

## P.7

THEME: Numeracy

TOPIC: Fractions

### ADDITION OF FRACTIONS

#### Examples

1. Work out:  $\frac{1}{4} + \frac{1}{2}$

$$\begin{aligned}\frac{1}{4} &= \frac{2}{8}, \quad \frac{3}{12} \\ \frac{1}{2} &= \frac{4}{8}, \quad \frac{3}{6} \\ \frac{2}{8} + \frac{4}{8} &= \end{aligned}$$

$$\begin{array}{r} 2 + 4 \\ \hline 8 \end{array}$$

$$\begin{array}{r} 6 \\ \cancel{8} \\ 3 \\ \cancel{4} \\ \hline 4 \end{array}$$

#### Method II

LCD = 8

$$\begin{array}{r} \left( \frac{1}{4} \times \cancel{2}^{\cancel{2}} \right) + \left( \frac{1}{2} \times \cancel{8}^{\cancel{4}} \right) \\ \hline 8 \end{array}$$

$$\begin{array}{r} 2 + 4 \\ \hline 8 \\ \cancel{6} \\ \cancel{8} \\ 3 \\ \cancel{4} \\ \hline 4 \end{array}$$

2. Work out:  $\frac{5}{6} + \frac{3}{8}$

LCD = 24

$$\begin{array}{r} \left( \frac{5}{6} \times \cancel{24}^{\cancel{4}} \right) + \left( \frac{3}{8} \times \cancel{24}^{\cancel{3}} \right) \\ \hline 24 \end{array}$$

$$\begin{array}{r} 20 + 9 \\ \hline 24 \end{array}$$

$$\begin{array}{r} \cancel{29} \\ \hline 24 \\ 1r5 \end{array} = 1\frac{5}{24}$$

#### Method II

$$\frac{5}{6} = \frac{10}{12}, \frac{15}{18}, \boxed{\frac{20}{24}}, \frac{25}{30}$$

$$\frac{3}{8} = \frac{6}{16}, \boxed{\frac{9}{24}}$$

$$\frac{20}{24} + \frac{9}{24}$$

$$\frac{29}{24} \text{ 1r5}$$

$$1\frac{5}{24}$$

3. John filled  $\frac{1}{2}$  of a tank in the morning and  $\frac{2}{5}$  in the afternoon, what fraction did he fill altogether?

$$\frac{1}{2} + \frac{2}{5} \quad M_2 = \{ 2, 4, 6, 8, 10, 12, \dots \}$$

$$M_5 = \{ 5, 10, 15, 20, \dots \}$$

LCD=10

$$\frac{\left(\frac{1}{2} \times 10\right) + \left(\frac{2}{5} \times 10\right)}{10}$$

$$\frac{5+4}{10}$$

$$\frac{9}{10}$$

**Method II**

$$\frac{1}{2} = \frac{2}{4}, \frac{3}{6}, \frac{4}{8}, \boxed{\frac{5}{10}}$$

$$\frac{2}{5} = \boxed{\frac{4}{10}}$$

$$\frac{5}{10} + \frac{4}{10}$$

$$\frac{5+4}{10}$$

$$\frac{9}{10}$$

## ACTIVITY

- Find the sum of the following fractions.  
 a)  $\frac{2}{9} + \frac{3}{9}$       b)  $\frac{1}{3} + \frac{1}{5}$       c)  $\frac{2}{5} + \frac{1}{6}$       d)  $\frac{5}{8} + \frac{1}{6}$       e)  $\frac{1}{7} + \frac{2}{3}$
- $\frac{2}{3}$  of the seats in a church were occupied by adults and  $\frac{1}{4}$  by children. What fraction of the seats in the church is occupied?
- Mpala spends  $\frac{1}{3}$  of her pocket money on eats,  $\frac{1}{8}$  on medical and  $\frac{1}{6}$  on stationery. What fraction of her pocket money is spent?
- Work out:  $\frac{1}{4} - \frac{1}{6} + \frac{1}{3}$

## ADDITION OF MIXED NUMBERS

### Examples

1. Add:  $1\frac{1}{8} + 3\frac{1}{12}$        $m_8 = \{8, 16, 24, 32, \dots\}$

Method I

$$(1+3) + \left(\frac{1}{8} + \frac{1}{12}\right)$$

$$4 + \left(\frac{1}{8} + \frac{1}{12}\right)$$

$$4 + \frac{\left(\frac{1}{8} \times 24\right) + \left(\frac{1}{12} \times 24\right)}{24}$$

$$4 + \frac{3+2}{24}$$

$$4 + \frac{5}{24}$$

$$4\frac{5}{24}$$

### Method II

$$\frac{9}{8} + \frac{37}{12}$$

$$\frac{9}{8} = \frac{18}{16}, \boxed{\frac{27}{24}}, \frac{36}{32}$$

$$\frac{37}{12} = \boxed{\frac{74}{24}}$$

$$\frac{27}{24} + \frac{74}{24}$$

$$\begin{array}{r} 27+74 \\ \hline 24 \end{array}$$

4 r 5

$$\begin{array}{r} 101 \\ \hline 24 \\ 4 \frac{5}{24} \end{array}$$

2. Akulo had  $1\frac{1}{2}$  cakes, Janat  $2\frac{3}{4}$  cakes and Kenty had  $\frac{3}{4}$  cake. How many cakes did the three children have?

