

10. [Fraction \times, \div]

continues on page 54

Skill 10.1 Multiplying a fraction by a whole number (1).

MMBlue 11 2 2 3 3 4 4
MMGreen 11 2 2 3 3 4 4

Greatest Common Factor (GCF) of two numbers

- Write all the factors of each number (the factors must divide exactly into the number).
- Find the largest number that appears on both lists.

Hint: The Greatest Common Factor is the largest number that divides evenly into both numbers.

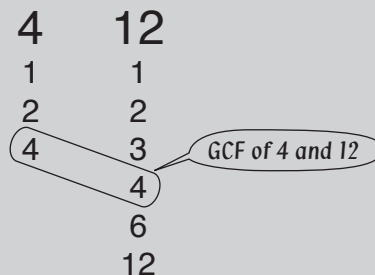
Examples:

Identical numbers



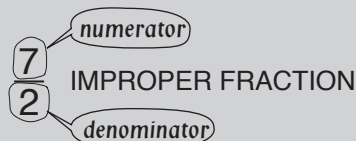
Hint: 5 is the GCF of 5 and 5 because 5 is the largest number that divides into 5 and 5.

One number divides evenly into the other number



Hint: 4 is the GCF of 4 and 12 because 4 is the largest number that divides into 4 and 12.

Changing an improper fraction to a mixed number



- Divide the numerator by the denominator.

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

- Write the result as the whole number and the remainder over the denominator.

$$3 \text{ remainder } 1 = 3\frac{1}{2}$$

Cross simplifying a fraction and a whole number

- Simplify the denominator of the fraction and the whole number. This means to divide them by the same number, usually by their Greatest Common Factor.
- Cross out the denominator of the fraction and the whole number.
- Write the result of the division next to each crossed number.
- Multiply the top numbers together.

$$\begin{aligned} \frac{3}{10} \times 5 &= \frac{3}{\cancel{10}^{\div 5}} \times \cancel{5}_{\div 5} && \text{Divide 5 and 10 by 5} \\ &= \frac{3}{2} \times 1 && \begin{matrix} 5 \div 5 = 1 \\ 10 \div 5 = 2 \end{matrix} \\ &= \frac{3}{2} = 1\frac{1}{2} \end{aligned}$$

- Multiply the numerator of the fraction by the whole number.
- Do not change the denominator.
- Simplify the resulting fraction and/or change it to a mixed number if necessary.

EITHER

- Cross simplify where possible before multiplying.

OR

- Simplify at the end.

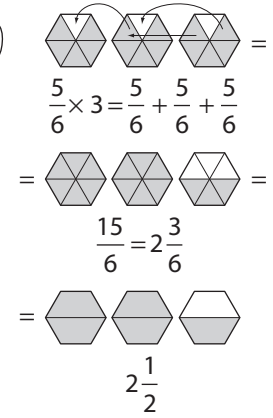
Skill 10.1 Multiplying a fraction by a whole number (2).

MMBlue 11 2 2 3 3 4 4
MMGreen 11 2 2 3 3 4 4

Q. $\frac{5}{6} \times 3 =$

A. $\frac{5}{\cancel{6}^2} \times \frac{1}{\cancel{3}} =$
 $= \frac{5 \times 1}{2}$ *Divide 6 and 3 by 3*
 $= \frac{5}{2}$ *Change to mixed number*
 $= 2\frac{1}{2}$

OR A. $\frac{5}{6} \times 3 =$ *Multiply 5 by 3*
 $= \frac{5 \times 3}{6}$
 $= \frac{15}{6}$
 $= 2\frac{3}{6}$ *Simplify*
 $= 2\frac{1}{2}$



a) $9 \times \frac{2}{5} =$

$= \frac{9 \times 2}{5} = \frac{18}{5}$ *Change to mixed number*
 $= 18 \div 5 = 3\frac{3}{5}$

