
2. Where are they found?
3. What are some of their most common uses?
4. Are there different types of rocks? If so, what are they?
5. Are there any tests to distinguish between rocks?

After spending 10 minutes or so discussing these questions and their appropriate answers, I will then set up for the Science Lab activity for the day. While I am doing so, students will be writing down the pre-lab questions in their science journal.

#### **Concept Development:**

I will explain that in today's Science Lab activity the students will get to explore the physical properties of 5 different rock samples. We will then

read about and discuss the testing practices of rocks found in our Science book on page C7.

The tests we will be looking at today include:

1. Luster—which refers to the way light bounces off the minerals in the rocks. Some are shiny, dull, glassy and even greasy looking.
2. Streak Plate—Gently but firmly rub the mineral down a streak plate. You often see a streak that is the same color as the mineral's surface.
3. Hardness—The harder the mineral is, the less likely it will be scratched. You can test the mineral's hardness by three ways—a fingernail, a copper penny, and an iron nail.
4. Color—This is often a good way to classify minerals, but is better when used in conjunction with the other three above.

Questions for Pre-Lab:

1. What are we studying today?
2. What materials do I need for my experiment/activity?
3. What is the procedure for the experiment/activity?
4. What do I expect to happen? (My hypothesis?)

**Independent Practice:**

The students will be given a Rock Test Worksheet grid to fill out as they rotate through the 5 different stations. I will break the students up into five groups and designate their starting areas. Each group will have approximately 10 minutes at each station to perform the tests on the rock. They will then rotate to the next station and perform the same test again, but on a different rock. Once they have visited all stations, they will return to their desks and answers the Post-Lab Questions.

5. What happened and why?
6. What did I learn about rocks today?

### **Assessments:**

For the formative assessment, I will be looking at the Science Journal pre-lab questions to check for accuracy. I will also be using an observation checklist during the activity to see who is on task and focused. This will count towards their participation grade.

As for the summative assessment, I will check and grade their Rock Worksheet Grid and their two post-lab questions. My primary focus is on question # 6...what did I learn today?



## ROCK IDENTIFICATION TESTING

**DIRECTIONS:** You will visit each station for ten minutes. Once you are there, you will perform the rock identification tests we talked about during our lesson discussion. After ten minutes has passed, I will call time and you will rotate to the next station. You are in groups, so please make sure that everyone is actively participating. I do not want to see one person doing all the work. I will be monitoring for your **Lab Participation Points**.

	<b>BASALT</b>	<b>LIMESTONE</b>	<b>GNEISS</b>	<b>GRANITE</b>	<b>SANDSTONE</b>
Observe Color					
Describe Luster					
Streak Plate Color					
Fingernail Scratch					
Copper Penny Scratch					
Iron Nail Scratch					

## **LESSON # 2: Types of Rocks**

**Objective:** Students will explore the three different types of rocks and be able to compare and contrast their different properties.

**Context:** This is the second lesson in this unit. Previously, students worked in groups to rotate through a rock identification lab trying to distinguish and identify different traits. Now that they understand how rocks can be identified, we will move our focus to classification of rocks. There are three types of rocks that we will discuss and identify in this lesson. This lesson is an overview, with three individual lessons to come.

### **Connections:**

SC-04-2.3.1

### **Materials:**

- Types of Rocks Worksheet
- Different types of rocks
- pencil
- Find Someone Who worksheet

### **PROCEDURE:**

#### **Guided Practice:**

We will review and discuss the previous lesson, especially focusing on the questions in the post-lab to determine what the students learned about rocks. Today's lesson will introduce them to the three main types of rocks and discuss how each rock is formed. We will look at some different types of each rock and try to determine where they fit.

#### **Concept Development:**

Using the Types of Rock Worksheet, each student will take notes from this information. As we discuss each type of rock, I will pass around samples for students to examine.

#### **Igneous Rocks**

- igneous means "fire-made"
- formed from hot, molten rock material that has cooled and hardened
- molten material can be above and below the Earth's surface
- Examples include: granite, obsidian, basalt

### Sedimentary Rocks

- formed when smaller bits of rock become pressed and cemented together.
- also form when deposited layers of rock are moved during rain or by wind.
- you can see different layers of rocks
- Often find fossil remains in these type of rocks
- Examples include: rock salt, shale, limestone, conglomerate

### Metamorphic Rock

- metamorphic means “changed in form”
- formed by a change in heat, pressure or both.
- can be classified by bands
- Examples include: marble, gneiss

### **Independent Practice:**

The students will now test their knowledge by participating in a Cooperative Learning Strategy called *Find Someone Who*. They will stand up, hand up, and pair up to find a partner who can answer one of the questions on the worksheet. If that partner answers it correctly, then they sign their name and answer on the line.

### **Assessments:**

Both formative and summative assessments will result from teacher observation checklists, note-taking skills and *Find Someone Who* cooperating learning skills builder.

*Find Someone Who*

**DIRECTIONS:** When teacher calls Stand up, hand up, and pair up, the student will then circulate around the room finding a partner to ask one of the questions. If the partner answers correctly, they will sign their name and write the answer on the line.

1. This type of rock means to be “Fire-made.” \_\_\_\_\_
  
2. You can see different layers of this rock when you examine it closely \_\_\_\_\_.
  
3. This rock’s name means “changed in form.” \_\_\_\_\_
  
4. Where do you think hot, molten rock material comes from? \_\_\_\_\_
  
5. Sedimentary rocks are formed when bits and layers of other rocks are \_\_\_\_\_ and \_\_\_\_\_ together.
  
6. Molten material can be found both \_\_\_\_\_ and \_\_\_\_\_ below Earth’s surface.
  
7. Name the three ways a metamorphic rock can be changed.  
\_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_
  
8. Granite is a type of this rock. \_\_\_\_\_
  
9. Most fossils will be found in this type of rock. \_\_\_\_\_
  
10. This type of rock can be classified by different bands. \_\_\_\_\_

### **LESSON # 3: Sedimentary Rock Lab**

**Objective:** Students will simulate the creation of sedimentary rock. They will also understand about relative age.

**Context:** This is the third lesson in this unit. The previous lesson introduced the students to the different types of rocks. This lesson will take the introduction to a higher knowledge—application. Students perform a lab that should assist them in their understanding of sedimentary rock. The next lesson will focus on metamorphic rock.

#### **Connections:**

SC-04-2.3.1

#### **Materials:**

- Science Journal
- Pre and Post Lab Questions
- gravel
- sand
- water
- clear jar with a lid

#### **PROCEDURE:**

##### **Guided Practice:**

We will review the definition and explanation of sedimentary rocks from what we have learned in the two previous lessons. In their science journal they will record and answer the pre-lab questions.

Questions for Pre-lab:

1. What are we studying today?
2. What materials do I need for my experiment/activity?
3. What is the procedure for my experiment/activity?
4. What do I expect to happen? (My hypothesis?)

