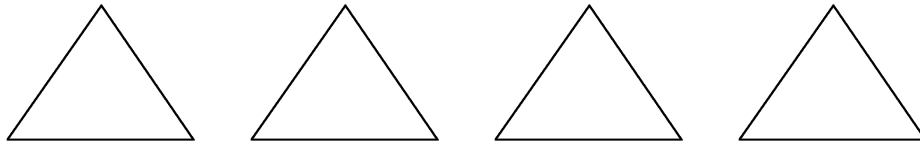


Unit Three

Multiplying & Dividing Fractions

Topic A: Multiplying Fractions

Example A: What is $\frac{1}{4}$ of 4? Here are four equal shapes:



Shade in $\frac{1}{4}$ of the shapes.

You should have one shape shaded.

You have just done this multiplication question: $\frac{1}{4} \times 4 = 1$ or $\frac{1}{4}$ of 4 = 1

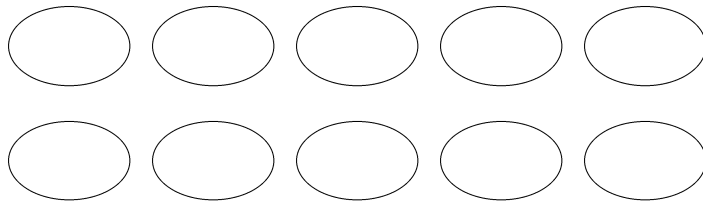
Example B: What is $\frac{2}{5}$ of 5? Draw 5 equal shapes.



Shade in $\frac{2}{5}$ of the shapes.

You should have shaded in two shapes. $\frac{2}{5} \times 5 = 2$ or $\frac{2}{5}$ of 5 = 2

Example C: What is $\frac{1}{2}$ of 10? Here are 10 equal shapes:



Shade in $\frac{1}{2}$ of the shapes.

Did you shade 5? $\frac{1}{2} \times 10 = 5$ or $\frac{1}{2}$ of 10 = 5

Example D: What is $\frac{1}{4}$ of 8?



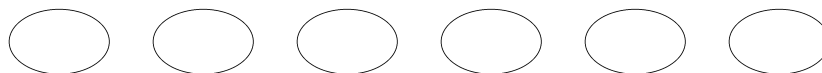
Shade $\frac{1}{4}$ of the shapes.

First, divide the 8 shapes into 4 equal groups.

Now shade 1 group.

$$\frac{1}{4} \times 8 = 2 \text{ or } \frac{1}{4} \text{ of } 8 = 2$$

Example E: What is $\frac{2}{3}$ of 6?



Shade $\frac{2}{3}$ of the shapes.

First, divide the 6 shapes into 3 equal groups.

Now shade 2 of the groups.

$$\frac{2}{3} \times 6 = 4$$

These examples calculate **a fraction of a whole number**. Some everyday examples, with the answers, are listed:

A. I burned $\frac{1}{2}$ of the hamburger patties. There were 8 patties. How many patties were burned?

$$\frac{1}{2} \text{ of } 8 \text{ patties} = \frac{1}{2} \times 8 = 4 \text{ burned patties}$$

B. Mary only finished $\frac{3}{4}$ of the test. The test had 20 questions. How many questions did Mary do?

$$\frac{3}{4} \text{ of test} = \frac{3}{4} \text{ of } 20 \text{ questions} = \frac{3}{4} \times 20 = 15 \text{ questions}$$

C. $\frac{1}{5}$ of the employees have been laid off. There are 50 employees. How many have been laid off?

$$\frac{1}{5} \text{ of } 50 \text{ employees} = \frac{1}{5} \times 50 = 10 \text{ employees laid off}$$

D. We spend $\frac{1}{4}$ of our monthly take home pay on rent. Our take home pay is \$1600. How much is the rent?

$$\frac{1}{4} \text{ of pay} = \frac{1}{4} \text{ of } \$1600 = \frac{1}{4} \times \$1600 = \$400 \text{ on rent}$$

Exercise One

Write the multiplication equation you would use to find the fraction of the whole number. You **do not** have to calculate the answers.

a) More than $\frac{1}{3}$ of the students are single parents. There are 27 students. How many students are single parents?

b) We have ten houses on our street. $\frac{2}{5}$ of the houses have cedar shake roofs. How many houses have cedar shake roofs?

c) The guinea hen hatched 16 chicks. The ravens snatched $\frac{3}{8}$ of the chicks. How many chicks did the ravens take?

Answers to Exercise One

$$\text{a) } \frac{1}{3} \times 27 = 9$$

$$\text{b) } \frac{2}{5} \times 10 = 4$$

$$\text{c) } \frac{3}{8} \times 16 = 6$$

Now let's look at multiplying a fraction by a whole number.

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

$$3 \times \frac{4}{5} = \square$$

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

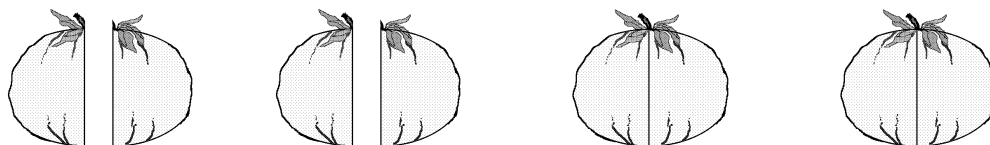
The order of writing the multiplication equation will not change the product, but it does change how we understand what the numbers mean. Again, look at the examples:

Example A:

$4 \times \frac{1}{2}$ means you have four halves.

Imagine tomatoes cut in half and you have 4 halves.

How many tomatoes would you have altogether?



4 halves = 2 tomatoes

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

Example B:

$3 \times \frac{1}{4}$ means that you have $\frac{1}{4}$ of something three times. Imagine that you spent $\frac{1}{4}$ of an hour exercising in the morning, $\frac{1}{4}$ of an hour exercising after lunch, and $\frac{1}{4}$ of an hour exercising in the evening.

How long did you exercise?

$$3 \times \frac{1}{4} \text{ hour} = \frac{3}{4} \text{ hour} = \text{three quarters of an hour}$$

Here are some everyday examples of multiplying a fraction by a whole number:

C. There are six boxes of cereal open in the cupboard and each one is $\frac{1}{3}$ full.

It is the same as having _____ full boxes of cereal.

$$6 \times \frac{1}{3} \text{ box of cereal} = \frac{6}{3} = 2 \text{ boxes of cereal.}$$

D. We have three packs of ground beef that are $\frac{1}{2}$ full. How much meat is there altogether?

$$3 \times \frac{1}{2} \text{ pack of meat} = \frac{3}{2} = 1\frac{1}{2} \text{ packs of meat.}$$

E. How much gas do we have for the motorboat? There are 4 jerry cans (cans for carrying gas), each about $\frac{1}{4}$ full.

$$4 \times \frac{1}{4} \text{ can of gas} = \frac{4}{4} = 1 \text{ can of gas}$$

Exercise Two

Write the multiplication equation you would use to multiply a fraction by a whole number. You **do not** have to calculate the answer.

a) You say I should buy more shampoo but this bathroom has five bottles of the stuff lying around! Each bottle is about $\frac{1}{8}$ full. How much shampoo is there altogether?

b) When we double a recipe we multiply each ingredient by 2. Double a recipe that uses $\frac{1}{4}$ teaspoon of nutmeg. How much nutmeg is needed?

Answers to Exercise Two

a) $5 \times \frac{1}{8} = \frac{5}{8}$

b) $\frac{1}{4} \times 2 = \frac{1}{2}$

Multiplying a Whole Number and a Proper Fraction

Any whole number can be written with a denominator of 1. (This does not change the value of the whole number because a number divided by one is still the same whole number in the end.)

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

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

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

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

$$100 = \frac{100}{1} \quad \text{and so on.}$$

To multiply a whole number and a fraction, do this:

Step 1 - Write the whole number as a fraction with a denominator of 1.

Step 2 - Multiply the numerator by the numerator.

Step 3 - Multiply the denominator by the denominator.

Step 4 - Simplify the product.

Example A: $\frac{4}{5} \times 6 = \square$

Step 1 Write the whole number with a denominator of 1.

$$\frac{4}{5} \times \frac{6}{1} = \square$$

Step 2 Multiply the numerators.

$$\frac{4}{5} \times \frac{6}{1} = \frac{24}{5}$$

Step 3 Multiply the denominators.

$$\frac{4}{5} \times \frac{6}{1} = \frac{24}{5}$$

Step 4 Simplify the product.