$$(1+2) + (\frac{3}{4} + \frac{3}{4} + \frac{1}{2})$$

$$\frac{1}{2} = \frac{2}{4}, \frac{3}{6}, \frac{4}{8}, \frac{5}{10}, \frac{6}{12}$$

$$3 + (\frac{6}{12} + \frac{6}{12})$$

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

$$3 + \frac{6+6}{12}$$

$$3 + \frac{12}{12}$$

$$3 + 1$$

4 cakes

### ACTIVITY

1. Work out the sum of the following:

$$a) 2 + \frac{2}{7} \quad b) 1\frac{1}{4} + \frac{3}{8} \quad c) 6\frac{2}{3} + 2\frac{1}{4} \quad d) 1\frac{1}{2} + 3\frac{1}{4} + \frac{5}{6}$$

2. A father gave sugar cane to her children. Esther got  $1\frac{1}{2}$  and Robert got  $2\frac{1}{4}$ . How many sugar canes did both children get?

A worker painted  $3\frac{1}{9}$  walls on Monday and  $\frac{6}{9}$  on Tuesday. How much was painted in two days? Subtraction of fractions

## SUBTRACTION OF FRACTIONS

### Examples

1. Work out:  $\frac{1}{2} - \frac{1}{8}$

$$m_2 = \{ 2, 4, 6, 8, 10, 12, 14, 16, \dots \}$$

$$m_8 = \{ 8, 16, 24, 32, 40, \dots \}$$

$$LCD = 8$$

$$\left( \frac{1}{2} \times \frac{4}{4} \right) - \left( \frac{1}{8} \times \frac{1}{1} \right)$$

$$\frac{8}{(1 \times 4) - (1 \times 1)}$$

$$8$$

$$\begin{array}{r} 4 - 1 \\ \hline 8 \\ 3 \\ \hline 8 \end{array}$$

**Method II**

$$\frac{1}{2} = \frac{2}{4}, \quad \frac{3}{6}, \quad \boxed{\frac{4}{8}}, \quad \frac{6}{12}$$

$$\boxed{\frac{1}{8}} = \frac{2}{16}, \quad \frac{3}{24}$$

$$\begin{array}{r} 4 \quad 1 \\ 8 - 8 \\ 4 - 1 \\ \hline 8 \\ 3 \\ \hline 8 \end{array}$$

2. Work out the difference between  $\frac{3}{4}$  and  $\frac{3}{5}$ .

$$m_4 = \{4, 8, 12, 16, \textcircled{20}, 24, \dots\}$$

$$m_5 = \{5, 10, 15, \textcircled{20}, 25,$$

$$LCD = 20$$

$$\frac{\left(\frac{3}{4} \times \cancel{20}^5\right) - \left(\frac{3}{5} \times \cancel{20}^4\right)}{20}$$

$$\begin{array}{r} (3 \times 5) - (3 \times 4) \\ \hline 20 \\ 15 - 12 \\ \hline 20 \\ 3 \\ \hline 20 \end{array}$$

**Method II**

$$\frac{3}{4} = \frac{6}{8}, \quad \frac{9}{12}, \quad \frac{12}{16}, \quad \boxed{\frac{15}{20}}$$

$$\frac{3}{5} = \frac{6}{10}, \quad \frac{9}{15}, \quad \boxed{\frac{12}{20}}$$

$$\begin{array}{r}
 15 & 12 \\
 20 - & 20 \\
 15 - 12 & \\
 \hline
 & 20 \\
 & 3 \\
 \hline
 & 20
 \end{array}$$

3. A baby was given  $\frac{5}{6}$  litres of milk and drunk  $\frac{7}{12}$  litres. How much milk remained?

$$\frac{5}{6} = \boxed{\frac{10}{12}}, \frac{15}{18}, \frac{20}{24}, \frac{25}{30}, \frac{30}{36}, \frac{35}{42}$$

$$\boxed{\frac{7}{12}} = \frac{14}{24}, \frac{21}{36},$$

$$\begin{array}{r}
 10 - 7 \\
 \hline
 12
 \end{array}$$

$$\begin{array}{r}
 10 - 7 \\
 \hline
 12
 \end{array}$$

$$\begin{array}{r}
 \cancel{3} \ 1 \\
 \hline
 12 \\
 \cancel{12} \ 4
 \end{array}$$

$$\frac{1}{4} \text{ litre}$$

### Activity

1. Work out the difference of the following:

$$a) \frac{4}{5} - \frac{1}{5}$$

$$b) \frac{3}{4} - \frac{2}{3}$$

$$c) \frac{3}{7} - \frac{1}{6}$$

$$d) \frac{2}{3} - \frac{5}{12}$$

$$e) \frac{1}{3} - \frac{1}{5}$$

$$f) \frac{3}{5} - \frac{3}{8}$$

2. Adam had a half a glass of water and used  $\frac{1}{3}$  to take medicine. What of water he had did he remain with?

3. Ongom was given  $\frac{3}{4}$  of sugar cane. He gave  $\frac{1}{6}$  to his friend. What fraction of the sugar cane did he remain with?