##### **Concept Development:**

Students will be working in groups of four with each person in each group labeled person A, person B, person C and person D. This is a part of the Kagan Cooperative Learning Strategies that help ensure equal participation in all activities. Each person will have a designated task in the experiment.

## **Observing Sediments Lab**

**Directions:** Each student in your group has been designated a letter A, B, C or D. Based on your letter, follow the directions below.

**Student A:**

You will go to the table and gather the supplies for your group. You will need one clear plastic container, a spoon, one bag of gravel, and one bag of sand. Take these items back to your table. Place the plastic container on Student B's desk, the gravel on student C's desk, and the bag of sand on student D's desk.

**Student B:**

Take the container to the sink and fill it half-way full of water. Do not go over the half-way point. This is very important.

**Student C:**

You will now place your bag of gravel into the plastic container. Pass the container to student D.

**Student D:**

Now place the bag of sand into the water. Put the top on and make sure it is tightened down securely.

**Student A, B, C, and D:**

Each student gets a quick turn to gently shake the plastic container. Place the container aside and observe.

**Post-Lab Questions to answer in your journal:**

How many layers have formed?

Which layer settled first? Last?

How does this illustrate the formation of sedimentary rocks?

**Independent Practice:**

Students will answer the post-lab questions in their journals.

**Assessments:**

For the formative assessments, I will use teacher observation and checklist for appropriate lab behavior and Kagan cooperative learning strategies.

For the summative assessment, I will score the lab report specifically looking at the post-lab questions to see if the student understood the purpose of the lab and how it simulates the formation of sedimentary rocks.

## **LESSON # 4: Metamorphic Rock Lab**

**Objective:** Students will simulate the creation of metamorphic rock, focusing specifically on “applied pressure.”

**Context:** This is the fourth lesson of this unit. In the last lesson students simulated the formation of sedimentary rocks. This lesson will have the students working with play-dough to simulate how applied pressure helps create metamorphic rock. The next lesson will focus on the Rock Cycle and how it is a never-ending cycle just like water.

### **Connections:**

SC-04-2.3.1

### **Materials:**

- waxed paper
- 3 different colors of play-dough or clay
- plastic knife

### **PROCEDURE:**

#### **Guided Practice:**

We will review our prior knowledge of metamorphic rock, remembering that they are formed by either a change in pressure, heat or both. This activity will deal only with applied pressure. Students will record and answer the following pre-lab questions in their journal. This is an activity that all students will get to perform.

Pre-lab questions for journal:

1. What are we studying today?
2. What materials do I need for my experiment/activity?
3. What is the procedure for this experiment/activity?
4. What do I expect to happen? (My hypothesis?)

### **Concept Development:**

Lab Procedure:

1. Make a number of marble-sized balls from each color of clay.
2. Gently stick different-colored balls together to make a larger ball.



3. On a piece of waxed paper, press down the ball until it is flat. Turn the flattened ball on its edge and press down again.
4. Cut your “rock” in half with a plastic knife.  
SAFETY TIP: Use the knife carefully.
5. Draw what the inside of your “rock” looks like in your journal. Use crayons to assist you.

### **Independent Practice:**

Post-Lab questions to answer in your journal:

1. How did the shape of the small, colored balls change?
2. What effect did pressure from your hands have on the shape of the small balls?
3. Look at your “rock.” Would it be easier to separate the colored balls now, or before you pressed the “rock” together?
4. How could heat help change your “rock”?

### **Assessments:**

For the formative assessment, I will check the post-lab questions.

For the summative assessment, students will answer the Types of Rocks ORQ.

### **Types of Rocks**

In Science, we have been studying about the different types of rocks that make up our Earth. Imagine that you are a geologist who has been given two samples of rocks to identify. You do not know what type of rock each is.

- A. In your own words define the word “geologist.”
- B. Explain in detail the process you would use to determine what types of rocks you have.

## **LESSON # 5: The Rock Cycle**

**Objective:** Students will learn that the rock cycle is a never-ending process just like the water cycle. The objective is to teach them that under certain circumstances rocks will undergo a transformation.

**Context:** This is the fifth lesson of this unit. The previous lesson students created metamorphic rock. This lesson will help reinforce how rocks are continuously changing via the rock cycle. The next lesson will discuss what we can learn about the past from rocks.

### **Connections:**

SC-04-2.3.1

### **Materials:**

- Rock Cycle cut-out worksheet
- crayons
- glue
- paper plate
- scissors

### **PROCEDURE:**

#### **Guided Practice:**

Begin the discussion with review questions:

1. What is a cycle?
2. What do you remember about the water cycle?

#### **Concept Development:**

Lead students to think about a cycle...like a bicycle that is the wheel that goes around and around. A cycle is a series of events that happens over and over with no beginning or no end. A rock cycle, then, is a series of steps that form rocks, one from another, continuously.

Discuss the rock cycle. Be sure to include the various elements that can result in a rock change: weathering and erosion, melting, cooling and hardening, heat and pressure, cementing and pressing. Discuss that one type of rock can be easily turned into another type of rock at any time during the rock cycle as long as it is exposed to one of these elements.

### **Independent Practice:**

Give each student a paper plate, crayons, scissors, glue and colors. Then give each student the Rock Cycle paper. Have the lightly color the arrows and rocks. Cut them out and place them on their paper plate. They may use page C13 in the Science book as reference to the rock cycle. They will not be allowed to glue their items on until the teacher has checked it.

### **Assessments:**

For the formative assessment, I will monitor the activity as the students participate. I will have to check their plate before they are allowed to glue down the items.

For the summative assessment, I will use the Rock Cycle ORQ. It will be scored based on the rubric provided.

### **The Rock Cycle**

Rocks change their form over time but the amount of rocks on Earth has remained the same for millions of years. You have just constructed a model of the Rock Cycle.

- A. List the three types of rocks.
- B. Explain what happens in the Rock cycle.

## **LESSON # 6: Learning from the past**

**Objective:** Students will describe how rocks change over time and what can be learned from these changes.

**Context:** This is the sixth lesson of this unit. The previous lesson outlined the never-ending cycle of rocks. This lesson will lead the students to understand that we can learn about clues from the past in rocks.

### **Connections:**

SC-04-2.3.1

### **Materials:**

- Have students bring in any fossilized rocks
- Plaster of Paris
- shells
- clay
- petroleum jelly

### **PROCEDURE:**

#### **Guided Practice:**

Write these questions on the board to help lead the class discussion to start this lesson. Copy these questions into their science journal. Give them a few minutes to do a think and write.

1. What can scientists learn from studying fossils found in sedimentary rocks?
2. When a scientist finds a dinosaur fossil in a rock, what does that tell about the rock?
3. How can rocks and fossils give clues to what Earth was like in the past?

