Unit 2
How is Flowing Water an Energy Source?

Activity B

Can water pressure influence water flow?

Introduction

Water pressure influences the rate of water flow. As pressure increases, so does the rate of flow. The pressure of water is greatest at the bottom of a collection of water, and least at the top. This principle will be illustrated as students conduct the activity in this lesson.

Scientific Learning Goals and Objectives for this Activity:

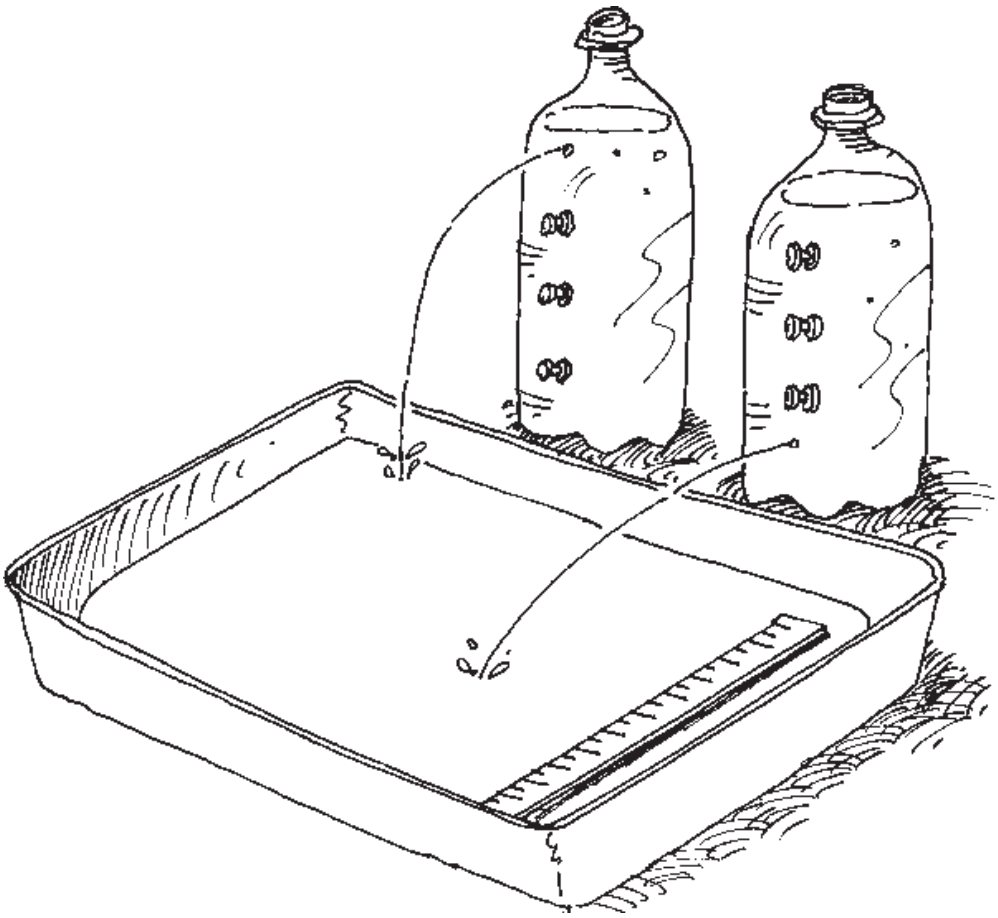
(Goals from Washington State Commission on Student Learning — Essential Learning Requirements for Science)

Goals

- Students will understand and apply scientific concepts and principles.
- Students will conduct scientific inquiry.
- Students will communicate scientific understanding.

Objectives

- Students will observe, document, and understand the relationship between water pressure and water flow.
- Students will increase their understanding of water flow as an energy source.
- Students will represent data by averaging.
- Students will communicate results by graphing .
- Students will draw conclusions from graphed data .



Teacher Preparation

Preparation Time:
15 minutes

Materials

Prepare for the Entire Class:

- duct tape (precaution in case of leaks)
- an easy to reach water source, possibly buckets (you will be refilling cartons 4 times!)

