

10. [Fraction \times, \div]

continues on page 54

MM7 1 1 2 2 3 3 4 4
MM8 1 1 2 2 3 3 4 4

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

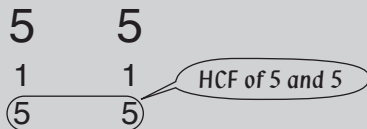
Highest Common Factor (HCF) of two numbers

- 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 Highest Common Factor is the largest number that divides evenly into both numbers.

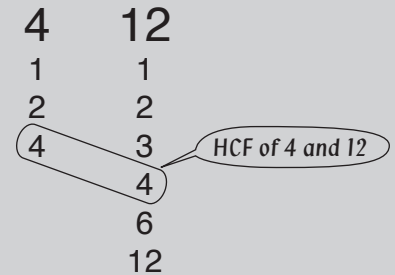
Examples:

Identical numbers



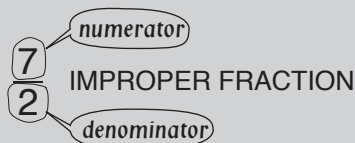
Hint: 5 is the HCF of 5 and 5 because 5 is the largest number that divides into 5 and 5.

One number divides evenly into the other number



Hint: 4 is the HCF 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 Highest 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.

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

- 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.

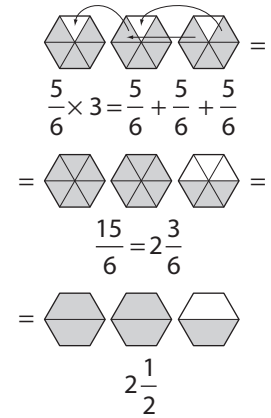
Skill 10.1 Multiplying a fraction by a whole number (2).

MM7 11 22 33 44
MM8 11 22 33 44

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

A. $\frac{5}{\cancel{6}^2} \times \frac{1}{\cancel{3}^3} =$
 $= \frac{5 \times 1}{2}$ *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.

MM7 11 2 2 3 3 4 4
MM8 11 2 2 3 3 4 4

- 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 =

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

$$180 \div 9 = 20$$

$$20 \times 5 = \mathbf{\$100}$$

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

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

Divide
9 and 180 by 9

$$= \mathbf{\$100}$$

Add the \$ sign

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

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

Divide
7 and 35 by 7

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

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

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

$$= \quad = \mathbf{\quad}$$

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

$$= \quad = \mathbf{\quad}$$

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

$$= \quad = \mathbf{\quad}$$

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

$$= \quad = \mathbf{\quad}$$

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

$$= \quad = \mathbf{\quad}$$

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

$$= \quad = \mathbf{\quad}$$

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

$$= \quad = \mathbf{\quad}$$

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

$$= \quad = \mathbf{\quad}$$

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

$$= \quad = \mathbf{\quad}$$

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

$$= \quad = \mathbf{\quad}$$

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

$$= \quad = \mathbf{\quad}$$

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

MM7 11 2 33 44
MM8 11 2 33 44

- Copy the whole number and change “divide by” (\div) into “times” (\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.

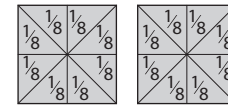
Q. $2 \div \frac{1}{8} =$

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

Change the sign to “ \times ”
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) $3 \div \frac{3}{5} =$
 $= 3 \times \frac{5}{3}$
 $= \frac{1 \times 5}{1} = 5$

Invert fraction
Divide 3 and 3 by 3

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

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

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

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

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

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

Invert fraction

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

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

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

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

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

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

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*

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

$$= \overset{3}{\cancel{6}} \times \frac{9}{\underset{2}{\cancel{2}} 1}$$
 Divide 6 and 2 by 2

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

$$=$$

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

$$=$$

$$=$$

$$=$$

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

$$=$$

$$=$$

$$=$$

s) $4 \div \frac{3}{6} =$

$$=$$

$$=$$

$$=$$

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

$$=$$

$$=$$

$$=$$

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

$$=$$

$$=$$

$$=$$

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

$$=$$

$$=$$

$$=$$

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

$$=$$

$$=$$

$$=$$

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

$$=$$

$$=$$

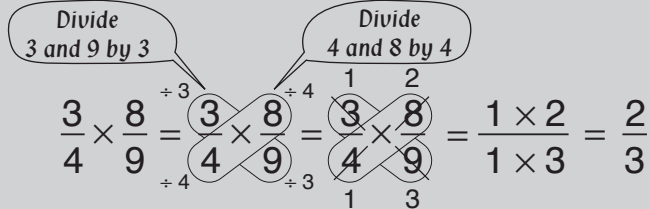
$$=$$

Skill 10.4 Multiplying two fractions (1).

MM7 11 2 2 3 4
MM8 11 2 3 4

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

Callouts: "Divide 3 and 9 by 3", "Divide 2 and 4 by 2"

OR A. $\frac{3}{4} \times \frac{2}{9} =$
 $\frac{3 \times 2}{4 \times 9} =$
 $\frac{6}{36} =$
 $\frac{1}{6}$

Callout: "Simplify"

a) $\frac{1}{4} \times \frac{1}{7} =$
 $\frac{1 \times 1}{4 \times 7} =$ $\frac{1}{28}$

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

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

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

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

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

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

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

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

Skill 10.4 Multiplying two fractions (2).

