LESSON 2.4

Using a Common Denominator

CA Standards
NS 1.2
NS 2.2
AF 1.3

Goal: Add and subtract fractions with different denominators.

Adding and Subtracting Fractions

Words If the fractions have different denominators, multiply the fractions by a fraction equivalent to [ ] to make a [ ] denominator.

Numbers $\frac{2}{3} + \frac{1}{2} = \frac{2 \cdot 2}{3 \cdot 2} + \frac{1 \cdot 3}{2 \cdot 3} = \frac{4}{6} + \frac{3}{6} = \frac{4+3}{6} = \frac{7}{6}$

$\frac{3}{5} - \frac{1}{2} = \frac{3 \cdot 2}{5 \cdot 2} - \frac{1 \cdot \square}{2 \cdot \square} = \frac{6}{10} - \square = \frac{6 - \square}{10} = \square$

Algebra $\frac{a}{b} + \frac{c}{d} = \frac{\square}{bd} + \frac{\square}{bd} \quad \square$ $\qquad \frac{a}{b} - \frac{c}{d} = \square - \square - \square$

EXAMPLE 1 Adding Fractions

a. $\frac{2}{5} + \frac{2}{15}$

To find the LCD of the fractions, write the prime factorization of each denominator.

$5 = 5$

$15 = \square \cdot 5$

So, the LCD is $\square \cdot 5 = \square$.

$\frac{2}{5} \cdot \frac{3}{3} = \square$

$\frac{2}{15} \cdot \frac{1}{1} = \frac{2}{15}$

$\square + \frac{2}{15} = \square$

b. $\frac{3}{4} + \frac{-1}{3}$

To find the LCD of the fractions, write the prime factorization of each denominator.

$4 = \square$

$3 = 3$

So, the LCD is $\square \cdot 3 = \square$

$\frac{3}{4} \cdot \frac{3}{3} = \frac{9}{12}$

$\frac{-1}{3} \cdot \square = \square$

$\frac{9}{12} + \left(-\frac{4}{12}\right) = \square$

EXAMPLE 2 Subtracting Fractions

a. $\frac{5}{8} - \frac{11}{12}$

To find the LCD of the fractions, write the prime factorization of each denominator.

$8 =$ ☐

$12 = 2^2 \cdot 3$

So, the LCD is ☐ $\cdot 3 =$ ☐.

$\frac{5}{8} \cdot \frac{3}{3} =$ ☐

$\frac{11}{12} \cdot \frac{2}{2} =$ ☐

☐ $-$ ☐ $=$ ☐

b. $5 - \frac{5}{6}$

To find the LCD of the fractions, write the prime factorization of each denominator.

$1 = 1$

$6 = 2 \cdot 3$

So, the LCD is ☐ $\cdot$ ☐ $=$ ☐

$\frac{5}{1} \cdot$ ☐ $=$ ☐

$\frac{5}{6} \cdot \frac{1}{1} =$ ☐

☐ $-$ ☐ $=$ ☐ $=$ ☐

Guided Practice **Find the sum or difference. Then simplify if possible.**

1. $\frac{2}{7} + \frac{1}{2}$	**2.** $\frac{7}{9} - \frac{5}{6}$
3. $\frac{2}{5} + \frac{-9}{10}$	**4.** $\frac{11}{12} - \frac{5}{18}$

EXAMPLE 3 Modeling with Mixed Numbers

Running you run $8\frac{5}{6}$ miles on Monday and $6\frac{3}{4}$ miles on Wednesday. Your goal is to run 25 miles. How many miles must you run to meet your goal?

Solution

To find the number of miles you must run, write a verbal model.

Think: What mixed number with a denominator of 12 equals 25?

Miles to run, m = Goal − (+)

$m =$ $- \left(8\frac{5}{6} + \right)$ Write an algebraic model.

$= \frac{12}{12} - \left(8 \frac{}{12} + \right)$ Rewrite fractions using LCD of 12.

$= \frac{12}{12} -$ Add inside parentheses.

$= \frac{12}{12} -$ Rename mixed number.

$= (-) + \left(\frac{12}{12} - \right)$ Commutative property.

$=$ Subtractwhole numbers and fractions.

Answer: You must run miles to meet your goal.

Guided Practice **Find the sum or difference. Then simplify if possible.**

5. $\frac{5}{9} + \frac{1}{3}$	**6.** $\frac{7}{10} - \frac{4}{5}$
7. $5\frac{1}{12} - 3\frac{3}{4}$	**8.** $2\frac{2}{3} + 6\frac{3}{8}$

Homework