Prepare for Each Team:

- 2 liter pop bottle
- 4 push pins (round toothpicks optional)
- meter stick

Prepare for Each Student:

- copy of journal page

Student Involvement

Activity Time:
50 minutes

Activity Processes:

? Will water which is twice as high fall out of a container twice as far?

Discuss responses.

1. Students predict what they think will happen. Students enter prediction in journal.

2. Pass out materials and explain activity to test prediction. Class sets standards for measurement and students enter in journal. Examples:

• Will we measure and place holes from the bottom or from the top of the bottle?

• Where is the water fill-up mark?

• How do we mark and measure the water stream?

3. Have teams prepare pop bottle by punching 4 holes with push pin at determined intervals in bottle and leaving the pin in each hole.

4. Fill carton to top with water. Place bottle on book or other object for elevation.

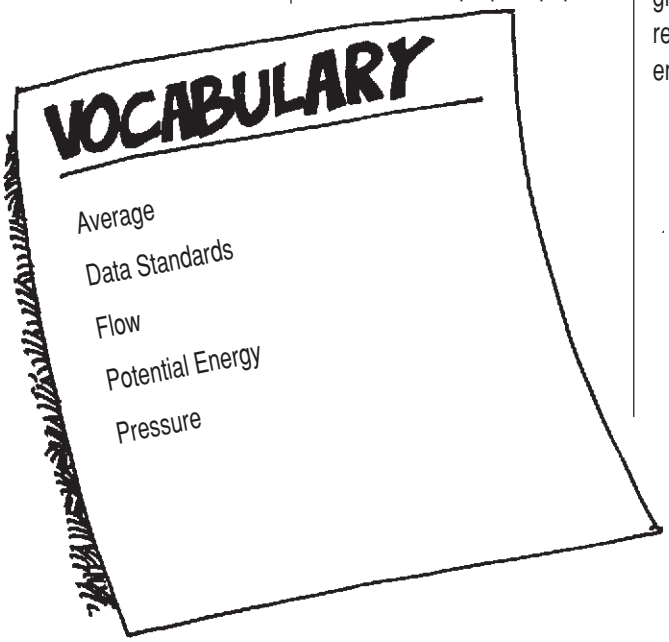
5. Start by removing the bottom pin. Mark where water touches paper with cube or coin. Refill and repeat 2 times. Using the table in journal, measure, record and average the three distances.

6. Plug bottom hole, refill and go to next push pin. Repeat measurements 3 times. If leaks occur, use scotch tape to cover holes.

7. Continue repeating procedure until each hole has been tested.

8. Graph the average flow results on Table 2 in journal.

9. Each team shares results with class. If time permits, graph each team's average results on overhead. Students enter conclusions in journal.



Notes

This experiment is best done outside or using a tray to capture water.

Step 2:

Let team establish heights of holes.

Step 3:

Use the bottom weld (shoulder) as the lowest pin hole and the top weld as the highest hole. Place the other pin holes at equal intervals. We suggest duct taping over old holes and creating new ones if they leak.

Step 4:

Allow students to discuss what happens when they raise or lower the bottle to different heights. They may find the experiment works better if the bottle is raise 6-8 inches from ground .

Step 8:

If additional class time is available, pose the following questions for discussion:

What do you think would happen to the water flow if all four holes were unplugged at the same time?

What do you think would happen to the water flow if the hole size was doubled?

Interested students can test after school and report back to class.

Teacher can also make the correlation between pressure at the bottom of the bottle being higher and how pressure increases in ear drums when swimming at greater depths.

Journal 2B
Can water pressure influence water flow?

Name _____

Team Name _____

Date _____

Predict what you think will happen when water falls out of a container from varying heights.

What procedures and standards are you using?
For example: heights of holes, water level chosen, how to measure outcome.

What conclusion can you draw from graphed data?

Journal 2B Continued
Can water pressure influence water flow?

Distance of water flow results

In each box, record how far the water flowed given the height selected for each test. Then calculate and record the average distance water flowed.

	Test 1	Test 1	Test 3	Total	Average (Total / 3)
Height at _____					
Height at _____					
Height at _____					
Height at _____					

Graph the average water flow results: