

# Lesson 1 Fractions and Mixed Numerals

Study how to change a fraction or mixed numeral to simplest form.

*Factors of 6*

1, 2, 3, 6

*Factors of 15*

1, 3, 5, 15

$$\frac{6}{15} = \frac{6 \div 3}{15 \div 3}$$

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

Divide 6 and 15 by their greatest common factor.

*Factors of 8*

1, 2, 4, 8

*Factors of 10*

1, 2, 5, 10

$$7\frac{8}{10} = 7 + \frac{8}{10}$$

$$= 7 + \frac{8 \div 2}{10 \div 2}$$

$$= 7 + \frac{4}{5} \text{ or } 7\frac{4}{5}$$

Divide 8 and 10 by their greatest common factor.

$$5 \overline{)11} \begin{array}{r} 2 \\ \underline{10} \\ 1 \end{array}$$

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

$$3 \overline{)17} \begin{array}{r} 5 \\ \underline{15} \\ 2 \end{array}$$

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

Write each of the following in simplest form.

1.  $\frac{9}{12}$

$2\frac{2}{4}$

$\frac{13}{5}$

2.  $\frac{2}{8}$

$3\frac{6}{10}$

$\frac{19}{3}$

3.  $\frac{10}{16}$

$7\frac{8}{12}$

$\frac{17}{2}$

4.  $\frac{18}{36}$

$5\frac{15}{20}$

$\frac{12}{8}$

5.  $\frac{15}{45}$

$2\frac{12}{28}$

$\frac{16}{10}$

## Lesson 2 Renaming Numbers

$$\begin{aligned} \frac{3}{4} &= \frac{\square}{8} \\ &= \frac{3 \times 2}{4 \times 2} \\ &= \frac{6}{8} \end{aligned}$$

Multiply both the numerator and the denominator by the same number.

Choose 2 so the new denominator is 8.

$$\begin{aligned} 4 &= \frac{\square}{8} \\ &= \frac{4 \times 8}{1 \times 8} \\ &= \frac{32}{8} \end{aligned}$$

Name the whole number as a fraction whose denominator is 1.

Choose 8 so the new denominator is 8.

$$\begin{aligned} 9\frac{2}{3} &= \frac{\square}{3} \\ 9\frac{2}{3} &= \frac{(3 \times 9) + 2}{3} \\ &= \frac{29}{3} \end{aligned}$$

Multiply the whole number by the denominator and add the numerator.

Use the same denominator.

$$\begin{aligned} 7\frac{1}{5} &= \frac{\square}{5} \\ 7\frac{1}{5} &= \frac{(5 \times 7) + 1}{5} \\ &= \frac{36}{5} \end{aligned}$$

Rename.

1.  $\frac{1}{2} = \frac{\square}{6}$

$\frac{2}{5} = \frac{\square}{15}$

$\frac{3}{8} = \frac{\square}{16}$

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

2.  $6 = \frac{\square}{4}$

$3 = \frac{\square}{10}$

$7 = \frac{\square}{3}$

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

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

$6\frac{3}{4} = \frac{\square}{4}$

$2\frac{7}{10} = \frac{\square}{10}$

$3\frac{5}{6} = \frac{\square}{6}$

4.  $2 = \frac{\square}{12}$

$\frac{9}{10} = \frac{\square}{50}$

$1\frac{7}{8} = \frac{\square}{8}$

$\frac{4}{5} = \frac{\square}{10}$

## Lesson 3 Adding and Subtracting Fractions

To add or subtract fractions having different denominators, rename either or both fractions so they have the same denominator. Then add or subtract.

$$\begin{array}{r} \frac{4}{5} = \frac{8}{10} \\ + \frac{1}{2} = + \frac{5}{10} \\ \hline \frac{13}{10} = 1\frac{3}{10} \end{array}$$

$$\begin{array}{r} \frac{10}{12} = \frac{10}{12} \\ - \frac{1}{3} = - \frac{4}{12} \\ \hline \frac{6}{12} = \frac{1}{2} \end{array}$$

Write each sum or difference in simplest form.

