



VA Natural Resources Demo Post Visit

Activity #1: Water Use Activity

Objective: Students will collect and analyze data about their own water usage and brainstorm ways in which they can reduce their usage in order to conserve water and protect the watershed.

Supplies:

Water use survey
Pencil
Graph paper (or Excel)

Data Collection:

1. Students should keep track of the number of times per day each activity on the survey was performed OR the number of minutes that the water was running during the activity for one week.
2. Students will add up the totals for the week in the "Weekly Total" column. (Formulas are already present if you are using the Excel spreadsheet for this activity.) Multiply by the number in the "Gallons of Water" column.
3. Add the numbers in the "Gallons of Water" column together to get the "Total Gallons of Water Used."

Analysis:

1. Students can graph these numbers in several ways – usage per activity (pie charts are a great way to show this), total usage for each member of the class (bar graphs), etc.
2. Students can discuss in small groups or as a whole class the ways in which they can reduce the water used. Emphasis should be placed on the Reduce, Reuse, Recycle concepts and the importance of protecting the natural environment. Some guiding ideas:
 - a. Shorter showers
 - b. Minimal lawn watering
 - c. More effective watering pattern for lawn
 - d. Sweeping yard debris in driveway rather than hosing it into gutters or the street
 - e. Only run full dishwasher/laundry loads
 - f. Fix leaking faucets
 - g. Replace shower heads and toilet with low-flow equivalents
 - h. Rain barrels
 - i. Planting native plants (can often thrive on less water)

Student Name _____

Class Period _____

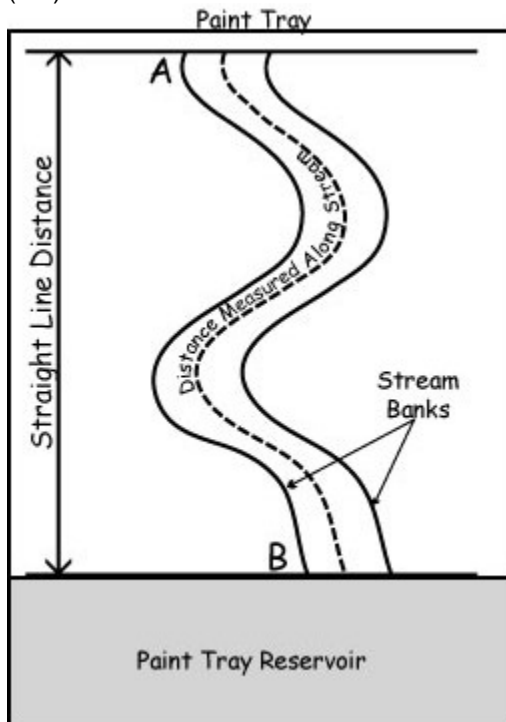
Directions: Fill in the total number of times each day that the activity occurs OR the number of minutes that water was running during the activity. For example, on Monday, you flushed the toilet 8 times, ran 3 loads of laundry, and ran the bath water for 4 minutes.

Activity	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Weekly Total	Gallons of Water	Total
Flushed the toilet									6	
Showers (in minutes)									3.8	
Baths (in minutes of running water)									3	
Loads of Laundry									40	
Dishwasher									15	
Hand washing dishes (in minutes of running water)									3	
Washing hands or face									1.5	
Watering Lawn (in minutes)									10	
Drinking Water (in glasses)									0.0625	
Cook a meal									3	
Shave									2	
Total Gallons of Water Used										

Post Visit Activity #2:

Streams and Sinuosity

Objective: Students will investigate the effect of stream sinuosity on the rate of water flow in the stream. This experiment addresses Virginia SOL's related to scientific investigation, reasoning, and logic (4.1).



Supplies:

Paint tray
Measuring cup or graduated cylinder
String
Ruler
Play dough or clay
Stop watch
Pencil and paper

Set-up

1. We will start with the simplest stream – a straight one. The play dough will create the “stream banks” in our model. Roll the play dough into long cylinders or “worms” and place them parallel to each other along the center of the paint tray.

