

**4.4 Addition and Subtraction of Fractions with Common Denominators**

Models of Addition of Fractions

**Example (a)**

Quarters are so named because they represent one quarter of a dollar. We



$$\frac{1}{4} + \frac{2}{4} = \frac{3}{4}$$

one quarter + two quarters = three quarters

**Example (b)**

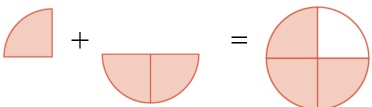
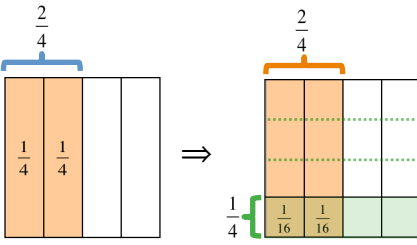
The word “dime” is adapted from Old French, “disme”, meaning one tenth (of a dollar).




$$\frac{3}{10} + \frac{4}{10} = \frac{7}{10}$$

three dimes + four dimes = seven dimes

Comparison of Fraction Addition with Fraction Multiplication

$$\frac{1}{4} + \frac{2}{4} = \frac{1+2}{4} = \frac{3}{4}$$

$$\frac{1}{4} \cdot \frac{2}{4} = \frac{1 \cdot 2}{4 \cdot 4} = \frac{2}{16}$$

Notice that only the numerators were added.

Notice that the numerators were multiplied and the denominators were multiplied.

**Addition of Fractions with Common Denominators Property**

For any real numbers  $a$ ,  $b$ , and  $c$  ( $c \neq 0$ )  $\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$

<i>Demonstration Problems</i>	<i>Practice Problems</i>
Add and simplify, if possible. <b>1. (a)</b> $\frac{3}{7} + \frac{2}{7} =$	Add and simplify, if possible. <b>1. (b)</b> $\frac{3}{5} + \frac{1}{5} =$
<b>2. (a)</b> $\frac{x}{4} + \frac{3}{4} =$	<b>2. (b)</b> $\frac{x}{3} + \frac{2}{3} =$
<b>3. (a)</b> $-\frac{6}{m} + \frac{8}{m} =$	<b>3. (b)</b> $-\frac{9}{d} + \frac{3}{d} =$
<b>4. (a)</b> $\frac{w}{7} + \frac{5w}{7} =$	<b>4. (b)</b> $\frac{2n}{11} + \frac{5n}{11} =$
Answers: <b>1. (b)</b> $\frac{4}{5}$ ; <b>2. (b)</b> $\frac{x+2}{3}$ ; <b>3. (b)</b> $-\frac{6}{d}$ ; <b>4. (b)</b> $\frac{7n}{11}$	

<i>Demonstration Problems</i>	<i>Practice Problems</i>
<p>Simplify.</p> <p><b>5. (a)</b> <math>\frac{19}{28} - \frac{7}{28} =</math></p>          <p><b>6. (a)</b> <math>\frac{x}{7} - \frac{2}{7} =</math></p>          <p><b>7. (a)</b> <math>-\frac{9}{x} - \frac{7}{x} =</math></p>          <p><b>8. (a)</b> <math>-\frac{3}{7} - \left(-\frac{5}{7}\right) =</math></p>	<p>Simplify.</p> <p><b>5. (b)</b> <math>\frac{23}{24} - \frac{14}{24} =</math></p>          <p><b>6. (b)</b> <math>\frac{y}{6} - \frac{1}{6} =</math></p>          <p><b>7. (b)</b> <math>-\frac{10}{x} - \frac{4}{x} =</math></p>          <p><b>8. (b)</b> <math>-\frac{7}{9} - \left(-\frac{5}{9}\right) =</math></p>
Answers: <b>5. (b)</b> $\frac{3}{8}$ ; <b>6. (b)</b> $\frac{y-1}{6}$ ; <b>7. (b)</b> $-\frac{14}{x}$ ; <b>8. (b)</b> $-\frac{2}{9}$	