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>
1.	$\frac{2}{5}$ $+\frac{2}{5}$ <hr/>	$\frac{5}{8}$ $+\frac{1}{8}$ <hr/>	$\frac{8}{9}$ $-\frac{7}{9}$ <hr/>	$\frac{7}{8}$ $-\frac{3}{8}$ <hr/>

2.	$\frac{11}{12}$ $-\frac{3}{4}$ <hr/>	$\frac{13}{15}$ $-\frac{2}{3}$ <hr/>	$\frac{1}{2}$ $+\frac{1}{4}$ <hr/>	$\frac{1}{4}$ $+\frac{1}{5}$ <hr/>
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3.	$\frac{10}{12}$ $-\frac{1}{3}$ <hr/>	$\frac{1}{3}$ $-\frac{1}{5}$ <hr/>	$\frac{7}{10}$ $+\frac{1}{2}$ <hr/>	$\frac{4}{5}$ $+\frac{2}{4}$ <hr/>
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4.	$\frac{4}{5}$ $-\frac{2}{4}$ <hr/>	$\frac{1}{12}$ $+\frac{1}{3}$ <hr/>	$\frac{3}{4}$ $-\frac{1}{2}$ <hr/>	$\frac{5}{8}$ $-\frac{1}{6}$ <hr/>
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## Lesson 3 Problem Solving

Solve. Write each answer in simplest form.

1. Kelly purchased  $\frac{3}{8}$  of a round of gouda cheese and Noah purchased  $\frac{3}{8}$  of a round of gouda cheese. How much gouda did they purchase?

They purchased \_\_\_\_\_ of a round of gouda.

2. Sara had  $\frac{5}{6}$  of a box of raisins before she ate  $\frac{1}{6}$  of a box. How much does she have left?

She has \_\_\_\_\_ of a box of raisins left.

3. One fourth of the house was painted yesterday and one half was painted today. How much of the house was painted on those two days?

\_\_\_\_\_ of the house was painted.

4. Brandon practised his clarinet each day. He spent  $\frac{1}{8}$  of his time practising scales and  $\frac{5}{8}$  of his time practising new pieces. What fraction of his time did he spend on scales and new pieces?

\_\_\_\_\_ of his time was spent on scales and new pieces.

5. Diane bought  $\frac{3}{4}$  of a round of gouda cheese and  $\frac{1}{2}$  of a round of mozzarella cheese. How much more gouda cheese than mozzarella cheese did she buy?

She bought \_\_\_\_\_ of a round more gouda cheese.

6. Eric spent  $\frac{1}{4}$  h eating breakfast and  $\frac{1}{3}$  h showering and getting dressed. How long did he spend getting ready altogether?

Eric spent \_\_\_\_\_ h getting ready.

7. Dan power-walked for  $\frac{3}{4}$  h and jogged for  $\frac{1}{3}$  h. How long did he exercise in all?

Dan exercised for \_\_\_\_\_ h.

1.

2.

3.

4.

5.

6.

7.

# Lesson 4 Adding and Subtracting Mixed Numerals

To add or subtract mixed numerals having different denominators, rename either or both fractions so they have the same denominator. Then add or subtract.

$$\begin{array}{r} 2\frac{1}{2} = 2\frac{4}{8} \\ +3\frac{5}{8} = +3\frac{5}{8} \\ \hline 5\frac{9}{8} = 6\frac{1}{8} \end{array}$$

$$\begin{array}{r} 4\frac{2}{3} = 4\frac{8}{12} \\ -1\frac{2}{4} = -1\frac{6}{12} \\ \hline 3\frac{2}{12} = 3\frac{1}{6} \end{array}$$

Write each sum or difference in simplest form.

*a*

$$1. \begin{array}{r} 1\frac{7}{10} \\ -\frac{4}{10} \\ \hline \end{array}$$

*b*

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

*c*

$$\begin{array}{r} 2\frac{4}{7} \\ -1\frac{4}{7} \\ \hline \end{array}$$

*d*

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

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

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

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

$$\begin{array}{r} 8\frac{3}{4} \\ -2\frac{11}{12} \\ \hline \end{array}$$

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

$$\begin{array}{r} 8\frac{7}{12} \\ -2\frac{1}{6} \\ \hline \end{array}$$

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

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

$$4. \begin{array}{r} 4\frac{3}{8} \\ +1\frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 8\frac{1}{2} \\ -1\frac{1}{6} \\ \hline \end{array}$$

$$\begin{array}{r} 3\frac{2}{5} \\ +1\frac{7}{10} \\ \hline \end{array}$$

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

## Lesson 4 Problem Solving

Solve. Write each answer in simplest form.

