



Water Water Everywhere: Designing Water Filters

Lesson 4

Title: How much is a liter?

Grade Level: 2

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

Lesson Description:

Students estimate and measure the capacity of a one liter bottle using a 1 cup measuring cup, then algebraically determine the equivalent volume using $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{3}$ cup and ultimately the number of tablespoons in a liter bottle.

Strands:

- Measurement and Data
- Operations and Algebraic Thinking
- Number and Operations-- Fractions
- Mathematical Practices

Standards:

- Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit
- Model with mathematics
- Use the four operations with whole numbers to solve problems
- Solve problems involving measurement and estimation of intervals

Objective:

Students will explore volume of a liter bottle use common fractions use algebraic thinking to discover equivalency relationships between and among common fractions complete a simple table

Materials:

- Each group:
 - One liter bottle
 - Measuring cup
 - Tablespoon
 - Pitcher of water
 - Paper towels
 - Worksheet

Lesson Plan:

1. Prepare materials for each pair or group of students.
2. Explain that they will be exploring a one liter bottle. Example: "We know that a one liter bottle has a volume of one liter. **What does a volume of one liter equal in terms of cups?**"
3. Review the directions for the worksheet and the activity.
4. Remind students about cleanup/spills procedures.
5. Remind students that they will only be measuring the liter bottle once-- using whole cups (1 cup). After that initial measurement, all other answers are found using their knowledge of fractions, looking at the measuring cups carefully and discussing ideas with their partners/groups.
6. Demonstrate using the tablespoon how to carefully measure the volume of a cup.
7. Remind students to count carefully and verify their results as they will be using that response to answer the remaining questions on the worksheet.
8. Allow enough time to complete the activity.

Reflections:

Hold a brief discussion to allow students the opportunity to share their results and any difficulties they encountered. Ask... **"Which fractions were the easiest to use (1/2, 1/4)? Which fractions were challenging to use (1/3)? Have you used measuring cups like this at home? What do you use them for? If you wanted to share a 1 liter bottle of juice with some friends afterschool, how many friends could drink a full cup of juice with you?"**

Assessment:

Circulate as groups complete the table and answer the questions looking for evidence of understanding about fractions and equivalencies.

Worksheet: How much is in a liter?

1. Look at the empty liter bottle. How many cups of water do you think it will take to fill the bottle? Estimation: _____

2. Try it out. How many cups of water does it take to fill the liter bottle?
It takes _____ cups of water to fill the liter bottle.

Fun with Fractions and Measurement Table

Unit of Measurement	How much = 1 Liter	How much = 2 Liters
Using 1 cup...	It took _____ cups to fill a 1 liter bottle.	It will take _____ cups to fill a 2 liter bottle.
Using $\frac{1}{2}$ cup...	It took _____ $\frac{1}{2}$ cups to fill a 1 liter bottle.	It will take _____ $\frac{1}{2}$ cups to fill a 2 liter bottle.
Using $\frac{1}{4}$ cup...	It took _____ $\frac{1}{4}$ cups to fill a 1 liter bottle.	It will take _____ $\frac{1}{4}$ cups to fill a 2 liter bottle.
Using $\frac{1}{3}$ cup...	It took _____ $\frac{1}{3}$ cups to fill a 1 liter bottle.	It will take _____ $\frac{1}{3}$ cups to fill a 2 liter bottle.

3. Look at the empty measuring cup. How many tablespoons will it take to fill the measuring cup to the $\frac{1}{4}$ cup line? Estimation: _____

4. Try it out. How many tablespoons of water does it take to fill $\frac{1}{4}$ cup?
It takes _____ tablespoons of water to fill $\frac{1}{4}$ cup.

5. How many tablespoons will it take to fill $\frac{1}{2}$ cup?
It takes _____ tablespoons to fill $\frac{1}{2}$ cup.

6. How many tablespoons will it take to fill 1 cup?
It takes _____ tablespoons to fill 1 cup.

7. How many tablespoons will it take to fill 1 liter?
It takes _____ tablespoons to fill 1 liter.