Since
$$\begin{array}{r} 4 \\ 5 \overline{)24} \\ \underline{-20} \\ 4 \end{array}$$
 $\frac{24}{5} = 4 \frac{4}{5}$ Then $\frac{4}{5} \times 6 = 4 \frac{4}{5}$

Example B: $\frac{1}{2} \times 3 = \square$

Step 1 $\frac{1}{2} \times \frac{3}{1} = \square$

Step 2 & 3 $\frac{1}{2} \times \frac{3}{1} = \frac{3}{2}$

Step 4

Since
$$\begin{array}{r} 1 \\ 2 \overline{)3} \\ \underline{-2} \\ 1 \end{array}$$
 $\frac{3}{2} = 1 \frac{1}{2}$ Then $\frac{1}{2} \times 3 = 1 \frac{1}{2}$

Example C: $\frac{2}{3} \times 4 = \square$

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

$$\begin{array}{r} 2 \\ 3 \overline{)8} \\ \underline{-6} \\ 2 \end{array}$$

Example D: $7 \times \frac{3}{4} = \square$

$$\frac{7}{1} \times \frac{3}{4} = \frac{21}{4} = 5 \frac{1}{4}$$

$$\begin{array}{r} 5 \\ 4 \overline{)21} \\ \underline{-20} \\ 1 \end{array}$$

Exercise Three

Multiply these fractions. Write your answers in lowest terms.

a) $\frac{3}{5} \times 10 =$

b) $\frac{1}{10} \times 8 =$

$$\frac{3}{5} \times \frac{10}{1} = \frac{30}{5} = 6$$

$$\begin{array}{r} 6 \\ 5 \overline{)30} \\ \underline{-30} \\ 0 \end{array}$$

$$\frac{1}{10} \times \frac{8}{1} = \frac{8}{10} = \frac{8 \div 2}{10 \div 2} = \frac{4}{5}$$

c) $\frac{2}{3} \times 9 =$

d) $4 \times \frac{1}{6} =$

e) $1 \times \frac{3}{8} =$

f) $\frac{1}{2} \times 5 =$

g) $5 \times \frac{2}{3} =$

h) $4 \times \frac{2}{5} =$

i) $\frac{1}{2} \times 8 =$

j) $\frac{3}{8} \times 8 =$

k) $6 \times \frac{1}{5} =$

l) $6 \times \frac{3}{4} =$

m) $\frac{3}{2} \times 12 =$

n) $7 \times \frac{2}{3} =$

o) $\frac{3}{8}$ of 4 =

p) $\frac{5}{6}$ of 3 =

q) $\frac{7}{8}$ of 3

r) $\frac{5}{7}$ of 5

Answers to Exercise Three

c) 6

d) $\frac{2}{3}$

e) $\frac{3}{8}$

f) $2\frac{1}{2}$

g) $3\frac{1}{3}$

h) $1\frac{3}{5}$

i) 4

j) 3

k) $1\frac{1}{5}$

l) $4\frac{1}{2}$

m) 18

n) $4\frac{2}{3}$

o) $1\frac{1}{2}$

p) $2\frac{1}{2}$

q) $2\frac{5}{8}$

r) $3\frac{4}{7}$

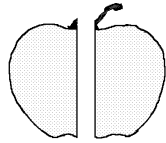
Multiplying Common Fractions Together

To multiply common fractions, multiply the numerator times the numerator and then the denominator times the denominator and simplify the answer. (Write the answer in lowest terms.)

The method is easy, but let's take a look at what you're doing.

Example A: $\frac{1}{2} \times \frac{1}{2} = \frac{1}{2}$ of $\frac{1}{2} = \square$

Take an apple and cut it in half.



Now cut one of the halves in half. What fraction of the whole apple do you get?

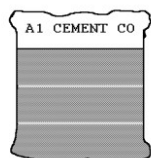


You get $\frac{1}{4}$ of the apple.

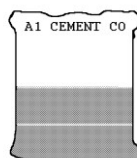
$$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$

Example B: $\frac{1}{3} \times \frac{3}{4} = \frac{1}{3}$ of $\frac{3}{4} = \square$

You borrowed $\frac{3}{4}$ of a bag of cement from your neighbour. You used $\frac{1}{3}$ of the cement and gave the bag back to him. How much of your neighbour's bag of cement did you use?



$\frac{3}{4}$ of a bag



$\frac{2}{4}$ of a bag left

use $\frac{1}{3}$ of this

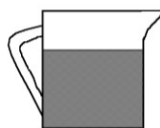
$$\frac{1}{3} \text{ of } \frac{3}{4} = \frac{3}{12} = \frac{1}{4} \text{ of the bag used}$$

used $\frac{1}{4}$ of a bag

Example C: $\frac{1}{2}$ of $\frac{2}{3} = \frac{1}{2} \times \frac{2}{3} = \square$

You are making a marinade to tenderize that cheap steak you bought. It calls for $\frac{2}{3}$ cup of beer. You only need $\frac{1}{2}$ of the amount the recipe makes and it would be a shame to waste the beer. How much beer is needed?

$\frac{1}{2}$ of $\frac{2}{3}$ cup =



$\frac{1}{3}$ cup

$$\frac{1}{2} \text{ of } \frac{2}{3} \text{ cup of beer} = \frac{1}{2} \times \frac{2}{3} = \frac{2}{6} = \frac{2}{6} \left(\begin{smallmatrix} +2 \\ -2 \end{smallmatrix} \right) = \frac{1}{3} \text{ cup of beer}$$

Exercise Four

Multiply these fractions. Write the answers in lowest terms.

a) $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

b) $\frac{1}{2} \times \frac{3}{2} = \underline{\hspace{2cm}}$

c) $\frac{1}{2} \times \frac{4}{2} = \underline{\hspace{2cm}}$

d) $\frac{1}{5} \times \frac{2}{3} = \underline{\hspace{2cm}}$

e) $\frac{3}{5} \times \frac{2}{4} = \underline{\hspace{2cm}}$

f) $\frac{2}{3} \times \frac{2}{3} = \underline{\hspace{2cm}}$

g) $\frac{2}{5} \times \frac{3}{5} = \underline{\hspace{2cm}}$

h) $\frac{5}{7} \times \frac{3}{4} = \underline{\hspace{2cm}}$

i) $\frac{5}{6} \times \frac{1}{4} = \underline{\hspace{2cm}}$

j) $\frac{3}{4} \times \frac{2}{3} = \underline{\hspace{2cm}}$

k) $\frac{5}{10} \times \frac{1}{4} = \underline{\hspace{2cm}}$

l) $\frac{1}{8} \times \frac{2}{3} = \underline{\hspace{2cm}}$

m) $\frac{1}{4} \times \frac{1}{8} = \underline{\hspace{2cm}}$

n) $\frac{7}{9} \times \frac{1}{7} = \underline{\hspace{2cm}}$

o) $\frac{8}{10} \times \frac{2}{3} = \underline{\hspace{2cm}}$

p) $\frac{1}{9} \times \frac{2}{3} = \underline{\hspace{2cm}}$

Answers to Exercise Four

b) $\frac{3}{4}$	c) 1	d) $\frac{2}{15}$	e) $\frac{3}{10}$	f) $\frac{4}{9}$	g) $\frac{6}{25}$
h) $\frac{15}{28}$	i) $\frac{5}{24}$	j) $\frac{1}{2}$	k) $\frac{1}{8}$	l) $\frac{1}{12}$	m) $\frac{1}{32}$
n) $\frac{1}{9}$	o) $\frac{8}{15}$	p) $\frac{2}{27}$			

Simplify Before Multiplying

Review Factors and Expressing Fractions in Lower Terms in Topic B. Multiplication of common fractions can be made much easier if you simplify before you multiply. In a multiplication question any numerator and any denominator may be divided by a common factor. This is sometimes called cancelling.

Step 1 Look to see if any numerator and any denominator have common factors.

Choose the greatest common factor.

Step 2 Divide that numerator and that denominator by the greatest common factor (G.C.F.). Be sure to cross out the old numerals and put in the lower terms.

Step 3 Multiply the numerators (Be sure to use the lower term!) and then the denominators.

Step 4 Simplify.

Example A: $\frac{3}{4} \times \frac{1}{6} = \square$

Step 1 Numerator 3 and denominator 6 have a common factor of 3.

Step 2 $\frac{\cancel{3}^1}{4} \times \frac{1}{\cancel{6}_2}$ $3 \div 3 = 1$ and $6 \div 3 = 2$

Step 3 $\frac{\cancel{3}^1}{4} \times \frac{1}{\cancel{6}_2} = \frac{1}{8}$

Step 4 The answer is already in lowest terms.

