

# 5. [Fraction $\times, \div$ ]

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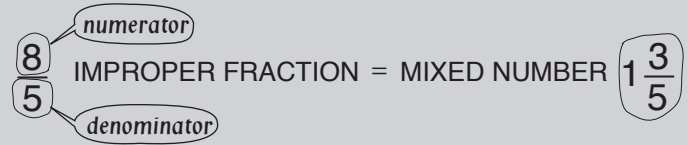
## Skill 5.1 Multiplying a fraction by a whole number (1).

MM9 1 2 2 3 3 4 4  
MM10 1 1 2 2 3 3 4 4

### Changing an improper fraction to a mixed number

- Divide the numerator by the denominator.

$$\frac{8}{5} = 8 \div 5 = 1 \text{ remainder } 3$$



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

$$\frac{8}{5} = 8 \div 5 = 1 \frac{3}{5}$$

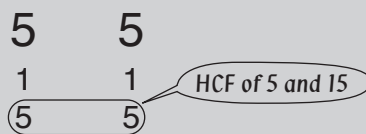
### Highest Common Factor (HCF) of two numbers

- 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 in both numbers.*

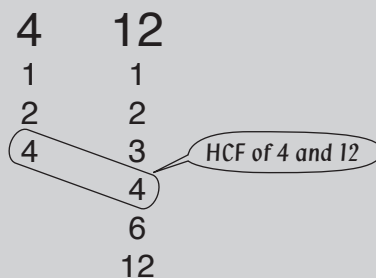
Examples:

#### HCF of 5 and 5



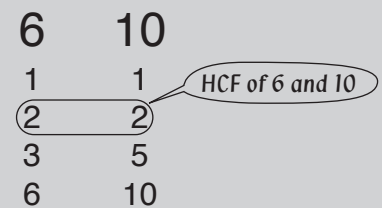
*Hint: 5 is the HCF of 5 and 5 because 5 is the largest number that divides into 5 and 5.*

#### HCF of 4 and 12



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

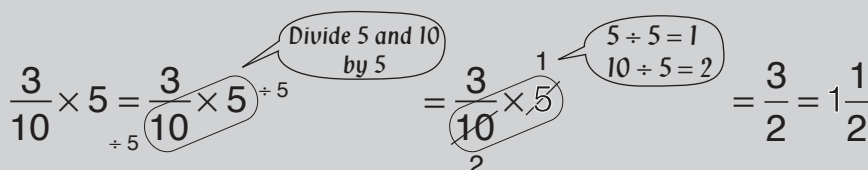
#### HCF of 6 and 10



*Hint: 2 is the HCF of 6 and 10 because 2 is the largest number that divides into 6 and 10.*

### 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.



**Skill 5.1** Multiplying a fraction by a whole number (2).

- Multiply the numerator of the fraction by the whole number.
  - Don't change the denominator.
  - Simplify.
- EITHER  
Cross simplify where possible before multiplying.

OR  
Simplify at the end.