### **Concept Development:**

Discuss the questions above. Make sure to talk about the correct answers, clearing up any misconceptions that a student might have.

Answers to look for:

1. Fossils in sedimentary rock are usually found where they were formed, so scientists can learn what organisms lived in a place and what Earth was like when they lived there.
2. The scientist will know that the rock was formed around the time when that dinosaur was alive.
3. Some animals and plants live specifically in warm areas. If fossils of these organisms are found in cold regions, we know these areas were once warm.

### **Independent Practice:**

Students will make a cast and mold to create their own fossil.

Activity Procedure:

1. First mix up the correct ratio of Plaster of Paris.
2. Coat a shell with petroleum jelly. Then firmly but gently press the shell into the clay.
3. When the plaster has dried, remove it from the clay.

### **Assessment:**

For the formative assessment, I will use teacher checklist to monitor class discussion and participation.

For the summative assessment, in their science journals students will complete the following “Think and Write” Question.

#### ***“Think and Write” Question:***

You have been hired to build a new factory. As you dig into the ground, you discover what you think is a dinosaur fossil. What would you do next? Who might agree with your decision? Disagree?

## **LESSON # 7: Layers of the Soil**

**Objective:** Students will explore and describe what soil is by learning the different layers of soil found in the Earth.

**Context:** This is the seventh lesson of this unit. The previous lesson had students exploring fossils. This lesson will focus on the soil and the different layers that can be found. The students will participate in a soil profile. The next lesson in this unit is a soil classification lab.

### **Connections:**

SC-04-2.3.1

### **Materials:**

- soil profile worksheet
- Science Journal
- soil pit (outside)

### **PROCEDURE:**

#### **Guided Practice:**

Start the class discussion with these questions: Have you ever watched digging at your home or on a construction site? What did you see? Did you notice the different layers of soil?

Lead the students to discuss the different types of soil they see: soft, dark soil on top, bits of rock and debris, solid bedrock.

#### **Concept Development:**

I will dig a soil pit outside where students can get a better understanding of the soil profile. We will go outside and investigate the soil pit. The students will be able to better visualize the different layers of soil after seeing a section of the Earth dug out. In the soil pit, the soil profile is quite evident.

#### **Independent Practice:**

Students will come back to class and create their own soil profile. Soils typically have three horizons. A horizon is a layer of soil that differs from the layers above it and below it. From the top down, they are horizon A, B, and C. We will discuss what the soil looks like at each horizon layer.

What is a soil profile?

A soil profile is a vertical section of soil from the surface down to the bedrock.

**Horizon A:**

- made up of mostly topsoil
- rich in humus and minerals
- usually darkest in color
- most plants grow here
- many organisms live here

**Horizon B:**

- known as subsoil
- normally a fairly hard labor
- made up of clay particles and minerals that have filtered down from horizon A.
- usually light in color
- sturdy plants may grow down into this layer

**Horizon C:**

- made up of coarse material broken down from the underlying bedrock.
- typically beyond the reach of plant roots.

**Assessment:**

For the formative assessment, I will give a quiz.

For the summative assessment, I will assess with the Layers of the Soil ORQ.

**Layers of the Soil**

In Science we have been studying the different layers of the soil. In your own words...

- Define a soil profile.
- Draw a soil profile.
- Label the four layers of the soil.
- Explain one characteristic from each layer.

## Layers of the Soil Quiz

**Directions:** Read each question carefully. There is only one correct answer for each item.

1. A vertical section of the soil from the surface down to the bedrock is called a...
  - A. soil profile
  - B. layer
  - C. soil picture
  - D. horizon
2. Soil begins to form when \_\_\_\_\_ is broken apart into small pieces of rock and minerals.
  - A. topsoil
  - B. bedrock
  - C. subsoil
  - D. humus
3. Leftover plant and animal matter found in the topsoil is called...
  - A. fossils
  - B. bones
  - C. humus
  - D. sand
4. A layer of soil differing from the layers above and below it is called a(n)...
  - A. line
  - B. profile
  - C. horizon
  - D. layer
5. The top layer of soil is also known as what horizon.
  - A. Horizon A
  - B. Horizon B
  - C. Horizon C
  - D. Horizon D



6. This horizon is usually light in color...
  - A. Horizon A
  - B. Horizon B
  - C. Horizon C
  - D. Horizon D
  
7. This horizon is where most plants grow and organisms live...
  - A. Horizon A
  - B. Horizon B
  - C. Horizon C
  - D. Horizon D
  
8. This horizon is made up of coarse material broken down from the underlying bedrock.
  - A. Horizon A
  - B. Horizon B
  - C. Horizon C
  - D. Horizon D
  
9. This horizon usually has the darkest color soil.
  - A. Horizon A
  - B. Horizon B
  - C. Horizon C
  - D. Horizon D
  
10. The top, or A, horizon is made up of...
  - A. subsoil
  - B. bottom soil
  - C. top soil
  - D. different soil

## **LESSON # 8: Introducing Soil**

**Objective:** Students will observe different soil samples.

**Context:** This is the eighth lesson of this unit. The previous lesson led students to understand the different layers of soil present in the Earth's ground. This lesson will focus on observing different types of soil samples.

### **Connections:**

SC-04-2.3.1

### **Materials:**

- 3 soil samples (clay, sandy, potting)
- hands lens
- eye dropper
- water
- newspaper
- paper towels
- 3 sharp pencils

### **PROCEDURE:**

#### **Guided Practice:**

Discuss with the students there are different types of soil found under the ground. Review the different horizons.

#### **Concept Development:**

In their science journal, the students will record the pre-lab questions.

Pre-lab questions:

1. What are we studying today?
2. What materials do I need for my experiment/activity?
3. What is the procedure for my experiment/activity?

## **Independent Practice:**

Procedure for soil lab:

1. Spread the newspaper on a desk or table. Place a soil sample on each paper towel. Put the paper towels on the newspaper.
2. **OBSERVE** Use a pencil to push around the soil a little bit. Observe each soil sample with the hand lens. Record your observations of each soil sample.
3. **CLASSIFY** Use the pencil tip to classify the particles of each sample into two piles—pieces of rock and pieces of plant or animal material.
4. **OBSERVE** Put four drops of water on each sample. After a few minutes, check which sample leaves the biggest wet spot on the newspaper.

Post-Lab Questions:

1. What kinds of material make up each soil sample?
2. How do the particles you sorted in each soil sample compare by size? By color?
3. Describe the properties you observed in each sample.
4. Which sample observed the most water? How can you tell?

## **Assessments:**

For the formative assessment, I will use teacher observation checklist for appropriate lab behavior and participation.

For the summative assessment, I will assess with a Soil ORQ.

### **It's More Than Just Dirt**

You have a box with damp soil from under trees in a thick forest.

- A. Name **TWO** living and **TWO** non-living things that you would expect to find in the soil.
- B. Tell how these things happen to be in the soil.

