OP G	**Recognize that division is the inverse of multiplication and vice versa (÷4 is the same as x $\frac{1}{4}$)**

Banana Bread Bake Off

Description

Through this task, students will explore the inverse operations of multiplication and division by comparing the result of multiplying by a unit fraction and dividing by the inverse whole number.

Mathematics

Research reinforces that it is important for students to understand the inverse operations of multiplication and division. In the case of fractions, exploring and comparing division with whole numbers and multiplication with the inverse unit fractions helps students to make this connection and build a deeper understanding of the operations. Since division of fractions is so complex, it is important to teach multiplication and division together, rather than one after the other. This approach allows students an early opportunity to explore the relationship between these operations and helps build conceptual understanding and fluidity between operations.

Curriculum Connections

Students will:

- represent multiplication and division of fractions using models;
- use estimation when problem solving involving fractions to judge reasonableness of solution;
- demonstrate an understanding that multiplication and division are inverse operations.

Instructional Sequence

1. Provide half of the class with BLM 1 and the other half with BLM 2.
2. Allow time for students to write their estimations. Discuss estimates using think-pair-share.
3. Allow students time to complete the rest of the BLM.
4. Partner students by pairing up individuals who worked on BLM 1 with individuals who worked on BLM 2 and have them compare their solutions.
5. Consolidate with class.

Highlights of Student Thinking

Students may:

- use mental math to change some ingredient quantities (e.g., 3 bananas divided by 3 = 1 banana);
- use number lines, array models;
- use the denominators to partition and subpartition their number line, by which they will find a common denominator (even though they may not label it as a common denominator);
- intuitively use a mix of division and multiplication (e.g., dividing 3 bananas by 3 may seem obvious to many, whereas multiplication by $\frac{1}{3}$ may not be a friendly strategy);
- confuse division and multiplication with fractions (e.g., confuse when division or when multiplication is the appropriate operation with fractions, which may be related to fragile understanding of the meanings of the operations of division or multiplication); and
- see a pattern (e.g., tripling the denominator but leaving the numerator the same will result in a fraction which is equivalent to multiplying by $\frac{1}{3}$ and dividing by 3).

Key Questions

1. What type of representation could help you obtain your answer?
2. What model did you use to solve the problem?
3. Is there a model that might more accurately represent the problem?
4. Were there times that multiplication could help you/division could help you?
5. Why does dividing by 3 get the same result as multiplying by $\frac{1}{3}$?
6. What did you and your partner discover when comparing results?

Materials

- BLM1 (one copy for half of the students)
- BLM2 (one copy for half of the students)
- standard measuring cup sets and material available for measuring if desired