

# SWEPT AWAY: MY GAIN, YOUR LOSS (MODIFIED FOR ADEED)



## Science Concept:

Water velocity has an effect on erosion.

## Objectives:

The student will:

- create a diagram to show where different velocities of streams affect sediments;
- describe how the surface of a stream valley changes after different velocities of water have traveled through it; and
- write a report about water velocity and its effect on erosion.

## GLEs Addressed:

### *Science*

[10] SD1.1 The student demonstrates an understanding of geochemical cycles by using a model to explain the processes (i.e., formation, sedimentation, erosion, reformation) of the rock cycle.

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

### *Writing*

[10] W4.2.2 The student writes for a variety of purposes and audiences by writing in a variety of nonfiction forms (e.g., letter, report, biography, autobiography, and/or essay) to inform, describe or persuade.

## Vocabulary:

**density** – 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

**elevation** – the altitude of a place above sea level or ground level

**erosion** – removal of material by water, wind, or ice

**grains** – the individual mineral crystals or particles within a rock or sediment deposit

**gravity** – the force of attraction by which terrestrial bodies tend to fall toward the center of Earth or any other physical body having mass

**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

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

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

**transport** – to carry, move, or convey from one place to another

**velocity** – the time rate of change of position of a body in a specified direction

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## Materials:

- Sedimentation tube, purchased or teacher-made (one per group)
- Sand, medium grain
- Gravel, coarse grain
- Silt or clay, fine grain
- Cobbles, very coarse grain
- Water
- Pitcher or jug for water
- Stream Table (purchased or click below for instructions on how to build your own)  
[http://www.pbs.org/americanfieldguide/teachers/floods/stream\\_table.pdf](http://www.pbs.org/americanfieldguide/teachers/floods/stream_table.pdf)
- Collection bucket (one per stream table)
- Funnel
- Timer
- Science journal

## 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, inferring, and communicating*

1. Ask students to write, in their science journals, what they know about water velocity and its effect on erosion.
2. Divide students into groups. Distribute a settled sediment tube to each group.
3. Ask students to describe what they see in the tube. List student observations on the white board. Start a vocabulary list as vocabulary words come up in the discussion.
4. Ask why the larger (coarse grain) material is at the bottom and why the smaller (fine grain) material is at the top of the sediment column.
5. Ask what is between the top and bottom layers (medium grain) and why might it be there.
6. Ask what might happen if this sediment were buried in Earth for a million years.
7. Discuss what would happen if this sediment column were exposed at ground level after it had turned into sedimentary rock.
8. Ask what will happen to the sediment if we shake up the tube. Write student predictions on the board, shake the tube and observe. Discuss what happened.

### Explore

#### *Process Skills: observing, describing, communicating, measuring, and predicting*

9. Explain groups will build two stream valleys. Students should work cooperatively and agree on division of tasks such as artist, scribe, engineer, etc. Ask groups to decide on which sediment material(s) to use. Distribute materials and allow groups to begin. If necessary, model how to build a stream valley model.
10. Once each valley is constructed, groups then must discuss and decide how to create two streams of significantly different velocities. This may include raising the source of water, creating a slope to the stream valley, using a narrower opening to release the water through, or other ideas.

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11. Instruct students to record, in their science journal, their prediction of what will happen when water flows through their stream valley at different velocities. Each group should draw a labeled diagram of each stream valley on a separate piece of paper before adding the water.
12. Instruct students to add the water to the stream valleys, make observations, and record results in their science journals. Students should not destroy their stream valleys after adding the water.

### **Generalize**

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

13. As a class, compare groups' predictions. Ask each group to share how they changed the velocity of their streams. Ask each group to share their labeled stream valley sketches with the class, and then allow groups to observe each other's stream valley models. As a class, make a chart of similarities and differences of each model.
14. Ask each group to make inferences about what happened in their stream valley and why, to help form a preliminary conclusion.
15. Discuss what conclusions can be formed from this exploration activity. Ask students how they can test their conclusions.
16. Review vocabulary words and add any to the list that are new.

### **Apply**

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

17. Ask students to use their science journal observations and sketches to write an informational brochure informing new home buyers/builders of the possible risks of building in a scenic stream valley. The brochure should include the vocabulary introduced in this lesson. The brochure should also offer suggestions for safer construction areas supported by their recorded observations.

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# RUBRIC

## Assessment Task:

In your science journal, draw a diagram with at least six labels to indicate where different velocities of streams affect sediments. Write a report of at least five paragraphs using complete sentences. The report must include at least three descriptive statements to explain how the surface of the stream valley changes after different velocities of water have traveled through it.

## Rubric:

Objective	GLE	Below Proficient	Proficient	Above Proficient
The student creates a diagram to show where different velocities of streams affect sediments.	[10] SD1.1	The student does not draw a diagram or uses less than six labels to show where different velocities of streams affect sediments.	The student draws a diagram that includes at least six labels to show where different velocities of streams affect sediments.	The student draws a diagram that includes more than six labels to show where different velocities of streams affect sediments.
The student describes how the surface of a stream valley changes after different velocities of water have traveled through it.	[10] SA1.1	The student writes less than three descriptions of how the surface of a stream valley changes after different velocities of water have traveled through it.	The student writes three descriptions of how the surface of a stream valley changes after different velocities of water have traveled through it.	The student writes more than three descriptions of how the surface of a stream valley changes after different velocities of water have traveled through it.
The student writes a report about water velocity and its effect on erosion.	[10] W4.2.2	The student writes less than five paragraphs about water velocity and its effect on erosion.	The student writes five paragraphs (using complete sentences) about water velocity and its effect on erosion.	The student writes more than five paragraphs (using complete sentences) about water velocity and its effect on erosion.

