

Operations with Fractions: Adding and Subtracting

To add or subtract fractions with the same denominator, add or subtract the numerators and write the sum or difference over the denominator.

EXAMPLE

1 Find each sum or difference.

a. $\frac{3}{5} + \frac{1}{5}$
 $\frac{3}{5} + \frac{1}{5} = \frac{3+1}{5}$ The denominators are the same. Add the numerators
 $= \frac{4}{5}$ Simplify.

b. $\frac{5}{9} - \frac{4}{9}$
 $\frac{5}{9} - \frac{4}{9} = \frac{5-4}{9}$ The denominators are the same. Subtract the numerators.
 $= \frac{1}{9}$ Simplify.

To write a fraction in simplest form, divide both the numerator and the denominator by their greatest common factor (GCF).

EXAMPLE

2 Write each fraction in simplest form.

a. $\frac{4}{16}$
 $\frac{4}{16} = \frac{4 \div 4}{16 \div 4}$ Divide 4 and 16 by their GCF, 4.
 $= \frac{1}{4}$ Simplify.

b. $\frac{24}{36}$
 $\frac{24}{36} = \frac{24 \div 12}{36 \div 12}$ Divide 24 and 36 by their GCF, 12.
 $= \frac{2}{3}$ Simplify.

EXAMPLE

3 Find each sum or difference. Write in simplest form.

a. $\frac{7}{16} - \frac{1}{16}$
 $\frac{7}{16} - \frac{1}{16} = \frac{6}{16}$ The denominators are the same. Subtract the numerators.
 $= \frac{3}{8}$ Simplify.

b. $\frac{5}{8} + \frac{7}{8}$
 $\frac{5}{8} + \frac{7}{8} = \frac{12}{8}$ The denominators are the same. Add the numerators.
 $= 1\frac{4}{8}$ or $1\frac{1}{2}$ Rename $\frac{12}{8}$ as a mixed number in simplest form.

To add or subtract fractions with unlike denominators, first find the least common denominator (LCD). Rename each fraction with the LCD, and then add or subtract. Simplify if necessary.

EXAMPLE**4** Find each sum or difference. Write in simplest form.

a. $\frac{2}{9} + \frac{1}{3}$

$$\frac{2}{9} + \frac{1}{3} = \frac{2}{9} + \frac{3}{9}$$
$$= \frac{5}{9}$$

The LCD for 9 and 3 is 9. Rename $\frac{1}{3}$ as $\frac{3}{9}$.

Add the numerators.

b. $\frac{1}{2} + \frac{2}{3}$

$$\frac{1}{2} + \frac{2}{3} = \frac{3}{6} + \frac{4}{6}$$
$$= \frac{7}{6} \text{ or } 1\frac{1}{6}$$

The LCD for 2 and 3 is 6. Rename $\frac{1}{2}$ as $\frac{3}{6}$ and $\frac{2}{3}$ as $\frac{4}{6}$.

Simplify.

c. $\frac{3}{8} - \frac{1}{3}$

$$\frac{3}{8} - \frac{1}{3} = \frac{9}{24} - \frac{8}{24}$$
$$= \frac{1}{24}$$

The LCD for 8 and 3 is 24. Rename $\frac{3}{8}$ as $\frac{9}{24}$ and $\frac{1}{3}$ as $\frac{8}{24}$.

Simplify.

d. $\frac{7}{10} - \frac{2}{15}$

$$\frac{7}{10} - \frac{2}{15} = \frac{21}{30} - \frac{4}{30}$$
$$= \frac{17}{30}$$

The LCD for 10 and 15 is 30. Rename $\frac{7}{10}$ as $\frac{21}{30}$ and $\frac{2}{15}$ as $\frac{4}{30}$.

Simplify.