

# 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.*

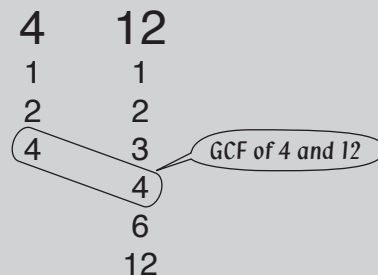
Examples:

#### 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.

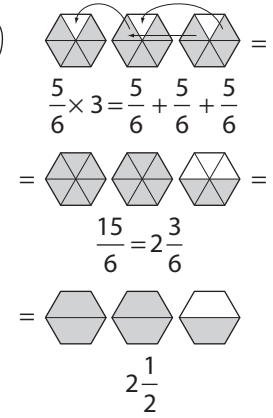
**Skill 10.1** Multiplying a fraction by a whole number (2).

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*  
 $= \frac{5 \times 3}{6}$   
 $= \frac{15}{6}$   
 $= 2\frac{3}{6+3}$  *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 =

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

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

Divide  
7 and 35 by 7

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

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

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

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

$$=$$

$$= \quad = \$$$

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

$$=$$

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

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

$$=$$

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

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

$$=$$

$$= \quad = \$$$

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

$$=$$

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

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

$$=$$

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

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

$$=$$

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

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

$$=$$

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

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

$$=$$

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

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

$$=$$

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



## 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

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

$= \overset{3}{\cancel{6}} \times \frac{9}{\cancel{2}_1}$  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)  $8 \div \frac{4}{11} =$

$=$

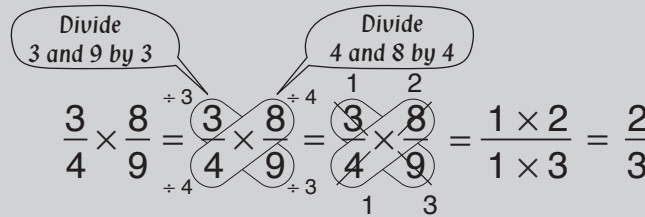
$=$

$=$

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

Divide 3 and 9 by 3

Divide 2 and 4 by 2

$$= \frac{\overset{1}{\cancel{3}}}{\underset{2}{\cancel{4}}} \times \frac{\overset{1}{\cancel{2}}}{\underset{3}{\cancel{9}}} = \frac{1 \times 1}{2 \times 3} = \frac{1}{6}$$

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

Simplify

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

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

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

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

$$= \frac{3 \times 3}{5 \times 4} = \boxed{\frac{9}{20}}$$

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

$$= \frac{1 \times 3}{8 \times 4} = \boxed{\frac{3}{32}}$$

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

$$= \frac{7 \times 1}{10 \times 2} = \boxed{\frac{7}{20}}$$

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

$$= \frac{2 \times 4}{9 \times 5} = \boxed{\frac{8}{45}}$$

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

$$= \frac{3 \times 4}{5 \times 7} = \boxed{\frac{12}{35}}$$

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

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

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

$$= \frac{5 \times 1}{6 \times 2} = \boxed{\frac{5}{12}}$$

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

$$= \frac{1 \times 3}{4 \times 11} = \boxed{\frac{3}{44}}$$

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

$$=$$

$$=$$

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

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.

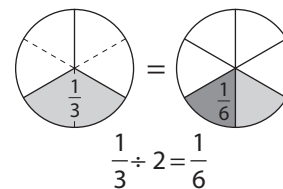
OR

- 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 10.6** 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)**  $\frac{2}{9} \div \frac{3}{7} =$

$$=$$

$$=$$

$$= \boxed{\phantom{00}}$$

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

$$=$$

$$=$$

$$= \boxed{\phantom{00}}$$

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

$$=$$

$$= \boxed{\phantom{00}}$$

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

$$=$$

$$= \boxed{\phantom{00}}$$

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

$$=$$

$$= \boxed{\phantom{00}}$$

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

$$=$$

$$= \boxed{\phantom{00}}$$

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

$$=$$

$$= \boxed{\phantom{00}}$$

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

$$=$$

$$= \boxed{\phantom{00}}$$

## 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

$$= \frac{7 \times 1}{2 \times 1} = \frac{7}{2} = \boxed{\phantom{00}}$$

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

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

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

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

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

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

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