Example B: $\frac{3}{4} \times \frac{8}{9} = \square$

Step 1 Numerator 3 and denominator 9 have a common factor of 3, AND numerator 8 and denominator 4 have common factors of 2 and 4. The G.C.F. is 4.

Step 2 $\frac{\cancel{3}^1}{\cancel{4}_1} \times \frac{\cancel{8}^2}{\cancel{9}_3}$ $3 \div 3 = 1$, $9 \div 3 = 3$, $8 \div 4 = 2$, and $4 \div 4 = 1$

Step 3 $\frac{\cancel{3}^1}{\cancel{4}_1} \times \frac{\cancel{8}^2}{\cancel{9}_3} = \frac{2}{3}$

Step 4 The answer is already in lowest terms.



It is easier to simplify (or cancel) before you multiply because the numbers are smaller and the factors easier to find. You may make fewer multiplying mistakes, too.

Example C: $\frac{3}{8} \times 12 = \square$

$$\frac{3}{8} \times \frac{12}{1} \quad (\text{Numerator 12 and denominator 8 have a G.C.F. of 4})$$

$$\frac{3}{\cancel{8}_2} \times \frac{\cancel{12}^3}{1} = \frac{9}{2} = 4\frac{1}{2}$$

Exercise Five

Find the products. Simplify before multiplying when possible.

a) $\frac{5}{6} \times \frac{4}{5} = \underline{\hspace{2cm}}$

b) $\frac{3}{5} \times \frac{5}{9} = \underline{\hspace{2cm}}$

$$\frac{\cancel{3}^1}{\cancel{6}_3} \times \frac{\cancel{4}^2}{\cancel{2}_1} = \frac{2}{3}$$

$$\frac{\cancel{3}^1}{\cancel{3}_1} \times \frac{\cancel{5}^1}{\cancel{9}_3} = \frac{1}{3}$$

c) $\frac{3}{16} \times \frac{8}{9} = \underline{\hspace{2cm}}$

d) $\frac{7}{9} \times \frac{3}{7} = \underline{\hspace{2cm}}$

e) $\frac{2}{5} \times \frac{5}{8} = \underline{\hspace{2cm}}$

f) $\frac{4}{5} \times \frac{7}{8} = \underline{\hspace{2cm}}$

g) $\frac{4}{21} \times \frac{7}{8} = \underline{\hspace{2cm}}$

h) $\frac{3}{8} \times \frac{4}{9} = \underline{\hspace{2cm}}$

i) $\frac{9}{10} \times \frac{2}{3} = \underline{\hspace{2cm}}$

j) $\frac{3}{10} \times \frac{5}{12} = \underline{\hspace{2cm}}$

$$\text{k) } \frac{2}{5} \times \frac{10}{7} = \underline{\hspace{2cm}}$$

$$\text{l) } \frac{5}{8} \times 16 = \underline{\hspace{2cm}}$$

$$\text{m) } \frac{3}{4} \times \frac{1}{12} = \underline{\hspace{2cm}}$$

$$\text{n) } \frac{7}{8} \times \frac{12}{21} = \underline{\hspace{2cm}}$$

A multiplication question may have more than two fractions to be multiplied, such as

$$\frac{2}{3} \times \frac{9}{10} \times \frac{5}{8} = \square$$

Cancel any numerator with any denominator and then multiply all numerators together and then all denominators together. Study this worked example:

Numerator 2 and denominator 8 have a common factor of 2, numerator 9 and denominator 3 have a common factor of 3, AND numerator 5 and denominator 10 have a common factor of 5.

$$\frac{\cancel{2}^1}{\cancel{3}_1} \times \frac{\cancel{9}^3}{\cancel{10}_2} \times \frac{\cancel{5}^1}{\cancel{8}_4} = \frac{3}{8}$$

$$\text{o) } \frac{8}{9} \times \frac{3}{4} = \underline{\hspace{2cm}}$$

$$\text{p) } \frac{1}{2} \times \frac{2}{5} \times \frac{5}{7} = \underline{\hspace{2cm}}$$

$$\text{q) } \frac{3}{5} \times \frac{2}{3} \times \frac{1}{2} = \underline{\hspace{2cm}}$$

$$\text{r) } 2 \times \frac{3}{4} \times \frac{5}{12} = \underline{\hspace{2cm}}$$

$$\text{s) } \frac{4}{9} \times \frac{3}{5} \times \frac{15}{16} = \underline{\hspace{2cm}}$$

$$\text{t) } \frac{2}{3} \times \frac{3}{4} \times \frac{8}{9} = \underline{\hspace{2cm}}$$

Answers to Exercise Five

- | | | | | | |
|------------------|------------------|------------------|-------------------|-------------------|------------------|
| c) $\frac{1}{6}$ | d) $\frac{1}{3}$ | e) $\frac{1}{4}$ | f) $\frac{7}{10}$ | g) $\frac{1}{6}$ | h) $\frac{1}{6}$ |
| i) $\frac{3}{5}$ | j) $\frac{1}{8}$ | k) $\frac{4}{7}$ | l) 10 | m) $\frac{1}{16}$ | n) $\frac{1}{2}$ |
| o) $\frac{2}{3}$ | p) $\frac{1}{7}$ | q) $\frac{1}{5}$ | r) $\frac{5}{8}$ | s) $\frac{1}{4}$ | t) $\frac{4}{9}$ |

Multiplying Mixed Numbers

Review Renaming Mixed Numbers as Improper Fractions in Unit One. To multiply with a mixed number, follow these steps:

- Step 1** Rename any mixed numbers as improper fractions.
- Step 2** Write any whole number by itself as an improper fraction with a denominator of 1.
- Step 3** Rewrite the question with the new improper fraction(s).
- Step 4** Simplify (cancel).
- Step 5** Multiply the numerator by the numerator.
Multiply the denominator by the denominator.
- Step 6** The answer will often be an improper fraction. Rename improper fractions as mixed numbers and be sure any fraction is in lowest terms.

Example A: $2\frac{3}{4} \times \frac{1}{3} = \square$

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

Step 2 No whole numbers by themselves.

Step 3 Question is rewritten as $\frac{11}{4} \times \frac{1}{3} = \square$

Step 4 Simplify – the fraction has no common factors. Can't simplify.

Step 5 $\frac{11}{4} \times \frac{1}{3} = \frac{11}{12}$

Step 6 Already in lowest terms.

Example B: $1\frac{1}{5} \times 2\frac{2}{3} = \square$

Step 1 $1\frac{1}{5} = \frac{6}{5}$ and $2\frac{2}{3} = \frac{8}{3}$

Step 2 No whole numbers by themselves.

Step 3 Question is rewritten as $\frac{6}{5} \times \frac{8}{3} = \square$

Step 4 and 5 $\frac{\cancel{6}^2}{5} \times \frac{8}{\cancel{3}_1} = \frac{16}{5}$ (an improper fraction)

Step 6 $\frac{16}{5} = 3\frac{1}{5}$
$$\begin{array}{r} 5 \overline{)16} \\ \underline{15} \\ 1 \end{array}$$

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

Example C: $4 \times 2\frac{5}{6} = \square$

Step 1 and 2 $4 = \frac{4}{1}$ and $2\frac{5}{6} = \frac{17}{6}$

Step 3 The question is rewritten as $\frac{4}{1} \times \frac{17}{6} = \square$

Step 4, 5, and 6 $4 \times 2\frac{5}{6} = \frac{\cancel{4}^2}{1} \times \frac{17}{\cancel{6}_3} = \frac{34}{3} = 11\frac{1}{3}$

Example D: $\frac{2}{3} \times 12 \times 3\frac{1}{2} = \square$

$$\frac{\cancel{2}^1}{\cancel{3}_1} \times \frac{\cancel{12}^4}{1} \times \frac{7}{\cancel{2}_1} = \frac{28}{1} = 28$$

Remember to only skip steps when you are totally confident in your method.
Writing out the steps will help you to get the answer right more often.