4. Kempo had tom plant  $\frac{7}{8}$  of a garden. He planted  $\frac{3}{4}$  in the morning and the rest in the evening. What portion of the garden was planted in the evening?

## MULTIPLICATION INVOLVING FRACTION

### Examples

1. Work out the product of the following:

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

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

b)  $\frac{2}{8} \times \frac{3}{12} \times \frac{2}{9}$

$$\frac{2}{8} \times \frac{3}{12} \times \frac{2}{9}$$
$$\frac{\cancel{2}}{4} \times \frac{\cancel{3}}{\cancel{12}} \times \frac{\cancel{2}}{\cancel{9}}$$

$$\frac{1 \times 1 \times 1}{4 \times 6 \times 3} = \frac{1}{72}$$

c)  $36 \times \frac{4}{9}$

$$\frac{36}{\cancel{4}} \times \frac{4}{\cancel{9}} = 4 \times 4$$
$$= 16$$

d)  $\frac{3}{50} \times 100$

$$\frac{3}{50} \times \frac{100}{1}$$

$$= 3 \times 2$$

$$= 6$$

e)  $4\frac{3}{8} \times 40$

$$\frac{35}{8} \times 40$$

$$= 35 \times 5$$

$$= 175$$

2) What is  $\frac{2}{5}$  of 20 books?

$$\frac{2}{5} \times 20$$

$$2 \times 4 = \underline{\underline{8 \text{ books}}}$$

3) What is  $2\frac{1}{2}$  of 2 dozen books?

$$\begin{aligned}1 \text{ doz} &= 12 \text{ books} \\2 \text{ dozens} &= 12 \times 2 \\&= 24 \text{ books}\end{aligned}$$

$$\begin{aligned}2 \frac{1}{2} \times 24 \\&\frac{5}{2} \times \underline{24} = \underline{\underline{60}} \text{ books}\end{aligned}$$

### ACTIVITY

1. Work out the following:

- a)  $\frac{2}{3} \times \frac{9}{12}$     b)  $\frac{4}{15} \times \frac{5}{18}$     c)  $\frac{11}{18} \times \frac{9}{22}$     d)  $2\frac{3}{5} \times \frac{10}{15}$   
e)  $\frac{3}{4} \times \frac{1}{2} \times \frac{7}{12}$     e)  $4\frac{1}{2} \times 5\frac{1}{5}$
2. What is  $\frac{3}{4}$  of 48 pens?  
3. What is  $3\frac{1}{2}$  of  $4\frac{2}{7}$  weeks?

Ref: New MK pupils book 6  
pages 109

### RECIPROCALS OF FRACTIONS/MULTIPLICATIVE INVERSE

A reciprocal is a number that is multiplied by a different number to give 1.

The Reciprocal of  $\frac{2}{3}$  is  $\frac{3}{2}$

$$\begin{aligned}\text{I.e. } \frac{2}{3} \times \frac{3}{2} &= \frac{6}{6}^1 \\&= \underline{\underline{1}}\end{aligned}$$

Therefore, a fraction multiplied by its reciprocal gives a product of 1.

#### Example:

1. Find the reciprocal of  $\frac{3}{4}$

Let the reciprocal be m

$$\text{Fraction} \times \text{rec.} = 1$$

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

$$\cancel{4}^1 \times \frac{3}{\cancel{4}^1} m = 1 \times 4$$

$$3m = 4$$

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

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

Ref: New MK pupils book 6  
pages 110

2. What is the reciprocal of  $1\frac{2}{7}$ ?

Let the reciprocal be k

$$F \times r = 1$$

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

$$\frac{9}{7}m = 1$$

$$\cancel{1}\cancel{7} \times \frac{9}{\cancel{7}}m = 1 \times 7$$

$$\cancel{1}9m = 7$$

$$\cancel{1}\cancel{9}m = \frac{7}{9}$$

$$\cancel{1}m = \frac{7}{9}$$

3. Find the reciprocal of 5.

Let the reciprocal be w.