## **LESSON # 9: Soil Permeability**

**Objective:** Students will perform a lab experiment that relates pore spaces to soil permeability.

**Context:** This is the final lesson in this unit of study. It will wrap up with teaching the students about pore spaces and permeability.

### **Connections:**

SC-04-2.3.1

### **Materials:**

- Science journal
- 2 two-liter bottles cut about five inches above the mouth
- sandy soil
- clay soil
- screen
- rubber band
- water

### **PROCEDURE:**

#### **Guided Practice:**

Lead the discussion about the types of soil we saw in the previous lab experiment. This lesson will focus on pore spaces and permeability.

The students will perform an experiment to demonstrate this process.

Pre-lab questions:

1. What are we studying?
2. What materials do I need for this experiment/activity?
3. What is the procedure for this experiment/activity?
4. What do I expect to happen? (My hypothesis?)

#### **Concept Development:**

Discuss these important vocabulary terms:

Pore Spaces—the space between soil particles. Water and air fill these spaces.

Permeability—is the rate at which water can pass through a porous material.  
Discuss the importance of soil permeability.

### **Independent Practice:**

Lab Procedure:

1. Take the two bottles and cover the opening with the screen. Use the rubber band to hold in place.
2. Fill one bottle half-way up with sandy soil. Hold the container over a measuring cup of water. Slowly pour one cup of water over the soil and start timing.
3. When water drops begin to “hang” record the total time. Determine the amount of water left in the soil. Record your findings.
4. Repeat the same procedure for the clay-rich soil in the other container.

Post-Lab Questions:

1. Which soil did the water pass through more quickly?
2. Which soil allowed more water to pass?
3. Can you relate your findings to soil texture?

### **Assessment:**

For the formative assessment, I will use a student checklist to help with following the lab procedure.

For the formative assessment, I will use the Think and Write Questions below.

### ***Think and Write Questions:***

1. Sam grows tomatoes on his land year after year. Each year he gets fewer and smaller tomatoes than the year before. Why do you think this is happening? What do you think Sam should do?
2. What is soil made of?
3. Is soil different at different depths below the surface? Explain
4. What are pore spaces? What do they hold?

## Multiple Intelligence Contract

To end our unit of study on Rocks and Soil, I decided to take a different approach to assessing what you have learned. This is called a Multiple Intelligence Contract and here is how it works. You need to read over all the assignments. You will choose one of the assignments to complete. It will be your final grade for this unit of study. Once you have chosen your assignment, the contract needs three signatures: the student, the parent, and the teacher. This becomes a binding document, which means you have now agreed that this is the assignment you are going to complete and cannot change your mind. So, read over the choices carefully and think about which one of the assignments would best suit your personality. No matter which assignment you choose, you will be required to present it to the class.

### ACTIVITIES

#### **ART**

- Create a soil painting (specific instructions will be given). \_\_\_\_\_
- Make a necklace out of stones, pebbles or rock. \_\_\_\_\_
- Create a mosaic art piece using stones, pebbles or rock. \_\_\_\_\_

#### **MUSIC**

- Create a song about Rocks and Soil. Lyrics must be original, \_\_\_\_\_  
but can use music of a popular song.

#### **SOCIAL STUDIES**

- Research Report: Research 4 states from different areas of the country. \_\_\_\_\_  
Find out what the soil is like in each state and what crops are grown there.  
Write a 1-2 page report about your findings.
- Research Report: Research to find what types of fossils have been \_\_\_\_\_  
found in your state? Use the local library or Internet for help. Write  
a 1-2 page research report.

#### **WRITING**

- Write a story that includes the creation or discovery of a fossil. \_\_\_\_\_  
Describe the fossil and the plant or animal that made it.
- Write a story. Someone in the story should use a rock or mineral \_\_\_\_\_  
in some way.

#### **HEALTH**

- Write down 5 healthy foods you eat that are grown in soil. Find out \_\_\_\_\_  
the three main nutrients in each of these foods? Do the five foods have  
nutrients in common? What might this mean?

**MATH**

--Create a math worksheet that includes graphs, tables, and word problems. \_\_\_\_\_

All the problems should relate to rocks and soil. See page C15 in the book

For examples.

Once you have chosen the assignment you want to complete for this task, put a check mark on the line. You must now take this paper home to talk it over with your parents. If they approve of the assignment, then both of you need to sign the contract. Return it to me and then I will sign. Once I have signed it, you have exactly one week to complete the assignment.

---

**MULTIPLE INTELLIGENCE CONTRACT**

Student Signature: \_\_\_\_\_

Parent/Guardian Signature: \_\_\_\_\_

Teacher Signature: \_\_\_\_\_

Today's Date: \_\_\_\_\_

Due Date: \_\_\_\_\_

---

# **Rocks and Soil**

## **Unit of Study**

**Wendy Brady**  
**Allyson Stine**  
**OCI 2006**



## Rocks and Soil Unit Pre-Test

### **DIRECTIONS:**

This is a pre-test designed to test your prior knowledge. Please read each question carefully and choose the best answer. Only one answer is correct so please read all choices before selecting the answer. Take your time!!

1. Rocks are made up of \_\_\_\_\_.
  - A. minerals
  - B. plants
  - C. animals
  - D. water
  
2. Scientists who study the physical properties of rocks to tell how the rocks may have formed years ago are called \_\_\_\_\_.
  - A. biologists
  - B. geologists
  - C. archeologists
  - D. anthropologists
  
3. The property that refers to the way light bounces off a mineral is called \_\_\_\_\_.
  - A. reflection
  - B. refraction
  - C. luster
  - D. streak
  
4. Which one of these is not a way to identify rocks?
  - A. streak plate
  - B. hardness
  - C. luster
  - D. weight
  
5. This type of rock is formed when hot, molten rock material has cooled and hardened.
  - A. igneous
  - B. metamorphic
  - C. sedimentary
  - D. gravel

6. A rock formed from bits or layers of other rocks cemented together is called a \_\_\_\_\_.
- A. igneous rock
  - B. sedimentary rock
  - C. metamorphic rock
  - D. gravel
7. A rock that has been changed by heat, pressure or both is called a \_\_\_\_\_.
- A. igneous rock
  - B. sedimentary rock
  - C. metamorphic rock
  - D. gravel
8. The never-ending process by which rocks are changed from one type into another is called \_\_\_\_\_.
- A. the water cycle.
  - B. the soil cycle.
  - C. the rock cycle.
  - D. the Earth's cycle.
9. Scientists use clues from these to learn about the past.
- A. Animals
  - B. plants
  - C. soil
  - D. fossils
10. Many fossils are found in this type of rock.
- A. igneous
  - B. metamorphic
  - C. gravel
  - D. sedimentary
11. Sap can harden into this, trapping insects inside.
- A. amber
  - B. casts
  - C. rock
  - C. dirt

