

Watershed Science for Educators

NRS 591

Spring 2009

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- **Title of Watershed Extension** –How Fast Does a Stream Flow? Inquiry Lesson
- **GEMS**-Not Available
- **Grade**- 8th Grade Earth Science
- **Skills**-Students will build, calculate, and interpret.
- **GSE's**-ESS1- The Earth and earth materials as we know them today have developed over long periods of time, through continual change processes. (Identify, analyze, and compare) the four basic materials: water, soil, rocks, and air)
- **Duration**-55 Minutes
- **Group Size**-26 Students
- **Setting**-Classroom with 4' by 6' foot lab tables.
- **Objectives**-Students will be able to: build a model stream; calculate water speed in a model stream; interpret test data to conclude that water speed increases when the slope and water volume are increased.
- **Method**-This particular lesson is student focused. The objectives will be met by allowing the students partner up and explore different outcomes with the variables they are given.
- **Background**-Prior to teaching this lesson, the practioner should have a strong content knowledge of the following: How water is important to living and non-living things, the properties/chemistry of water, and the water cycle.
- **Materials**-Five lengths of rain gutters (six feet), two dozen (2" x 4" x 6") wooden blocks. Paper towels (for clean-up), stop watches, and food coloring
- **Procedure**-
 1. Copy the data table into your notebook.
 2. Use a pencil to mark an "S" at one end of the gutter. This represents the stream's source. Mark an "M" at the other end of the gutter. This represents the stream's mouth.
 3. At 10 cm from the source end, draw a dark line across the inside of the gutter.
 4. Measure 100cm toward the mouth end from the first line. Draw a second line across the gutter.
 5. Place a plastic tube under the mouth end of the gutter to collect the water.
 6. Place enough blocks under the source end to raise it 5cm above the tub. Record the number of blocks in the data table.
 7. Write "1" after "Number of beakers" in the data table.
 8. One person should slowly pour water from one beaker into the source end of the gutter, trying not to spill any water on the back end. A second person should add one drop of food

coloring at the source end, above the “S” line. A third person should begin timing when the food coloring first reaches the “S” line. Stop timing when the food coloring reaches the “M” line. 9. Repeat Step 8 twice, pouring the water at the same rate each time. Record your results. 10. Copy the data table again, labeling it “Experiment number 2”. Repeat steps 8 & 9 with an increased water volume in the stream. Increase the water volume by pouring water into the stream from two beakers at the same time. Try to pour at the same rate. 11. Now increase the slope of the stream, adding blocks to raise the source end 5 cm higher. 12. Copy the data table two more times for Experiment numbers 3 and 4. For Experiment 3, repeat Steps 8 & 9 at this steeper slope. For Experiment 4, repeat step 10.

- **Analyze and Conclude** – 1. Average the three trials for each experiment. Record the average times on your data table. 2. Calculate the average stream speed for each experiment using the following formula: Speed of stream (cm/s) = distance (100cm)/average time (s). 3. How did the speed of the stream change when you increased the volume of water? 4. How did the speed of the stream change when you increased the slope? 5. What errors might have affected your data? How could they be reduced? Calculate the average stream speed for each experiment using the following formula: Speed of stream (cm/s) = distance (100cm)/average time (s). 3. How did the speed of the stream change when you increased the volume of water? 4. How did the speed of the stream change when you increased the slope? 5. What errors might have affected your data? How could they be reduced?
- **Variations**- This hands on inquiry lesson would lend itself to further questions. I would hope the students would make connections to local streams and rivers to make this lesson relevant to them.
- **Resources**- Prentice –Hall, Earth’s Waters, 3rd Edition., 2000
- **Evaluation**-This lesson will be part of a formative assessment piece. The student’s data tables will be checked for accuracy, as well as an understanding for correlations that took place.