Exercise Six

Find the products.

a) $3\frac{1}{2} \times 6 =$ _____

b) $3 \times 1\frac{1}{5} =$ _____

$\frac{7}{2} \times \frac{6^3}{1} = 21$

$\frac{3}{1} \times \frac{6}{5} = \frac{18}{5} = 3\frac{3}{5}$

c) $\frac{3}{14} \times 2\frac{1}{6} \times 12 =$ _____

d) $9 \times 3\frac{1}{3} =$ _____

e) $3 \times 4\frac{1}{3} =$ _____

f) $2\frac{3}{4} \times 8 =$ _____

g) $1\frac{2}{5} \times 15 =$ _____

h) $1\frac{2}{3} \times 6 =$ _____

i) $3\frac{3}{8} \times 8 =$ _____

j) $7 \times 2\frac{1}{7} \times 1\frac{2}{3} =$ _____

k) $4 \times 2\frac{1}{2} =$ _____

l) $10 \times 3\frac{1}{4} =$ _____

m) $2\frac{1}{4} \times 8 =$ _____

n) $6 \times 1\frac{1}{3} \times \frac{1}{2} =$ _____

o) $4\frac{1}{3} \times 9 =$ _____

p) $\frac{3}{8} \times 1\frac{2}{5} \times 10 =$ _____

q) $3 \times 2\frac{2}{3} =$ _____

r) $3\frac{3}{4} \times 8 =$ _____

s) $7 \times 4\frac{1}{7} =$ _____

t) $3\frac{1}{5} \times 10 =$ _____

u) $16 \times 3\frac{1}{2} =$ _____

v) $5 \times 2\frac{1}{5} \times \frac{1}{4} =$ _____

w) $6\frac{1}{3} \times 3 =$ _____

x) $8 \times 4\frac{1}{8} =$ _____

y) $3 \times 1\frac{1}{3} =$ _____

z) $8 \times 3\frac{1}{4} =$ _____

Answers to Exercise Six

c) $5\frac{4}{7}$	d) 30	e) 13	f) 22	g) 21	h) 10
i) 27	j) 25	k) 10	l) $32\frac{1}{2}$	m) 18	n) 4
o) 39	p) $5\frac{1}{4}$	q) 8	r) 30	s) 29	t) 32
u) 56	v) $2\frac{3}{4}$	w) 19	x) 33	y) 4	z) 26

Exercise Seven

This is extra practice if you feel you need it.

a) $1\frac{1}{2} \times \frac{2}{3} =$ _____

b) $1\frac{1}{2} \times 2\frac{3}{4} =$ _____

c) $1\frac{1}{4} \times 3\frac{1}{2} =$ _____

d) $2\frac{1}{3} \times \frac{4}{7} =$ _____

e) $\frac{1}{3} \times 5\frac{1}{2} =$ _____

f) $\frac{1}{8} \times 3\frac{3}{4} =$ _____

g) $1\frac{1}{6} \times 1\frac{5}{7} =$ _____

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

i) $\frac{1}{2} \times 2\frac{1}{2} =$ _____

j) $\frac{2}{3} \times 3\frac{3}{4} =$ _____

k) $7\frac{1}{4} \times 3\frac{1}{3} =$ _____

l) $\frac{3}{5} \times 1\frac{1}{4} =$ _____

m) $7\frac{1}{3} \times \frac{3}{8} =$ _____

n) $\frac{5}{7} \times 35 =$ _____

o) $2\frac{1}{4} \times 3\frac{1}{2} =$ _____

p) $4\frac{2}{3} \times 4\frac{1}{2} =$ _____

q) $3\frac{1}{5} \times \frac{5}{6} =$ _____

r) $7\frac{2}{3} \times \frac{3}{8} =$ _____

s) $6 \times \frac{2}{3} =$ _____

t) $3\frac{1}{3} \times 4\frac{1}{4} =$ _____

u) $8 \times \frac{5}{6} =$ _____

v) $8\frac{1}{3} \times \frac{5}{6} =$ _____

w) $4\frac{1}{5} \times 2\frac{1}{2} =$ _____

x) $3\frac{3}{4} \times \frac{4}{5} =$ _____

y) $\frac{3}{4} \times 6\frac{1}{2} =$ _____

z) $3\frac{1}{2} \times 4\frac{2}{3} =$ _____

Answers to Exercise Seven

- | | | | | | |
|-------------------|--------------------|-------------------|---------------------|--------------------|--------------------|
| a) 1 | b) $4\frac{1}{8}$ | c) $4\frac{3}{8}$ | d) $1\frac{1}{3}$ | e) $1\frac{5}{6}$ | f) $\frac{15}{32}$ |
| g) 2 | h) 7 | i) $1\frac{1}{4}$ | j) $2\frac{1}{2}$ | k) $24\frac{1}{6}$ | l) $\frac{3}{4}$ |
| m) $2\frac{3}{4}$ | n) 25 | o) $7\frac{7}{8}$ | p) 21 | q) $2\frac{2}{3}$ | r) $2\frac{7}{8}$ |
| s) 4 | t) $14\frac{1}{6}$ | u) $6\frac{2}{3}$ | v) $6\frac{17}{18}$ | w) $10\frac{1}{2}$ | x) 3 |
| y) $4\frac{7}{8}$ | z) $16\frac{1}{3}$ | | | | |

Problems using Multiplication of Common Fractions

The following exercise gives some typical word problems for multiplication of fractions. The type of wording is similar for decimals and common fractions.

Remember this important word:

A fraction **of** some number means to **multiply**

Example: $\frac{2}{3}$ of her money means $\frac{2}{3} \times$ amount of the money

$\frac{1}{4}$ of the children means $\frac{1}{4} \times$ number of children

These techniques may help you through the problem solving steps when you're working with common fractions:

- Look for key words.
- Look for familiar patterns in the wording.
- Round fractions to whole numbers to estimate and to try to make sense of the problem.
- Draw a sketch or diagram of what the problem is describing.

List key words which point to multiplication:

Exercise Eight

a) Maria was angry with her children because they had eaten $\frac{2}{3}$ of the 24 cupcakes she had made to take to a meeting. How many cupcakes did the kids eat?

b) Double this recipe for Awesome Chocolate Chip Cookies

$\frac{2}{3}$ cup margarine _____

$\frac{5}{8}$ cup white sugar _____

2 eggs _____

$1\frac{1}{2}$ cups flour _____

1 teaspoon baking soda _____

$\frac{7}{8}$ cup chocolate chips _____

$\frac{2}{3}$ cup vegetable shortening _____

$\frac{5}{8}$ cup brown sugar _____

$1\frac{3}{4}$ teaspoons vanilla _____

1 cup rolled oats _____

$\frac{1}{4}$ teaspoon salt. _____

Cream margarine and shortening well, blend in sugar. Beat in eggs and vanilla. Add dry ingredients, blending very thoroughly. Add chocolate chips and mix. Drop by spoonful onto cookie sheet; cookies will flatten during cooking. Bake in 350° F. oven for 10 to 12 minutes.

c) Marni is trying to gradually cut down the amount of coffee she drinks. Right now she allows herself $\frac{3}{4}$ of a cup of coffee at breakfast, $\frac{3}{4}$ cup at morning break time, and $\frac{3}{4}$ cup at lunch and another $\frac{3}{4}$ cup after dinner. How many cups of coffee is she drinking per day right now?

d) Sam's truck uses $\frac{1}{3}$ of a tank of gas every time he drives to his girlfriend's house. His tank holds 75 litres. How many litres of gas does he use to drive to his girlfriend's place?

e) If you do math for $1\frac{1}{2}$ hours every day you are at school, how many hours do you spend on math per month if you come to school twenty days in a month?

f) David was complaining that his car insurance was the same price as $\frac{7}{8}$ of the cost of his car! His car cost \$1200. What did he pay for car insurance?

g) Sue's family will eat all of one recipe of her favourite pancakes, and be asking for more, but they will not eat a whole doubled recipe. Help her increase this amazing recipe by $1\frac{1}{2}$ times.

$1\frac{1}{2}$ cups flour _____

$1\frac{1}{2}$ cups plain yogurt _____

$1\frac{1}{2}$ tsp. baking soda _____

$\frac{1}{2}$ cup milk _____

$\frac{3}{4}$ tsp. baking powder _____

zest of one orange _____

1 Tbsp. brown sugar _____

$\frac{1}{2}$ cup of fresh orange juice _____

$\frac{1}{4}$ tsp. salt _____

1 Tbsp. butter or oil for cooking _____

2 eggs _____

Mix dry ingredients first, then mix all the wet ingredients together. Mix all the wet ingredients into the dry. Cook and enjoy.

h) Justine was building a dog shed. She spent $\frac{1}{3}$ of an hour on the project every evening for 8 days in a row. How much time did she spend on the project?

i) A park is $1\frac{3}{4}$ km wide and $3\frac{5}{6}$ km long. What is the area of the park?

j) Kaz painted a solid colour background on 3 signs. Each sign was $10\frac{1}{2}$ cm high and $35\frac{3}{4}$ cm long. How much area did she cover in paint?