12. Which of these body parts is **LEAST** likely to become a fossil?
- A. feather
  - B. bone
  - C. shell
  - D. tooth
13. A vertical section of soil from the surface down to the bedrock is called a \_\_\_\_\_.
- A. rock profile
  - B. picture
  - C. soil profile
  - D. layers
14. Soil begins to form when this starts to break down.
- A. sand
  - B. dirt
  - C. bedrock
  - D. air
15. The rate at which water can pass through a substance is called \_\_\_\_\_.
- A. flow
  - B. fast
  - C. permeability
  - D. slow
16. Humus comes from \_\_\_\_\_.
- A. bedrock
  - B. heavy rainfall
  - C. dead plants and animals
  - D. clay soil
17. A layer of soil differing from the layers above and below it is called a \_\_\_\_\_.
- A. crust
  - B. fault
  - C. fragment
  - D. horizon

18. The space between the soil particles is called\_\_\_\_\_.
- A. pore space
  - B. faults
  - C. cracks
  - D. crust
19. The layer of soil that is rich in humus and minerals and is usually the darkest in color is the \_\_\_\_\_.
- A. subsoil
  - B. topsoil
  - C. undersoil
  - D. horizon
20. In which horizon will you find broken-down bedrock in a soil profile?
- A. Horizon A
  - B. Horizon B
  - C. Horizon C
  - D. Horizon D

## **LESSON # 1: Introducing Rocks**

**Objective:** Students will explore the physical properties of rocks.

**Context:** This is the first lesson in this unit of study. It will allow the students to participate in a hands-on lab activity where they will explore how rocks are identified and classified.

### **Connections:**

SC-04-2.3.1

### **Materials:**

- 5 different rock samples (basalt, sandstone, limestone, gneiss, granite)
- hand lens
- streak plates
- pennies and iron nails
- Science Journal
- Lab Questions
- Rock Test worksheet Grid

### **PROCEDURE:**

#### **Guided Practice:**

Students will begin this first lesson by having a teacher-led discussion about rocks. Some of the questions to inquire will be:

1. What do you know about rocks?
2. Where are they found?
3. What are some of their most common uses?
4. Are there different types of rocks? If so, what are they?
5. Are there any tests to distinguish between rocks?

After spending 10 minutes or so discussing these questions and their appropriate answers, I will then set up for the Science Lab activity for the day. While I am doing so, students will be writing down the pre-lab questions in their science journal.

#### **Concept Development:**

I will explain that in today's Science Lab activity the students will get to explore the physical properties of 5 different rock samples. We will then

read about and discuss the testing practices of rocks found in our Science book on page C7.

The tests we will be looking at today include:

1. Luster—which refers to the way light bounces off the minerals in the rocks. Some are shiny, dull, glassy and even greasy looking.
2. Streak Plate—Gently but firmly rub the mineral down a streak plate. You often see a streak that is the same color as the mineral's surface.
3. Hardness—The harder the mineral is, the less likely it will be scratched. You can test the mineral's hardness by three ways—a fingernail, a copper penny, and an iron nail.
4. Color—This is often a good way to classify minerals, but is better when used in conjunction with the other three above.

Questions for Pre-Lab:

1. What are we studying today?
2. What materials do I need for my experiment/activity?
3. What is the procedure for the experiment/activity?
4. What do I expect to happen? (My hypothesis?)

**Independent Practice:**

The students will be given a Rock Test Worksheet grid to fill out as they rotate through the 5 different stations. I will break the students up into five groups and designate their starting areas. Each group will have approximately 10 minutes at each station to perform the tests on the rock. They will then rotate to the next station and perform the same test again, but on a different rock. Once they have visited all stations, they will return to their desks and answer the Post-Lab Questions.

5. What happened and why?
6. What did I learn about rocks today?

### **Assessments:**

For the formative assessment, I will be looking at the Science Journal pre-lab questions to check for accuracy. I will also be using an observation checklist during the activity to see who is on task and focused. This will count towards their participation grade.

As for the summative assessment, I will check and grade their Rock Worksheet Grid and their two post-lab questions. My primary focus is on question # 6...what did I learn today?

## ROCK IDENTIFICATION TESTING

**DIRECTIONS:** You will visit each station for ten minutes. Once you are there, you will perform the rock identification tests we talked about during our lesson discussion. After ten minutes has passed, I will call time and you will rotate to the next station. You are in groups, so please make sure that everyone is actively participating. I do not want to see one person doing all the work. I will be monitoring for your **Lab Participation Points**.

	<b>BASALT</b>	<b>LIMESTONE</b>	<b>GNEISS</b>	<b>GRANITE</b>	<b>SANDSTONE</b>
Observe Color					
Describe Luster					
Streak Plate Color					
Fingernail Scratch					
Copper Penny Scratch					
Iron Nail Scratch					



## **LESSON # 2: Types of Rocks**

**Objective:** Students will explore the three different types of rocks and be able to compare and contrast their different properties.

**Context:** This is the second lesson in this unit. Previously, students worked in groups to rotate through a rock identification lab trying to distinguish and identify different traits. Now that they understand how rocks can be identified, we will move our focus to classification of rocks. There are three types of rocks that we will discuss and identify in this lesson. This lesson is an overview, with three individual lessons to come.

### **Connections:**

SC-04-2.3.1

### **Materials:**

- Types of Rocks Worksheet
- Different types of rocks
- pencil
- Find Someone Who worksheet

### **PROCEDURE:**

#### **Guided Practice:**

We will review and discuss the previous lesson, especially focusing on the questions in the post-lab to determine what the students learned about rocks. Today's lesson will introduce them to the three main types of rocks and discuss how each rock is formed. We will look at some different types of each rock and try to determine where they fit.

#### **Concept Development:**

Using the Types of Rock Worksheet, each student will take notes from this information. As we discuss each type of rock, I will pass around samples for students to examine.

#### **Igneous Rocks**

- igneous means "fire-made"
- formed from hot, molten rock material that has cooled and hardened
- molten material can be above and below the Earth's surface
- Examples include: granite, obsidian, basalt

### Sedimentary Rocks

- formed when smaller bits of rock become pressed and cemented together.
- also form when deposited layers of rock are moved during rain or by wind.
- you can see different layers of rocks
- Often find fossil remains in these type of rocks
- Examples include: rock salt, shale, limestone, conglomerate

### Metamorphic Rock

- metamorphic means “changed in form”
- formed by a change in heat, pressure or both.
- can be classified by bands
- Examples include: marble, gneiss

### **Independent Practice:**

The students will now test their knowledge by participating in a Cooperative Learning Strategy called *Find Someone Who*. They will stand up, hand up, and pair up to find a partner who can answer one of the questions on the worksheet. If that partner answers it correctly, then they sign their name and answer on the line.