1. The distance from Chad's house to Ryan's house is  $14\frac{1}{2}$  blocks. The distance from Chad's house to Jeff's house is  $7\frac{3}{4}$  blocks. How much farther is it from Chad's to Ryan's than from Chad's to Jeff's?

It is \_\_\_\_\_ blocks farther.

2. What is the combined distance from problem 1?

The combined distance is \_\_\_\_\_ blocks.

3. Yesterday Anne spent  $5\frac{1}{2}$  h in school,  $1\frac{3}{4}$  h playing, and  $1\frac{1}{4}$  h doing homework. How much time did she spend on these activities?

She spent \_\_\_\_\_ h.

4. It is  $6\frac{1}{4}$  blocks to the beach and  $4\frac{1}{2}$  blocks to the ballpark. How much closer is it to the ballpark than to the beach?

It is \_\_\_\_\_ blocks closer to the ballpark.

5. Lauren can run  $14\frac{7}{12}$  laps around the track in 1 h. Adam can run  $12\frac{3}{4}$  laps in 1 h. How much farther can Lauren run?

Lauren can run \_\_\_\_\_ laps farther.

6. What is the combined distance in problem 5?

The combined distance is \_\_\_\_\_ laps.

7. Joan likes to volunteer. Last week she spent  $4\frac{2}{3}$  h at a library and  $3\frac{1}{4}$  h helping at a school. How much time did she spend last week volunteering?

Joan spent \_\_\_\_\_ h volunteering.

8. Carol picked  $3\frac{1}{2}$  buckets of strawberries. Each bucket holds  $2\frac{1}{2}$  L. How many litres of strawberries did she pick?

Carol picked \_\_\_\_\_ L of strawberries.

1.

2.

3.

4.

5.

6.

7.

8.

## Lesson 5 Multiplication

$$\frac{5}{6} \times \frac{1}{3} = \frac{5 \times 1}{6 \times 3}$$

Multiply numerators.  
Multiply denominators.

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

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

$$= \underline{\hspace{2cm}}$$

$$4\frac{1}{2} \times 5\frac{2}{3} \times 1\frac{3}{5} = \frac{\overset{3}{\cancel{9}}}{2} \times \frac{17}{\underset{1}{\cancel{3}}} \times \frac{8}{5}$$

Divide a numerator and a denominator by a common factor.

$$= \frac{\overset{3}{\cancel{9}}}{2} \times \frac{17}{\underset{1}{\cancel{3}}} \times \frac{\overset{4}{\cancel{8}}}{5}$$

$$= \frac{3 \times 17 \times \underline{\hspace{1cm}}}{1 \times \underline{\hspace{1cm}} \times \underline{\hspace{1cm}}}$$

$$= \underline{\hspace{2cm}} \text{ or } \underline{\hspace{2cm}}$$

Write each product in simplest form.

