



Rock and Roll

Rocks can be defined as the solid material forming part of the surface of the Earth. Through observation of rocks, students can better understand that there are many different types of rocks that can have different physical properties. Physical properties are defined as any property used to characterize physical objects (matter) such as size, shape, color, texture, odor, appearance, etc.

Different processes, such as volcanic activity, movement of the earth's crust, and erosion and redeposition of rocks on the surface, create several different environments where different types of minerals and rocks form. Rocks can be classified into three different rock groups: igneous, metamorphic, or sedimentary. The rock cycle explains the process of how igneous, sedimentary, and metamorphic rock changes and makes up Earth's crust.

Topic / Unit	Matter and Energy
Grade Level/ Course	Grade 4 Science
TEKS (include number and text of applicable TEKS)	4.b.6.C determine the physical properties of rocks that allow Earth's natural resources to be stored there.
Materials	<ul style="list-style-type: none"> ● Sedimentary Rock collection ● 1 hand lens per student ● Lab Time with Leo: Seeping Stones ● Hand lens ● Kitchen sponge ● Block of Styrofoam ● Block of wood ● Pumice ● Cup of water

	<ul style="list-style-type: none"> • Dropper or dropper bottle
I can (EQ)	<ul style="list-style-type: none"> • explain why some rocks contain natural resources like fossil fuels.
Scaffolded scripted questions	<ul style="list-style-type: none"> • What kinds of rocks store energy? • How are fossil fuels made?
Warmup 10 minutes	<p>ENGAGE</p> <p>Using the links below , ask students what the four pictures have in common. Allow 2-3 minutes for turn and talk time. Discuss as a class.</p> <ul style="list-style-type: none"> • West and East Mitten Buttes are located in Monument Valley, Utah. They are made of three principle rock layers. The lowest layer is Organ Rock Shale, middle layer is De Chelly Sandstone, and the top layer is the Moenkopi Formation capped by Shinarump Conglomerate. • Devils Tower is located in northeastern Wyoming. It is composed of mostly sedimentary rocks. The dark red is sandstone and maroon siltstone, interbedded with shale. Geologists agree that Devils Tower was formed by the intrusion of igneous material. • Stonehenge is located in Wiltshire, England. It is made up of about 20 different types of rock that were brought to the site at different times over the period of 1,000 years. The bluestones (rhyolite debitage) are made of dolerite, an igneous rock; the larger upright stones • are made of sarsen sandstone, sedimentary rock. • Mount Rushmore National Memorial is located in the Black Hills of South Dakota. It is made of granite, an igneous rock. <p>Guide students toward the fact that they are all made of rock. Explain to students that in this lesson, we are going to look more closely at rocks! Note that in Texas, limestone is the most commonly found sedimentary rock. Next, show the students this short Instagram reel which explains how rocks contain energy.</p>
Lesson Activities 25 minutes	<p>PART 1</p> <p>EXPLORE</p> <ol style="list-style-type: none"> 1. Show students the Lab Time With Leo: Seeping Stones video. 2. Group students into groups of four. 3. Continuing with the powerpoint, explain to students that there are different types of sedimentary rocks and in this lesson, they will study six. 4. Discuss with students vocabulary words that are important in discussing and observing sedimentary rocks:

Sedimentary rock- rocks that have been pressed together to form layers and may have fossil fuels trapped in them.

Porous- space that allows air and liquid to flow.

Permeability- a way to describe how easily air and liquids can flow through rocks.

5. Give each group a [sedimentary rock collection](#) comprised of samples of sandstone, conglomerate, shale, coal, limestone and arkose.

**** if you have a limited supply of rock collections, consider a round robin activity with students rotating through the rocks or as a demonstration from the front of the class.*

5. Using hand lenses, allow students to complete Part A Observation of the Rock Research Data Sheet attached to observe their rocks, discuss with their group, and sort the rocks in different ways.
6. Before students complete Part B Assessment of the Rock Research Data Sheet, give the definition for physical property to the students. (A physical property is how we can describe an object by its size, shape, color, texture, odor or appearance.)
7. In order to demonstrate and provide an example of a physical property, ask students to name physical properties of a common classroom item. Describe what it looks like. (For example: My stapler is black with shiny silver, it has a circle around a square on the logo, it is bigger than the red stapler, the top of the stapler is smooth, the very top of the stapler looks like a rectangle.) Next, have students write a descriptive paragraph of one of the rocks they observed in Part A.

PART 2 EXPLAIN

1. Explain to students that oil, gas, and water may be held in and/or move through rocks and that in this lab activity, we will examine porosity and permeability of different types of rocks.
2. Put drops of water on various materials. Why does water respond differently?
3. Remind students of the definitions on the powerpoint. Sedimentary rocks are able to hold fluids (liquids and gases) because of the physical properties of porosity and permeability. Porosity (porous) is the term used to describe how much pore space (space between the grains) is in the rock. Permeability refers

	<p>to the ability of the fluids to move through the rock. Therefore, porosity describes the ability of the rock to hold a fluid and permeability is the measure of how easily the fluid can flow through the rock.</p> <p>ELABORATE</p> <p>4. Sedimentary rocks are the types of rocks in which oil and gas are found. In drilling for oil and gas, conventional drilling extracts oil and gas that flow easily through rock and collect in areas where they can easily be brought to the surface by drilling vertical wells. Unconventional drilling methods, including horizontal wells and hydraulic fracturing (fracking), involve pumping a mixture of water, sand, and chemicals into the well at high pressure in order to create fissures in the shale rock, which increases permeability and allows the hydrocarbons to escape.</p> <p>5. Show students a demonstration of this with the video Virtual Field Trip- Hydraulic Fracturing</p>
<p>Assessment</p> <p>5 minutes</p>	<p>EVALUATE</p> <p>Students should complete Part C Wrap It Up of the Rock Research Data Sheet using the words in the word bank.</p>



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Rock Research Data Sheet



NAME:

DATE:

CLASS:

Part A: Observation

Use the space in the chart below to observe traits of rocks.

Type of Rock	Colors seen in rock	Appearance of Rock (shiny, dull, spotted, striped)	Texture of Rock (smooth, rough, other)	Rock shape
<i>Sandstone</i>				
<i>Conglomerate</i>				
<i>Shale</i>				
<i>Limestone</i>				
<i>Coal</i>				
<i>Arkose</i>				

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Rock Research Data Sheet continued

Part B: Assessment

Choose one rock from Part A that you find interesting. Answer the following questions based on the rock you selected.

- What is the most important physical property of your sedimentary rock?
- Why is this factor the most important?
- What are two key factors that make the rock you chose unique?

Part C: Wrap It Up

Using five of the words below, create a well written paragraph that answers the questions below.

- What kinds of rocks store energy?
- How are fossil fuels made?

porous sandstone sedimentary rock fossil fuel gas
liquid limestone permeability