### **Assessments:**

Both formative and summative assessments will result from teacher observation checklists, note-taking skills and *Find Someone Who* cooperating learning skills builder.

*Find Someone Who*

**DIRECTIONS:** When teacher calls Stand up, hand up, and pair up, the student will then circulate around the room finding a partner to ask one of the questions. If the partner answers correctly, they will sign their name and write the answer on the line.

1. This type of rock means to be “Fire-made.” \_\_\_\_\_
  
2. You can see different layers of this rock when you examine it closely \_\_\_\_\_.
  
3. This rock’s name means “changed in form.” \_\_\_\_\_
  
4. Where do you think hot, molten rock material comes from? \_\_\_\_\_
  
5. Sedimentary rocks are formed when bits and layers of other rocks are \_\_\_\_\_ and \_\_\_\_\_ together.
  
6. Molten material can be found both \_\_\_\_\_ and \_\_\_\_\_ below Earth’s surface.
  
7. Name the three ways a metamorphic rock can be changed.  
\_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_
  
8. Granite is a type of this rock. \_\_\_\_\_
  
9. Most fossils will be found in this type of rock. \_\_\_\_\_
  
10. This type of rock can be classified by different bands. \_\_\_\_\_

### **LESSON # 3: Sedimentary Rock Lab**

**Objective:** Students will simulate the creation of sedimentary rock. They will also understand about relative age.

**Context:** This is the third lesson in this unit. The previous lesson introduced the students to the different types of rocks. This lesson will take the introduction to a higher knowledge—application. Students perform a lab that should assist them in their understanding of sedimentary rock. The next lesson will focus on metamorphic rock.

#### **Connections:**

SC-04-2.3.1

#### **Materials:**

- Science Journal
- Pre and Post Lab Questions
- gravel
- sand
- water
- clear jar with a lid

#### **PROCEDURE:**

##### **Guided Practice:**

We will review the definition and explanation of sedimentary rocks from what we have learned in the two previous lessons. In their science journal they will record and answer the pre-lab questions.

Questions for Pre-lab:

1. What are we studying today?
2. What materials do I need for my experiment/activity?
3. What is the procedure for my experiment/activity?
4. What do I expect to happen? (My hypothesis?)

##### **Concept Development:**

Students will be working in groups of four with each person in each group labeled person A, person B, person C and person D. This is a part of the Kagan Cooperative Learning Strategies that help ensure equal participation in all activities. Each person will have a designated task in the experiment.

## **Observing Sediments Lab**

**Directions:** Each student in your group has been designated a letter A, B, C or D. Based on your letter, follow the directions below.

### **Student A:**

You will go to the table and gather the supplies for your group. You will need one clear plastic container, a spoon, one bag of gravel, and one bag of sand. Take these items back to your table. Place the plastic container on Student B's desk, the gravel on student C's desk, and the bag of sand on student D's desk.

### **Student B:**

Take the container to the sink and fill it half-way full of water. Do not go over the half-way point. This is very important.

### **Student C:**

You will now place your bag of gravel into the plastic container. Pass the container to student D.

### **Student D:**

Now place the bag of sand into the water. Put the top on and make sure it is tightened down securely.

### **Student A, B, C, and D:**

Each student gets a quick turn to gently shake the plastic container. Place the container aside and observe.

### **Post-Lab Questions to answer in your journal:**

How many layers have formed?

Which layer settled first? Last?

How does this illustrate the formation of sedimentary rocks?

**Independent Practice:**

Students will answer the post-lab questions in their journals.

**Assessments:**

For the formative assessments, I will use teacher observation and checklist for appropriate lab behavior and Kagan cooperative learning strategies.

For the summative assessment, I will score the lab report specifically looking at the post-lab questions to see if the student understood the purpose of the lab and how it simulates the formation of sedimentary rocks.

## **LESSON # 4: Metamorphic Rock Lab**

**Objective:** Students will simulate the creation of metamorphic rock, focusing specifically on “applied pressure.”

**Context:** This is the fourth lesson of this unit. In the last lesson students simulated the formation of sedimentary rocks. This lesson will have the students working with play-dough to simulate how applied pressure helps create metamorphic rock. The next lesson will focus on the Rock Cycle and how it is a never-ending cycle just like water.

### **Connections:**

SC-04-2.3.1

### **Materials:**

- waxed paper
- 3 different colors of play-dough or clay
- plastic knife

### **PROCEDURE:**

#### **Guided Practice:**

We will review our prior knowledge of metamorphic rock, remembering that they are formed by either a change in pressure, heat or both. This activity will deal only with applied pressure. Students will record and answer the following pre-lab questions in their journal. This is an activity that all students will get to perform.

Pre-lab questions for journal:

1. What are we studying today?
2. What materials do I need for my experiment/activity?
3. What is the procedure for this experiment/activity?
4. What do I expect to happen? (My hypothesis?)

### **Concept Development:**

Lab Procedure:

1. Make a number of marble-sized balls from each color of clay.
2. Gently stick different-colored balls together to make a larger ball.

3. On a piece of waxed paper, press down the ball until it is flat. Turn the flattened ball on its edge and press down again.
4. Cut your “rock” in half with a plastic knife.  
SAFETY TIP: Use the knife carefully.
5. Draw what the inside of your “rock” looks like in your journal. Use crayons to assist you.

### **Independent Practice:**

Post-Lab questions to answer in your journal:

1. How did the shape of the small, colored balls change?
2. What effect did pressure from your hands have on the shape of the small balls?
3. Look at your “rock.” Would it be easier to separate the colored balls now, or before you pressed the “rock” together?
4. How could heat help change your “rock”?

### **Assessments:**

For the formative assessment, I will check the post-lab questions.

For the summative assessment, students will answer the Types of Rocks ORQ.

### **Types of Rocks**

In Science, we have been studying about the different types of rocks that make up our Earth. Imagine that you are a geologist who has been given two samples of rocks to identify. You do not know what type of rock each is.

- A. In your own words define the word “geologist.”
- B. Explain in detail the process you would use to determine what types of rocks you have.



## **LESSON # 5: The Rock Cycle**

**Objective:** Students will learn that the rock cycle is a never-ending process just like the water cycle. The objective is to teach them that under certain circumstances rocks will undergo a transformation.

**Context:** This is the fifth lesson of this unit. The previous lesson students created metamorphic rock. This lesson will help reinforce how rocks are continuously changing via the rock cycle. The next lesson will discuss what we can learn about the past from rocks.

### **Connections:**

SC-04-2.3.1

### **Materials:**

- Rock Cycle cut-out worksheet
- crayons
- glue
- paper plate
- scissors

### **PROCEDURE:**

#### **Guided Practice:**

Begin the discussion with review questions:

1. What is a cycle?
2. What do you remember about the water cycle?

#### **Concept Development:**

Lead students to think about a cycle...like a bicycle that is the wheel that goes around and around. A cycle is a series of events that happens over and over with no beginning or no end. A rock cycle, then, is a series of steps that form rocks, one from another, continuously.