$$F \times w = 1$$

$$5 \times w = 1$$

$$5w = 1$$

$$\frac{\cancel{1}5w}{5} = \frac{1}{5}$$

$$\cancel{1}w = \frac{1}{5}$$

3. What is the reciprocal of 0.4?

Let the reciprocal be m

$$F \times r = 1$$

$$0.4 \times m = \frac{4}{10} \times m = 1$$

$$\cancel{1}0 \times \frac{4}{\cancel{10}}m = 1 \times 10$$

$$\cancel{1}4m = 10$$

$$\cancel{1}\cancel{4}m = \frac{10}{4}$$

$$\cancel{1}m = \frac{10}{4}$$

### Activity

1. Find the multiplicative inverse of the following numbers:

- a)  $1\frac{1}{3}$       b)  $\frac{9}{15}$       c)  $\frac{21}{8}$       d) 3    0.6    e) 0.25      f) 2.4

2. Find the missing number in the following:

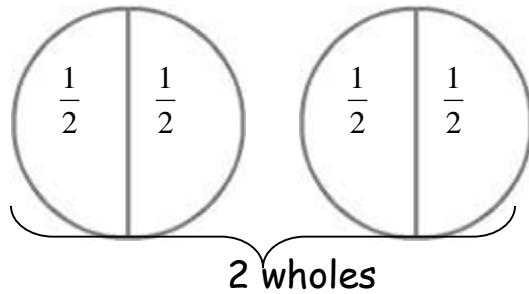
- i)  $\frac{1}{7} \times \boxed{\quad} = 1$       ii)  $\frac{3}{11} \times \boxed{\quad} = 11$

Ref: New MK pupils book 6  
page 110

# DIVISION OF WHOLE NUMBERS BY FRACTIONS

## Wholes by fractions

1)  $2 \div \frac{1}{2}$  (Use of diagrams)



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

## Method II (reciprocal)

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

2. Work out:  $3 \div \frac{1}{4}$

$$= \frac{3}{1} \times \frac{4}{1} \\ = \frac{12}{1} \\ \Rightarrow 12$$

3. Work out:  $\frac{2}{3} \div 18$

$$= \frac{2}{3} \times \frac{1}{18} \\ = \frac{1}{27} \\ = \frac{1}{27}$$

3. How many half litre cups are in a 20 litre jerry can?

$$20 \div \frac{1}{2} \\ = 20 \times \frac{2}{1} \\ = 20 \times 2 \\ = \frac{1 \times 1}{40}$$

## Method II

1 litre	$\rightarrow$	2 half litres
20 litres	$\rightarrow$	(2 $\times$ 20) half litres
20 litres	$\rightarrow$	40 half litre cups

$$\begin{array}{r}
 40 \\
 - 1 \\
 \hline
 40 \\
 = 40 \text{ cups}
 \end{array}$$

4. How many  $\frac{1}{4}$  kg packets of sugar can be packed from 30kg?

$$\begin{array}{lcl}
 1\text{kg} & \longrightarrow & 4 \text{ quarter kg} \\
 30\text{kg} & \longrightarrow & (4 \times 30) \text{ quarter kg} \\
 30\text{kg} & \longrightarrow & 120 \text{ quarter kg packets} \\
 & & \underline{120 \text{ kg packets can be packed}}
 \end{array}$$

Method II

$$\begin{array}{r}
 30 \div \frac{1}{4} \\
 \frac{30}{1} \times \frac{4}{1} \\
 30 \times 4 \\
 \hline
 1 \times 1 \\
 120
 \end{array}$$

1  
120 packets

120 kg packets can be packed

5. Walyenge shared  $\frac{2}{3}$  a sugar cane among her 5 friends. What fraction did each get?

$$\begin{array}{r}
 \frac{2}{3} \div 5 \\
 \frac{2}{3} \times \frac{1}{5} \\
 \frac{2 \times 1}{3 \times 5} \\
 \hline
 2
 \end{array}$$

Ref: New MK pupils book 6  
pages 111-112

### Activity

1. Work out the following:
  - $10 \div \frac{1}{2}$
  - $24 \div \frac{3}{5}$
  - $35 \div \frac{5}{10}$
  - $\frac{3}{4} \div 15$
  - $\frac{5}{6} \div 20$
2. A seamstress uses  $\frac{1}{2}$  metre piece of cloth to make a dress. How many such dresses can he make from 16 metres of cloth.
3. Mark uses  $\frac{1}{8}$  litre of cooking oil every day. If she buys a 20-litre jerrycans of cooking oil. how long will it last?
4. Muko served  $\frac{5}{6}$  of a water melon to her visitors and each got an equal share. If there were 10 visitors, what fraction was each piece?

