Extension Lesson: Mathematics

EiE Engineering isElementary

Developed by the Museum of Science, Boston

Water Water Everywhere: Designing Water Filters
Lesson 3

Title: What's the Rate?

Grade Level: 3, 4, 5

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Prep Time: Under 15min
Lesson Time (1): 45 Minutes
Lesson Time (2): None

Lesson Description:
Students will calculate the rate at which water flows through each filter material. Students will use this information to then predict how much water would flow through the filter in given increments of time.

Strands:
- Ratios and Proportional Relationships
- Operations and Algebraic Thinking
- Mathematical Practices

Standards:
- Make sense of problems and persevere in solving them
- Model with mathematics
- Understand ratio concepts and use ratio reasoning to solve problems
- Analyze patterns and relationships

Objectives:
- Students will calculate the rate at which water flows through each filter material.
- Students will use this information to then predict how much water would flow through the filter in given increments of time.

Materials:
- Each student:
  - Paper
  - Pencil
- Each group:
  - Materials from Lesson 3 of Designing Water Filters

Lesson Plan:
1. As students test each filter material, they will time how long it takes for 1/4 cup of water to pass through each filter material (this is a required part of Lesson 3 of the unit--for more information see the Designing Water Filters teacher guide).

2. Students will use the information they have recorded to calculate rate. Explain to students that rate is amount over time. For example if 1/4 cup of water flows through the coffee filter in 30 seconds, the rate would be 1/4cup/30 seconds or 1/2 cup/ minute.
3. Have students calculate the rate for each filter material. You may also want to have groups convert each rate to a "per minute" rate or a "per second" rate.

Reflections:
To be sure students understand the concept, have them apply the rate information they've determined for each filter material. For example, try asking:
- **How much water could flow through each material in two minutes?**
- **If you had 3/4 cup of water, how long would it take the water to flow through each material?**

Assessment:
- Observe class discussion.
- Review student calculations based on reflection questions.