Discuss the rock cycle. Be sure to include the various elements that can result in a rock change: weathering and erosion, melting, cooling and hardening, heat and pressure, cementing and pressing. Discuss that one type of rock can be easily turned into another type of rock at any time during the rock cycle as long as it is exposed to one of these elements.

### **Independent Practice:**

Give each student a paper plate, crayons, scissors, glue and colors. Then give each student the Rock Cycle paper. Have the lightly color the arrows and rocks. Cut them out and place them on their paper plate. They may use page C13 in the Science book as reference to the rock cycle. They will not be allowed to glue their items on until the teacher has checked it.

### **Assessments:**

For the formative assessment, I will monitor the activity as the students participate. I will have to check their plate before they are allowed to glue down the items.

For the summative assessment, I will use the Rock Cycle ORQ. It will be scored based on the rubric provided.

### **The Rock Cycle**

Rocks change their form over time but the amount of rocks on Earth has remained the same for millions of years. You have just constructed a model of the Rock Cycle.

- A. List the three types of rocks.
- B. Explain what happens in the Rock cycle.

## **LESSON # 6: Learning from the past**

**Objective:** Students will describe how rocks change over time and what can be learned from these changes.

**Context:** This is the sixth lesson of this unit. The previous lesson outlined the never-ending cycle of rocks. This lesson will lead the students to understand that we can learn about clues from the past in rocks.

### **Connections:**

SC-04-2.3.1

### **Materials:**

- Have students bring in any fossilized rocks
- Plaster of Paris
- shells
- clay
- petroleum jelly

### **PROCEDURE:**

#### **Guided Practice:**

Write these questions on the board to help lead the class discussion to start this lesson. Copy these questions into their science journal. Give them a few minutes to do a think and write.

1. What can scientists learn from studying fossils found in sedimentary rocks?
2. When a scientist finds a dinosaur fossil in a rock, what does that tell about the rock?
3. How can rocks and fossils give clues to what Earth was like in the past?

### **Concept Development:**

Discuss the questions above. Make sure to talk about the correct answers, clearing up any misconceptions that a student might have.

Answers to look for:

1. Fossils in sedimentary rock are usually found where they were formed, so scientists can learn what organisms lived in a place and what Earth was like when they lived there.
2. The scientist will know that the rock was formed around the time when that dinosaur was alive.
3. Some animals and plants live specifically in warm areas. If fossils of these organisms are found in cold regions, we know these areas were once warm.

### **Independent Practice:**

Students will make a cast and mold to create their own fossil.

Activity Procedure:

1. First mix up the correct ratio of Plaster of Paris.
2. Coat a shell with petroleum jelly. Then firmly but gently press the shell into the clay.
3. When the plaster has dried, remove it from the clay.

### **Assessment:**

For the formative assessment, I will use teacher checklist to monitor class discussion and participation.

For the summative assessment, in their science journals students will complete the following “Think and Write” Question.

#### ***“Think and Write” Question:***

You have been hired to build a new factory. As you dig into the ground, you discover what you think is a dinosaur fossil. What would you do next? Who might agree with your decision? Disagree?

## **LESSON # 7: Layers of the Soil**

**Objective:** Students will explore and describe what soil is by learning the different layers of soil found in the Earth.

**Context:** This is the seventh lesson of this unit. The previous lesson had students exploring fossils. This lesson will focus on the soil and the different layers that can be found. The students will participate in a soil profile. The next lesson in this unit is a soil classification lab.

### **Connections:**

SC-04-2.3.1

### **Materials:**

- soil profile worksheet
- Science Journal
- soil pit (outside)

### **PROCEDURE:**

#### **Guided Practice:**

Start the class discussion with these questions: Have you ever watched digging at your home or on a construction site? What did you see? Did you notice the different layers of soil?

Lead the students to discuss the different types of soil they see: soft, dark soil on top, bits of rock and debris, solid bedrock.

#### **Concept Development:**

I will dig a soil pit outside where students can get a better understanding of the soil profile. We will go outside and investigate the soil pit. The students will be able to better visualize the different layers of soil after seeing a section of the Earth dug out. In the soil pit, the soil profile is quite evident.

#### **Independent Practice:**

Students will come back to class and create their own soil profile. Soils typically have three horizons. A horizon is a layer of soil that differs from the layers above it and below it. From the top down, they are horizon A, B, and C. We will discuss what the soil looks like at each horizon layer.

What is a soil profile?

A soil profile is a vertical section of soil from the surface down to the bedrock.

**Horizon A:**

- made up of mostly topsoil
- rich in humus and minerals
- usually darkest in color
- most plants grow here
- many organisms live here

**Horizon B:**

- known as subsoil
- normally a fairly hard labor
- made up of clay particles and minerals that have filtered down from horizon A.
- usually light in color
- sturdy plants may grow down into this layer

**Horizon C:**

- made up of coarse material broken down from the underlying bedrock.
- typically beyond the reach of plant roots.

**Assessment:**

For the formative assessment, I will give a quiz.

For the summative assessment, I will assess with the Layers of the Soil ORQ.

**Layers of the Soil**

In Science we have been studying the different layers of the soil. In your own words...

- Define a soil profile.
- Draw a soil profile.
- Label the four layers of the soil.
- Explain one characteristic from each layer.

## Layers of the Soil Quiz

**Directions:** Read each question carefully. There is only one correct answer for each item.

1. A vertical section of the soil from the surface down to the bedrock is called a...
  - A. soil profile
  - B. layer
  - C. soil picture
  - D. horizon
  
2. Soil begins to form when \_\_\_\_\_ is broken apart into small pieces of rock and minerals.
  - A. topsoil
  - B. bedrock
  - C. subsoil
  - D. humus
  
3. Leftover plant and animal matter found in the topsoil is called...
  - A. fossils
  - B. bones
  - C. humus
  - D. sand
  
4. A layer of soil differing from the layers above and below it is called a(n)...
  - A. line
  - B. profile
  - C. horizon
  - D. layer
  
5. The top layer of soil is also known as what horizon.
  - A. Horizon A
  - B. Horizon B
  - C. Horizon C
  - D. Horizon D

6. This horizon is usually light in color...
  - A. Horizon A
  - B. Horizon B
  - C. Horizon C
  - D. Horizon D
  
7. This horizon is where most plants grow and organisms live...
  - A. Horizon A
  - B. Horizon B
  - C. Horizon C
  - D. Horizon D
  
8. This horizon is made up of coarse material broken down from the underlying bedrock.
  - A. Horizon A
  - B. Horizon B
  - C. Horizon C
  - D. Horizon D
  
9. This horizon usually has the darkest color soil.
  - A. Horizon A
  - B. Horizon B
  - C. Horizon C
  - D. Horizon D
  
10. The top, or A, horizon is made up of...
  - A. subsoil
  - B. bottom soil
  - C. top soil
  - D. different soil



## **LESSON # 8: Introducing Soil**

**Objective:** Students will observe different soil samples.

**Context:** This is the eighth lesson of this unit. The previous lesson led students to understand the different layers of soil present in the Earth's ground. This lesson will focus on observing different types of soil samples.