*a*

1.  $\frac{3}{5} \times \frac{1}{4}$

*b*

$\frac{2}{3} \times \frac{4}{5}$

*c*

$\frac{1}{3} \times \frac{1}{5} \times \frac{1}{2}$

*d*

$\frac{3}{4} \times \frac{1}{2} \times \frac{3}{5}$

2.  $\frac{3}{10} \times \frac{2}{5}$

$\frac{2}{3} \times \frac{7}{8}$

$\frac{5}{8} \times \frac{3}{10} \times \frac{5}{6}$

$\frac{7}{12} \times \frac{6}{7} \times \frac{2}{3}$

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

$\frac{3}{5} \times \frac{5}{12}$

$\frac{11}{12} \times \frac{3}{4} \times \frac{8}{11}$

$\frac{7}{16} \times \frac{4}{5} \times \frac{5}{8}$

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

$2\frac{1}{3} \times \frac{5}{12}$

$1\frac{7}{8} \times \frac{2}{3} \times \frac{3}{4}$

$\frac{1}{2} \times 3\frac{1}{3} \times \frac{5}{6}$

5.  $\frac{3}{5} \times 3\frac{1}{3}$

$\frac{5}{6} \times 3\frac{1}{2}$

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

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

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

$5\frac{1}{2} \times 3\frac{1}{6}$

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

$6\frac{1}{2} \times 2\frac{1}{3} \times 1\frac{3}{5}$

## Lesson 5 Problem Solving

Solve each problem. Write each answer in simplest form.

1. The tank on Mr. Kent's lawn mower will hold  $\frac{3}{4}$  of a can of gasoline. Suppose the tank is  $\frac{1}{2}$  full. How much gasoline is in the tank?

\_\_\_\_\_ of a can of gasoline is in the tank.

2. Band practice lasted  $1\frac{1}{4}$  h. Two thirds of the time was spent marching. How much time was spent marching?

\_\_\_\_\_ h was spent marching.

3. An industrial machine can make  $2\frac{1}{2}$  engines an hour. How many engines will be made in  $1\frac{3}{4}$  h?

\_\_\_\_\_ engines will be made.

4. In Joshua's class,  $\frac{1}{4}$  of the students have blond hair.  $2\frac{1}{2}$  times that fraction have brown hair. What fraction of the class has brown hair?

\_\_\_\_\_ of the class has brown hair.

5. In problem 4, what fraction of the class has neither brown nor blond hair?

\_\_\_\_\_ of the class has neither brown nor blond hair.

6. Steve can run  $5\frac{1}{2}$  laps of the track in 12 min. His younger sister can run  $\frac{3}{4}$  as far in the same time. How far can Steve's sister run in 12 min?

She can run \_\_\_\_\_ laps in 12 min.

7. In problem 6, Steve ran six 12-min runs during gym class last month. How many laps did he run in all?

He ran \_\_\_\_\_ laps in all.

8. The soccer team practises  $2\frac{1}{2}$  h on each of five weekday afternoons. How many hours does the team practise each week?

The team practises \_\_\_\_\_ h each week.

1.

2.

3.

4.

5.

6.

7.

8.



## Lesson 6 Division

reciprocals

$$\frac{4}{7} \times \frac{7}{4} = 1$$

reciprocals

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

reciprocals

$$2\frac{3}{4} \times \frac{4}{11} = 1$$

If two numbers are reciprocals, their product is 1.

Multiply by the reciprocal.

$$\begin{aligned} \frac{3}{8} \div \frac{4}{5} &= \frac{3}{8} \times \frac{5}{4} \\ &= \frac{15}{32} \end{aligned}$$

To divide any number, multiply by its reciprocal.

$$\begin{aligned} 6\frac{1}{2} \div \frac{3}{4} &= \frac{13}{2} \times \underline{\hspace{2cm}} \\ &= \underline{\hspace{2cm}} \end{aligned}$$

$$\begin{aligned} \frac{2}{3} \div 1\frac{1}{2} &= \frac{2}{3} \times \underline{\hspace{2cm}} \\ &= \underline{\hspace{2cm}} \end{aligned}$$

Write each quotient in simplest form.

*a*

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

*b*

$\frac{7}{8} \div \frac{2}{3}$

*c*

$\frac{4}{5} \div \frac{4}{7}$

*d*

$\frac{5}{8} \div \frac{7}{10}$

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

$8 \div \frac{2}{3}$

$\frac{9}{10} \div 3$

$9 \div \frac{3}{5}$

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

$3\frac{1}{3} \div \frac{5}{6}$

$2\frac{1}{2} \div \frac{7}{10}$

$4\frac{1}{3} \div \frac{7}{8}$

4.  $\frac{7}{8} \div 2\frac{1}{2}$

$\frac{7}{8} \div 1\frac{3}{4}$

$\frac{5}{6} \div 2\frac{2}{3}$

$\frac{3}{4} \div 1\frac{4}{5}$

5.  $2 \div 1\frac{7}{8}$

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

$6 \div 1\frac{1}{8}$

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

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

$3\frac{1}{4} \div 1\frac{7}{8}$

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

$5\frac{1}{4} \div 1\frac{1}{8}$

## Lesson 6 Problem Solving

Solve. Write each answer in simplest form.

