

# Changing Improper Fractions to Whole Numbers or Mixed Numbers

An improper fraction is a fraction with a numerator that is equal to or greater than its denominator.  $\frac{5}{5}$ ,  $\frac{15}{5}$ , and  $\frac{13}{5}$  are improper fractions.

The answer to some fraction problems may contain an improper fraction. When this happens, we need to change the improper fractions to whole or mixed numbers.

Change  $\frac{5}{5}$  and  $\frac{15}{5}$  to whole numbers

Change  $\frac{13}{5}$  to a mixed number.

Divide the numerators by the denominators.

|   |                    |
|---|--------------------|
| $\begin{array}{r} 1 \\ 5 \overline{)5} \\ \underline{5} \\ 0 \end{array}$   | $\frac{5}{5} = 1$  |
| $\begin{array}{r} 3 \\ 5 \overline{)15} \\ \underline{15} \\ 0 \end{array}$ | $\frac{15}{5} = 3$ |

Divide the numerator by the denominator.  
Write the remainder as a fraction.

|  |                               |
|--|-------------------------------|
| $\begin{array}{r} 2\frac{3}{5} \\ 5 \overline{)13} \\ \underline{10} \\ 3 \end{array}$ | $\frac{13}{5} = 2\frac{3}{5}$ |
|--|-------------------------------|

Change each improper fraction to a whole or mixed number.

- |                                 |                   |                  |                   |                  |
|---------------------------------|-------------------|------------------|-------------------|------------------|
| 1. $\frac{6}{5} = 1\frac{1}{5}$ | $\frac{5}{3} =$   | $\frac{31}{6} =$ | $\frac{19}{12} =$ | $\frac{3}{2} =$  |
| 2. $\frac{12}{5} =$             | $\frac{16}{3} =$  | $\frac{13}{9} =$ | $\frac{19}{4} =$  | $\frac{7}{6} =$  |
| 3. $\frac{19}{12} =$            | $\frac{23}{6} =$  | $\frac{13}{2} =$ | $\frac{21}{8} =$  | $\frac{5}{4} =$  |
| 4. $\frac{36}{9} =$             | $\frac{12}{12} =$ | $\frac{16}{8} =$ | $\frac{54}{6} =$  | $\frac{25}{5} =$ |
| 5. $\frac{5}{5} =$              | $\frac{20}{7} =$  | $\frac{15}{3} =$ | $\frac{7}{2} =$   | $\frac{30}{7} =$ |
| 6. $\frac{7}{6} =$              | $\frac{9}{2} =$   | $\frac{7}{4} =$  | $\frac{24}{6} =$  | $\frac{31}{7} =$ |
| 7. $\frac{7}{5} =$              | $\frac{10}{3} =$  | $\frac{11}{9} =$ | $\frac{39}{5} =$  | $\frac{17}{2} =$ |
| 8. $\frac{20}{13} =$            | $\frac{12}{4} =$  | $\frac{19}{8} =$ | $\frac{43}{12} =$ | $\frac{16}{8} =$ |
| 9. $\frac{7}{4} =$              | $\frac{21}{10} =$ | $\frac{17}{7} =$ | $\frac{51}{11} =$ | $\frac{32}{3} =$ |

## Changing Mixed Numbers and Whole Numbers to Improper Fractions

---

A mixed number contains both a whole number and a fraction.

$1\frac{1}{2}$ ,  $9\frac{5}{12}$ , and  $7\frac{7}{10}$  are mixed numbers.

Sometimes a mixed or whole number must be changed to an improper fraction before you can solve a problem.

**Change  $1\frac{1}{2}$  to an improper fraction.**

Multiply the whole number by the denominator.  
Add the result to the numerator. Write the sum  
over the denominator.

$$1\frac{1}{2} = \frac{(1 \times 2 + 1)}{2} = \frac{(2 + 1)}{2} = \frac{3}{2}$$

**Change 3 to an improper fraction.**

Write 3 as the numerator and  
1 as the denominator.

$$3 = \frac{3}{1}$$

**Change each whole or mixed number to an improper fraction.**

1.  $4\frac{1}{4} = \frac{17}{4}$        $3\frac{2}{3} =$        $4\frac{1}{2} =$        $1\frac{1}{6} =$        $2\frac{2}{9} =$

2.  $2\frac{1}{4} =$        $1\frac{7}{8} =$        $4\frac{1}{3} =$        $3\frac{4}{5} =$        $4\frac{2}{5} =$

3.  $4\frac{2}{3} =$        $1\frac{1}{10} =$        $2\frac{3}{5} =$        $2\frac{5}{7} =$        $5\frac{1}{2} =$

4.  $2 =$        $3 =$        $5 =$        $4 =$        $7 =$

5.  $6\frac{1}{3} =$        $5\frac{1}{5} =$        $9\frac{2}{7} =$        $8\frac{5}{9} =$        $3\frac{4}{11} =$

6.  $1\frac{3}{8} =$        $10\frac{2}{3} =$        $7\frac{1}{10} =$        $4\frac{3}{4} =$        $2\frac{1}{2} =$

7.  $3\frac{5}{6} =$        $12\frac{1}{4} =$        $15\frac{1}{9} =$        $9\frac{4}{5} =$        $5\frac{5}{12} =$

8.  $8 =$        $9 =$        $10 =$        $6 =$        $14 =$

9.  $20\frac{1}{2} =$        $17\frac{3}{8} =$        $4\frac{8}{9} =$        $10\frac{1}{3} =$        $7\frac{2}{7} =$

10.  $5\frac{1}{6} =$        $3\frac{1}{4} =$        $21\frac{3}{5} =$        $13\frac{3}{10} =$        $6\frac{7}{12} =$

# Adding Fractions with Different Denominators - The LCD

Sometimes multiplying denominators will give a common denominator that is larger than necessary. To find the smallest possible denominator, or Lowest Common Denominator (LCD), make a list of the multiples of each denominator. Use the smallest multiple on both lists as the new denominator.

Find:  $\frac{3}{10} + \frac{3}{4}$

List multiples of each denominator.

Change to equivalent fractions using 20 as the LCD. Add and simplify.

10    **20**    30    40    50  
 4    8    12    16    **20**

$$\begin{array}{r} \frac{3}{10} = \frac{6}{20} \\ + \frac{3}{4} = \frac{15}{20} \\ \hline \frac{21}{20} = 1\frac{1}{20} \end{array}$$

20 is the smallest multiple on both lists. 20 is the LCD.

Add using the LCD. Simplify if possible.

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

2.  $\frac{5}{6}$                        $\frac{7}{8}$                        $\frac{3}{4}$                        $\frac{3}{10}$                        $\frac{11}{12}$   
 $+ \frac{1}{10}$                        $+ \frac{5}{12}$                        $+ \frac{5}{6}$                        $+ \frac{5}{8}$                        $+ \frac{4}{15}$

3.  $\frac{3}{4}$                        $\frac{3}{16}$                        $\frac{7}{12}$                        $\frac{5}{6}$                        $\frac{13}{18}$   
 $+ \frac{9}{10}$                        $+ \frac{5}{24}$                        $+ \frac{1}{16}$                        $+ \frac{5}{8}$                        $+ \frac{2}{27}$

4.  $\frac{4}{9} = \frac{16}{36}$                        $\frac{7}{15}$                        $\frac{1}{6}$                        $\frac{13}{18}$                        $\frac{1}{4}$   
 $\frac{7}{12} = \frac{21}{36}$                        $\frac{1}{9}$                        $\frac{9}{10}$                        $\frac{1}{24}$                        $\frac{5}{6}$   
 $+ \frac{1}{3} = \frac{12}{36}$                        $+ \frac{2}{3}$                        $+ \frac{1}{2}$                        $+ \frac{5}{6}$                        $+ \frac{1}{2}$   
 $\hline \frac{49}{36} = 1\frac{13}{36}$

5.  $\frac{5}{12} + \frac{7}{18} =$                        $\frac{3}{8} + \frac{11}{12} =$                        $\frac{9}{12} + \frac{3}{20} =$                        $\frac{1}{2} + \frac{3}{4} + \frac{1}{6} =$

# Mixed Practice with Adding Fractions

Add. Use the LCD. Simplify if possible.

