NAME_____ **PERIOD**_____ **DATE** _____

LAB PARTNERS_____ **LAB #13**

FACTORS AFFECTING STREAM VELOCITY

INTRODUCTION

Running water flows downhill due to the pull of gravity. The rate of erosion varies from stream to stream; the velocity of a stream depends on its discharge (volume) and its slope.

OBJECTIVE

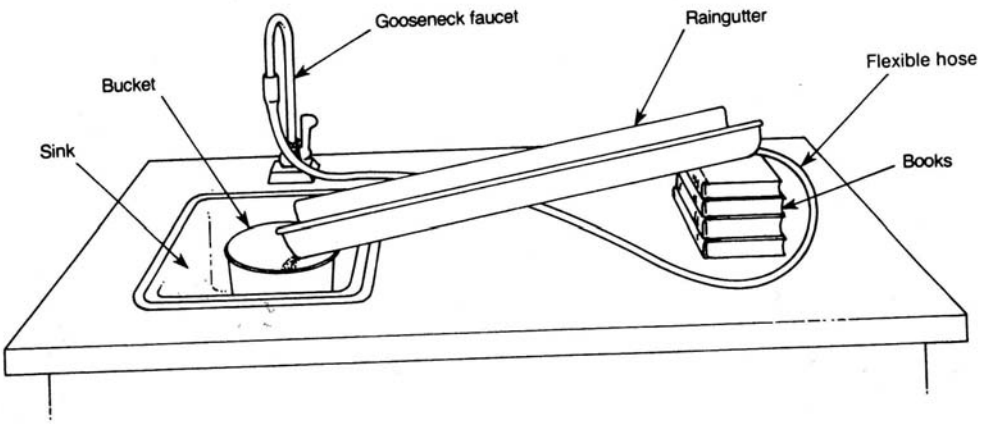
Determine the relationship between slope, discharge, and stream velocity, and its ability to transport sediments.

MATERIALS

Hose
Gooseneck faucet adapter
Trough/Gutter
Small pieces of paper
Colored Pencils
Graph Paper
Stopwatch
Ruler

PROCEDURE: Small Tube (Less Discharge)

1. Place a trough on the lab table so that one end is in the sink. Lift the other end of the trough until you have a 5 degree angle (one text book).
2. *This should be done for you already.* From the source end of the trough, measure 5-10 cm and mark the edge of it with tape. Make a second mark 80-85 cm from the source end of the trough. The distance between the two pieces of tape should be **75 cm**. Set up lab apparatus as shown below.
    a. *Please see the set-up below, check with your teacher to make sure it is correct.*



3. Once the water begins to flow place a small piece of paper at the start line and time how long it takes for the paper to pass from the first piece of tape to the last piece of tape. **Again, time how long it takes a piece of paper to travel the 75 cm between your two tape marks.**
4. Enter the travel times in Chart A.
5. Repeat this process, but instead of using one book, place **two** textbooks under the trough (10 degree angle).
6. Repeat this process, but instead of using three books, place **four** textbooks under the trough (20 degree angle).
7. Find the average travel times and then calculate the velocities for each angle using the equation:

***** Velocity (cm/sec) = [Distance (cm) ÷ Time (sec)] *****

Chart A: Low Discharge

Slope	**Volume of H_2O (Discharge)**	**Travel Time (sec)**			**Average Travel Time (sec)**	**Velocity (cm/sec)** 75cm ÷ travel time
5° (1 Book)	Small Tube					
10°(2 Books)	Small Tube					
20°(4 Books)	Small Tube					

<u>PROCEDURE</u>: Large Tube (Greater Discharge)

1. Change the hose to a thicker diameter (greater discharge) or turn the facet up for a higher velocity. Repeat the procedures 3-6 starting with one book. Then two. Then four.
2. Record each time in the Chart B with the stopwatch and calculate the velocities using the velocity formula provided.
3. Using the data from part A and B make a line graph plotting **Slope vs. Velocity** on one graph.

Chart B: High Discharge

Slope	**Volume of H_2O (Discharge)**	**Travel Time (sec)**			**Average Travel Time (sec)**	**Velocity (cm/sec)** 75cm ÷ travel time
5° (1 Book)	Large Tube					
10°(2 Books)	Large Tube					
20°(4 Books)	Large Tube					

LABORATORY QUESTIONS:

1. How did you increase the discharge (volume) of the stream flow in this lab?

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2. At a slope of 5 degrees, what happens to the velocity of the stream when you increase the discharge of the flow?

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3. If the discharge remains the same, as the slope increases what happens to the velocity and the rate of erosion?

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4. If discharge decreases what would happen to stream velocity and the rate of erosion?

_____

5. Describe the relationship between the discharge (volume) and the slope of a stream and the size of the particles transported?

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6. What is the largest particle that can be kept in motion by a stream that has a velocity of 100 centimeters per second?

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7. What is the minimum rate of flow at which a stream of water can maintain the transportation of pebbles 1.0 centimeter in diameter?

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8. A stream flowing at a velocity of 75 centimeters per second can transport (name all the sediments that move).

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9. What is the minimum rate of flow at which a stream of water can maintain the transportation of a particle 0.006 centimeters in diameter?

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