

Bottling Maple Syrup

Description

Students investigate how many $\frac{3}{4}$ L bottles can be filled with a large amount of maple syrup through questioning, estimating, modelling and verifying. The visual models allow students to interpret the meaning of the remainder.

Mathematics

This task supports students in understanding the meaning of dividing fractions with unlike denominators, that includes a remainder that must be resolved with respect to the divisor. Using real world examples and visual models provides students with an entry point into dividing fractions which does not rely on rote use of an algorithm. Interpreting the remainder correctly requires students to track the units and to make sense of the relationship between them. When students' only strategy for division with fractions is to use an algorithm, they have no need to reason about the remainder. This procedural knowledge does not support them in understanding the operation of division or the meaning of the remainder, limiting their ability to sense make in subsequent mathematics concepts involving division.

Curriculum Connections

Students will:

- divide fractions with unlike denominators where the answer will have a fractional remainder; and
- use proportional reasoning to estimate and represent the reasonableness of quantities of syrup.

Instructional Sequence

1. (Optional) Use the PowerPoint to introduce the information and task. A script is included with the PPT which includes information regarding instruction.
 - a. The Introduction section (slides 1-3) provides visuals of the syrup and the bottles and engages the students in questioning.
 - b. The Task Section (slides 4-7) supports students in making sense of the volume of syrup and the capacity of the bottles to be filled. Animations allow for student thinking before quantities are revealed. Part 3 (slide 7) states the task to be completed.
2. Distribute BLM 1 to students and allow them to work through the task with a partner or small group. Encourage students to use a visual representation to think through the solution.
3. Have students share their solutions (either whole class or by joining with other students). Allow time for them to discuss their reasoning and to make any revisions to their own work they deem necessary.
4. (Optional) Use The Solution section (Slides 8-9) of the PowerPoint to show the solution to the task.
5. Consolidate the learning with a discussion of the meaning of the remainder as a result of division as determined by students through their solutions. (Optional) Use The Remainder section (Slide 10) to show why the remainder of $\frac{3}{8}$ L of syrup is equal to $\frac{1}{2}$ bottle.

Highlights of Student Thinking

Students may:

- intuitively see that four bottles are filled;
- easily represent the task visually;
- identify the remainder as $\frac{3}{8}$ L;
- convert the $\frac{3}{4}$ to $\frac{6}{8}$;
- misinterpret that the remainder is actually $\frac{3}{8}$ of the $\frac{3}{4}$ L bottle; and
- convert all values to ml and possibly misinterpret what the decimal means.

Key Questions

1. How much maple syrup do the different bottles hold?
2. How did you represent and label your thinking (bottle amounts vs total amount)?
3. Might a different representation help you more?
4. What did you do with that extra amount left over?

Materials

Power Point (optional)

BLM 1 (1 copy/student)

Assorted manipulatives including measuring cups