Answers to Exercise Eight

a) 16 cupcakes

b) Awesome Chocolate Chip Cookies (Doubled)

$1\frac{1}{3}$ cup margarine $1\frac{1}{3}$ cup vegetable shortening

$1\frac{1}{4}$ cup white sugar $1\frac{1}{4}$ cup brown sugar

4 eggs $3\frac{1}{2}$ teaspoons vanilla

3 cups flour 2 cups rolled oats

2 teaspoons baking soda $\frac{1}{2}$ teaspoon salt

$1\frac{3}{4}$ cup chocolate chips

c) 3 cups

d) 25 L

e) 30 hours

f) \$1 050.00

g) $2\frac{1}{4}$ cups flour

$2\frac{1}{4}$ cups plain yogurt

$2\frac{1}{4}$ tsp. baking soda

$\frac{3}{4}$ cups milk

$1\frac{1}{8}$ tsp. baking powder

zest of one and a half oranges

$1\frac{1}{2}$ Tbsp. brown sugar

$\frac{3}{4}$ cup of fresh orange juice

$\frac{3}{8}$ tsp. salt

$1\frac{1}{2}$ Tbsp. butter or oil for cooking

3 eggs

h) $2\frac{2}{3}$ hours

i) $6\frac{17}{24}$ km²

j) $1126\frac{1}{8}$ cm²

A. Find the products.**10 marks**

a) $\frac{1}{4} \times \frac{3}{8} =$

b) $\frac{3}{8} \times \frac{5}{6} =$

c) $\frac{7}{9} \times \frac{3}{14} =$

d) $\frac{1}{4} \times 12 =$

e) $5 \times \frac{4}{9} =$

f) $1\frac{1}{4} \times \frac{4}{5} =$

g) $\frac{3}{5}$ of $7\frac{2}{9} =$

h) $6 \times 1\frac{2}{3} =$

i) $1\frac{1}{2} \times 1\frac{3}{5} =$

j) $2\frac{7}{8} \times 1\frac{9}{10} =$

B. Solve the following word problems:

8 Marks

a) Frank is putting on a big party. He needs to multiply his favourite tomato sauce by five to make enough to serve his guests. Five times this recipe for him. **2 Marks**

$1\frac{1}{2}$ Tbsp Olive Oil

1 onion

$\frac{1}{2}$ tsp salt

2 bay leaves

6 garlic cloves

$\frac{1}{3}$ tsp red chile flakes

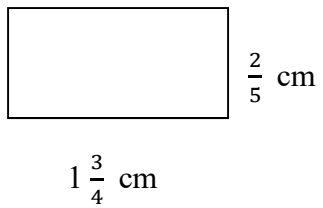
$1\frac{3}{4}$ litres diced tomatoes

$1\frac{1}{4}$ Tbsp brown sugar

b) Joey practices $\frac{3}{4}$ of an hour for his choir each day. How much time does he spend practicing each week? **2 Marks**

c) A Haida longhouse measures $15\frac{1}{4}$ m by $18\frac{1}{3}$ m. What area of land does it cover? **2 Marks**

d) Find the area of the rectangle. **2 Marks**



Answers to Topic A Self-Test

A.

- a) $\frac{3}{32}$ b) $\frac{5}{16}$ c) $\frac{1}{6}$ d) 3 e) $2\frac{2}{9}$
f) 1 g) $4\frac{1}{3}$ h) 10 i) $2\frac{2}{5}$ j) $5\frac{37}{80}$

B.

a)

$7\frac{1}{2}$ Tbsp Olive Oil

5 onions

$2\frac{1}{2}$ tsp salt

10 bay leaves

30 garlic cloves

$1\frac{2}{3}$ tsp red chile flakes

$8\frac{3}{4}$ litres diced tomatoes

$6\frac{1}{4}$ Tbsp brown sugar

b) $5\frac{1}{4}$ hours

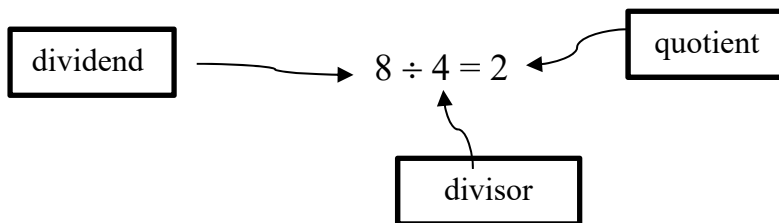
c) $279\frac{7}{12}$ m² in area

d) $\frac{7}{10}$ cm²

Topic B: Dividing Common Fractions

Think over what you know about dividing:

- When we divide, we take the total amount and separate (divide it) into equal parts or groups.
- Remember:



Example A: $8 \div 4 = \square$

The total amount is 8.

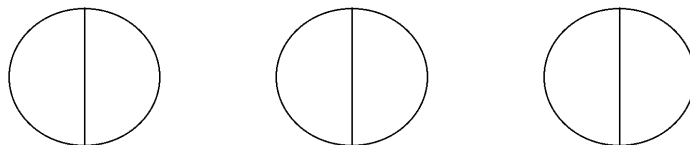
The divisor is 4. How many groups of 4 are in 8? Yes, 2.

$$8 \div 4 = 2$$

Example B: $3 \div \frac{1}{2} = \square$

The total amount is 3.

The divisor is $\frac{1}{2}$. How many $\frac{1}{2}$'s are in 3?



There are 6 halves.

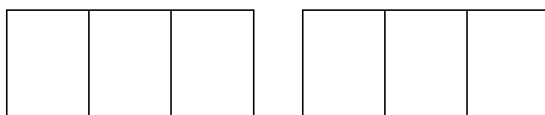
$$3 \div \frac{1}{2} = 6$$

Example C: $2 \div \frac{2}{3} = \square$

The total amount is 2.

The divisor is $\frac{2}{3}$. How many $\frac{2}{3}$'s are in 2?

Use different colours to shade in each group of two that you can find.



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

Example D: $1 \div \frac{1}{4} = \square$

Total amount is 1. Divisor is $\frac{1}{4}$.

How many $\frac{1}{4}$'s in 1?

Draw a shape. Divide it into quarters. How many $\frac{1}{4}$'s are there?

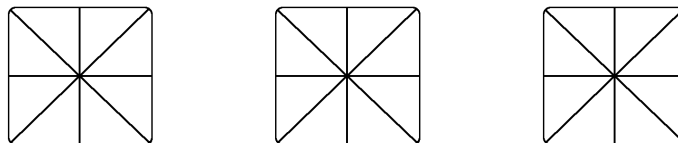
There are 4 quarters.

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

Example E: $3 \div \frac{3}{8} = \square$

How many $\frac{3}{8}$'s in 3.

Use different colours to shade in each group of 3 that you can find.



Did you find 8 groups of $\frac{3}{8}$?

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

Division of fractions by a fraction is difficult to picture, probably because it is not often used in everyday life. Here are some everyday examples for you to think about.

A. You have half a dollar. Someone asks you to change it for quarters. How many quarters are there in half a dollar?

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

2 quarters in one half a dollar

B. It takes $\frac{1}{4}$ hour to solve a math problem. How many problems can you solve in $\frac{3}{4}$ of an hour?

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

3 problems in $\frac{3}{4}$ of an hour.

Reciprocals

Dividing by a number is the same as multiplying by its reciprocal. We use reciprocals when we divide fractions. Two numbers are reciprocals if they have a product of 1.

To find the reciprocal of a fraction, turn the fraction upside down (flip it over). This is called "inverting the fraction". Some people remember this by thinking of reciprocals as "refliprocals"!

Fraction	Reciprocal
$\frac{1}{2}$	$\frac{2}{1}$ ($\frac{1}{2} \times \frac{2}{1} = \frac{1}{1} = 1$)
$\frac{3}{4}$	$\frac{4}{3}$ ($\frac{3}{4} \times \frac{4}{3} = \frac{12}{12} = 1$)
$\frac{7}{8}$	$\frac{8}{7}$
$\frac{2}{3}$	$\frac{3}{2}$
$\frac{1}{4}$	$\frac{4}{1}$

To find the reciprocal of a whole number:

- Rename the whole number as a fraction with a denominator of 1.
- Invert the fraction
- Check the reciprocal by multiplying the fraction by the reciprocal.
The product will be one.