$$\begin{array}{r} 1. \quad \frac{5}{8} \\ + \frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{2}{5} \\ + \frac{3}{5} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{3} \\ + \frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{3}{10} \\ + \frac{9}{10} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{3}{4} \\ + \frac{5}{6} \\ \hline \end{array}$$

$$\begin{array}{r} 2. \quad \frac{3}{5} \\ + \frac{9}{25} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{2}{5} \\ + \frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{3}{4} \\ + \frac{3}{4} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{5}{6} \\ + \frac{5}{12} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{6} \\ + \frac{1}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad \frac{3}{4} \\ + \frac{2}{3} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{5}{9} \\ + \frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{3}{8} \\ + \frac{7}{12} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{3}{10} \\ + \frac{1}{10} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{3} \\ + \frac{5}{6} \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad \frac{5}{12} \\ + \frac{7}{12} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{7}{10} \\ + \frac{3}{5} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{6} \\ + \frac{2}{9} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{3} \\ + \frac{5}{7} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{3}{4} \\ + \frac{7}{10} \\ \hline \end{array}$$

$$\begin{array}{r} 5. \quad \frac{5}{6} \\ \frac{1}{8} \\ + \frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{3}{16} \\ \frac{5}{16} \\ + \frac{7}{16} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{12} \\ \frac{1}{6} \\ + \frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{2} \\ \frac{2}{3} \\ + \frac{3}{5} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{3}{8} \\ \frac{1}{8} \\ + \frac{3}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 6. \quad \frac{1}{3} \\ \frac{3}{4} \\ + \frac{2}{5} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{6} \\ \frac{4}{9} \\ + \frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{2} \\ \frac{3}{4} \\ + \frac{7}{12} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{2} \\ \frac{4}{5} \\ + \frac{3}{10} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{1}{9} \\ \frac{5}{9} \\ + \frac{7}{9} \\ \hline \end{array}$$

$$7. \quad \frac{1}{2} + \frac{1}{2} =$$

$$\frac{3}{4} + \frac{5}{12} =$$

$$\frac{9}{24} + \frac{3}{8} + \frac{2}{3} =$$

$$\frac{1}{12} + \frac{7}{15} =$$

$$8. \quad \frac{1}{2} + \frac{1}{4} =$$

$$\frac{3}{8} + \frac{3}{10} =$$

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

$$\frac{3}{15} + \frac{5}{9} + \frac{2}{5} =$$

# Adding Mixed Numbers, Whole Numbers, and Fractions

When adding mixed numbers, whole numbers, and fractions, first change the fractions to equivalent fractions. Then add the fractions. Next, add the whole numbers. Simplify if possible.

**Find:**  $3 + 1\frac{3}{4} + \frac{1}{3}$

Line up the whole numbers and fractions. Change to equivalent fractions with like denominators.

$$\begin{array}{r} 3 = 3 \\ 1\frac{3}{4} = 1\frac{9}{12} \\ + \frac{1}{3} = \frac{4}{12} \\ \hline \end{array}$$

Add.

$$\begin{array}{r} 3 = 3 \\ 1\frac{3}{4} = 1\frac{9}{12} \\ + \frac{1}{3} = \frac{4}{12} \\ \hline 4\frac{13}{12} \end{array}$$

Change the improper fraction in the answer to a mixed number.

$$4\frac{13}{12} = 4 + 1\frac{1}{12} = 5\frac{1}{12}$$

**Add. Simplify if possible.**

1.  $6 = 6$

$$\begin{array}{r} \frac{7}{12} = \frac{7}{12} \\ + 1\frac{1}{4} = 1\frac{3}{12} \\ \hline 7\frac{10}{12} = 7\frac{5}{6} \end{array}$$

$$\begin{array}{r} 12 \\ \frac{9}{16} \\ + 3\frac{1}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ \frac{7}{8} \\ + 3\frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ 2\frac{4}{8} \\ + \frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ 4\frac{1}{4} \\ + \frac{1}{6} \\ \hline \end{array}$$

2.  $4$

$$\begin{array}{r} 4\frac{9}{16} \\ + \frac{3}{4} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{5}{9} \\ 7 \\ + 2\frac{2}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 3\frac{5}{6} \\ \frac{4}{10} \\ + 4 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ 2\frac{5}{6} \\ + \frac{1}{6} \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ \frac{2}{3} \\ + 6\frac{3}{4} \\ \hline \end{array}$$

3.  $\frac{7}{8}$

$$\begin{array}{r} 14\frac{3}{8} \\ + 20\frac{1}{8} \\ \hline \end{array}$$

$$\begin{array}{r} 15\frac{1}{3} \\ 9\frac{2}{3} \\ + 6\frac{4}{9} \\ \hline \end{array}$$

$$\begin{array}{r} 5\frac{4}{5} \\ 12\frac{3}{4} \\ + 16\frac{3}{10} \\ \hline \end{array}$$

$$\begin{array}{r} \frac{7}{8} \\ 14\frac{1}{2} \\ + 10\frac{5}{16} \\ \hline \end{array}$$

$$\begin{array}{r} 3\frac{5}{12} \\ 1\frac{3}{4} \\ + 9\frac{1}{3} \\ \hline \end{array}$$

4.  $\frac{3}{4} + 1\frac{2}{3} + 9 =$

$\frac{1}{4} + 15\frac{3}{4} + 7 =$

$3\frac{1}{2} + 2\frac{5}{6} + 8\frac{1}{4} =$

# Subtracting Fractions with Different Denominators - The LCD

Multiplying denominators may give a common denominator that is larger than necessary. Find the lowest common denominator, or LCD, by making a list of the multiples of each denominator. Use the smallest number that appears on both lists as the LCD.

Find:  $\frac{7}{10} - \frac{1}{6} =$

|   |    |           |           |           |    |   |    |    |    |           |  |
|---|----|-----------|-----------|-----------|----|---|----|----|----|-----------|--|
| <p>List multiples of each denominator.<br/>30 is the smallest multiple on both lists. 30 is the LCD.</p> <table style="margin-left: 20px;"> <tr> <td>10</td><td>20</td><td><b>30</b></td><td>40</td><td>50</td> </tr> <tr> <td>6</td><td>12</td><td>18</td><td>24</td><td><b>30</b></td> </tr> </table> | 10 | 20        | <b>30</b> | 40        | 50 | 6 | 12 | 18 | 24 | <b>30</b> | <p>Change to equivalent fractions using 30 as the LCD. Subtract and simplify.</p> $\begin{array}{r} \frac{7}{10} = \frac{21}{30} \\ - \frac{1}{6} = \frac{5}{30} \\ \hline \frac{16}{30} = \frac{8}{15} \end{array}$ |
| 10  | 20 | <b>30</b> | 40        | 50        |    |   |    |    |    |           |  |
| 6   | 12 | 18        | 24        | <b>30</b> |    |   |    |    |    |           |  |

Subtract using the LCD. Simplify if possible.

|   |   |   |   |   |
|---|---|---|---|---|
| 1. $\frac{3}{4} = \frac{15}{20}$                          | $\frac{5}{6}$                             | $\frac{5}{8}$                             | $\frac{4}{9}$                             | $\frac{11}{12}$                           |
| $-\frac{1}{10} = \frac{2}{20}$                            | $-\frac{1}{4}$                            | $-\frac{3}{10}$                           | $-\frac{1}{6}$                            | $-\frac{5}{9}$                            |
| <hr style="width: 50%; margin-left: 0;"/> $\frac{13}{20}$ | <hr style="width: 50%; margin-left: 0;"/> | <hr style="width: 50%; margin-left: 0;"/> | <hr style="width: 50%; margin-left: 0;"/> | <hr style="width: 50%; margin-left: 0;"/> |

|   |   |   |   |   |
|---|---|---|---|---|
| 2. $\frac{9}{16}$                         | $\frac{5}{6}$                             | $\frac{7}{12}$                            | $\frac{7}{10}$                            | $\frac{11}{12}$                           |
| $-\frac{1}{24}$                           | $-\frac{3}{8}$                            | $-\frac{1}{8}$                            | $-\frac{3}{6}$                            | $-\frac{4}{15}$                           |
| <hr style="width: 50%; margin-left: 0;"/> | <hr style="width: 50%; margin-left: 0;"/> | <hr style="width: 50%; margin-left: 0;"/> | <hr style="width: 50%; margin-left: 0;"/> | <hr style="width: 50%; margin-left: 0;"/> |

|   |   |   |   |   |
|---|---|---|---|---|
| 3. $\frac{10}{27}$                        | $\frac{10}{12}$                           | $\frac{3}{4}$                             | $\frac{7}{9}$                             | $\frac{6}{8}$                             |
| $-\frac{5}{18}$                           | $-\frac{3}{16}$                           | $-\frac{3}{6}$                            | $-\frac{2}{15}$                           | $-\frac{2}{6}$                            |
| <hr style="width: 50%; margin-left: 0;"/> | <hr style="width: 50%; margin-left: 0;"/> | <hr style="width: 50%; margin-left: 0;"/> | <hr style="width: 50%; margin-left: 0;"/> | <hr style="width: 50%; margin-left: 0;"/> |

|   |   |   |   |   |
|---|---|---|---|---|
| 4. $\frac{17}{18}$                        | $\frac{15}{24}$                           | $\frac{9}{18}$                            | $\frac{11}{16}$                           | $\frac{5}{9}$                             |
| $-\frac{5}{12}$                           | $-\frac{17}{36}$                          | $-\frac{12}{24}$                          | $-\frac{3}{20}$                           | $-\frac{1}{12}$                           |
| <hr style="width: 50%; margin-left: 0;"/> | <hr style="width: 50%; margin-left: 0;"/> | <hr style="width: 50%; margin-left: 0;"/> | <hr style="width: 50%; margin-left: 0;"/> | <hr style="width: 50%; margin-left: 0;"/> |

|                                   |                               |                                 |                                 |
|-----------------------------------|-------------------------------|---------------------------------|---------------------------------|
| 5. $\frac{6}{10} - \frac{1}{4} =$ | $\frac{1}{6} - \frac{1}{8} =$ | $\frac{11}{12} - \frac{7}{8} =$ | $\frac{13}{15} - \frac{4}{9} =$ |
|-----------------------------------|-------------------------------|---------------------------------|---------------------------------|