## DIVISION OF FRACTION BY FRACTION

1. Work out:  $\frac{2}{3} \div \frac{4}{5}$

$$\frac{2}{3} \div \frac{4}{5} \implies \frac{2}{3} \times \frac{5}{4}$$

$$= \frac{\cancel{2}^{10}}{\cancel{3}^{12}} = \frac{5}{6}$$

2. Work out  $\frac{3}{4} \div \frac{1}{3}$

$$\frac{3}{4} \times \frac{3}{1} = \frac{9}{4}$$

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

4. Work out:  $2\frac{1}{3} \div 1\frac{7}{12}$

*Ref: New MK pupils book 7  
pages 80 - 81*

$$\frac{7}{3} \div \frac{19}{12}$$

$$\frac{7}{3} \times \frac{12}{19}$$

$$\begin{array}{r} 28 \\ \hline 19 \\ 1\frac{9}{19} \end{array}$$

### ACTIVITY

1. Work out the following:

a)  $\frac{2}{5} \div \frac{2}{3}$       b)  $\frac{5}{8} \div \frac{5}{12}$       c)  $\frac{12}{15} \div 1\frac{3}{5}$       d)  $\frac{8}{10} \div \frac{4}{5}$

3. How many  $\frac{3}{5}$  litres of milk are in  $\frac{2}{3}$  litres of milk?

4. A lady packed  $\frac{1}{2}$  kilogram packets of tea leaves in smaller packets of  $\frac{1}{6}$  kilogram each. How many smaller packets did he obtain

## MIXED OPERATIONS WITH FRACTIONS (BODMAS)

### Examples

1. Work out:  $\frac{1}{2} + \frac{1}{4} - \frac{1}{3}$

apply BODMAS

$$m_4 = \{ 4, 8, 12, 16, 20, 24, \dots \}$$

$$m_2 = \{ 2, 4, 6, 8, 10, 12, \dots \}$$

$$m_3 = \{ 3, 6, 9, 12, 15, \dots \}$$

$$\text{LCD} = 12$$

$$\frac{\left( \frac{1}{2} \times 12 + \frac{1}{4} \times 12 \right) - \frac{1}{3} \times 12}{12}$$

$$\frac{(1 \times 6 + 1 \times 3) - 1 \times 4}{12}$$

$$\frac{(6 + 3) - 4}{12}$$

$$\frac{9 - 4}{12}$$

$$\frac{5}{12}$$

2. Simplify:  $\frac{5}{6} - \frac{5}{9} + \frac{7}{18}$

Rearrange according to BODMAS

ii)  $\frac{5}{6} - \frac{5}{9} + \frac{7}{18}$

$$\frac{\left( \frac{5}{6} + \frac{7}{18} - \frac{5}{9} \right)}{18}$$

$$\frac{\left( \frac{5}{6} \times 3 + \frac{7}{18} \times 18 - \frac{5}{9} \times 2 \right)}{18}$$

$$\frac{(5 \times 3 + 7 \times 1) - 5 \times 2}{18}$$

2	6	9	18
2	3	9	9
3	1	3	3
3	1	1	1

$$\text{LCD} = 2 \times 3 \times 3$$

$$\text{LCD} = 18$$

$$\begin{array}{r} (15 + 7) - 10 \\ \hline 22 - 10 \\ \hline 18 \\ \hline 12 \\ \hline 18 \\ \hline 3 \end{array}$$

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

3. Simplify:  $\frac{2}{3}$  of  $(\frac{3}{4} - \frac{1}{3})$  rearrange according to BODMAS

$$\begin{array}{r} (\frac{3}{4} - \frac{1}{3}) \text{ of } \frac{2}{3} \quad \text{LCD} = 12 \\ \hline (\frac{3}{4} \times \cancel{12}^3) - (\cancel{\frac{1}{3}} \times \cancel{12}^4) \text{ of } \frac{2}{3} \\ \hline 12 \end{array}$$

$$\begin{array}{r} (9 - 4) \text{ of } \frac{2}{3} \\ \hline 12 \\ \hline \frac{5}{12} \times \cancel{\frac{2}{3}}^1 \\ \hline 6 \\ \hline \frac{5}{18} \end{array}$$

4. Work out:  $\frac{5}{6} - \frac{3}{4} \div 1\frac{1}{2}$

note: deal with division first

$$\frac{5}{6} - (\frac{3}{4} \div \frac{3}{2})$$

$$\frac{5}{6} - (\cancel{\frac{3}{4}}^1 \times \cancel{\frac{2}{3}}^1)$$

$$\frac{5}{6} - \frac{1}{2} \quad \text{LCD} = 6$$

$$\begin{array}{r} (\frac{5}{6} \times \cancel{6}^1) - (\frac{1}{2} \times \cancel{6}^3) \\ \hline 6 \end{array}$$

$$\begin{array}{r} (5-3) \\ \hline 6 \\ \hline \cancel{12}^6 \\ \hline 3 \end{array}$$

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

*Ref: New MK pupils book 6  
pages 113*

## ACTIVITY

Work out the following:

a)  $\frac{1}{3} \times \frac{1}{4} + \frac{1}{2}$       b)  $(\frac{1}{3} \times \frac{1}{2}) \times \frac{1}{4}$       c)  $\frac{3}{4} \times \frac{2}{3} - \frac{1}{2}$       d)  $\frac{5}{6} \div (\frac{3}{4} \text{ of } 3)$

e)  $\frac{7}{12} - \frac{1}{2} \text{ of } \frac{1}{3}$       f)  $\frac{1}{2} - \frac{4}{5} \text{ of } \frac{5}{6} + \frac{1}{4}$       g)  $(\frac{1}{6} - \frac{1}{7}) \div (\frac{1}{6} + \frac{1}{7})$

