

# Using Your Marbles – Volume Measurement and Reporting

## 3rd Grade

### Michael Schuette

#### **References:**

- This lesson was adapted from the lesson *Marbles in Water* in the Columbus Public Schools Science Curriculum Guide.

#### **Benchmarks:**

- SI-2: Discuss observations and measurements made by other people.
- SI-3: Read and interpret simple tables and graphs produced by self/others.
- SI-5: Record and organize observations (e.g., journals, chart, and tables).
- SI-6: Communicate scientific findings to others through a variety of methods (e.g., pictures, written, oral and recorded observations).

#### **Objectives:**

Students will practice measuring the volume of liquid and solids immersed in liquid, while recording, organizing, and discussing observations and measurements made by themselves and others.

#### **Materials:**

- 6-8 graduated cylinders (or small, clear, plastic cups with rulers taped to the side)
- Marbles (about 5 per group, or similar small objects that would sink in water)
- Cup containing water for each group

#### **Initial Demonstration:**

Review with the students the importance of making observations, recording and organizing data, and using tables and graphs to interpret and communicate data.

Demonstrate the procedure for using a graduated cylinder (gc) (or cup with ruler) to measure liquid volume:

- 1) Placed the gc on a flat surface.
- 2) Your eyes must be at the level of the gc; don't pick it up.
- 3) Pour 35 mL of water into the gc.
- 4) Read the line that is touched by the bottom of the curve (meniscus) of the liquid (in a glass gc; for a plastic one there is no curve).

Tell the students that gcs can be used also to measure the volume of solids that sink (such as marbles). Demonstrate by dropping a marble into the water in the gc and reporting the change in water level. Tell them that the change in the water level is the volume of the marble.

### **Target Observations:**

- It's important to make observations, record and organize data, and use tables and graphs to interpret and communicate data. A gc can be used to measure water.

### **Target Model:**

- A gc is a standard tool that is used to measure liquid volume. Observations can be analyzed and communicated by generating tables and graphs.

### **Procedure:**

Place students into groups of three or four. Provide each group with a gc, five marbles, a container of water, and a lab worksheet. Review the worksheet and instruct students to construct a data table that would show the number of marbles (0-5) and the height of the water (mL).

Instruct teams to pour 35 mL of water into their gcs. Have them record the water level in mL on the "0 marbles" line of their data tables. Have them continue to add marbles, one at a time, while recording the new water level after each addition in their data tables.

Once the data tables are complete, students should independently label and construct their graphs. Students should now discuss and compare observations and measurements made by one another and respond to the discussion questions.

### **Target Observations:**

- After putting marbles into water, the water level rises. A graph can show how high the water is after adding marbles.

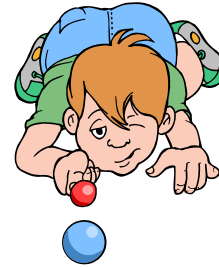
### **Target Revised Model:**

- Bar graphs are a great way of representing data. The increase in the water level after adding a marble is equal to the volume of the marble.

### **Summary:**

Students should have improved their ability to measure volume of liquids and solids using a gc. They also should have improved their ability to construct, read, and interpret graphs and tables. Finally, students had a chance to practice sharing and comparing data with other students.

# *Using Your Marbles*



Name: \_\_\_\_\_

Number: \_\_\_\_\_

*Part 1:* Construct a data table showing the height of the water when 0, 1, 2, 3, 4, and 5 marbles are added.

*Part 2:* Construct a bar graph from the information from the data table. Be sure to label all of the parts.



---

---

---

---

---

---

---

---

3. Share your graph with another group. How do the graphs compare? What is the same about them? What is different?

---

---

---

---

---

---

---

---