# Mixed Practice with Subtracting Fractions

Subtract. Use the LCD. Simplify if possible.

|                   |                |                |                |                |
|-------------------|----------------|----------------|----------------|----------------|
| 1. $\frac{9}{16}$ | $\frac{3}{8}$  | $\frac{4}{5}$  | $\frac{3}{4}$  | $\frac{5}{9}$  |
| $-\frac{1}{2}$    | $-\frac{1}{8}$ | $-\frac{1}{3}$ | $-\frac{1}{4}$ | $-\frac{1}{6}$ |
| <hr/>             | <hr/>          | <hr/>          | <hr/>          | <hr/>          |

|                  |                 |                 |                |                |
|------------------|-----------------|-----------------|----------------|----------------|
| 2. $\frac{1}{2}$ | $\frac{5}{6}$   | $\frac{11}{12}$ | $\frac{9}{10}$ | $\frac{7}{8}$  |
| $-\frac{1}{4}$   | $-\frac{7}{10}$ | $-\frac{7}{12}$ | $-\frac{3}{5}$ | $-\frac{1}{3}$ |
| <hr/>            | <hr/>           | <hr/>           | <hr/>          | <hr/>          |

|                   |                |                 |                |                |
|-------------------|----------------|-----------------|----------------|----------------|
| 3. $\frac{7}{10}$ | $\frac{4}{5}$  | $\frac{11}{32}$ | $\frac{3}{4}$  | $\frac{4}{7}$  |
| $-\frac{1}{10}$   | $-\frac{1}{4}$ | $-\frac{3}{16}$ | $-\frac{1}{6}$ | $-\frac{1}{3}$ |
| <hr/>             | <hr/>          | <hr/>           | <hr/>          | <hr/>          |

|                  |                 |                |                |                |
|------------------|-----------------|----------------|----------------|----------------|
| 4. $\frac{4}{6}$ | $\frac{7}{12}$  | $\frac{7}{8}$  | $\frac{4}{5}$  | $\frac{5}{8}$  |
| $-\frac{2}{5}$   | $-\frac{5}{16}$ | $-\frac{1}{6}$ | $-\frac{3}{5}$ | $-\frac{1}{4}$ |
| <hr/>            | <hr/>           | <hr/>          | <hr/>          | <hr/>          |

|                  |                 |                |                |                 |
|------------------|-----------------|----------------|----------------|-----------------|
| 5. $\frac{4}{6}$ | $\frac{13}{16}$ | $\frac{5}{6}$  | $\frac{3}{4}$  | $\frac{11}{15}$ |
| $-\frac{3}{8}$   | $-\frac{7}{16}$ | $-\frac{2}{3}$ | $-\frac{1}{3}$ | $-\frac{5}{9}$  |
| <hr/>            | <hr/>           | <hr/>          | <hr/>          | <hr/>           |

|                  |                |                 |                |                |
|------------------|----------------|-----------------|----------------|----------------|
| 6. $\frac{1}{2}$ | $\frac{5}{9}$  | $\frac{11}{12}$ | $\frac{7}{10}$ | $\frac{7}{9}$  |
| $-\frac{5}{12}$  | $-\frac{1}{2}$ | $-\frac{8}{9}$  | $-\frac{3}{5}$ | $-\frac{1}{9}$ |
| <hr/>            | <hr/>          | <hr/>           | <hr/>          | <hr/>          |

|                                     |                                |                                  |                                |
|-------------------------------------|--------------------------------|----------------------------------|--------------------------------|
| 7. $\frac{17}{32} - \frac{9}{32} =$ | $\frac{7}{10} - \frac{2}{5} =$ | $\frac{13}{18} - \frac{7}{12} =$ | $\frac{2}{3} - \frac{1}{10} =$ |
|-------------------------------------|--------------------------------|----------------------------------|--------------------------------|

|                                    |                                 |                                  |                                  |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|
| 8. $\frac{13}{15} - \frac{2}{3} =$ | $\frac{10}{12} - \frac{3}{5} =$ | $\frac{9}{16} - \frac{11}{20} =$ | $\frac{10}{25} - \frac{5}{25} =$ |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|

## Subtracting Mixed Numbers with Regrouping

When subtracting mixed numbers it may be necessary to regroup the first mixed number. Write the whole number part as a mixed number. Add the mixed number and the fraction. Then subtract and simplify if possible.

**Find:**  $8\frac{7}{12} - 2\frac{3}{4}$

Write the fractions with like denominators. Compare the numerators.

$$\begin{array}{r} 8\frac{7}{12} = 8\frac{7}{12} \\ - 2\frac{3}{4} = 2\frac{9}{12} \\ \hline \end{array}$$

Since  $\frac{9}{12}$  is bigger than  $\frac{7}{12}$ , regroup.

Write 8 as a mixed number.

$$8 = 7\frac{12}{12}$$

Add the mixed number and the fraction.

$$7\frac{12}{12} + \frac{7}{12} = 7\frac{19}{12}$$

Subtract and simplify.

$$\begin{array}{r} 8\frac{7}{12} = 7\frac{19}{12} \\ - 2\frac{9}{12} = 2\frac{9}{12} \\ \hline 5\frac{10}{12} = 5\frac{5}{6} \end{array}$$

**Subtract. Simplify if possible**

$$\begin{array}{r} 1. \quad 16\frac{1}{8} = 16\frac{1}{8} = 15\frac{9}{8} \\ - 7\frac{1}{2} = 7\frac{4}{8} = 7\frac{4}{8} \\ \hline 8\frac{5}{8} \end{array}$$

$$\begin{array}{r} 15\frac{1}{2} \\ - 9\frac{3}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 12\frac{1}{10} \\ - 4\frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 2. \quad 10\frac{1}{15} \\ - 4\frac{1}{5} \\ \hline \end{array}$$

$$\begin{array}{r} 16\frac{1}{10} \\ - 7\frac{1}{5} \\ \hline \end{array}$$

$$\begin{array}{r} 19\frac{1}{12} \\ - 10\frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad 15\frac{1}{3} \\ - 7\frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 8\frac{1}{5} \\ - 3\frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 12\frac{1}{5} \\ - 4\frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 15\frac{1}{2} \\ - 7\frac{2}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 8\frac{1}{5} \\ - 3\frac{1}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 7\frac{1}{5} \\ - 4\frac{1}{3} \\ \hline \end{array}$$

$$\begin{array}{r} 5. \quad 12\frac{2}{3} \\ - 9\frac{3}{4} \\ \hline \end{array}$$

$$\begin{array}{r} 16\frac{2}{5} \\ - 4\frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 24\frac{1}{4} \\ - 15\frac{2}{3} \\ \hline \end{array}$$

$$6. \quad 6\frac{1}{5} - 4\frac{1}{4} =$$

$$9\frac{1}{4} - 7\frac{1}{3} =$$

$$8\frac{2}{3} - 5\frac{4}{5} =$$

## Multiplying Fractions Using Cancellation

Instead of simplifying fractions after they have been multiplied, it may be possible to *cancel* before multiplying. To cancel, find a common factor of the numerator and the denominator. Divide the numerator and the denominator by the common factor. Then multiply.

