

3-3: Adding and Subtracting Unlike fractions

Unlike fractions must be changed to like fractions, in order to add or subtract them.

P.217

Step 1: Rewrite the unlike fractions as Like Fractions with the LCM as their new Denominator. The new Denominator is called LCD = Least Common Denominator.

Step 2:

Add or Subtract as with like fractions

Step 3:

Simplify the answer in Lowest terms, mixed number or whole number

* Adding unlike fractions

$$\frac{12}{18} + \frac{4}{12}$$

LCM of 18 and 12

$$18 = 2 \times \underline{3} \times 3$$

$$12 = \underline{2} \times \underline{2} \times 3$$

$$\begin{array}{r} 2 \overline{)18} \\ 3 \overline{)9} \\ 3 \overline{)3} \\ 1 \end{array}$$

$$\begin{array}{r} 2 \overline{)12} \\ 2 \overline{)6} \\ 3 \overline{)3} \\ 1 \end{array}$$

$$\text{LCM} = 2 \cdot 2 \cdot 3 \cdot 3 = 4 \cdot 9 = 36$$

Rewrite the fractions with LCD = 36

$$\frac{12}{18} = \frac{?}{36} = \frac{12 \cdot 2}{18 \cdot 2} = \frac{24}{36} \quad ; \quad \frac{4}{12} = \frac{?}{36} = \frac{4 \cdot 3}{12 \cdot 3} = \frac{12}{36}$$

$$\frac{12}{18} + \frac{4}{12} = \frac{24}{36} + \frac{12}{36} = \frac{24+12}{36} = \frac{36}{36} = 1$$

* Subtracting Unlike fractions

$$\frac{15}{16} - \frac{3}{12}$$

Find LCM of 16 and 12

$$\text{LCM} = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 = 16 \cdot 3$$

$$\text{LCM} = 48$$

The new and common denominator of both fractions is LCD = 48

$$\begin{array}{r|rr} 2 & 16 & 12 \\ 2 & 8 & 6 \\ 2 & 4 & 3 \\ 2 & 2 & 3 \\ 3 & 1 & 3 \\ & 1 & 1 \end{array}$$

done

$$\frac{15}{16} = \frac{?}{48} = \frac{15 \cdot 3}{16 \cdot 3} = \frac{45}{48}$$

$$\frac{3}{12} = \frac{?}{48} = \frac{3 \cdot 4}{12 \cdot 4} = \frac{12}{48}$$

$$\begin{array}{r|rr} 3 & 33 & \\ 11 & 11 & \\ & 1 & \end{array} \quad \begin{array}{r|rr} 2 & 48 & \\ 2 & 24 & \\ 2 & 12 & \\ 2 & 6 & \\ 3 & 3 & \\ & 1 & \end{array}$$

so,

$$\frac{15}{16} - \frac{3}{12} = \frac{45}{48} - \frac{12}{48} = \frac{45-12}{48} = \frac{33}{48}$$

$$\frac{33}{48} = \frac{3 \cdot 11}{3 \cdot 16} = \frac{11}{16}$$