Developed by the Museum of Science, Boston

Extension Lesson: Mathematics

Water Water Everywhere: Designing Water Filters

Lesson 3, Lesson 4

Title: Evaporation Rate and the concept of Volume

Grade Level: 1, 2, 3, 4, 5

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Prep Time: Under 15min
Lesson Time (1): 45 Minutes
Lesson Time (2): 15 Minutes

Lesson Description:
Students explore through a classroom model how surface area affects the rate of evaporation despite the volume being the same.

Strands:

- Measurement and Data
- Mathematical Practices

Standards:

- Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects
- Geometric measurement: understand concepts of area and relate area to multiplication and addition
- Model with mathematics
- Attend to precision

Objective:
Students explore through a classroom model how surface area affects the rate of evaporation despite the volume being the same.

Materials:

- Class:
  - Pie pan
  - Drinking glass
  - Water
  - Measuring cup
  - Soda bottle
  - Tape

Lesson Plan:

1. Another way that water is cleaned (with the exeption of acid rain) is when it goes through the water cycle.

2. **From which container will the water evaporate the quickest, a container that has a large surface area or one that has small surface area or will it be the same?**
3. Ask students what they know about volume and measuring volume.
4. Explain that volume is the amount of space that something takes up. You can measure volume in different ways.
5. **How is volume measured on this soda bottle (show a soda bottle and discuss the different units of measurement on the label that refer to volume)?**
6. As a demonstration, measure out 1 cup of water or 250 mL and pour into a pie pan. Repeat and pour into a cup. Place them side by side. Mark the top level of the liquid with a piece of masking tape.
7. Questions: Ask students, **"How much liquid is in the pan**?" (1 cup or 250mL) Ask, **"How much is in the cup?"** (1 cup or 250mL). Ask, **"Even though they are different shapes, do the containers have the same volume of liquid?"** (Yes) Each day make observations of how the volume of the liquid in the two containers is changing until one is empty.

Reflections:

From which container did the water evaporate from the quickest, the one with the large surface area or the small surface area? Explain that the scientific explanation is that there is more contact between the water and air for evaporation to occur in the pan with the larger surface area. If volume was measured and recorded each day, compare data between two containers.

Assessment:

Students made accurate observations that the pan with the larger surface area had the water evaporate quicker even though it had the same volume as the cup.