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

$$= \frac{\overset{1}{\cancel{2}}}{3} \times \frac{1}{\underset{1}{\cancel{2}}} \quad \text{Simplify}$$

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

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

$$= \frac{5 \times \cancel{6}}{6 \times 7} = \boxed{\frac{5}{7}}$$

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

$$= \frac{\cancel{3} \times 2}{5 \times \cancel{3}} = \boxed{\frac{2}{5}}$$

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

$$= \frac{\cancel{7} \times 2}{9 \times \cancel{7}} = \boxed{\frac{2}{9}}$$

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

$$= \frac{1 \times \cancel{4}}{2 \times 9} = \boxed{\frac{2}{9}}$$

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

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

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

$$= \frac{\cancel{3} \times \cancel{8}}{4 \times 11} = \boxed{\frac{2}{11}}$$

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

$$= \frac{2 \times 3}{\cancel{5} \times \cancel{4}} = \boxed{\frac{3}{10}}$$

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

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

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

$$= \frac{\cancel{7} \times 1}{9 \times \cancel{14}} = \boxed{\frac{1}{18}}$$

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

$$= \frac{5 \times \cancel{3}}{\cancel{7} \times \cancel{10}} = \boxed{\frac{1}{2}}$$

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

$$= \frac{5 \times \cancel{6}}{\cancel{12} \times 7} = \boxed{\frac{5}{14}}$$

v) $\frac{3}{12} \times \frac{4}{6} =$

$$= \frac{\cancel{3} \times \cancel{4}}{\cancel{12} \times \cancel{6}} = \boxed{\frac{1}{6}}$$

w) $\frac{2}{5} \times \frac{10}{14} =$

$$= \frac{\cancel{2} \times \cancel{10}}{5 \times \cancel{14}} = \boxed{\frac{2}{7}}$$

x) $\frac{3}{10} \times \frac{2}{9} =$

$$= \frac{\cancel{3} \times 2}{\cancel{10} \times \cancel{9}} = \boxed{\frac{1}{15}}$$

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

$$= \frac{\cancel{3} \times \cancel{5}}{\cancel{10} \times \cancel{9}} = \boxed{\frac{1}{6}}$$

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

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

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

$$= \frac{\cancel{4} \times \cancel{3}}{\cancel{9} \times \cancel{16}} = \boxed{\frac{1}{12}}$$

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

$$\begin{aligned} \text{g) } \frac{2}{5} \div 8 &= \\ &= \frac{2}{5} \div \frac{8}{1} \\ &= \frac{2}{5} \times \frac{1}{8} \\ &= \frac{\cancel{2}^1}{5} \times \frac{1}{\cancel{8}_4} = \boxed{\frac{1}{20}} \end{aligned}$$

$$\begin{aligned} \text{h) } \frac{3}{7} \div 12 &= \\ &= \\ &= \\ &= \end{aligned}$$

$$\begin{aligned} \text{i) } \frac{6}{11} \div 3 &= \\ &= \\ &= \\ &= \end{aligned}$$

$$\begin{aligned} \text{j) } \frac{5}{8} \div 15 &= \\ &= \\ &= \\ &= \end{aligned}$$

$$\begin{aligned} \text{k) } \frac{2}{7} \div 10 &= \\ &= \\ &= \\ &= \end{aligned}$$

$$\begin{aligned} \text{l) } \frac{2}{9} \div 16 &= \\ &= \\ &= \\ &= \end{aligned}$$

$$\begin{aligned} \text{m) } \frac{2}{3} \div 9 &= \\ &= \\ &= \\ &= \end{aligned}$$

$$\begin{aligned} \text{n) } \frac{5}{6} \div 4 &= \\ &= \\ &= \\ &= \end{aligned}$$

$$\begin{aligned} \text{o) } \frac{2}{11} \div 3 &= \\ &= \\ &= \\ &= \end{aligned}$$

$$\begin{aligned} \text{p) } \frac{3}{4} \div 4 &= \\ &= \\ &= \\ &= \end{aligned}$$

$$\begin{aligned} \text{q) } \frac{3}{5} \div 2 &= \\ &= \\ &= \\ &= \end{aligned}$$

$$\begin{aligned} \text{r) } \frac{7}{10} \div 6 &= \\ &= \\ &= \\ &= \end{aligned}$$

Skill 10.6 Dividing two fractions (1).

MM7 11 22 33 44
MM8 11 22 33 44

- Copy the first fraction and change “divide by” (÷) into “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. $\frac{2}{9} \div \frac{1}{3} =$
 $= \frac{2}{9} \times \frac{3}{1}$
 $= \frac{2 \times 3}{9 \times 1}$
 $= \frac{6^+3}{9^+3}$ *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) $\frac{2}{9} \div \frac{3}{7} =$
 $=$
 $=$
 $=$

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

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

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

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

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

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

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

Skill 10.6 Dividing two fractions (2).

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

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

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

Divide
10 and 5 by 5

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

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

$$=$$

$$=$$

$$= = \boxed{}$$

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

$$=$$

$$=$$

$$= = \boxed{}$$

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

$$=$$

$$=$$

$$= = \boxed{}$$

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

$$=$$

$$=$$

$$= = \boxed{}$$

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

$$=$$

$$=$$

$$= = \boxed{}$$

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

$$=$$

$$=$$

$$= = \boxed{}$$

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

$$=$$

$$=$$

$$= = \boxed{}$$

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

$$=$$

$$=$$

$$= = \boxed{}$$

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

$$=$$

$$=$$

$$= = \boxed{}$$

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

$$=$$

$$=$$

$$= = \boxed{}$$

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

$$=$$

$$=$$

$$= = \boxed{}$$