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

$=$ $=$
 $=$ $=$

c) $3 \times \frac{5}{8} =$

$=$ $=$
 $=$ $=$

d) $\frac{4}{5} \times 3 =$

$=$ $=$
 $=$ $=$

e) $2 \times \frac{4}{7} =$

$=$ $=$
 $=$ $=$

f) $2 \times \frac{2}{9} =$

$=$ $=$
 $=$ $=$

g) $8 \times \frac{3}{4} =$

$= \frac{\cancel{8}^2 \times 3}{\cancel{4}_1}$ *Divide 8 and 4 by 4*
 $= \frac{2 \times 3}{1} = 6$

h) $\frac{5}{8} \times 2 =$

$=$ $=$
 $=$ $=$

i) $2 \times \frac{5}{12} =$

$=$ $=$
 $=$ $=$

j) $6 \times \frac{5}{12} =$

$=$ $=$
 $=$ $=$

k) $\frac{3}{7} \times 14 =$

$=$ $=$
 $=$ $=$

l) $\frac{3}{4} \times 20 =$

$=$ $=$
 $=$ $=$

m) $2 \times \frac{5}{6} =$

$=$ $=$
 $=$ $=$

n) $\frac{1}{4} \times 16 =$

$=$ $=$
 $=$ $=$

o) $12 \times \frac{3}{4} =$

$=$ $=$
 $=$ $=$

Skill 10.2 Finding a fraction of a quantity.

- Replace the word “of” with the multiplication symbol.
- Multiply the fraction by the whole number. (see skill 10.1, page 53)
- Write the unit of measurement in the result.

Hint: To find a fraction of a whole number divide that number by the denominator of the fraction, and then multiply the result by the numerator.

Q. $\frac{5}{9}$ of \$180 =

A. $\frac{5}{9}$ of \$180 =

$$= \frac{5}{9} \times 180$$

$$= \frac{5 \times 20}{1}$$

Divide
9 and 180 by 9

= \$100

Add the \$ sign

OR A. To find $\frac{5}{9}$ of \$180:

$$180 \div 9 = 20$$

$$20 \times 5 = \$100$$

a) $\frac{3}{7}$ of 35 mL =

$$= \frac{3}{7} \times 35$$

Divide
7 and 35 by 7

$$= \frac{3 \times 5}{1} = \boxed{15 \text{ mL}}$$

b) $\frac{1}{2}$ of 360 kg =

$$= \frac{1}{2} \times 360$$

$$= \quad = \boxed{\text{kg}}$$

c) $\frac{1}{4}$ of \$72 =

$$=$$

$$= \quad = \boxed{\$}$$

d) $\frac{3}{10}$ of 150 L =

$$=$$

$$= \quad = \boxed{\text{L}}$$

e) $\frac{1}{5}$ of 1000 m =

$$=$$

$$= \quad = \boxed{\text{m}}$$

f) $\frac{1}{9}$ of \$45 =

$$=$$

$$= \quad = \boxed{\$}$$

g) $\frac{2}{3}$ of 600 L =

$$=$$

$$= \quad = \boxed{\text{L}}$$

h) $\frac{1}{6}$ of 120 cm =

$$=$$

$$= \quad = \boxed{\text{cm}}$$

i) $\frac{3}{4}$ of 60 m =

$$=$$

$$= \quad = \boxed{\text{m}}$$

j) $\frac{1}{9}$ of 720 g =

$$=$$

$$= \quad = \boxed{\text{g}}$$

k) $\frac{4}{5}$ of 40 mL =

$$=$$

$$= \quad = \boxed{\text{mL}}$$

l) $\frac{3}{8}$ of 80 kg =

$$=$$

$$= \quad = \boxed{\text{kg}}$$

Skill 10.3 Dividing a whole number by a fraction (1).

- Copy the whole number and change “divide by” (÷) into “times” (×).
- Invert the fraction.
- Multiply the whole number by the numerator of the fraction. Do not change the denominator. To simplify:

EITHER

- Cross simplify where possible before multiplying. (see skill 10.1, page 53)

OR

- Simplify at the end.

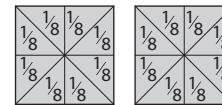
Q. $2 \div \frac{1}{8} =$

A. $2 \div \frac{1}{8} =$
 $= 2 \times \frac{8}{1}$
 $= \frac{2 \times 8}{1}$
 $= 16$

Change the sign to "×"
Invert fraction

How many eighths are there in two wholes?