Find:  $\frac{3}{10} \times \frac{1}{9}$

Cancel. Divide both the 3 and the 9 by 3.

$$\frac{\cancel{3}}{10} \times \frac{1}{\cancel{9}_3}$$

Multiply the new numerators and denominators.

$$\frac{1 \times 1}{10 \times 3} = \frac{1}{30}$$

Cancel and multiply. Simplify if possible.

$$1. \quad \frac{1}{10} \times \frac{4}{7} = \frac{1}{\cancel{10}_5} \times \frac{\cancel{4}_2}{7} = \frac{2}{35}$$

$$\frac{3}{35} \times \frac{5}{8} =$$

$$\frac{2}{5} \times \frac{10}{11} =$$

$$2. \quad \frac{3}{4} \times \frac{4}{5} =$$

$$\frac{2}{3} \times \frac{6}{7} =$$

$$\frac{5}{9} \times \frac{1}{5} =$$

$$3. \quad \frac{5}{11} \times \frac{3}{10} =$$

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

$$\frac{5}{7} \times \frac{2}{15} =$$

$$4. \quad \frac{1}{3} \times \frac{3}{7} =$$

$$\frac{3}{5} \times \frac{10}{13} =$$

$$\frac{6}{11} \times \frac{2}{3} =$$

$$5. \quad \frac{7}{8} \times \frac{4}{21} =$$

$$\frac{3}{4} \times \frac{8}{9} =$$

$$\frac{2}{3} \times \frac{3}{8} =$$

$$6. \quad \frac{2}{3} \times \frac{5}{9} \times \frac{3}{10} = \frac{\cancel{2}_1}{3} \times \frac{\cancel{5}_1}{9} \times \frac{\cancel{3}_1}{\cancel{10}_5} = \frac{1}{9}$$

$$\frac{4}{5} \times \frac{7}{8} \times \frac{2}{7} =$$

$$\frac{5}{8} \times \frac{4}{9} \times \frac{27}{40} =$$

$$7. \quad \frac{3}{5} \times \frac{5}{12} \times \frac{4}{15} =$$

$$\frac{6}{11} \times \frac{3}{7} \times \frac{7}{9} =$$

$$\frac{4}{9} \times \frac{7}{10} \times \frac{5}{14} =$$

$$8. \quad \frac{6}{7} \times \frac{3}{8} \times \frac{4}{9} =$$

$$\frac{8}{9} \times \frac{5}{8} \times \frac{2}{5} =$$

$$\frac{2}{15} \times \frac{6}{25} \times \frac{5}{12} =$$

## Multiplying Mixed Numbers and Whole Numbers

To multiply mixed numbers and whole numbers, change both numbers to improper fractions. Then multiply. Simplify if possible.

Find:  $5\frac{1}{3} \times 6$

|   |  |
|---|--|
| <p>Write the mixed number and whole number as improper fractions.</p> $5\frac{1}{3} \times 6 = \frac{16}{3} \times \frac{6}{1}$ | <p>Cancel. Multiply and simplify.</p> $\frac{16}{\cancel{3}} \times \frac{\cancel{6}^2}{1}$ $\frac{16 \times 2}{1 \times 1} = \frac{32}{1} = 32$ |
|---|--|

Find:  $3\frac{1}{3} \times 4\frac{1}{2}$

|   |   |
|---|---|
| <p>Write both mixed numbers as improper fractions.</p> $3\frac{1}{3} \times 4\frac{1}{2} = \frac{10}{3} \times \frac{9}{2}$ | <p>Cancel. Multiply and simplify.</p> $\frac{\cancel{10}^5}{\cancel{3}} \times \frac{\cancel{9}^3}{\cancel{2}} = \frac{5 \times 3}{1 \times 1} = \frac{15}{1} = 15$ |
|---|---|

Cancel and multiply. Simplify if possible.

1.  $4\frac{2}{3} \times 9 = \frac{14}{\cancel{3}} \times \frac{\cancel{9}^3}{1} = \frac{42}{1} = 42$        $7\frac{1}{5} \times \frac{1}{5} =$        $3\frac{1}{2} \times 2 =$

2.  $15\frac{1}{2} \times 8 =$        $12\frac{1}{2} \times 4 =$        $5\frac{1}{8} \times 4 =$

3.  $8 \times 2\frac{3}{4} =$        $\frac{1}{2} \times 5\frac{3}{4} =$        $5 \times 1\frac{3}{5} =$

4.  $8 \times 3\frac{4}{5} =$        $\frac{1}{9} \times 7\frac{2}{10} =$        $8 \times 2\frac{1}{5} =$

When both terms are mixed numbers, change both mixed numbers to improper fractions and proceed as above.

5.  $2\frac{1}{2} \times 3\frac{1}{2} = \frac{5}{2} \times \frac{7}{2} = \frac{35}{4} = 8\frac{3}{4}$        $7\frac{1}{3} \times 2\frac{1}{2} =$        $3\frac{1}{3} \times 3\frac{2}{7} =$

6.  $8\frac{1}{3} \times 6\frac{3}{4} =$        $2\frac{3}{4} \times 6\frac{2}{3} =$        $2\frac{2}{3} \times 5\frac{1}{4} =$

7.  $1\frac{1}{5} \times 3\frac{1}{2} =$        $4\frac{1}{5} \times 3\frac{1}{3} =$        $7\frac{1}{3} \times 1\frac{1}{2} =$

8.  $1\frac{4}{5} \times 2\frac{1}{7} =$        $3\frac{6}{7} \times 10\frac{2}{3} =$        $9\frac{4}{5} \times 3\frac{4}{7} =$

## Checking Up on Multiplication of Fractions

**Simplify.**

$$1. \frac{10}{4} = \quad \frac{15}{10} = \quad \frac{16}{3} = \quad \frac{12}{5} = \quad \frac{21}{8} = \quad \frac{19}{4} =$$

**Write as improper fractions.**

$$2. 4\frac{1}{2} = \quad 5\frac{1}{5} = \quad 6 = \quad 7\frac{1}{4} = \quad 3\frac{1}{10} = \quad 4 =$$

**Multiply. Cancel if possible.**

$$3. 18 \times \frac{1}{2} = \quad 15 \times \frac{1}{3} = \quad 12 \times \frac{1}{4} =$$

$$4. 32 \times \frac{3}{4} = \quad 21 \times \frac{2}{3} = \quad 25 \times \frac{2}{5} =$$

$$5. \frac{2}{3} \times 24 = \quad \frac{3}{4} \times 24 = \quad \frac{2}{5} \times 15 =$$

$$6. \frac{1}{2} \times \frac{2}{3} = \quad \frac{1}{2} \times \frac{4}{5} = \quad \frac{3}{8} \times \frac{4}{9} =$$

$$7. \frac{2}{5} \times \frac{15}{32} = \quad \frac{3}{16} \times \frac{8}{9} = \quad \frac{3}{4} \times \frac{1}{6} =$$

$$8. 3\frac{1}{3} \times 6 = \quad 2\frac{1}{2} \times 4 = \quad 8\frac{1}{2} \times 8 =$$

$$9. 12\frac{1}{2} \times \frac{2}{5} = \quad \frac{1}{4} \times 6\frac{1}{3} = \quad 3\frac{1}{3} \times \frac{1}{2} =$$

$$10. 6\frac{2}{3} \times 4\frac{3}{4} = \quad 8\frac{3}{4} \times 2\frac{2}{7} = \quad 11\frac{2}{3} \times 1\frac{1}{5} =$$

$$11. \frac{1}{3} \times \frac{3}{7} \times \frac{7}{10} = \quad \frac{3}{4} \times \frac{8}{9} \times \frac{1}{2} = \quad \frac{5}{8} \times \frac{1}{10} \times \frac{4}{5} =$$

$$12. \frac{5}{6} \times \frac{6}{11} \times \frac{11}{12} = \quad \frac{8}{15} \times \frac{10}{20} \times \frac{3}{4} = \quad \frac{1}{2} \times \frac{12}{15} \times \frac{5}{7} =$$

$$13. \frac{2}{3} \times \frac{6}{10} \times \frac{5}{8} = \quad \frac{1}{4} \times \frac{10}{13} \times \frac{2}{3} = \quad \frac{5}{14} \times \frac{7}{20} \times \frac{6}{7} =$$

Answers begin on page 46. *FMSW*

# Dividing Fractions by Fractions

To divide a fraction by a fraction, multiply the first fraction by the reciprocal of the second fraction. To find the reciprocal, invert the fraction (turn it upside down).

Write the reciprocals:  $\frac{1}{2}$ ,  $\frac{3}{4}$

| Number        | Reciprocal    |
|---------------|---------------|
| $\frac{1}{2}$ | $\frac{2}{1}$ |
| $\frac{3}{4}$ | $\frac{4}{3}$ |

Find:  $\frac{3}{4} \div \frac{1}{4}$

Invert the second fraction and multiply.

$$\frac{3}{4} \div \frac{1}{4} = \frac{3}{4} \times \frac{4}{1} = \frac{3}{1} = 3$$

Write the reciprocals by inverting the fractions.

1.  $\frac{1}{6}$     $\frac{6}{1}$     $\frac{2}{3}$     $\frac{3}{2}$     $\frac{1}{20}$     $\frac{20}{1}$     $\frac{6}{8}$     $\frac{8}{6}$     $\frac{4}{9}$     $\frac{9}{4}$     $\frac{25}{50}$     $\frac{50}{25}$

Divide.

