

Factor: in mathematics, **a number or algebraic expression that divides another number or expression evenly—i.e., with no remainder**

Integer: an integer is a whole number. No fraction nor decimal is an integer. The following are NOT integers 0.5, 0.84, 0.9245...nor $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{9}$, ...

What integer numbers when multiplied will give us 8?

$$1 * 8 = 8$$

$$2 * 4 = 8$$

$$4 * 2 = 8$$

$$8 * 1 = 8$$

Each *distinct* number is a factor of 8.

Factors of 8: **1, 2, 4, 8**

What integer numbers when multiplied will give us 12?

Factors of 12: _____

What is the least common **factor** of 8 and 12? **1**

What is the greatest common **factor** of 8 and 12? _____

What is the least common **multiple** of 8 and 12? **24**

When multiplying fractions we can multiply straight across

$$\frac{3}{5} \cdot \frac{4}{8} = \frac{12}{40}$$

$$\frac{3}{5} \cdot -\frac{4}{8} = -\frac{12}{40}$$

Notice for the second problem we are multiplying NOT subtracting. The dot means to multiply the fractions.

When we divide fractions we take the **reciprocal** of the second fraction

$$\frac{\frac{3}{6}}{\frac{8}{9}} = \frac{3}{6} \div \frac{8}{9} = \frac{3}{6} \cdot \frac{9}{8} = \frac{27}{48}$$

When we add or subtract we need to have the fractions decide how many blocks will be in each group. That is, when adding or subtracting fractions we need to have the same common denominator.

$$\frac{\text{numerator}}{\text{denominator}}$$

$$\frac{5}{8} + -\frac{3}{8} = \frac{2}{8}$$

$$\frac{5}{8} + \frac{3}{8} = \frac{8}{8} = 1$$

When fractions do NOT have the same denominator we need to rewrite the fraction so they have the same denominator. We do this by multiplying by 1. Any number multiplied by 1 is the same number.

$$n \cdot 1 = n$$

$$182 \cdot 1 = 182$$

$$x \cdot 1 = x$$

$$92 \cdot 1 = 92$$

$$\frac{5}{8} \cdot 1 = \frac{5}{8}$$

$$\frac{4}{4} = 1$$

$$\frac{5}{8} \cdot 1 = \frac{5}{8} \cdot \frac{4}{4} = \frac{20}{32} = \frac{5}{8}$$

What is the least common multiple of 2 and 5? _____

Solve

$$\frac{1}{2} + \frac{4}{5} =$$

Step 1. Find the least common denominator. We do this by finding the least common multiple of 2 and 5.

2: 2, 4, 6, 8, **10**, 12, ...

5: 5, **10**, 15, 20, 25, ...

The first multiple they share is **10**. (Note: we could choose another multiple like 20 or 30 but choosing the smallest number makes the math easier to do).

Step 2. Rewrite the fractions so they have the same denominator of 10.

$$\frac{1}{2} \cdot \frac{5}{5} = \frac{5}{10}$$

$$\frac{4}{5} \cdot \frac{2}{2} = \frac{8}{10}$$

Step 3. Rewrite the problem and solve

$$\frac{1}{2} + \frac{4}{5} = \frac{5}{10} + \frac{8}{10} = \frac{13}{10}$$

Example 2

$$\frac{1}{2} - \frac{5}{8} = \frac{4}{8} - \frac{5}{8} = -\frac{1}{8}$$