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

**A.**  $\frac{3}{\cancel{4}^2} \times \cancel{2}^1 =$  *Divide 4 and 2 by 2*

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

$= \frac{3}{2}$  *Change to mixed number*

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

**OR**

**A.**  $\frac{3}{4} \times 2 =$  *Multiply 3 by 2*

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

$= \frac{6}{4}$

$= 1\frac{2+2}{4+2}$  *Simplify*

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

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

$= \frac{6}{4} = 1\frac{2}{4}$

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

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

$= \frac{4 \times 3}{7}$

$= \frac{12}{7} = \boxed{1\frac{5}{7}}$

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

$=$

$=$

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

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

$=$

$=$

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

**d)**  $\frac{7}{10} \times 3 =$

$=$

$=$

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

**e)**  $2 \times \frac{6}{7} =$

$=$

$=$

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

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

$=$

$=$

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

**g)**  $6 \times \frac{1}{12} =$

$= \frac{\cancel{6}^1 \times 1}{\cancel{12}_2} =$  *Divide 6 and 12 by 6*

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

**h)**  $3 \times \frac{5}{9} =$

$=$

$=$

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

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

$=$

$=$

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

**j)**  $5 \times \frac{3}{10} =$

$=$

$=$

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

**k)**  $10 \times \frac{2}{15} =$

$=$

$=$

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

**l)**  $8 \times \frac{5}{6} =$

$=$

$=$

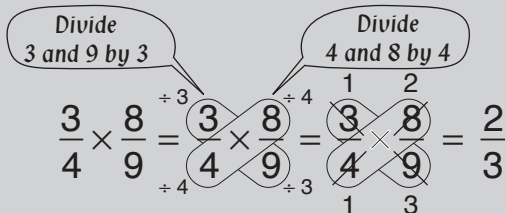
$= \boxed{\phantom{00}}$

**Skill 5.2** Multiplying two fractions (1).

MM9 1 1 2 2 3 3 4 4  
MM10 1 1 2 2 3 3 4 4

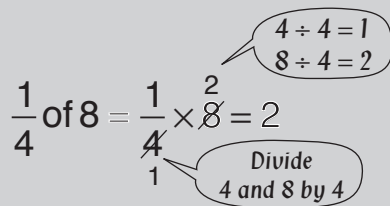
**Cross simplifying two fractions**

- 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 5.1, page 46)
- 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.



**“Of” means “times”**

A quarter of a box of 8 pencils equals 2.



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

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

Divide 3 and 3 by 3

Divide 2 and 4 by 2

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

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

$\frac{2 \times 3}{3 \times 4} = \frac{6}{12} \overset{\div 6}{\text{Simplify}} = \frac{1}{2}$

$\frac{3}{4}$  →  $\frac{2}{3} \text{ of } \frac{3}{4}$

$\frac{2}{3} \times \frac{3}{4} = \frac{6}{12}$

$\frac{2}{3} \times \frac{3}{4} = \frac{6}{12}$

$= \frac{1}{2}$

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

$= \frac{3 \times 1}{4 \times 5} = \boxed{\frac{3}{20}}$

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

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

c)  $\frac{1}{6} \times \frac{5}{8} =$

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



**Skill 5.3**

**Multiplying a mixed number by a fraction or by another mixed number.**

MM9 11 22 33 44  
MM10 11 22 33 44

- Change the mixed numbers to improper fractions before multiplying. (see skill 5.1, page 46)
- Multiply the numerators of the fractions.
- Multiply the denominators of the fractions.

To simplify:

EITHER

- Cross simplify where possible before multiplying. (see skill 5.2, page 48)

OR

- Simplify at the end.

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

**A.**  $2\frac{3}{5} \times 1\frac{1}{4} =$  *Change to improper fractions*

$$= \frac{13}{5} \times \frac{5}{4}$$

*Divide 5 and 5 by 5*

$$= \frac{13 \times 1}{1 \times 4}$$

*Change to mixed number*

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

**OR A.**  $2\frac{3}{5} \times 1\frac{1}{4} =$

$$= \frac{13}{5} \times \frac{5}{4}$$

$$= \frac{13 \times 5}{5 \times 4}$$

*Simplify*

$$= \frac{65 \div 5}{20 \div 5}$$

*Change to mixed number*

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

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

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

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

*Divide 3 and 6 by 3*

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

$$= \frac{5}{4} = 1\frac{1}{4}$$

**b)**  $1\frac{1}{11} \times 3\frac{2}{3} =$

$$=$$

$$=$$

$$=$$

$$=$$

$$=$$

$$=$$

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

$$=$$

$$=$$

$$=$$

$$=$$

$$=$$

$$=$$

**d)**  $4\frac{1}{2} \times \frac{4}{15} =$

$$=$$

$$=$$

$$=$$

$$=$$

$$=$$

$$=$$

**e)**  $1\frac{1}{5} \times 1\frac{7}{8} =$

$$=$$

$$=$$

$$=$$

$$=$$

$$=$$

$$=$$

**f)**  $1\frac{4}{5} \times \frac{5}{12} =$

$$=$$

$$=$$

$$=$$

$$=$$

$$=$$

$$=$$

## Skill 5.4 Multiplying three fractions.

MM9 11 22 33 44  
MM10 11 22 33 44

- Multiply the numerators of the fractions.
  - Multiply the denominators of the fractions.
- To simplify:  
EITHER
- Cross simplify where possible before multiplying.  
(see skill 5.2, page 48)

- OR
- Simplify at the end.