2.  $\frac{2}{9} \div \frac{3}{4} = \frac{2}{9} \times \frac{4}{3} = \frac{8}{27}$     $\frac{5}{12} \div \frac{3}{4} =$     $\frac{9}{16} \div \frac{3}{8} =$

3.  $\frac{5}{6} \div \frac{5}{8} =$     $\frac{7}{8} \div \frac{5}{12} =$     $\frac{3}{16} \div \frac{9}{32} =$

4.  $\frac{5}{16} \div \frac{5}{32} =$     $\frac{5}{64} \div \frac{5}{16} =$     $\frac{10}{64} \div \frac{1}{4} =$

5.  $\frac{1}{2} \div \frac{1}{4} =$     $\frac{5}{8} \div \frac{1}{8} =$     $\frac{1}{6} \div \frac{2}{3} =$

6.  $\frac{5}{6} \div \frac{1}{6} =$     $\frac{2}{7} \div \frac{2}{5} =$     $\frac{7}{10} \div \frac{1}{5} =$

7.  $\frac{2}{3} \div \frac{1}{3} =$     $\frac{2}{11} \div \frac{4}{6} =$     $\frac{4}{5} \div \frac{1}{3} =$

8.  $\frac{9}{13} \div \frac{3}{7} =$     $\frac{8}{10} \div \frac{2}{10} =$     $\frac{3}{4} \div \frac{1}{2} =$

9.  $\frac{4}{9} \div \frac{1}{3} =$     $\frac{2}{15} \div \frac{2}{5} =$     $\frac{7}{12} \div \frac{7}{12} =$

# Dividing Fractions by Mixed Numbers and Whole Numbers

To divide a fraction by a mixed or whole number, change the mixed or whole number to an improper fraction. Invert and multiply.

Find:  $\frac{3}{4} \div 3$

Find:  $\frac{9}{10} \div 1\frac{1}{2}$

Change 3 to  $\frac{3}{1}$ . Invert and multiply.

$$\frac{3}{4} \div 3 = \frac{3}{4} \div \frac{3}{1} = \frac{3}{4} \times \frac{1}{3} = \frac{1}{4}$$

Change  $1\frac{1}{2}$  to  $\frac{3}{2}$ . Invert and multiply. Simplify.

$$\frac{9}{10} \div 1\frac{1}{2} = \frac{9}{10} \div \frac{3}{2} = \frac{9}{10} \times \frac{2}{3} = \frac{3}{5}$$

Divide.

1.  $\frac{6}{7} \div 6 =$

$\frac{7}{8} \div 8 =$

$\frac{4}{5} \div 2 =$

2.  $\frac{3}{4} \div 1\frac{1}{2} =$

$\frac{5}{6} \div 2\frac{1}{2} =$

$\frac{5}{8} \div 10 =$

3.  $\frac{2}{3} \div 2 =$

$\frac{4}{9} \div 1\frac{1}{4} =$

$\frac{5}{6} \div 12 =$

4.  $\frac{7}{10} \div 3\frac{1}{2} =$

$\frac{5}{8} \div 5 =$

$\frac{5}{9} \div 6 =$

5.  $\frac{9}{12} \div 3 =$

$\frac{3}{14} \div 1\frac{1}{2} =$

$\frac{9}{16} \div 4 =$

6.  $\frac{11}{15} \div 11 =$

$\frac{3}{20} \div 6 =$

$\frac{7}{12} \div 7 =$

7.  $\frac{19}{25} \div 2\frac{1}{5} =$

$\frac{10}{21} \div 5 =$

$\frac{3}{7} \div 4 =$

8.  $\frac{13}{17} \div 7\frac{1}{2} =$

$\frac{22}{24} \div 2 =$

$\frac{5}{18} \div 3 =$

9.  $\frac{10}{13} \div 5 =$

$\frac{7}{11} \div 1\frac{3}{4} =$

$\frac{5}{11} \div 2 =$

## Dividing Mixed Numbers by Fractions, Whole Numbers, and Mixed Numbers

To divide mixed numbers by fractions, whole numbers, or mixed numbers, change each whole or mixed number to an improper fraction. Then invert and multiply.

**Find:**  $9\frac{3}{4} \div 1\frac{2}{3}$

| Change $9\frac{3}{4}$ and $1\frac{2}{3}$ to improper fractions.  | Invert and multiply.                               | Simplify.                         |
|--|--|-----------------------------------|
| $9\frac{3}{4} \div 1\frac{2}{3} = \frac{39}{4} \div \frac{5}{3}$ | $\frac{39}{4} \times \frac{3}{5} = \frac{117}{20}$ | $\frac{117}{20} = 5\frac{17}{20}$ |

Divide. Simplify if possible.

1.  $2\frac{1}{3} \div 1\frac{1}{3} = \frac{7}{3} \times \frac{3}{4} = \frac{7}{4} = 1\frac{3}{4}$

$6\frac{4}{5} \div 3 =$

$7\frac{1}{3} \div \frac{1}{2} =$

2.  $4\frac{1}{9} \div 2 =$

$5\frac{2}{3} \div 2\frac{1}{3} =$

$9\frac{3}{8} \div \frac{1}{4} =$

3.  $9\frac{3}{4} \div 13 =$

$7\frac{1}{3} \div 11\frac{1}{2} =$

$4\frac{2}{3} \div \frac{1}{6} =$

4.  $20\frac{1}{6} \div 10\frac{1}{2} =$

$5\frac{3}{7} \div 7 =$

$3\frac{1}{3} \div \frac{1}{2} =$

5.  $27\frac{1}{2} \div 4 =$

$42\frac{1}{3} \div 2\frac{1}{3} =$

$16\frac{3}{5} \div \frac{3}{5} =$

6.  $14\frac{9}{10} \div 2 =$

$20\frac{2}{5} \div \frac{1}{2} =$

$25\frac{1}{6} \div 3\frac{1}{3} =$

7.  $6\frac{2}{3} \div 3\frac{1}{3} =$

$5\frac{3}{5} \div 7 =$

$5\frac{1}{7} \div 7 =$

8.  $1\frac{3}{8} \div 1\frac{1}{8} =$

$4\frac{1}{2} \div \frac{1}{2} =$

$5\frac{2}{7} \div 3 =$

9.  $2\frac{5}{7} \div 7 =$

$3\frac{1}{3} \div 15 =$

$4\frac{1}{4} \div 8\frac{1}{2} =$

# Sum It Up

Find the sums.

A. 
$$\begin{array}{r} 6.2 \\ + 1.73 \\ \hline 7.93 \end{array}$$

$$\begin{array}{r} 0.525 \\ + 0.139 \\ \hline \end{array}$$

$$\begin{array}{r} 12.36 \\ + 8.75 \\ \hline \end{array}$$

$$\begin{array}{r} 7.65 \\ + 3.34 \\ \hline \end{array}$$

$$\begin{array}{r} 0.68 \\ + 0.4 \\ \hline \end{array}$$

B. 
$$\begin{array}{r} 72.88 \\ + 14.75 \\ \hline \end{array}$$

$$\begin{array}{r} 9.89 \\ + 42.69 \\ \hline \end{array}$$

$$\begin{array}{r} 0.25 \\ + 0.73 \\ \hline \end{array}$$

$$\begin{array}{r} 5.9 \\ + 6.057 \\ \hline \end{array}$$

$$\begin{array}{r} 38.93 \\ + 17.6 \\ \hline \end{array}$$

C. 
$$\begin{array}{r} 4.769 \\ + 3.825 \\ \hline \end{array}$$

$$\begin{array}{r} 78.9 \\ + 32.6 \\ \hline \end{array}$$

$$\begin{array}{r} 34.9 \\ + 67.85 \\ \hline \end{array}$$

$$\begin{array}{r} 1.79 \\ + 3.826 \\ \hline \end{array}$$

$$\begin{array}{r} 36.29 \\ + 28.75 \\ \hline \end{array}$$

D. 
$$\begin{array}{r} 4.7 \\ 8.8 \\ + 0.45 \\ \hline \end{array}$$

$$\begin{array}{r} 439.6 \\ 7.049 \\ + 12.32 \\ \hline \end{array}$$

$$\begin{array}{r} 72.6 \\ 123.12 \\ + 2.4 \\ \hline \end{array}$$

$$\begin{array}{r} 2.36 \\ 3.78 \\ + 2.67 \\ \hline \end{array}$$

$$\begin{array}{r} 42.83 \\ 75.6 \\ + 36.356 \\ \hline \end{array}$$

E. 
$$\begin{array}{r} 7.84 \\ 65.3 \\ + 238.72 \\ \hline \end{array}$$

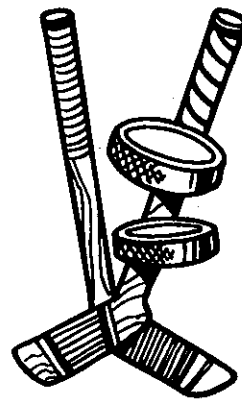
$$\begin{array}{r} 179.6 \\ 4.98 \\ + 56.43 \\ \hline \end{array}$$

$$\begin{array}{r} 2.368 \\ 3.26 \\ + 0.471 \\ \hline \end{array}$$

$$\begin{array}{r} 27.6 \\ 3.84 \\ + 51.09 \\ \hline \end{array}$$



# Decimal Differences



Find the differences.