Measurement

1. Measure the length of the stream. Points A will be the beginning of the stream along the top of the tray, and point B will be the end of the stream (see diagram). Lay one end of the string at point A place the string down the center of the stream, and mark the string at point B. Lay the string along the ruler and measure the length from the end to the mark on the string. Write the length in the chart.
2. Time the stream water flow. Prop the top end of the paint try on a book or other block so that it is tilted at an angle. Use a measured amount of water (at least 2 cups or 500 mL works well) and pour the water fairly slowly down the stream. Start the stop watch when you begin pouring the water and stop it when all the water is in the reservoir at the bottom of the paint tray. Record the time in the chart.
 - The slower you pour the water, the more accurate your measurements will be.
 - Practice pouring the water so that you get a consistent rate for the water entering the stream top at point A. This will be especially important for comparing the times of water in the straight stream with water in the curved streams.
 - With older students, consistent pouring and timing of the water flow can be achieved by first having them practice pouring (and practice timing with the stop watch) and then averaging the times of several trials with both the straight stream and the curved stream. This is also a good place to talk with students about errors in measurements and the importance of measuring accurately and in the same way each time.
3. Make a curvy stream. Change the play dough stream banks (and add more play dough as needed) so that they create a very curved stream, as in the diagram.

4. Measure the length of the new stream with the string using the same method as Step 2 above. It is important to measure the stream length along the center of the stream in order to make good comparisons with the straight stream. Lay the string along the ruler and measure the length from the end to the mark on the string, as above. Write the length in the chart.
 - Note: the curvy stream will be longer than the straight stream. With younger students the point can be made that the shortest distance between two points is a straight line. With more advanced students, the sinuosity ratio (curviness) of the stream can be calculated by dividing the length of the curvy stream by the length of the straight stream. The units will cancel out. The larger the number, the more curvy (or sinuous) the stream is. A stream with a sinuosity ratio of 1.5 or greater is considered to be a **meandering stream**.
 - **For example:**
Straight stream = 8 inches
Curvy stream = 13 inches
Sinuosity = $13 \div 8 = 1.625 =$ meandering stream
5. Time the stream water flow in the curvy stream. Remember to prop the top of the paint tray up at the same angle as you did when pouring water down the straight stream. Use the same amount of water as in Step 3 and try hard to pour the water at the same rate. Make sure to start and stop the stop watch at the same times (when you start pouring and when all the water is out of the stream and in the bottom of the tray). Record the time in the chart.

Analysis

1. For younger groups, the analysis can be as simple as comparing the times and lengths measured for the straight stream and the curvy stream. The longer the stream, the longer the time for the water to travel the path of the curvy stream.
 2. Have more advanced students calculate the sinuosity of the stream and determine if the curvy stream qualifies as a meandering stream.
 3. Have the most advanced students vary the input parameters one at a time (rate of water poured, slope of the paint tray) and record the results. Several conclusions may then be drawn from the data. In general, you may expect the following:
 - a. If a higher volume of water is poured in the same amount of time (faster pouring rate) then both streams will flow faster. In nature, this process is called “rejuvenation” in an established stream. In particular, the flow rate will be so fast that the banks of a curvy stream will be breached and the new path of the stream will be straighter than the previous path, and the sinuosity value will be lower.
 - b. The higher the slope of the paint tray, the faster the water will flow down both types of stream. With a slope that is high enough, the banks of the curvy stream may be breached by the faster-flowing water, lowering the sinuosity value of the stream.
- ❖ Interpretation of these results:
- a. In general, flatter slopes and lower volume streams have higher sinuosity, and are referred to as “older” streams. Older streams tend to occur where weathering and erosion have flattened the slope of a previously steeper area, particularly in areas where the water volume doesn’t fluctuate drastically.
 - b. In general, higher slopes and greater water volumes create streams with lower sinuosity, and are referred to as “younger” streams. Storm runoff, seasonal melting, and catastrophic water volume changes (a burst dam, for example) will “rejuvenate” the older streams, decreasing sinuosity, and creating a younger stream (and often flooding of the stream banks) in the same general path as the older stream.

This document was created with Win2PDF available at <http://www.daneprairie.com>.
The unregistered version of Win2PDF is for evaluation or non-commercial use only.