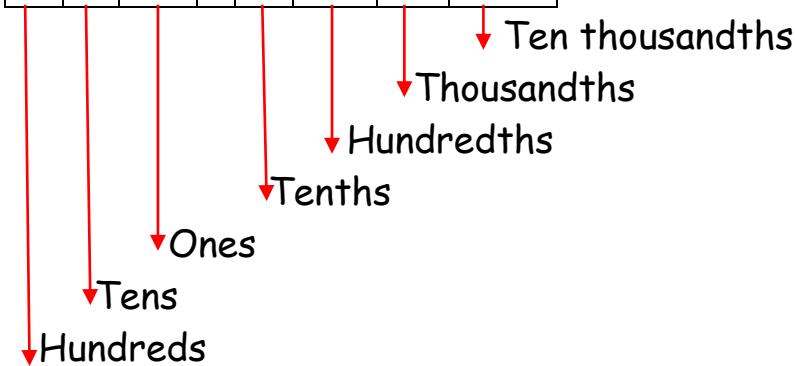
## DECIMAL FRACTIONS

### PLACE VALUES AND VALUES OF DECIMALS

#### Examples

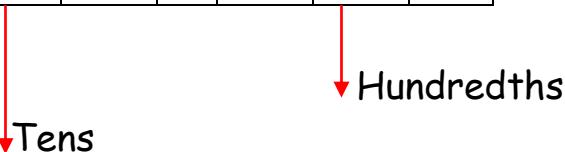
1. Find the place value of each digit in 234.0678.

H	T	O	.	t	h	th	T th
2	3	4	.	0	6	7	8



1. Find the place value of 4 and 6 in 249.867.

H	T	O	.	t	h	th
2	4	9	.	8	6	7



2. What is the values of each digit in 903.2567?

H	T	O	.	t	h	th	T th
9	0	3	.	2	5	6	7

$(9 \times 100) = 900$	$(0 \times 10) = 0$	$(3 \times 1) = 3$	$(2 \times 0.1) = 0.2$	$(5 \times 0.01) = 0.05$	$(6 \times 0.001) = 0.006$	$(7 \times 0.0001) = 0.0007$
------------------------	---------------------	--------------------	------------------------	--------------------------	----------------------------	------------------------------

3. Find the value of 8 and 3 in 587.0934

H	T	O	.	t	h	th	T th
5	8	7	.	0	9	3	4

$$(3 \times 0.001) = 0.003$$

$$(8 \times 10) = 80$$

4. Find the product of the value of 4 and the value of 8 in 835.6479.

H	T	O	.	t	h	th	T th
8	3	5	.	6	4	7	9

$$(4 \times 0.01) = 0.04$$

$$(8 \times 100) = 800$$

Product

$$800 \times 0.04$$

$$800 \times \frac{4}{100}$$

Product is 32

### Activity

1. Find the place values of each underlined digits in the following numerals.

a) 0.8634      b) 986.4732      c) 984.6531

2. Find the value of each underlined digit in the following numerals.

i) 42.1659      ii) 9064.5731      iii) 0.40345

3. Find the sum of the value of 2 and the value of 9 in 72.694.

4. What is the difference of the value of 4 and the value of 5 in 2.465?

5. Find the product of the value of 3 and the value of 7 in 238.974.

## WRITING DECIMAL IN WORDS

### Examples

1. Write 0.4 in words.

0.4 zero point four

Or

0.4

↓  
Tenths

0.4 = Four tenths

2. Write 0.27 in words.

0.27= zero point two seven

Or

0.27

Hundredths

0.27 = Twenty-seven hundredths.

3. Write 0.048 in words.

0.048 = zero point zero four eight

Or

0.048

Thousands

0.048 = forty-eight thousandths

4. Express 6.0378 in words.

O	and	t	h	th	T th
6	.	0	3	7	8

Ten thousandths

6.0378 = six point three seven eight

Or

6.0378 = six and three hundred seventy-eight ten thousandths

5. Write 406.308 in words.

406.308 = four hundred six point three zero eight

Or

H	T	O	and	t	h	th
4	0	6	.	3	0	8

Thousands

406.308 = four hundred six and three hundred eight thousandths.