A. 
$$\begin{array}{r} 265.3 \\ - 121.44 \\ \hline 143.86 \end{array}$$

$$\begin{array}{r} 3.74 \\ - 1.88 \\ \hline \end{array}$$

$$\begin{array}{r} 52.67 \\ - 24.7 \\ \hline \end{array}$$

$$\begin{array}{r} 57.19 \\ - 19.88 \\ \hline \end{array}$$

B. 
$$\begin{array}{r} 5.25 \\ - 3.87 \\ \hline \end{array}$$

$$\begin{array}{r} 0.85 \\ - 0.68 \\ \hline \end{array}$$

$$\begin{array}{r} 51.04 \\ - 22.63 \\ \hline \end{array}$$

$$\begin{array}{r} 70.00 \\ - 16.95 \\ \hline \end{array}$$

$$\begin{array}{r} 143.79 \\ - 88.81 \\ \hline \end{array}$$

C. 
$$\begin{array}{r} 26.85 \\ - 15.97 \\ \hline \end{array}$$

$$\begin{array}{r} 71.35 \\ - 4.661 \\ \hline \end{array}$$

$$\begin{array}{r} 73.21 \\ - 56.56 \\ \hline \end{array}$$

$$\begin{array}{r} 54.135 \\ - 27.950 \\ \hline \end{array}$$

$$\begin{array}{r} 95.41 \\ - 8.72 \\ \hline \end{array}$$

D. 
$$\begin{array}{r} 23.9 \\ - 18.72 \\ \hline \end{array}$$

$$\begin{array}{r} 44.04 \\ - 28.15 \\ \hline \end{array}$$

$$\begin{array}{r} 1.343 \\ - 0.975 \\ \hline \end{array}$$

$$\begin{array}{r} 680.3 \\ - 136.9 \\ \hline \end{array}$$

$$\begin{array}{r} 7.342 \\ - 2.617 \\ \hline \end{array}$$

E. 
$$\begin{array}{r} 56.53 \\ - 17.6 \\ \hline \end{array}$$

$$\begin{array}{r} 213.06 \\ - 4.8 \\ \hline \end{array}$$

$$\begin{array}{r} 1.04 \\ - 0.999 \\ \hline \end{array}$$

$$\begin{array}{r} 8.35 \\ - 2.967 \\ \hline \end{array}$$

$$\begin{array}{r} 4.0 \\ - 2.91 \\ \hline \end{array}$$

F. 
$$\begin{array}{r} 439.3 \\ - 97.42 \\ \hline \end{array}$$

$$\begin{array}{r} 83.81 \\ - 7.96 \\ \hline \end{array}$$

$$\begin{array}{r} 100.1 \\ - 83.79 \\ \hline \end{array}$$

$$\begin{array}{r} 17.31 \\ - 14.9 \\ \hline \end{array}$$

$$\begin{array}{r} 6.01 \\ - 3.07 \\ \hline \end{array}$$

# Multiplying Decimals

Find the products.

A. 
$$\begin{array}{r} 3.5 \\ \times 6.7 \\ \hline \end{array}$$

$$\begin{array}{r} 8.09 \\ \times 5.7 \\ \hline \end{array}$$

$$\begin{array}{r} 12.5 \\ \times 0.74 \\ \hline \end{array}$$

$$\begin{array}{r} 9.4 \\ \times 2.7 \\ \hline \end{array}$$

$$\begin{array}{r} 12.8 \\ \times 3.5 \\ \hline \end{array}$$

B. 
$$\begin{array}{r} 5.12 \\ \times 7.6 \\ \hline \end{array}$$

$$\begin{array}{r} 9.12 \\ \times 6.8 \\ \hline \end{array}$$

$$\begin{array}{r} 0.73 \\ \times 4.2 \\ \hline \end{array}$$

$$\begin{array}{r} 5.6 \\ \times 8.3 \\ \hline \end{array}$$

$$\begin{array}{r} 6.9 \\ \times 5.4 \\ \hline \end{array}$$

C. 
$$\begin{array}{r} 8.42 \\ \times 7.3 \\ \hline \end{array}$$

$$\begin{array}{r} 7.58 \\ \times 4.8 \\ \hline \end{array}$$

$$\begin{array}{r} 53.7 \\ \times 6.9 \\ \hline \end{array}$$

$$\begin{array}{r} 4.86 \\ \times 3.7 \\ \hline \end{array}$$

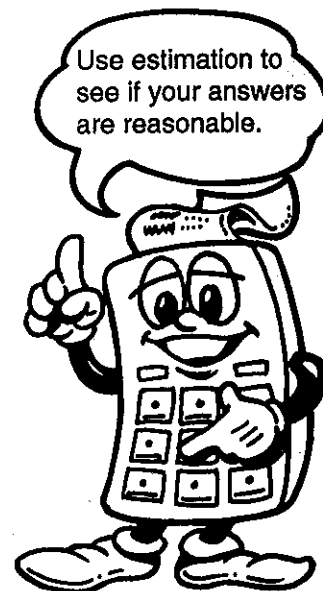
$$\begin{array}{r} 6.45 \\ \times 7.6 \\ \hline \end{array}$$

D. 
$$\begin{array}{r} 7.25 \\ \times 1.89 \\ \hline \end{array}$$

$$\begin{array}{r} 5.62 \\ \times 3.84 \\ \hline \end{array}$$

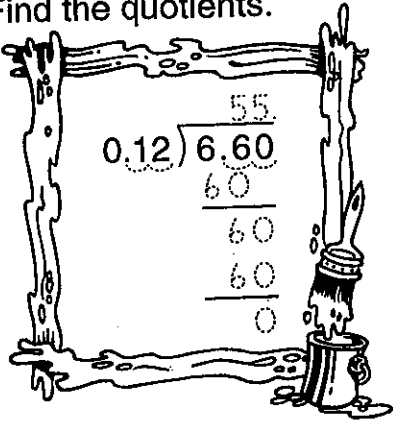
$$\begin{array}{r} 3.79 \\ \times 1.01 \\ \hline \end{array}$$

$$\begin{array}{r} 1.23 \\ \times 3.7 \\ \hline \end{array}$$



# Decimal Division

Find the quotients.



A.  $0.4 \overline{)26}$

$0.5 \overline{)29}$

$0.46 \overline{)33.12}$

B.  $0.25 \overline{)10}$

$3.4 \overline{)12.92}$

$0.67 \overline{)4.221}$

$0.03 \overline{)0.294}$

C.  $9.5 \overline{)0.8265}$

$0.7 \overline{)22.4}$

$0.08 \overline{)1.456}$

$2.1 \overline{)10.5}$

D.  $0.08 \overline{)3.68}$

$0.12 \overline{)3.12}$

$0.42 \overline{)1.470}$

$8.4 \overline{)54.6}$

# Adding Signed Numbers

When adding positive and negative numbers, or signed numbers, follow these rules.

**Rule 1:** To add two numbers with the same sign, add the numbers. Give the answer that sign.

**Rule 2:** To add numbers with different signs, find the difference between the numbers. Give the answer the sign of the larger number.

**Rule 3:** To add three or more signed numbers, add the positive numbers. Add the negative numbers. Then add the two totals. Use Rule 2 to find the sign.

Add  $-6 + (-3)$

Add  $-13 + 7$

Add  $36 + (-25) + (-5) + 4$

Use Rule 1.

$$-6 + (-3) = -9$$

Use Rule 2.

$$-13 + 7 = -6$$

Use Rule 3.

$$\begin{aligned}(-25) + (-5) &= -30 \\ 36 + 4 &= 40 \\ 40 + (-30) &= 10\end{aligned}$$

Add.

- |                                       |               |               |                         |
|---------------------------------------|---------------|---------------|-------------------------|
| 1. $-10 + (-7)$<br>$-10 + (-7) = -17$ | $-15 + 6$     | $6 + (+9)$    | $-12 + (-12) + (-5)$    |
| 2. $-14 + 0$                          | $-18 + (-9)$  | $-8 + (+3)$   | $1 + (-9) + (-8)$       |
| 3. $10 + (-10)$                       | $13 + (-8)$   | $-2 + (-5)$   | $7 + (-16) + 4 + 2$     |
| 4. $-15 + 7$                          | $24 + (-12)$  | $8 + (+8)$    | $-19 + (-2) + (-3)$     |
| 5. $20 + (-8)$                        | $-9 + (-9)$   | $13 + (-13)$  | $-4 + 4 + (-8)$         |
| 6. $0 + (-22)$                        | $-5 + (-5)$   | $-30 + (-9)$  | $25 + (-5) + (-10)$     |
| 7. $-11 + 6$                          | $7 + (-7)$    | $-6 + 15$     | $1 + (-6) + 5 + (-9)$   |
| 8. $-2 + (-5)$                        | $4 + (-14)$   | $-13 + (-15)$ | $21 + (-13) + (-12)$    |
| 9. $32 + (-16)$                       | $7 + (-21)$   | $-35 + (+19)$ | $-3 + (-19) + (-6) + 9$ |
| 10. $-12 + (-26)$                     | $-18 + (+15)$ | $-13 + 13$    | $4 + (-6) + 4 + (-12)$  |

## Subtracting Signed Numbers

When subtracting signed numbers, follow this rule.