There are 16 eighths in two wholes.



$$2 \div \frac{1}{8} = 2 \times 8 = 16$$

a) $3 \div \frac{3}{5} =$
Invert fraction

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

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

Divide 3 and 3 by 3

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

$$=$$

$$=$$

$$= \boxed{}$$

c) $4 \div \frac{4}{7} =$

$$=$$

$$=$$

$$= \boxed{}$$

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

$$=$$

$$=$$

$$= \boxed{}$$

e) $7 \div \frac{7}{9} =$

$$=$$

$$=$$

$$= \boxed{}$$

f) $5 \div \frac{5}{11} =$

$$=$$

$$=$$

$$= \boxed{}$$

g) $3 \div \frac{1}{6} =$
Invert fraction

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

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

h) $4 \div \frac{1}{5} =$

$$=$$

$$= \boxed{}$$

i) $4 \div \frac{1}{7} =$

$$=$$

$$= \boxed{}$$

Skill 10.3 Dividing a whole number by a fraction (2).

j) $2 \div \frac{3}{8} =$ Invert fraction

\downarrow \downarrow

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

$= \frac{2 \times 8}{3} = \frac{16}{3} = 5 \frac{1}{3}$

k) $4 \div \frac{3}{5} =$

$=$

$=$

l) $2 \div \frac{5}{6} =$

$=$

$=$

m) $3 \div \frac{7}{8} =$

$=$

$=$

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

$=$

$=$

o) $6 \div \frac{7}{8} =$

$=$

$=$

p) $6 \div \frac{2}{9} =$ Invert fraction

\downarrow \downarrow

$= 6 \times \frac{9}{2}$

$= \overset{3}{\cancel{6}} \times \frac{9}{\underset{2}{\cancel{2}}}$ Divide
6 and 2 by 2

$= \frac{3 \times 9}{1} =$

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

$=$

$=$

$=$

r) $10 \div \frac{2}{3} =$

$=$

$=$

$=$

s) $8 \div \frac{2}{7} =$

$=$

$=$

t) $9 \div \frac{3}{7} =$

$=$

$=$

u) $8 \div \frac{4}{11} =$

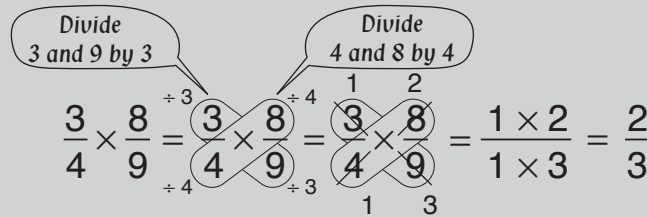
$=$

$=$

Skill 10.4 Multiplying two fractions (1).

Cross simplifying two fractions

- Simplify the numbers in the fractions diagonally (in a cross). This means to divide top and bottom numbers by the same number, usually by their Greatest Common Factor. (see skill 10.1, page 53)
- Cross out the numbers in the fractions diagonally (in a cross).
- Write the result of the division next to each crossed number.
- Multiply the top results together.
- Multiply the bottom results together.



- Multiply the numerators of the fractions.
 - Multiply the denominators of the fractions.
- To simplify:

EITHER

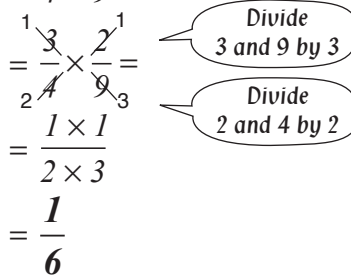
- Cross simplify where possible before multiplying.

OR

- Simplify at the end.

Q. $\frac{3}{4} \times \frac{2}{9} =$

A. $\frac{3}{4} \times \frac{2}{9} =$



OR

A. $\frac{3}{4} \times \frac{2}{9} =$

$$\begin{aligned} &= \frac{3 \times 2}{4 \times 9} \\ &= \frac{6}{36} \end{aligned}$$

Simplify

$$= \frac{1}{6}$$

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

$$= \frac{1 \times 1}{4 \times 7} = \boxed{\frac{1}{28}}$$

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

$$= \dots = \boxed{}$$

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

$$= \dots = \boxed{}$$

d) $\frac{7}{10} \times \frac{1}{2} =$

$$= \dots = \boxed{}$$

e) $\frac{2}{9} \times \frac{4}{5} =$

$$= \dots = \boxed{}$$

f) $\frac{3}{5} \times \frac{4}{7} =$

$$= \dots = \boxed{}$$

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

$$= \dots = \boxed{}$$

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

$$= \dots = \boxed{}$$

i) $\frac{1}{4} \times \frac{3}{11} =$

$$= \dots = \boxed{}$$

Skill 10.4 Multiplying two fractions (2).