### Activity

1. Write the following figures in words:

a) 0.7      b) 0.09      c) 0.123      d) 2.54      e) 0.0086    f) 862.459

2. What digit is in the place value of thousandths in 236.8097?

3. Represent 98.345 on an abacus

## WRITING DECIMAL WORDS IN FIGURES

### Examples

1. Write eight tenths in figures.

Eight tenths =  $\frac{8}{10}$   
= 0.8

2. Write twenty-nine hundredths in figures.

Twenty-nine hundredths =  $\frac{29}{100}$   
= 0.29

3. Write thirty-five thousandths in figures.

Thirty-five thousandths =  $\frac{35}{1000}$   
= 0.035

4. Write two and fourteen hundredths in words.

Two + fourteen hundredths

$2 + \frac{14}{100}$

2 + 0.14

Two and fourteen hundredths = 2.14

5. Express three hundred eighty-four and five hundred ninety-eight thousandths in figures.

Three hundred eighty-four + five hundred ninety-eight thousandths

$384 + \frac{598}{1000}$

384 + 0.598

384.598

Three hundred eighty-four +and five hundred ninety-eight thousandths = 384.598

### Activity

Express the following decimal words in figures;

1. Three tenths
2. Two hundredths
3. Fifteen thousandths
4. Four and forty-six hundredths
5. Twenty-three and three hundred ninety-five thousandths
6. One thousand two hundred nine and seven hundred twenty-eight ten thousandths.

## CONVERTING DECIMALS TO COMMON FRACTIONS

NB: The No. of decimal places determine the number of zeroes in the denominator.

### Examples

Convert the following decimals into common fractions:

$$\text{i) } 0.4 = \frac{4}{10} = \frac{2}{5}$$

$$\text{ii) } 0.05 = \frac{5}{100} = \frac{1}{20}$$

$$\text{iii) } 0.25 = \frac{25}{100} = \frac{5}{20} = \frac{1}{4}$$

$$\text{iv) } 6.9 = 6\frac{9}{10}$$

### Activity

Convert the following decimals into simplified common fractions

- a) 0.2    b) 0.8    c) 0.15    d) 0.45    e) 0.075    f) 3.25

Ref: NEW MK pupils' books 5  
Page 76

## COMPARING AND ARRANGING DECIMALS

### Examples

#### Comparing decimals

Use  $<$ ,  $>$  or  $=$  to compare the following decimals

a)  $0.11 \underline{\quad} 0.2$

$$\frac{11}{100} \underline{\quad} \frac{2}{10}$$

$$\frac{11}{100} \times \frac{100}{100} = 11$$

$$\frac{2}{10} \times \frac{100}{100} = 20$$

$$0.11 < 0.2$$

$$\text{LCD} = 100$$

-Change decimals to common fractions

-Find the LCD of the common fractions

-Multiply each fraction by LCD

b)  $0.5 \underline{\quad} 0.08$

$$\frac{5}{10} \quad \underline{\quad} \quad \frac{8}{100}$$

LCD = 100

$$\frac{5}{10} \times \frac{10}{10} = 50$$

$$\frac{8}{100} \times \frac{1}{10} = 8$$

$$\frac{5}{10} > \frac{8}{100}$$

### Ordering decimals

#### Examples

1. Arrange 0.4, 0.44, 4.4 in ascending order.

As common fractions  $\Rightarrow \frac{4}{10}, \frac{44}{100}, \frac{44}{10}$

LCD = 100 (biggest denominator)

$$\frac{4}{10} \times \frac{10}{10} = 40$$

$$\frac{44}{100} \times \frac{1}{10} = 44$$

$$\frac{44}{10} \times \frac{10}{10} = 440$$

In ascending order, 0.4, 0.44, 4.4

3. Arrange 0.1, 1.1 and 0.01 in descending order.

As common fractions  $\frac{1}{10}, \frac{11}{10}, \frac{1}{100}$

LCD = 100

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

$$\frac{11}{10} \times \frac{10}{10} = 110$$

$$\frac{1}{100} \times \frac{100}{100} = 1$$

Descending order is 1.1, 0.1 and 0.01

### Activity

1. Use  $>$ ,  $<$  or  $=$  to compare the following pairs of decimals

a)  $0.2 \underline{\quad} 0.3$       b)  $0.9 \underline{\quad} 0.8$       c)  $8.6 \underline{\quad} 8.4$       d)  $6.7 \underline{\quad} 7.4$

2. Arrange the decimals below in ascending order.

i) 0.5, 5.55, 0.55      ii) 2.2, 0.22, 0.02      iii) 3.5, 0.35, 0.5

3. Arrange the following decimals in descending order.

a) 1.8, 1.08, 8.01      b) 0.08, 0.8, 8.0      c) 0.1, 0.3, 0.33

b)

Ref: New Mk pupils' bk5  
pages 74 -75

## CHANGING COMMON FRACTIONS TO DECIMALS

### EXAMPLES

1. Convert  $\frac{5}{10}$  into a decimal fraction.

$$\frac{5}{10} = 0.5$$

### Method II (long division)

$$\frac{5}{10} = 5 \div 10$$

$$\begin{array}{r} 0.5 \\ \hline 10 ) 5.0 \\ 0 \downarrow \\ 5 \ 0 \\ \hline 0 \ 0 \end{array} \qquad \frac{5}{10} = 0.5$$