1. Football practice lasted  $2\frac{1}{2}$  h. An equal amount of time was spent on blocking, tackling, passing, and kicking. How much time was spent on each?

\_\_\_\_\_ h was spent on each.

2. Three-fourths of a can of gasoline was poured into four containers. Each container held the same amount. How much gasoline was poured into each container?

\_\_\_\_\_ of a can was poured into each container.

3. Suppose a motorboat uses 1 L of fuel in  $1\frac{1}{4}$  h. How many litres of fuel will the boat use in 10 h?

The boat will use \_\_\_\_\_ L of fuel in 10 h.

4. Due to a heavy rain, the water level on a lake was rising 1 cm every  $\frac{2}{3}$  h. How much will the water level rise in  $1\frac{1}{3}$  h?

The water level will rise \_\_\_\_\_ cm in  $\frac{3}{4}$  h.

5. It takes Alyssa  $\frac{3}{4}$  h to walk to school and back. How long does it take her to walk one way?

It takes her \_\_\_\_\_ h.

6. It takes  $\frac{1}{4}$  h for 1 L of a chemical to be filtered. How many litres can be filtered in  $2\frac{1}{2}$  h?

\_\_\_\_\_ L can be filtered.

7. In problem 6, how many litres can be filtered in  $3\frac{3}{4}$  h?

\_\_\_\_\_ L can be filtered.

8. A flight leaves the airport every  $1\frac{1}{4}$  min. How many flights will leave each hour?

\_\_\_\_\_ flights will leave each hour.

1.

2.

3.

4.

5.

6.

7.

8.

# CHAPTER 2 PRACTICE TEST

## Fractions

Write each fraction in simplest form.

$$1. \quad \overset{a}{\frac{6}{15}} =$$

$$\overset{b}{\frac{14}{85}} =$$

$$\overset{c}{\frac{3}{12}} =$$

$$\overset{d}{\frac{3}{30}} =$$

Rename.

$$2. \quad \frac{3}{4} = \frac{\quad}{20}$$

$$\frac{7}{8} = \frac{21}{\quad}$$

$$5 = \frac{\quad}{3}$$

$$3\frac{1}{8} = \frac{\quad}{8}$$

Write each sum, difference, product, or quotient in simplest form.

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

$$\begin{array}{r} 2\frac{4}{5} \\ + 3\frac{9}{10} \\ \hline \end{array}$$

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

$$\begin{array}{r} 3\frac{5}{6} \\ 5\frac{7}{8} \\ + 1\frac{3}{4} \\ \hline \end{array}$$

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

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

$$\begin{array}{r} 7\frac{2}{3} \\ - 1\frac{2}{5} \\ \hline \end{array}$$

$$\begin{array}{r} 4\frac{1}{5} \\ - 2\frac{7}{20} \\ \hline \end{array}$$

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

$$\frac{5}{7} \times \frac{3}{10} =$$

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

$$3\frac{5}{9} \times 3\frac{3}{8} =$$

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

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

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

$$8\frac{5}{9} \div 1\frac{1}{10} =$$

**CHAPTER 3 PRETEST**  
Pre-Algebra Equations

Solve each equation.

*a*

1.  $2x = 12$

*b*

$5y = 25$

*c*

$6z = 96$

2.  $\frac{d}{3} = 5$

$\frac{e}{6} = 7$

$\frac{f}{4} = 13$

3.  $r + 7 = 12$

$s + 3 = 25$

$t + 12 = 20$

4.  $g - 4 = 8$

$h - 5 = 12$

$j - 15 = 15$

5.  $72 = 4m$

$8n = 28 + 28$

$9 = \frac{p}{5}$

6.  $18 = a + 6$

$b + 4 = 12 + 3$

$13 = c - 4$

7.  $u - 12 = 23 + 7$

$v + 8 = 8$

$w - 8 = 8$