Whole Number	Fraction	Reciprocal	Check
3 =	$\frac{3}{1}$	$\frac{1}{3}$	$\frac{3^1}{1} \times \frac{1}{3^1} = 1$
6 =	$\frac{6}{1}$	$\frac{1}{6}$	$\frac{6^1}{1} \times \frac{1}{6^1} = 1$
10 =	$\frac{10}{1}$	$\frac{1}{10}$	$\frac{10^1}{1} \times \frac{1}{10^1} = 1$

To find the reciprocal of a mixed number

- Rename the mixed number as an improper fraction.
- Invert the fraction.

Mixed Number	Fraction	Reciprocal	Check
$1\frac{1}{2} =$	$\frac{3}{2}$	$\frac{2}{3}$	$\frac{3}{2} \times \frac{2}{3} = \frac{6}{6} = 1$
$2\frac{1}{3} =$	$\frac{7}{3}$	$\frac{3}{7}$	$\frac{7^1}{3^1} \times \frac{3^1}{7^1} = \frac{1}{1} = 1$
$4\frac{3}{8} =$	$\frac{35}{8}$	$\frac{8}{35}$	$\frac{35^1}{8^1} \times \frac{8^1}{35^1} = 1$

Exercise One

Write the reciprocal of these numbers.

	Number	Reciprocal		Number	Reciprocal
a)	$\frac{2}{5}$	$\frac{5}{2}$	b)	$\frac{3}{4}$	
c)	$\frac{5}{8}$		d)	$\frac{1}{10}$	
e)	$\frac{1}{2}$		f)	$\frac{3}{7}$	
g)	$5 = \frac{5}{1}$	$\frac{1}{5}$	h)	7	
i)	9		j)	11	
k)	2		l)	8	
m)	$2\frac{1}{2} = \frac{5}{2}$	$\frac{2}{5}$	n)	$3\frac{2}{3}$	
o)	$1\frac{1}{4}$		p)	$6\frac{2}{5}$	
q)	$8\frac{1}{3}$		r)	$3\frac{7}{10}$	

Answers to Exercise One

b) $\frac{4}{3}$	c) $\frac{8}{5}$	d) 10	e) 2	f) $\frac{7}{3}$	h) $\frac{1}{7}$
i) $\frac{1}{9}$	j) $\frac{1}{11}$	k) $\frac{1}{2}$	l) $\frac{1}{8}$	n) $\frac{3}{11}$	o) $\frac{4}{5}$
p) $\frac{5}{32}$	q) $\frac{3}{25}$	r) $\frac{10}{37}$			

Multiplying by the Reciprocal

To divide fractions, multiply by the reciprocal of the divisor.

Step 1 Rewrite the division question.

- rename all mixed numbers as improper fractions
- give any whole numbers a denominator of 1

Step 2 Change the \div sign to a \times sign.

- Invert (turn upside down) the divisor to make the reciprocal.
- Remember the divisor is always the number after the \div sign.

Step 3 Simplify (cancel) and then multiply to find the answer.

Step 4 Write the answer in lowest terms.

Example A: $\frac{3}{4} \div \frac{1}{2} = \square$

Step 1 No whole numbers or mixed numbers.

Step 2 $\frac{3}{4} \div \frac{1}{2} = \frac{3}{4} \times \frac{2}{1} = \square$

Step 3 and 4 $\frac{3}{\cancel{4}_2} \times \frac{\cancel{2}^1}{1} = \frac{3}{2} = 1\frac{1}{2}$

Example B: $\frac{7}{8} \div \frac{1}{4} = \square$

Step 1 No whole numbers or mixed numbers.

Step 2 $\frac{7}{8} \div \frac{1}{4} = \frac{7}{8} \times \frac{4}{1} = \square$

Step 3 and 4 $\frac{7}{\cancel{8}_2} \times \frac{\cancel{4}^1}{1} = \frac{7}{2} = 3\frac{1}{2}$

Example C: $5 \div \frac{2}{3} = \square$

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

Step 2 $\frac{5}{1} \times \frac{3}{2} = \square$

Step 3 and 4 $\frac{5}{1} \times \frac{3}{2} = \frac{15}{2} = 7\frac{1}{2}$

Example D: $3\frac{1}{2} \div 2\frac{3}{4} = \square$

Step 1 $3\frac{1}{2} \div 2\frac{3}{4} = \frac{7}{2} \div \frac{11}{4} = \square$

Step 2 $\frac{7}{2} \times \frac{4}{11} = \square$

Step 3 and 4 $\frac{7}{\cancel{2}_1} \times \frac{\cancel{4}^2}{11} = \frac{14}{11} = 1\frac{3}{11}$

Exercise Two

Divide these fractions using the steps you have just learned.

a) $\frac{4}{9} \div 4 =$

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

$$\frac{\cancel{4}^1}{9} \times \frac{1}{\cancel{4}_1} = \frac{1}{9}$$

b) $\frac{5}{8} \div \frac{10}{3} =$

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

d) $\frac{4}{5} \div \frac{6}{5} =$

e) $\frac{5}{8} \div \frac{7}{16} =$

f) $\frac{1}{2} \div \frac{3}{4} =$

g) $\frac{2}{3} \div \frac{8}{9} =$

h) $\frac{5}{8} \div \frac{4}{3} =$

i) $\frac{1}{5} \div \frac{1}{2} =$

j) $\frac{1}{4} \div \frac{2}{3} =$

k) $\frac{5}{6} \div \frac{5}{3} =$

l) $\frac{11}{12} \div \frac{5}{6} =$

m) $\frac{1}{3} \div \frac{3}{8} =$

n) $\frac{7}{12} \div \frac{5}{6} =$

o) $\frac{6}{7} \div \frac{1}{6} =$

p) $\frac{1}{8} \div \frac{5}{8} =$

Answers to Exercise Two

b) $\frac{3}{16}$

c) $5\frac{5}{6}$

d) $\frac{2}{3}$

e) $1\frac{3}{7}$

f) $\frac{2}{3}$

g) $\frac{3}{4}$

h) $\frac{15}{32}$

i) $\frac{2}{5}$

j) $\frac{3}{8}$

k) $\frac{1}{2}$

l) $1\frac{1}{10}$

m) $\frac{8}{9}$

n) $\frac{7}{10}$

o) $5\frac{1}{7}$

p) $\frac{1}{5}$

Exercise Three

Do one quarter of these questions. If you are not having any trouble, go on to Exercise Four, which has mixed numbers in it. If you are having a harder time with this, do the remaining $\frac{3}{4}$ of the questions.

a) $\frac{1}{2} \div \frac{1}{8} =$

b) $\frac{8}{9} \div \frac{3}{2} =$

$$\frac{1}{2} \times \frac{8}{1} = \frac{1}{\cancel{2}_1} \times \frac{\cancel{8}^4}{1} = \frac{4}{1} = 4$$

c) $\frac{3}{4} \div \frac{3}{4} =$

d) $\frac{5}{6} \div \frac{3}{3} =$

e) $\frac{1}{3} \div \frac{3}{4} =$

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

g) $2 \div \frac{3}{5} =$

h) $\frac{5}{6} \div \frac{1}{3} =$

i) $3 \div \frac{1}{5} =$

j) $4 \div \frac{2}{3} =$

k) $\frac{3}{4} \div \frac{1}{8} =$

l) $3 \div \frac{1}{9} =$

m) $\frac{2}{3} \div \frac{1}{6} =$

n) $\frac{5}{6} \div \frac{1}{12} =$

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

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

q) $4 \div \frac{3}{4} =$

r) $\frac{1}{4} \div \frac{3}{5} =$

s) $\frac{7}{8} \div \frac{7}{12} =$

t) $\frac{1}{8} \div 2 =$

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

v) $\frac{7}{8} \div \frac{1}{2} =$

$$w) \frac{2}{3} \div \frac{3}{4} =$$

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

$$y) 3 \div \frac{1}{4} =$$

$$z) \frac{5}{6} \div 10 =$$

Answers to Exercise Three

$$b) \frac{16}{27}$$

$$c) 1$$

$$d) \frac{5}{6}$$

$$e) \frac{4}{9}$$

$$f) 1\frac{1}{3}$$

$$g) 3\frac{1}{3}$$

$$h) 2\frac{1}{2}$$

$$i) 15$$

$$j) 6$$

$$k) 6$$

$$l) 27$$

$$m) 4$$

$$n) 10$$

$$o) \frac{3}{4}$$

$$p) 1\frac{1}{2}$$

$$q) 5\frac{1}{3}$$

$$r) \frac{5}{12}$$

$$s) 1\frac{1}{2}$$

$$t) \frac{1}{16}$$

$$u) 5\frac{1}{4}$$

$$v) 1\frac{3}{4}$$

$$w) \frac{8}{9}$$

$$x) \frac{3}{10}$$

$$y) 12$$

$$z) \frac{1}{12}$$

Exercise Four

More Practice: You might want to save some of this exercise to do as review before a test.

