

Lab Grade 5 Fractions Clarification

CCSSM: Grade 5

DOMAIN: Number and Operations—Fractions

Cluster: Use equivalent fractions as a strategy to add and subtract fractions.

Standard: 5.NF.1 Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.

Standard: 5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

Clarification of Math Discussion Terms

A **FRACTION** is a number in the form $\frac{a}{b}$, where b does not equal zero.

A **NUMERATOR** is the top number of a fraction. It represents how many parts of the whole are being considered. In the example $\frac{4}{9}$, 4 is the numerator.

A **DENOMINATOR** is the bottom (or Down) number of a fraction. The denominator represents how many parts make up the whole. In the fraction $\frac{4}{9}$, 9 is the denominator.

A **WHOLE NUMBER** is a number from the set: $\{0,1,2,3,4,5,\dots\}$ and whole numbers can be written as fractions by writing the number with a denominator of one: $0 = \frac{0}{1}$, $1 = \frac{1}{1}$,
 $2 = \frac{2}{1}$, $n = \frac{n}{1}$ etc.

The **LEAST COMMON MULTIPLE**, or **LCM**, is the smallest nonzero number that is a multiple of each of two or more numbers. One way to find the least common multiple is to list the multiples of each number until the lists have a number in common:

4: 4, 8, 12, 16, 20, **24...**

6: 6, 12, 18, **24...**

The number 24 is the LCM, least common multiple

The **LEAST COMMON DENOMINATOR**, or **LCD**, is the least common multiple of the denominators of two or more fractions.

To add or subtract fractions with like denominators, add or subtract the numerators and put the sum over the like denominator: $\frac{2}{5} + \frac{1}{5} = \frac{3}{5}$. To add or subtract fractions with

unlike denominators, it is necessary to first find the least common multiple of the denominators and then change each fraction to an equivalent fraction with like

denominators. To add $\frac{2}{5} + \frac{1}{8}$, for example, find the least common denominator, 40, and

change each fraction to an equivalent fraction with the common denominator: $\frac{2}{5} = \frac{16}{40}$ and

$$\frac{1}{8} = \frac{5}{40}, \text{ therefore } \frac{2}{5} + \frac{1}{8} = \frac{16}{40} + \frac{5}{40} = \frac{16+5}{40} = \frac{21}{40}$$

To multiply fractions, like denominators are not necessary. Just multiply the numerators

and put the product of the numerators over the product of the denominators: $\frac{2}{3} \times \frac{5}{9} = \frac{10}{27}$.

Often the word “of” indicates that a multiplication is required. For example, the phrase

“take $\frac{2}{3}$ of 60”, means to multiply $\frac{2}{3}$ times $\frac{60}{1}$: $\frac{2 \times 60}{3 \times 1} = \frac{120}{3} = 40$.

Classroom Example 1

What is the sum of $\frac{1}{3} + \frac{1}{2} + \frac{1}{6}$?

Answer: The Least Common Multiple of 2, 3 and 6 is 6. Changing each fraction to the

common denominator 6: $\frac{1}{3} = \frac{2}{6}$ and $\frac{1}{2} = \frac{3}{6}$ so $\frac{1}{3} + \frac{1}{2} + \frac{1}{6} = \frac{2}{6} + \frac{3}{6} + \frac{1}{6} = \frac{2+3+1}{6} = \frac{6}{6} = 1$ or 1.

Classroom Example 2

Find $\frac{2}{3}$ of 24.

$$\text{Answer: } \frac{2}{3} \text{ of } 24 = \frac{2}{3} \times \frac{24}{1} = \frac{2 \times 24}{3 \times 1} = \frac{48}{3} = \frac{16}{1} = 16$$

The Math in the Puzzle

In The Lab puzzle, players must use addition, subtraction and multiplication of fractions to decide how much of each ingredient is required to complete a recipe using jars of various sizes to measure the amounts of the ingredients.



In the screen shot above, players must first compute how much of each ingredient is needed. One way to compute this is to multiply the fraction by the total volume of the vat. For example, since $\frac{1}{3}$ of the required 36 units must be eyeballs, $\frac{1}{3}$ of 36 units = $\frac{1}{3} \times \frac{36}{1} = 12$ units of eyeballs. Players must then strategize how they might use the three measuring jars with capacities of 3, 8, and 18 to fill the large jar with the appropriate amounts, while minimizing waste. Care must also be taken to ensure that all fractional parts add up to the whole amounts required.