**To subtract signed numbers, change the sign of the number being subtracted. Then add.**

Subtract  $-3 - (+11)$

$$\begin{array}{l} -3 - (+11) \\ (-3) + (-11) = -14 \end{array}$$

Subtract  $-10 - (-10)$

$$\begin{array}{l} -10 - (-10) \\ -10 + (+10) = 0 \end{array}$$

Subtract  $0 - (-2)$

$$\begin{array}{l} 0 - (-2) \\ 0 + (+2) = 2 \end{array}$$

**Subtract.**

1.  $-10 - (+6)$

$$-10 + (-6) = -16$$

$-7 - (-6)$

$15 - (-2)$

$-8 - 0$

2.  $7 - (+14)$

$-16 - (+4)$

$19 - (-7)$

$-3 - (-15)$

3.  $0 - (-3)$

$-5 - (-5)$

$-2 - (-16)$

$13 - (+11)$

4.  $-8 - (+10)$

$11 - (+11)$

$12 - (-12)$

$-15 - 0$

5.  $18 - (+7)$

$22 - (-5)$

$4 - (-17)$

$-2 - (-6)$

6.  $-10 - (-15)$

$3 - (+7)$

$0 - 24$

$-18 - (-25)$

7.  $16 - (+4)$

$-30 - (+15)$

$-17 - (-2)$

$40 - 0$

8.  $22 - (-3)$

$-25 - (-8)$

$-6 - (-29)$

$-15 - (-15)$

9.  $1 - (-2)$

$-10 - (-20)$

$2 - (+6)$

$7 - (+19)$

10.  $33 - (+11)$

$-35 - (-15)$

$-26 - (+13)$

$9 - (+24)$

11.  $-42 - (-15)$

$3 - (+24)$

$16 - (+40)$

$27 - (+27)$

12.  $0 - (-17)$

$-18 - (-1)$

$-2 - (+17)$

$30 - (+39)$

13.  $-50 - (-25)$

$13 - (+17)$

$14 - (-14)$

$-23 - (-23)$

ANSW

# Adding and Subtracting Signed Numbers

When adding and subtracting three or more signed numbers, change the sign of any numbers being subtracted. Then follow addition Rule 3 on page 14.

**Add and subtract  $-9 + 6 - (-3)$**

Change the sign of the number being subtracted.

$$\begin{aligned} -9 + 6 - (-3) \\ -9 + 6 + 3 \end{aligned}$$

Add the positive numbers.

$$6 + 3 = 9$$

Add the positive and the negative numbers.

$$-9 + 9 = 0$$

**Add and subtract.**

1.  $-5 + 7 - (-1)$   
 $-5 + 7 + 1$   
 $-5 + 8 = 3$

$$7 - (+5) + 2$$

$$-10 + (-7) + (-6) - 2$$

2.  $17 - 32 + (-16)$

$$-9 + 15 - (-6)$$

$$1 - (-2) + (-3)$$

3.  $-14 - (-16) + 2$

$$15 - (-9) + (-2)$$

$$-6 + 2 - (-14) + (-6)$$

4.  $2 + 5 - (-9)$

$$-13 + (-12) + 1$$

$$-11 + (-2) - (+13)$$

5.  $-16 - (-8) + 2$

$$16 + (-16) - 12$$

$$14 + (-16) - (+14) - 9$$

6.  $-6 - (+4) - 10$

$$-18 - (-12) + 4$$

$$-13 - 12 + (-8)$$

7.  $5 + (+5) + (+10)$

$$-13 - (-11) - 15$$

$$-20 + (-16) + (-5) + (-3)$$

8.  $-4 - (+2) + (-6)$

$$7 - (+2) - (-9)$$

$$8 - (+2) - (+4) - (+2)$$

9.  $-12 - (+6) - (-9)$

$$-15 - (+8) - (-6)$$

$$-6 + 3 - (-10)$$

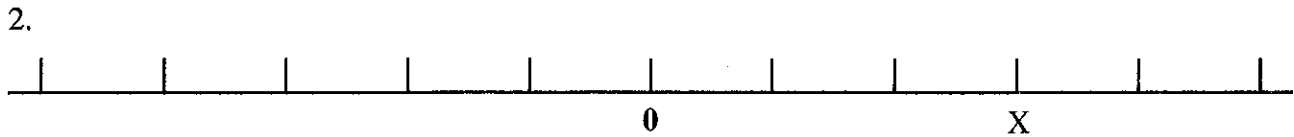
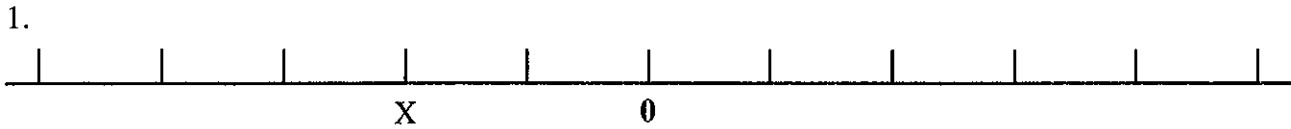
10.  $5 - (-5) - (+5)$

$$32 - (+14) - (+20)$$

$$1 - (-1) + (2)$$

# ..... Adding and Subtracting Positive and Negative Numbers

**Directions:** On each number line, write the number that X represents.



**Directions:** Find the sum.

|    |             |    |              |    |             |              |
|----|-------------|----|--------------|----|-------------|--------------|
| 4. |             | 6. |              | 8. |             | 10.          |
|    | -3          |    | -60          |    | -2.3        |              |
|    | -4          |    | -20          |    | -5          |              |
|    | <u>+ -2</u> |    | <u>+ -30</u> |    | <u>+ 10</u> |              |
|    |             |    |              |    |             | 1.3          |
|    |             |    |              |    |             | 2.89         |
|    |             |    |              |    |             | <u>+ 3.7</u> |
| 5. |             | 7. |              | 9. |             | 11.          |
|    | 5           |    | -12          |    | -4          |              |
|    | 2           |    | -31          |    | 8           |              |
|    | <u>+ 2</u>  |    | <u>+ 0</u>   |    | <u>+ 19</u> |              |
|    |             |    |              |    |             | -8           |
|    |             |    |              |    |             | 7            |
|    |             |    |              |    |             | -9           |
|    |             |    |              |    |             | <u>+ 4</u>   |

**Directions:** Find the difference.

|     |                                   |     |                                   |     |                                  |
|-----|-----------------------------------|-----|-----------------------------------|-----|----------------------------------|
| 12. | $8 - 4 = \underline{\quad}$       | 17. | $-30 - (-80) = \underline{\quad}$ | 22. | $8 - 3.6 = \underline{\quad}$    |
| 13. | $-4 - 9 = \underline{\quad}$      | 18. | $0 - (-12) = \underline{\quad}$   | 23. | $3.6 - 8 = \underline{\quad}$    |
| 14. | $(12) - (-3) = \underline{\quad}$ | 19. | $4 - 0 = \underline{\quad}$       | 24. | $7 - (-11) = \underline{\quad}$  |
| 15. | $-9 - (-3) = \underline{\quad}$   | 20. | $9 - 2 = \underline{\quad}$       | 25. | $-3 - (-15) = \underline{\quad}$ |
| 16. | $9 - (-3) = \underline{\quad}$    | 21. | $2 - 9 = \underline{\quad}$       | 26. | $5 - (-12) = \underline{\quad}$  |

**Directions:** Find the difference or sum.

|     |                                       |     |  |
|-----|---------------------------------------|-----|--|
| 27. | $-7 - 4 - (-2) = \underline{\quad}$   | 31. | $(9 - 4) - (1 - 3) + (7 + 10) = \underline{\quad}$ |
| 28. | $5 - (-5) - (-6) = \underline{\quad}$ | 32. | $(5 - 1) - (3 + 2) - (3 - 9) = \underline{\quad}$  |
| 29. | $-4 - 9 - (-3) = \underline{\quad}$   | 33. | $(2 - 8) - 8 - (9 - 4) = \underline{\quad}$        |
| 30. | $9 - 7 - (-5) = \underline{\quad}$    | 34. | $(7 - 3) - (7 - 11) + 7 = \underline{\quad}$       |

# Multiplying Signed Numbers

When multiplying signed numbers, follow these rules. Notice that multiplication is shown using parentheses around one or both signed numbers to avoid confusing operation signs and negative number signs.