**Q.**  $\frac{1}{8} \times \frac{6}{7} \times \frac{7}{9} =$

**A.**  $\frac{1}{8} \times \frac{6}{7} \times \frac{7}{9} =$

Divide 7 and 7 by 7  
Divide 6 and 9 by 3

Divide 8 and 2 by 2

Simplify

Simplify

**OR A.**  $\frac{1}{8} \times \frac{6}{7} \times \frac{7}{9} =$

$= \frac{1 \times 6 \times 7}{8 \times 7 \times 9}$

$= \frac{42 \div 6}{504 \div 6}$

$= \frac{7 \div 7}{84 \div 7}$

$= \frac{1}{12}$

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

Divide 4 and 4 by 4

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

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

$=$

$=$

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

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

$=$

$=$

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

**d)**  $\frac{5}{6} \times \frac{3}{4} \times \frac{2}{5} =$

$=$

$=$

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

**e)**  $\frac{3}{4} \times \frac{3}{10} \times \frac{5}{6} =$

$=$

$=$

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

**f)**  $\frac{7}{10} \times \frac{2}{3} \times \frac{6}{7} =$

$=$

$=$

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

**g)**  $\frac{4}{5} \times \frac{10}{11} \times \frac{3}{8} =$

$=$

$=$

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

**h)**  $\frac{5}{6} \times \frac{4}{15} \times \frac{9}{16} =$

$=$

$=$

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

**i)**  $\frac{5}{11} \times \frac{11}{18} \times \frac{6}{25} =$

$=$

$=$

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

**Skill 5.5** Dividing two fractions.

- Copy the first fraction and change “divide by” (÷) into “times” (×).
- Invert the second fraction.
- Multiply the numerators of the fractions.
- Multiply the denominators of the fractions.

To simplify:

EITHER

- Cross simplify where possible before multiplying.  
(see skill 5.2, page 48)

OR

- Simplify at the end.

**Q.**  $\frac{1}{6} \div \frac{3}{8} =$

**A.**  $\frac{1}{6} \div \frac{3}{8} =$  *Invert second fraction* **OR** **A.**  $\frac{1}{6} \div \frac{3}{8} =$

$= \frac{1}{6} \times \frac{8}{3}$

$= \frac{1}{\cancel{6}^4} \times \frac{\cancel{8}_2}{3}$  *Divide 6 and 8 by 2*

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

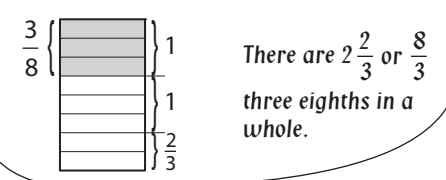
$= \frac{4}{9}$

$= \frac{1 \times 8}{6 \times 3}$

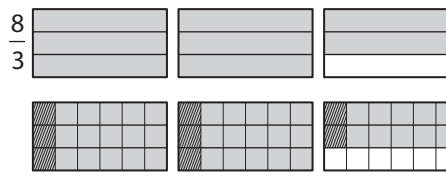
$= \frac{8^{\div 2}}{18^{\div 2}}$  *Simplify*

$= \frac{4}{9}$

How many three eighths are there in a whole?



There are  $2\frac{2}{3}$  or  $\frac{8}{3}$  three eighths in a whole.