a) $8 \div \frac{1}{2} =$ _____

b) $2\frac{1}{3} \div 1\frac{1}{6} =$ _____

c) $2\frac{2}{5} \div \frac{1}{8} =$ _____

d) $\frac{1}{2} \div \frac{1}{4} =$ _____

e) $\frac{1}{6} \div \frac{1}{5} =$ _____

f) $3\frac{5}{8} \div \frac{1}{2} =$ _____

g) $\frac{1}{8} \div \frac{1}{5} =$ _____

h) $1\frac{1}{3} \div 2\frac{1}{4} =$ _____

i) $\frac{3}{5} \div \frac{1}{4} =$ _____

j) $5 \div 3\frac{2}{3} =$ _____

k) $2\frac{4}{5} \div \frac{1}{5} =$ _____

l) $\frac{5}{9} \div \frac{1}{3} =$ _____

m) $\frac{2}{5} \div \frac{1}{2} =$ _____

n) $\frac{5}{6} \div 10 =$ _____

o) $\frac{1}{4} \div \frac{2}{3} =$ _____

p) $1\frac{1}{3} \div 3\frac{2}{3} =$ _____

q) $2\frac{3}{4} \div 1\frac{7}{8} =$ _____

r) $3\frac{5}{6} \div 1\frac{2}{3} =$ _____

s) $5\frac{1}{10} \div 3\frac{3}{10} =$ _____

t) $2\frac{3}{8} \div 1\frac{5}{16} =$ _____

u) $1\frac{5}{9} \div 3\frac{1}{3} =$ _____

v) $\frac{3}{4} \div \frac{1}{2} =$ _____

w) $\frac{1}{2} \div \frac{3}{8} =$ _____

x) $\frac{1}{3} \div \frac{1}{5} =$ _____

y) $\frac{1}{5} \div \frac{3}{4} =$ _____

z) $3\frac{3}{4} \div 2\frac{1}{8} =$ _____

Answers to Exercise Four

- | | | | | | |
|--------------------|---------------------|--------------------|--------------------|--------------------|--------------------|
| a) 16 | b) 2 | c) $19\frac{1}{5}$ | d) 2 | e) $\frac{5}{6}$ | f) $7\frac{1}{4}$ |
| g) $\frac{5}{8}$ | h) $\frac{16}{27}$ | i) $2\frac{2}{5}$ | j) $1\frac{4}{11}$ | k) 14 | l) $1\frac{2}{3}$ |
| m) $\frac{4}{5}$ | n) $\frac{1}{12}$ | o) $\frac{3}{8}$ | p) $\frac{4}{11}$ | q) $1\frac{7}{15}$ | r) $2\frac{3}{10}$ |
| s) $1\frac{6}{11}$ | t) $1\frac{17}{21}$ | u) $\frac{7}{15}$ | v) $1\frac{1}{2}$ | w) $1\frac{1}{3}$ | x) $1\frac{2}{3}$ |
| y) $\frac{4}{15}$ | z) $1\frac{13}{17}$ | | | | |

Problems Which Use Division of Common Fractions

Look for word patterns and key words in the division problems. Thinking about the problems using whole numbers instead of fractions may sometimes help you to recognize the division pattern. Start your division equation with the dividend. The dividend is the total amount.

These key words often point to division:

separated split cut shared

What is cost per...? unit pricing

What is distance per...? average (speed, cost, weight, time)

Exercise Five

Solve the problems.

- a) Every fall three friends get together to make antipasta. Last year they filled $4\frac{1}{2}$ ice cream buckets with antipasta and then shared it equally. How many buckets of antipasta did each person get?

- b) A pick-up truck load of split wood is $\frac{1}{2}$ cord of wood. If you shared a full truck load of wood with a neighbour, how much of a cord of firewood would you each get?

- c) The distance from Trail, B.C. to Vancouver, B.C. is 640 kilometres via the Crowsnest Highway. The trip can be made in $7\frac{1}{2}$ hours in good weather. What average speed must be maintained?
- d) The sweater that Janet is knitting has a complicated pattern. It takes her $3\frac{3}{4}$ hours to finish 15 rows. How long does each row take?
- e) Marian had $1\frac{2}{3}$ lemon pies left which she wanted to share equally amongst 10 people. How much of a pie will each person be given?
- f) Jack wants to cut his piece of trim for his square windows into 4 equal parts. The trim is $2\frac{2}{5}$ metres long. What will the measurement be of each piece?

g) Joni is sewing 3 identical pairs of pants for her son's dance performance. She has bought $5\frac{1}{3}$ meters of material. She uses up all the material, how much material was used in each pair of pants?

h) Joy has a $7\frac{1}{4}$ m long stick. She needs to split it into $\frac{1}{3}$ m pieces. How many pieces can she get? (remember: your answer will be given with the unit of 'pieces' not metres!)

Answers to Exercise Five

a) $1\frac{1}{2}$ buckets b) $\frac{1}{4}$ cord c) $85\frac{1}{3}$ km/h ($85.\bar{3}$ km/h)

d) $\frac{1}{4}$ hour or 15 minutes e) $\frac{1}{6}$ pie

f) each piece is $\frac{3}{5}$ metres long g) She uses $1\frac{7}{9}$ meter for each pair

h) She will get 21 pieces

Topic B: Self-Test

Mark /10 Aim 8/10

A. Divide and be sure the answers are in lowest terms.

8 marks

a) $\frac{3}{4} \div \frac{1}{4} =$ _____

b) $\frac{1}{4} \div 1\frac{1}{4} =$ _____

c) $\frac{5}{8} \div \frac{15}{16} =$ _____

d) $6 \div \frac{7}{9} =$ _____

e) $\frac{5}{11} \div 11 =$ _____

f) $9\frac{3}{4} \div 2 =$ _____

g) $3 \div 4\frac{1}{3} =$ _____

h) $3\frac{3}{7} \div 2\frac{5}{14} =$ _____

B. Word Problem

2 marks

- a) Joe is a school janitor. It takes him $\frac{3}{4}$ of an hour to clean one classroom. How many classrooms does he clean in his $7\frac{1}{2}$ hour shift.

Answers to Topic B Self-Test

A.

- a) 3 b) $\frac{1}{5}$ c) $\frac{2}{3}$ d) $7\frac{5}{7}$ e) $\frac{5}{121}$ f) $4\frac{7}{8}$
g) $\frac{9}{13}$ h) $1\frac{5}{11}$

B.

- a) 10 classrooms

Unit 3 Review

1. Write the multiplication equation you would use to find the fraction of the whole number. You do not have to calculate the answers.

a) More than $\frac{1}{3}$ of the children at the day care are sick today. There are 15 children in the day care. How many children are sick?

b) Rich answered $\frac{7}{8}$ of the questions on the test. The test had 48 questions. How many questions did Rich complete?

c) **Canada Post delivered more than** 11.6 billion pieces of mail across Canada in 2008. They have a target of getting $\frac{96}{100}$ letters delivered on time. How many letters got delivered on time in 2008?

- d) We spend $\frac{1}{6}$ of our monthly income on food. Our take home pay is \$1400. How much does our food cost each month?

2. Write the multiplication equation you would use to multiply a fraction by a whole number. You do not have to calculate the answer.

- a) We want to buy a good bottle of wine for dinner, but there are 4 bottles of wine from last night that are not used up yet. Let's take each $\frac{1}{6}$ bottle of wine that is left over and have that at dinner tonight. How much wine will we have?

- b) There are four boxes of cereal open in the cupboard and each one is $\frac{3}{4}$ full. How many full boxes would there be, if they were all put together?

- c) Double a recipe that needs $\frac{1}{3}$ tsp of cinnamon.

- d) Your friend is a frequent coffee drinker at the local coffee shop. He has a punch card, and gets a hole punched out each time he buys a coffee. Once he has a card with 14 holes punched out, he gets a free coffee. He keeps losing his card, and getting a new one. He has found them all, and he now has 3 cards, each with $\frac{2}{5}$ of the holes punched out. Does he have enough holes punched out to get a free coffee?