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

$$= \frac{\cancel{2}^1 \times \cancel{1}_1}{3 \times 2} \quad \text{Simplify}$$

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

k) $\frac{5}{6} \times \frac{6}{7} =$

$$=$$

$$=$$

$$= \boxed{\phantom{\frac{5}{7}}}$$

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

$$=$$

$$=$$

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

m) $\frac{7}{9} \times \frac{2}{7} =$

$$=$$

$$=$$

$$= \boxed{\phantom{\frac{2}{9}}}$$

n) $\frac{1}{2} \times \frac{4}{9} =$

$$=$$

$$=$$

$$= \boxed{\phantom{\frac{2}{9}}}$$

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

$$=$$

$$=$$

$$= \boxed{\phantom{\frac{1}{10}}}$$

p) $\frac{3}{4} \times \frac{8}{11} =$

$$=$$

$$=$$

$$= \boxed{\phantom{\frac{6}{11}}}$$

q) $\frac{2}{5} \times \frac{3}{4} =$

$$=$$

$$=$$

$$= \boxed{\phantom{\frac{3}{10}}}$$

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

$$=$$

$$=$$

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

s) $\frac{7}{9} \times \frac{1}{14} =$

$$=$$

$$=$$

$$= \boxed{\phantom{\frac{1}{18}}}$$

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

$$=$$

$$=$$

$$= \boxed{\phantom{\frac{3}{14}}}$$

u) $\frac{5}{12} \times \frac{6}{7} =$

$$=$$

$$=$$

$$= \boxed{\phantom{\frac{5}{14}}}$$

v) $\frac{3}{10} \times \frac{5}{9} =$

$$=$$

$$=$$

$$= \boxed{\phantom{\frac{1}{6}}}$$

w) $\frac{3}{4} \times \frac{8}{15} =$

$$=$$

$$=$$

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

x) $\frac{4}{9} \times \frac{3}{16} =$

$$=$$

$$=$$

$$= \boxed{\phantom{\frac{1}{12}}}$$

Skill 10.5 Dividing a fraction by a whole number (1).

- Copy the fraction and write the whole number as an improper fraction with denominator 1.
- Change “divide by” (\div) into “times” (\times).
- Invert the second fraction.
- Multiply the fractions. (see skill 10.4, page 58)

To simplify:

EITHER

- Cross simplify where possible before dividing.

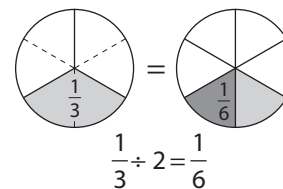
OR

- Simplify at the end.

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

A. $\frac{1}{3} \div 2 =$
 $= \frac{1}{3} \div \frac{2}{1} =$ *Invert second fraction*
 $= \frac{1}{3} \times \frac{1}{2} =$
 $= \frac{1 \times 1}{3 \times 2} =$
 $= \frac{1}{6}$

What is one third divided into 2 equal parts?



This can also be thought of as one half of a third.

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

a) $\frac{4}{9} \div 4 =$
 $= \frac{4}{9} \div \frac{4}{1} =$
 $= \frac{4}{9} \times \frac{1}{4} =$
 $= \frac{1 \times 1}{9 \times 1} =$ *Divide 4 and 4 by 4*

b) $\frac{2}{5} \div 2 =$
 $=$
 $=$
 $=$
 $=$
 $=$
 $=$

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

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

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

f) $\frac{1}{7} \div 3 =$
 $=$
 $=$
 $=$
 $=$
 $=$

Skill 10.5 Dividing a fraction by a whole number (2).