**Rule 1:** To multiply numbers with the same sign, multiply and give the answer a positive sign.

**Rule 2:** To multiply numbers with different signs, multiply and give the answer a negative sign.

**Rule 3:** To multiply several signed numbers, multiply the numbers two at a time using Rules 1 and 2.

Multiply  $(-3)(-6)$

Use Rule 1.

$$(-3)(-6) = 18$$

Multiply  $(4)(-2)$

Use Rule 2.

$$(4)(-2) = -8$$

Multiply  $(-5)(5)(-2)$

Use Rule 3.

$$\begin{aligned}(-5)(5) &= -25 \\ (-25)(-2) &= 50\end{aligned}$$

Multiply.

1.  $-9(3)$   
 $(-9)(3) = -27$

$(-5)(-6)$

$4(-8)$

$(8)(-9)$

2.  $-1(-5)$

$-7(2)$

$9(-12)$

$(11)(-2)$

3.  $2(1)$

$-3(-4)$

$6(-7)$

$-10(-11)$

4.  $12(9)$

$15(-10)$

$-20(-6)$

$16(-3)$

5.  $-6(8)$

$-9(9)$

$-7(-11)$

$11(-2)$

6.  $(9)(-2)(3)$

$(-13)(-7)(2)$

$(3)(5)(-3)$

7.  $(-1)(20)(-4)$

$(-2)(-3)(7)$

$(10)(-10)(-6)$

8.  $(4)(13)(0)$

$(-9)(-9)(-2)$

$(14)(-1)(3)$

9.  $(-4)(4)(3)(-4)$

$(12)(2)(-2)(7)$

$(-8)(-9)(-1)(-3)$

## Dividing Signed Numbers

When dividing signed numbers, follow these rules.

**Rule 1:** To divide numbers with the same sign, divide and give the answer a positive sign.

**Rule 2:** To divide numbers with different signs, divide and give the answer a negative sign.

Divide  $\frac{-15}{-3}$

Use Rule 1.  
 $\frac{-15}{-3} = 5$

Divide  $\frac{18}{-6}$

Use Rule 2.  
 $\frac{18}{-6} = -3$

Divide  $\frac{-20}{4}$

Use Rule 2.  $\{$   
 $\frac{-20}{4} = -5$

Divide.

- |                         |                       |                       |                     |
|-------------------------|-----------------------|-----------------------|---------------------|
| 1. $\frac{-12}{3} = -4$ | 2. $\frac{-14}{-2}$   | 3. $\frac{20}{-10}$   | 4. $\frac{-25}{5}$  |
| 5. $\frac{42}{6}$       | 6. $\frac{-36}{6}$    | 7. $\frac{32}{-4}$    | 8. $\frac{90}{9}$   |
| 9. $\frac{48}{8}$       | 10. $\frac{52}{-13}$  | 11. $\frac{-63}{7}$   | 12. $\frac{-72}{9}$ |
| 13. $\frac{60}{15}$     | 14. $\frac{-16}{4}$   | 15. $\frac{-10}{10}$  | 16. $\frac{30}{3}$  |
| 17. $\frac{-34}{17}$    | 18. $\frac{81}{-9}$   | 19. $\frac{24}{-6}$   | 20. $\frac{27}{9}$  |
| 21. $\frac{35}{7}$      | 22. $\frac{40}{-5}$   | 23. $\frac{-36}{9}$   | 24. $\frac{-49}{7}$ |
| 25. $\frac{9}{3}$       | 26. $\frac{-18}{2}$   | 27. $\frac{15}{-5}$   | 28. $\frac{-8}{4}$  |
| 29. $\frac{11}{1}$      | 30. $\frac{-12}{-12}$ | 31. $\frac{-20}{10}$  | 32. $\frac{-21}{7}$ |
| 33. $\frac{24}{8}$      | 34. $\frac{-2}{1}$    | 35. $\frac{-28}{-14}$ | 36. $\frac{13}{13}$ |
| 37. $\frac{44}{-11}$    | 38. $\frac{-30}{3}$   | 39. $\frac{32}{4}$    | 40. $\frac{22}{-2}$ |
| 41. $\frac{50}{25}$     | 42. $\frac{75}{-3}$   | 43. $\frac{-63}{9}$   | 44. $\frac{19}{1}$  |

AMSW

# ..... Multiplying and Dividing Positive and Negative Numbers

**Directions:** Multiply.

1.  $7 \times 9 = \underline{\hspace{2cm}}$
2.  $-11 \times -6.2 = \underline{\hspace{2cm}}$
3.  $-22 \times -2.1 = \underline{\hspace{2cm}}$
4.  $-1(-20)(5) = \underline{\hspace{2cm}}$
5.  $-6(-9)(1) = \underline{\hspace{2cm}}$
6.  $-12(11)(-9 + 2) = \underline{\hspace{2cm}}$
7.  $-2(-3)(-5)(-1 + 3 - 4) = \underline{\hspace{2cm}}$
8.  $(-6)(4)(1) = \underline{\hspace{2cm}}$
9.  $(5)(-7)(2) = \underline{\hspace{2cm}}$
10.  $(5-2)(-3)(3 + 1) = \underline{\hspace{2cm}}$
11.  $(7 - 3)(-3)(-2) = \underline{\hspace{2cm}}$
12.  $(2 + 4)(6 - 3)(-5) = \underline{\hspace{2cm}}$

**Directions:** Divide.

13.  $-16 \div 4 =$
14.  $85 \div -17 =$
15.  $21 \div -7 =$
16.  $\frac{-121}{-11} =$
17.  $\frac{-54}{-18} =$
18.  $\frac{-72}{-8} =$
19.  $\frac{-90}{-30} =$
20.  $\frac{5 - 10}{15 - 20} =$
21.  $\frac{12 - 3}{9 - 6} =$
22.  $\frac{-84}{-12} =$
23.  $\frac{9 + 3}{4 - 10} =$
24.  $\frac{8 + 7}{3 + 2} =$

**Directions:** Find the answers.

25.  $\frac{-81(-3 + 6)}{9} =$
26.  $\frac{90(2 - 5)}{-5} =$
27.  $6(4 + 1) - 7(5 - 4) + (3 + 2) =$
28.  $-5(8 + 2) + 4(6 - 9) - \left[ \frac{30}{10} \right] =$
29.  $-2(5 - 6) + 10(6 - 7) - \left[ \frac{25}{5} \right] =$
30.  $6(1 + 2) + 2(4 + 3) + \left[ \frac{36}{12} \right] =$
31.  $\frac{6(5 - 3) + 2(2 - 6)}{3(9 - 3)} =$
32.  $\frac{2(1 - 6) - 7(2 + 3)}{-9(3 - 4)} =$
33.  $\frac{2(7 - 3) + 8(5 + 2)}{2(10 - 2)} =$
34.  $\frac{8(-10 + 7) + 4(27 - 36)}{4(5 - 2)} =$

# Adding, Subtracting, Multiplying, and Dividing Signed Numbers

Use the rules for adding, subtracting, multiplying, and dividing signed numbers.

1.  $3 + (-4)$   
 $3 + (-4) = -1$

$7 - (-2)$

$8(-5)$

$\frac{30}{-2}$

2.  $-9 - (-9)$

$-10 + (-8)$

$\frac{-24}{6}$

$(-12)(3)(-2)$

3.  $\frac{45}{-9}$

$13(-4)$

$-5 + (-10)$

$7 - (+9)$

4.  $(-8)(-3)(-4)$

$\frac{-36}{-6}$

$19 - (-12)$

$-21 + (10)$

5.  $15 + (-12)$

$1 - (+1)$

$9(-6)$

$\frac{25}{-5}$

6.  $-15(-4)$

$\frac{-100}{25}$

$-26 - (-13)$

$16 + (-29)$

7.  $6 - (+17)$

$(-3)(-30)(3)$

$42 + (-19)$

$\frac{-81}{9}$

8.  $\frac{20}{-4}$

$-22 - (+33)$

$-4(32)$

$-8 + (-8)$

Use the rules for signed numbers and the correct order of operations.

9.  $\frac{30}{6} - 2(9)$   
 $5 - 18 = -13$

$-5(4) + 3 - 7$

$18 - 6(4)$

$32 + (-9)(-9)$

10.  $49 - 7(+7)$

$\frac{-14}{7} + 3(-2)$

$13 + 5(-2)$

$6(-3) - 2(-7)$

11.  $\frac{54}{9} + 8(-10)$

$-18(-4) - 62$

$35 + \frac{14}{2} - 5$

$40(-3) + 100$

12.  $\frac{-80}{8} - \frac{15}{3}$

$16(-2) + 32$

$84 - 18(4)$

$-8(9) - 5(7)$

13.  $18 - \frac{45}{5}$

$\frac{42}{-7} + 6(-8)$

$100 - 5(-20)$

$\frac{-50}{25} - 2(-1)$