### **Connections:**

SC-04-2.3.1

### **Materials:**

- 3 soil samples (clay, sandy, potting)
- hands lens
- eye dropper
- water
- newspaper
- paper towels
- 3 sharp pencils

### **PROCEDURE:**

#### **Guided Practice:**

Discuss with the students there are different types of soil found under the ground. Review the different horizons.

#### **Concept Development:**

In their science journal, the students will record the pre-lab questions.

Pre-lab questions:

1. What are we studying today?
2. What materials do I need for my experiment/activity?
3. What is the procedure for my experiment/activity?

## **Independent Practice:**

Procedure for soil lab:

1. Spread the newspaper on a desk or table. Place a soil sample on each paper towel. Put the paper towels on the newspaper.
2. **OBSERVE** Use a pencil to push around the soil a little bit. Observe each soil sample with the hand lens. Record your observations of each soil sample.
3. **CLASSIFY** Use the pencil tip to classify the particles of each sample into two piles—pieces of rock and pieces of plant or animal material.
4. **OBSERVE** Put four drops of water on each sample. After a few minutes, check which sample leaves the biggest wet spot on the newspaper.

Post-Lab Questions:

1. What kinds of material make up each soil sample?
2. How do the particles you sorted in each soil sample compare by size? By color?
3. Describe the properties you observed in each sample.
4. Which sample observed the most water? How can you tell?

## **Assessments:**

For the formative assessment, I will use teacher observation checklist for appropriate lab behavior and participation.

For the summative assessment, I will assess with a Soil ORQ.

## **It's More Than Just Dirt**

You have a box with damp soil from under trees in a thick forest.

- A. Name **TWO** living and **TWO** non-living things that you would expect to find in the soil.
- B. Tell how these things happen to be in the soil.

## **LESSON # 9: Soil Permeability**

**Objective:** Students will perform a lab experiment that relates pore spaces to soil permeability.

**Context:** This is the final lesson in this unit of study. It will wrap up with teaching the students about pore spaces and permeability.

### **Connections:**

SC-04-2.3.1

### **Materials:**

- Science journal
- 2 two-liter bottles cut about five inches above the mouth
- sandy soil
- clay soil
- screen
- rubber band
- water

### **PROCEDURE:**

#### **Guided Practice:**

Lead the discussion about the types of soil we saw in the previous lab experiment. This lesson will focus on pore spaces and permeability.

The students will perform an experiment to demonstrate this process.

Pre-lab questions:

1. What are we studying?
2. What materials do I need for this experiment/activity?
3. What is the procedure for this experiment/activity?
4. What do I expect to happen? (My hypothesis?)

#### **Concept Development:**

Discuss these important vocabulary terms:

Pore Spaces—the space between soil particles. Water and air fill these spaces.

Permeability—is the rate at which water can pass through a porous material.  
Discuss the importance of soil permeability.

### **Independent Practice:**

Lab Procedure:

1. Take the two bottles and cover the opening with the screen. Use the rubber band to hold in place.
2. Fill one bottle half-way up with sandy soil. Hold the container over a measuring cup of water. Slowly pour one cup of water over the soil and start timing.
3. When water drops begin to “hang” record the total time. Determine the amount of water left in the soil. Record your findings.
4. Repeat the same procedure for the clay-rich soil in the other container.

Post-Lab Questions:

1. Which soil did the water pass through more quickly?
2. Which soil allowed more water to pass?
3. Can you relate your findings to soil texture?

### **Assessment:**

For the formative assessment, I will use a student checklist to help with following the lab procedure.

For the formative assessment, I will use the Think and Write Questions below.

### ***Think and Write Questions:***

1. Sam grows tomatoes on his land year after year. Each year he gets fewer and smaller tomatoes than the year before. Why do you think this is happening? What do you think Sam should do?
2. What is soil made of?
3. Is soil different at different depths below the surface? Explain
4. What are pore spaces? What do they hold?

## Multiple Intelligence Contract

To end our unit of study on Rocks and Soil, I decided to take a different approach to assessing what you have learned. This is called a Multiple Intelligence Contract and here is how it works. You need to read over all the assignments. You will choose one of the assignments to complete. It will be your final grade for this unit of study. Once you have chosen your assignment, the contract needs three signatures: the student, the parent, and the teacher. This becomes a binding document, which means you have now agreed that this is the assignment you are going to complete and cannot change your mind. So, read over the choices carefully and think about which one of the assignments would best suit your personality. No matter which assignment you choose, you will be required to present it to the class.

### ACTIVITIES

#### **ART**

- Create a soil painting (specific instructions will be given). \_\_\_\_\_
- Make a necklace out of stones, pebbles or rock. \_\_\_\_\_
- Create a mosaic art piece using stones, pebbles or rock. \_\_\_\_\_

#### **MUSIC**

- Create a song about Rocks and Soil. Lyrics must be original, \_\_\_\_\_  
but can use music of a popular song.

#### **SOCIAL STUDIES**

- Research Report: Research 4 states from different areas of the country. \_\_\_\_\_  
Find out what the soil is like in each state and what crops are grown there.  
Write a 1-2 page report about your findings.
- Research Report: Research to find what types of fossils have been \_\_\_\_\_  
found in your state? Use the local library or Internet for help. Write  
a 1-2 page research report.

#### **WRITING**

- Write a story that includes the creation or discovery of a fossil. \_\_\_\_\_  
Describe the fossil and the plant or animal that made it.
- Write a story. Someone in the story should use a rock or mineral \_\_\_\_\_  
in some way.

#### **HEALTH**

- Write down 5 healthy foods you eat that are grown in soil. Find out \_\_\_\_\_  
the three main nutrients in each of these foods? Do the five foods have  
nutrients in common? What might this mean?

**MATH**

--Create a math worksheet that includes graphs, tables, and word problems. \_\_\_\_\_

All the problems should relate to rocks and soil. See page C15 in the book

For examples.

Once you have chosen the assignment you want to complete for this task, put a check mark on the line. You must now take this paper home to talk it over with your parents. If they approve of the assignment, then both of you need to sign the contract. Return it to me and then I will sign. Once I have signed it, you have exactly one week to complete the assignment.

---

**MULTIPLE INTELLIGENCE CONTRACT**

Student Signature: \_\_\_\_\_

Parent/Guardian Signature: \_\_\_\_\_

Teacher Signature: \_\_\_\_\_

Today's Date: \_\_\_\_\_

Due Date: \_\_\_\_\_

---