$\frac{1}{6}$  of  $\frac{8}{3} = \frac{1}{6} \times \frac{8}{3} = \frac{8}{18}$

a)  $\frac{1}{8} \div \frac{3}{5} =$

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

$= \frac{1 \times 5}{8 \times 3} = \frac{5}{24}$

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

$=$

$=$

c)  $\frac{2}{7} \div \frac{5}{8} =$

$=$

$=$

d)  $\frac{3}{10} \div \frac{3}{4} =$

$= \frac{3}{10} \times \frac{4}{3}$

$= \frac{\cancel{3}^1 \times \cancel{4}_2}{5 \times \cancel{3}_1}$  *Divide 3 and 3 by 3*

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

*Divide 10 and 4 by 2*

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

$=$

$=$

$=$

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

$=$

$=$

$=$

g)  $\frac{5}{8} \div \frac{5}{12} =$

$=$

$=$

$=$

h)  $\frac{9}{10} \div \frac{3}{8} =$

$=$

$=$

$=$

i)  $\frac{5}{9} \div \frac{15}{18} =$

$=$

$=$

$=$

**Skill 5.6** Dividing a whole number by a fraction.

- 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. Don’t change the denominator.
- To simplify:  
EITHER
- Cross simplify where possible before multiplying.  
(see skill 5.2, page 48)
- OR
- Simplify at the end.

**Q.**  $2 \div \frac{1}{4} =$

**A.**  $2 \div \frac{1}{4} =$  *Invert fraction*

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

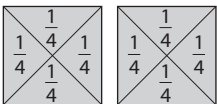
$$= \frac{2 \times 4}{1}$$

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

$$= 8$$

How many quarters are there in two wholes?

There are 8 quarters in two wholes.



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

**a)**  $5 \div \frac{5}{6} =$  *Invert fraction*

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

*Divide 5 and 5 by 5*

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

**b)**  $2 \div \frac{2}{7} =$

$$=$$

$$=$$

$$=$$

$$=$$

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

**c)**  $7 \div \frac{7}{9} =$

$$=$$

$$=$$

$$=$$

$$=$$

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

**d)**  $4 \div \frac{2}{5} =$

$$=$$

$$=$$

$$=$$

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

**e)**  $9 \div \frac{3}{8} =$

$$=$$

$$=$$

$$=$$

$$=$$

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

**f)**  $8 \div \frac{1}{2} =$

$$=$$

$$=$$

$$=$$

$$=$$

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

**g)**  $12 \div \frac{8}{11} =$

$$=$$

$$=$$

$$=$$

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

**h)**  $8 \div \frac{6}{7} =$

$$=$$

$$=$$

$$=$$

$$=$$

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

**i)**  $10 \div \frac{4}{9} =$

$$=$$

$$=$$

$$=$$

$$=$$

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

- 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 numerators of the fractions.
- Multiply the denominators of the fractions.

To simplify:

EITHER

- Cross simplify where possible before dividing.  
(see skill 5.2, page 48)

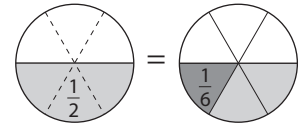
OR

- Simplify at the end.

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

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

What is one half divided into 3 equal parts?



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

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

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

a)  $\frac{4}{5} \div 8 =$   
 $= \frac{4}{5} \div \frac{8}{1} =$   
 $= \frac{4}{5} \times \frac{1}{8} =$   
 $= \frac{1 \times 1}{5 \times 2} = \frac{1}{10}$  *Divide 4 and 8 by 4*

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

c)  $\frac{6}{7} \div 3 =$   
 $=$   
 $=$   
 $=$   
 $=$   
 $=$   
 $=$   
 $=$   
 $=$

d)  $\frac{6}{7} \div 12 =$   
 $=$   
 $=$   
 $=$   
 $=$   
 $=$

e)  $\frac{3}{8} \div 15 =$   
 $=$   
 $=$   
 $=$   
 $=$   
 $=$

f)  $\frac{8}{9} \div 16 =$   
 $=$   
 $=$   
 $=$   
 $=$   
 $=$