3. Multiply these fractions:

a) $7 \times \frac{2}{3} =$ _____

b) $3 \times \frac{2}{5} =$ _____

c) $\frac{1}{2} \times 14 =$ _____

d) $\frac{3}{8} \times 4 =$ _____

e) $5 \times \frac{1}{5} =$ _____

f) $3 \times \frac{3}{4} =$ _____

g) $\frac{3}{2} \times 20 =$ _____

h) $4 \times \frac{2}{3} =$ _____

i) $\frac{3}{8}$ of 6 = _____

j) $\frac{5}{6}$ of 4 = _____

4. Multiply these fractions

a) $\frac{1}{6} \times \frac{1}{4} =$ _____

b) $\frac{3}{4} \times \frac{5}{6} =$ _____

c) $\frac{5}{10} \times \frac{1}{3} =$ _____

d) $\frac{1}{8} \times \frac{2}{5} =$ _____

e) $\frac{1}{4} \times \frac{1}{7} =$ _____

f) $\frac{4}{9} \times \frac{1}{7} =$ _____

g) $\frac{7}{10} \times \frac{2}{3} =$ _____

h) $\frac{8}{9} \times \frac{2}{3} =$ _____

5. Multiply these fractions. Simplify before multiplying, where possible.

a) $\frac{2}{5} \times \frac{15}{7} =$ _____

b) $\frac{5}{8} \times \frac{1}{10} =$ _____

c) $\frac{3}{4} \times \frac{1}{9} =$ _____

d) $\frac{7}{8} \times \frac{12}{14} =$ _____

e) $\frac{8}{9} \times \frac{1}{4} =$ _____

f) $\frac{1}{2} \times \frac{2}{7} \times \frac{5}{7} =$ _____

g) $\frac{3}{5} \times \frac{2}{9} \times \frac{1}{2} =$ _____

h) $2 \times \frac{3}{7} \times \frac{5}{12} =$ _____

6. Multiply these fractions. Simplify before multiplying, where possible.

a) $7\frac{1}{3} \times \frac{3}{7} =$ _____

b) $\frac{5}{7} \times 56 =$ _____

c) $3\frac{1}{4} \times 3\frac{1}{2} =$ _____

d) $6\frac{2}{3} \times 2\frac{1}{2} =$ _____

e) $2\frac{1}{5} \times \frac{5}{6} =$ _____

f) $7\frac{2}{3} \times \frac{3}{4} =$ _____

g) $9 \times \frac{2}{3} =$ _____

h) $3\frac{1}{3} \times 3\frac{1}{4} =$ _____

i) $4 \times \frac{5}{6} =$ _____

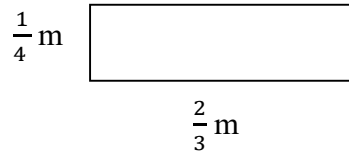
j) $6\frac{1}{3} \times \frac{5}{6} =$ _____

7. Solve the following word problems:

- a) A recipe calls for $\frac{2}{3}$ of a cup of sugar. How much sugar should be used if only $\frac{1}{2}$ the recipe is being made?

b) The Wrights sold their house for \$240 000. The real estate company that helped them sell their house gets $\frac{3}{20}$ of this amount. How much money did the Wrights have to pay the real estate company?

c) Find the area of the rectangle



d) Each turn of a screw sinks it $\frac{1}{2}$ of a centimetre deeper into the wood. Find out how deep the screw is after 7 turns.

e) $\frac{3}{4}$ of 48 students in the gym are girls. How many girls are in the gym?

8. Divide these fractions. Simplify before multiplying, where possible.

a) $\frac{7}{2} \div \frac{3}{4} =$ _____

b) $\frac{4}{10} \div \frac{6}{5} =$ _____

c) $\frac{5}{8} \div \frac{7}{24} =$ _____

d) $\frac{1}{8} \div \frac{3}{4} =$ _____

e) $\frac{2}{3} \div \frac{7}{9} =$ _____

f) $\frac{5}{8} \div \frac{4}{7} =$ _____

g) $\frac{1}{5} \div \frac{1}{4} =$ _____

h) $\frac{3}{4} \div \frac{2}{3} =$ _____

i) $\frac{5}{6} \div \frac{5}{3} =$ _____

j) $\frac{11}{15} \div \frac{5}{6} =$ _____

9. Divide these fractions. Simplify before multiplying, where possible.

a) $2\frac{4}{5} \div \frac{1}{5} =$ _____

b) $\frac{5}{9} \div \frac{1}{3} =$ _____

c) $\frac{2}{5} \div \frac{1}{2} =$ _____

d) $\frac{5}{6} \div 10 =$ _____

e) $\frac{1}{4} \div \frac{2}{3} =$ _____

f) $1\frac{1}{3} \div 3\frac{2}{3} =$ _____

g) $2\frac{3}{4} \div 1\frac{7}{8} =$ _____

h) $3\frac{5}{6} \div 1\frac{2}{3} =$ _____

i) $5\frac{1}{10} \div 3\frac{3}{10} =$ _____

j) $2\frac{3}{8} \div 1\frac{5}{16} =$ _____

10. Solve the following word problems:

a) If you want to share $3\frac{1}{3}$ cups of juice between 4 children, how much juice does each child get?

b) Aaron ran $24\frac{3}{4}$ km in 3 days. How many kilometres did he run each day?

c) Jordan is selling falafel at Music Fest this summer. She made $48\frac{3}{4}$ kg of falafel mix.
How many $\frac{1}{16}$ kg falafel balls can she make?

d) Sophie has a $75\frac{1}{4}$ cm piece of wood trim. She wants to cut it into $3\frac{1}{2}$ cm pieces. How many pieces can she get?

Answers to Review

- 1 a) $\frac{1}{3} \times \frac{15}{1}$ b) $\frac{7}{8} \times \frac{48}{1}$ c) $\frac{96}{100} \times \frac{11.6}{1}$ billion d) $\frac{1}{6} \times \frac{1400}{1}$
- 2 a) $4 \times \frac{1}{6}$ b) $4 \times \frac{3}{4}$ c) $2 \times \frac{1}{3}$ d) $3 \times \frac{2}{5}$
- 3 a) $4\frac{2}{3}$ b) $1\frac{1}{5}$ c) 7 d) $1\frac{1}{2}$ e) 1 f) $2\frac{1}{4}$
g) 30 h) $2\frac{2}{3}$ i) $2\frac{1}{4}$ j) $3\frac{1}{3}$
- 4 a) $\frac{1}{24}$ b) $\frac{5}{8}$ c) $\frac{1}{6}$ d) $\frac{1}{20}$ e) $\frac{1}{28}$ f) $\frac{4}{63}$
g) $\frac{7}{15}$ h) $\frac{16}{27}$
- 5 a) $\frac{6}{7}$ b) $\frac{1}{16}$ c) $\frac{1}{12}$ d) $\frac{3}{4}$ e) $\frac{2}{9}$ f) $\frac{5}{49}$
g) $\frac{1}{15}$ h) $\frac{5}{14}$
- 6 a) $3\frac{1}{7}$ b) 40 c) $11\frac{3}{8}$ d) $16\frac{2}{3}$ e) $1\frac{5}{6}$ f) $5\frac{3}{4}$
g) 6 h) $10\frac{5}{6}$ i) $3\frac{1}{3}$ j) $5\frac{5}{18}$
- 7 a) $\frac{1}{3}$ cup sugar b) \$36 000 c) $\frac{1}{6}$ m² d) $3\frac{1}{2}$ cm e) 36 students
- 8 a) $4\frac{2}{3}$ b) $\frac{1}{3}$ c) $2\frac{1}{7}$ d) $\frac{1}{6}$ e) $\frac{6}{7}$ f) $1\frac{3}{32}$
g) $\frac{4}{5}$ h) $1\frac{1}{8}$ i) $\frac{1}{2}$ j) $\frac{22}{25}$
- 9 a) 14 b) $1\frac{2}{3}$ c) $\frac{4}{5}$ d) $\frac{1}{12}$ e) $\frac{3}{8}$ f) $\frac{4}{11}$
g) $1\frac{7}{15}$ h) $2\frac{3}{10}$ i) $1\frac{6}{11}$ j) $1\frac{17}{21}$
- 10 a) $\frac{5}{6}$ cups each b) $8\frac{1}{4}$ km in one day c) 780 balls of falafel d) $21\frac{1}{2}$ pieces

It is now test time!

Please get the practice test
from your instructor.

Once you are ready, you can get
the unit 3 test from your instructor.

Good luck!