MMBlue 11 22 3 44
MMGreen 11 22 3 44

g) $\frac{2}{5} \div 8 =$

$$= \frac{2}{5} \div \frac{8}{1}$$

$$= \frac{2}{5} \times \frac{1}{8}$$

$$= \frac{\cancel{2}^1}{5} \times \frac{1}{\cancel{8}_4} = \boxed{\frac{1}{20}}$$

h) $\frac{3}{7} \div 12 =$

$$=$$

$$=$$

$$= \boxed{}$$

i) $\frac{6}{11} \div 3 =$

$$=$$

$$=$$

$$= \boxed{}$$

j) $\frac{5}{8} \div 15 =$

$$=$$

$$=$$

$$= \boxed{}$$

k) $\frac{2}{7} \div 10 =$

$$=$$

$$=$$

$$= \boxed{}$$

l) $\frac{2}{9} \div 16 =$

$$=$$

$$=$$

$$= \boxed{}$$

m) $\frac{2}{3} \div 9 =$

$$=$$

$$=$$

$$= \boxed{}$$

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

$$=$$

$$=$$

$$= \boxed{}$$

o) $\frac{2}{11} \div 3 =$

$$=$$

$$=$$

$$= \boxed{}$$

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

$$=$$

$$=$$

$$= \boxed{}$$

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

$$=$$

$$=$$

$$= \boxed{}$$

r) $\frac{7}{10} \div 6 =$

$$=$$

$$=$$

$$= \boxed{}$$

Skill 10.6 Dividing two fractions (1).

- Copy the first fraction and change “divide by” (\div) into “times” (\times).
 - Invert the second fraction.
 - Multiply the fractions. (see skill 10.4, page 58)
- To simplify:

EITHER

- Cross simplify where possible before multiplying. (see skill 10.4, page 58)

OR

- Simplify at the end.

Q. $\frac{2}{9} \div \frac{1}{3} =$

A. $\frac{2}{9} \div \frac{1}{3} =$ *Invert second fraction*

$$= \frac{2}{9} \times \frac{3}{1}$$

$$= \frac{2}{\cancel{9}^3} \times \frac{\cancel{3}^1}{1}$$

Divide 9 and 3 by 3

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

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

OR

A. $\frac{2}{9} \div \frac{1}{3} =$

$$= \frac{2}{9} \times \frac{3}{1}$$

$$= \frac{2 \times 3}{9 \times 1}$$

$$= \frac{6 \div 3}{9 \div 3}$$

Simplify

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

a) $\frac{3}{4} \div \frac{2}{5} =$

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

$$= \frac{3 \times 5}{4 \times 2} = \frac{15}{8} = \boxed{1\frac{7}{8}}$$

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

$$=$$

$$=$$

$$= \boxed{}$$

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

$$=$$

$$=$$

$$= \boxed{}$$

d) $\frac{2}{3} \div \frac{3}{8} =$

$$=$$

$$= \boxed{}$$

e) $\frac{4}{9} \div \frac{7}{11} =$

$$=$$

$$= \boxed{}$$

f) $\frac{5}{12} \div \frac{2}{7} =$

$$=$$

$$= \boxed{}$$

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

$$=$$

$$= \boxed{}$$

h) $\frac{3}{7} \div \frac{5}{8} =$

$$=$$

$$= \boxed{}$$

i) $\frac{3}{10} \div \frac{2}{9} =$

$$=$$

$$= \boxed{}$$

Skill 10.6 Dividing two fractions (2).

j) $\frac{7}{10} \div \frac{1}{5} =$

$$= \frac{7}{10} \times \frac{5}{1}$$

$$= \frac{7}{\cancel{10}^2} \times \frac{\cancel{5}^1}{1}$$

Divide
10 and 5 by 5

$$= \frac{7 \times 1}{2 \times 1} = \frac{7}{2} = \boxed{}$$

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

=

=

=

$$= \boxed{}$$

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

=

=

=

$$= \boxed{}$$

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

=

=

=

$$= \boxed{}$$

n) $\frac{1}{12} \div \frac{2}{3} =$

=

=

=

$$= \boxed{}$$

o) $\frac{9}{10} \div \frac{2}{5} =$

=

=

=

$$= \boxed{}$$

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

=

=

=

$$= \boxed{}$$

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

=

=

=

$$= \boxed{}$$

r) $\frac{3}{4} \div \frac{5}{16} =$

=

=

=

$$= \boxed{}$$

s) $\frac{4}{5} \div \frac{3}{10} =$

=

=

$$= \boxed{}$$

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

=

=

$$= \boxed{}$$

u) $\frac{7}{10} \div \frac{3}{20} =$

=

=

$$= \boxed{}$$