

## Science Concept:

Water can move sediments and rocks to contribute to the formation of sedimentary rocks.

## Objectives:

The student will:

- describe how water can move sediments and rocks to contribute to the formation of sedimentary rocks;
- make inferences about water moving sediments and rocks; and
- write and illustrate a focused paragraph with details about water and sedimentary rocks.

## GLEs Addressed:

### Science

[4] SD1.2 The student demonstrates an understanding of geochemical cycles by recognizing the physical properties of water as they relate to the rock cycle

[4] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.

### Writing

[4] W2.1.1 The student writes about a topic by writing a paragraph that maintains a focused idea and includes details that support the main idea.

## Vocabulary:

**current** - (1) the portion of a stream or body of water that is moving with a velocity much greater than the average of the rest of the water. The progress of the water is principally concentrated in the current. (2) The swiftest part of a stream; (3) A tidal or non-tidal movement of lake or ocean water; (4) Flow marked by force or strength

**delta** - An alluvial deposit, usually triangular in shape, at the mouth of a river, stream, or tidal inlet.

**density** - the state or quality of being dense, or having the component parts closely compacted together; in physics, measured by mass per unit volume

**deposition** - the accumulation of material dropped because of a slackening movement of the transporting medium, e.g., water or wind. Also, the transition of a substance from the vapor phase directly to the solid phase, without passing through an intermediate liquid phase, also referred to as "sublimation"

**deposits** - any accumulation of sediment

**fossil** - any remains, impression, or trace of a living thing of a former geologic age, as a skeleton, footprint, etc.

**igneous rock** - rock formed when molten rock (magma or lava) has cooled and solidified (crystallized)

**metamorphic rock** - a rock that has undergone chemical or structural changes produced by increase in heat or pressure, or by replacement of elements by hot, chemically active fluids. In metamorphic rocks some or all of the minerals in the original rock are replaced, atom by atom, to form new minerals. Metamorphic rocks are often squished, smeared out, and foliated. Metamorphic rocks do not get hot enough to melt, or they would become igneous rocks

**river mouth** - the place where a river flows into a larger body of water, such as a lake or an ocean

**particle** - in physics, one of the extremely small constituents of matter, as an atom or nucleus; a minute portion, piece, fragment, or amount; a tiny or very small bit

**rock cycle** - refers to how rocks are recycled from igneous to sedimentary to metamorphic and back to igneous again. The study of plate tectonics provides an explanation for how this happens

# ROCKING ON THE RIVER

## INSTRUCTIONS



**sedimentary rock** - sedimentary rocks are formed from pre-existing rocks and minerals or pieces of once-living organisms. They form from deposits that accumulate on Earth's surface. Sedimentary rocks often have distinctive layering or bedding

**sediment** - the word geologists use for loose, uncemented pieces of minerals and rock that come in a variety of sizes and go by common names like sand, boulders, clay, silt, pebbles, and cobbles

### Materials:

- Aluminum foil
- Books to elevate lids
- Box lid with the end cut out (one per group)
- Gravel
- Plastic bottles with holes poked in some of the lids
- Reference material that states the characteristics of rocks
- Rock collection (one per group)
- Sand
- Seashells, sticks, or other small toys to simulate fossils
- Soil
- Transparent containers (two per group)
- Water
- Science journal

### Activity Preparation:

1. Cut out the end of the box lid and line with aluminum foil.
  - a. group students
  - b. hand out science journals or supply each student with a recording paper
  - c. put rock characteristic reference material out

*Supply for each group:*

- d. box of rocks
- e. box lid with the end cut off and lined with aluminum foil
- f. books for elevating box lid on one end
- g. two or three plastic bottles half full with water
- h. containers of sand, gravel, and rocks
- i. see through containers at the end of the box lid to catch the rocks and sediment
- j. a couple of shells, sticks, or other "fossils"

### Activity Procedure:

Please refer to the assessment task and scoring rubric located at the end of these instructions. Discuss the assessment descriptors with the class before teaching this lesson.

#### Gear Up

**Process Skills: *observing, classifying, and communicating***

1. Distribute a rock collection to each group. Ask groups to sort the sedimentary rocks out of the collection, discuss, and record why they chose those rocks as sedimentary.
2. Check for understanding by asking the following questions:
  - a. How did you sort your rocks: color, size, shape, or other ways? Why?
  - b. What makes a rock sedimentary?
  - c. What role does water play in making sedimentary rocks?
  - d. Where would the water come from and in what form – could it be a gas or frozen?

- e. Record student responses on the board or chart paper and write student's initials by each response.

## Explore

### *Process Skills: observing, communicating, investigating, and predicting*

3. Explain each group of students will:
  - a. predict and record what will happen when water runs down a hillside;
  - b. predict and record in which order sand, soil, fossils, and rocks will settle in a bottle of water;
  - c. use the teacher provided materials to build hillsides and investigate what happens when water moves rocks and sediments;
  - d. use the plastic bottles of water, with the holes in the lids, to simulate moving water on the hillside and observe what happens to the sediment and rocks; and
  - e. record all observations.

## Generalize

### *Process Skills: inferring, communicating, and describing*

4. Ask students the following questions and discuss:
  - a. What happened on your hillside when it rained?
  - b. What happened to the sediments?
  - c. Why do you think this happened?
  - d. Why did they form in layers?
  - e. How would this layering contribute to the formation of sedimentary rocks?
  - f. What would have happened if you had used more water? Less water?
  - h. What did you observe about the sediment and rocks in the containers after you poured water on the hillside?
  - i. What happened to your "fossils"?
  - j. What order did the sediments settle in the bottle of water?
  - k. Why do you think this happened?
  - l. What happens to sediments and rocks in the bottom of rivers and oceans over time?
  - m. How does water help make sedimentary rocks?
  - n. How are sedimentary rocks formed over time?

## Apply

### *Process Skills: describing, making generalizations, and communicating*

5. Ask students to describe and illustrate, in their journal, another way water moves rocks (i.e., glaciers or waves).

## Extension Idea:

Students make layered bars by pressing them into pans and explain how these are similar to what happens to the sediments and rocks deposited by water over time.

# ROCKING ON THE RIVER

# RUBRIC

## Assessment Task:

Write a focused, five-sentence paragraph that includes at least two details on the role of water movement in the formation of sedimentary rock. Include at least two inferences about how water moves sediments and rock. Include an illustration that includes at least three details.

## Rubric:

Objective	GLE	Below Proficient	Proficient	Above Proficient
The student describes how water can move sediments and rocks to contribute to the formation of sedimentary rocks.	[4] SD1.2	The student may describe less than two ways water can move sediments and rocks to contribute to the formation of sedimentary rocks.	The student describes at least two ways water can move sediments and rocks to contribute to the formation of sedimentary rocks.	The student describes more than two ways water can move sediments and rocks to contribute to the formation of sedimentary rocks.
The student makes inferences about water moving sediments and rocks.	[4] SA1.1	The student may make an inference of water moving sediments and rocks.	The student makes two inferences based on an investigation of water moving sediments and rocks.	The student makes three or more inferences about water moving sediments and rocks.
The student writes and illustrates a focused paragraph with details about water and sedimentary rocks.	[4] W2.1.1	The student may write a focused paragraph of less than five-sentence and may have an illustration that includes less than three details about water and sedimentary rocks.	The student writes at least one focused, five-sentence paragraph with an illustration that includes at least three details about water and sedimentary rocks.	The student writes more than one focused, five-sentence paragraph with an illustration that includes more than three details, captions, or labels about water and sedimentary rocks.