2. Change  $\frac{8}{100}$  into a decimal

$$\frac{8}{100} = 0.08$$

### Method II (long division)

$$\frac{8}{100} = 8 \div 100$$

$$\begin{array}{r} 0.08 \\ \hline 100 ) 8.00 \\ 0 \downarrow \\ 8 \ 0 \\ \hline 0 \ 0 \end{array}$$

Ref: New Mk pupils' bk5  
pages 77

$$8 \times 100 = \frac{800}{100}$$

$$\frac{8}{100} = 0.08$$

3. Express  $\frac{3}{4}$  as a decimal fraction.

N÷D

$$\begin{array}{r} 3 \div 4 \\ \hline 0.75 \\ 4) 3.00 \\ \underline{0} \\ 30 \\ \underline{28} \\ 020 \\ \underline{000} \end{array}$$

$$\frac{3}{4} = 0.75$$

4. Change  $\frac{2}{3}$  into a decimal

N÷D

$$2 \div 3$$

$$2 \div 3 = 0.66\ldots / \underline{0.66}$$

*Ref: New Mk pupils' bk7  
pages 88 -89*

$$\begin{array}{r} 0.66 \\ 3) 2.00 \\ \underline{0} \\ 20 \\ \underline{18} \\ 020 \\ \underline{000} \end{array}$$

### Activity

Convert the following common fractions into decimals

$$\text{a)} \frac{8}{10} \quad \text{b)} \frac{13}{100} \quad \text{c)} \frac{45}{1000} \quad \text{d)} \frac{207}{100} \quad \text{e)} \frac{1}{2} \quad \text{f)} \frac{4}{5} \quad \text{g)} \frac{1}{4} \quad \text{h)} \frac{1}{3} \quad \text{i)} \frac{3}{8}$$

## CONVERTING RECURRING DECIMALS INTO RATIONAL NUMBERS

Examples

1. Change 0.3... to a rational number.

## Method I

Let the rational number be  $y$

$$y = 0.333\dots \dots \dots \text{ i}$$

$$10y = 10 \times 0.333$$

$$10y = 3.333\dots \text{ ii}$$

Subtract i from ii

$$10y = 3.333$$

$$\underline{-y = 0.333}$$

$$9y = 3$$

$$\underline{9y = 3^1}$$

$$\underline{9} \quad \underline{9_3}$$

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

$$0.3\dots = \frac{1}{3}$$

## Method II

$$\frac{3-0}{10-1} = \frac{\cancel{3}}{\cancel{9}} \frac{1}{3}$$

$$0.3 = \frac{1}{3}$$

2. Express  $2.6666\dots$  to a rational number.

Let  $p = 2.666\dots$  eqn. I

$$10p = 10 \times 2.666\dots$$

$$10p = 26.66\dots \text{ eqn. II}$$

Subtract i from ii

$$10p = 26.66$$

$$\underline{-p = 2.66}$$

$$\underline{9p = 24.00}$$

$$\underline{9p = 24} \quad 2r6$$

$$\underline{9} \quad \underline{9_3}$$

$$P = 2\frac{6}{9} \frac{2}{3}$$

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

## Method II

$$2.6666\dots = 2\frac{6}{10}$$

$$\begin{aligned}
 &= \frac{26-2}{10-1} \\
 &= \frac{24}{9} \\
 &= 2\frac{6}{9} = 2\frac{2}{3}
 \end{aligned}$$

3. Write 0.1333--- as a common fraction.

$$\text{Let } k = 0.1333\dots \quad \text{eqn. I}$$

$$K \times 10 = 0.1333\dots \times 10$$

$$10k = 1.333\dots \quad \text{eqn. II}$$

Subtract eqn.I from eqn. II

$$10k = 1.333$$

$$- k = 0.233$$

$$\underline{9k = 1.200}$$

$$\frac{9k}{9} = \frac{12}{10} \times \frac{1}{9}$$

$$K = \frac{\cancel{12}}{9} \frac{2}{15}$$

$$K = \frac{2}{15}$$

*Ref: New Mk pupils' bk7  
pages 90 -91*

### Activity

Express the following decimals as rational numbers.

- a) 0.2---
- b) 0.123123---
- c) 9.1212---
- d) 0.2777---
- e) 0.7272---
- f) 2.99---
- f) 0.444...

### ADDITION AND SUBTRACTION OF DECIMALS

#### Examples

1. Work out  $14.9 + 8.02 + 36.48$

$$\begin{array}{r}
 1 \ 4 \ . \ 9 \ 0 \\
 0 \ 8 \ . \ 0 \ 2 \\
 + 3 \ 6 \ . \ 4 \ 8 \\
 \hline
 5 \ 9 \ . \ 4 \ 0
 \end{array}$$

2. Add:  $0.45 + 13.2 + 52.00$

$$\begin{array}{r}
 0 \ . \ 4 \ 5 \\
 1 \ 3 \ . \ 2 \ 0 \\
 + 5 \ 2 \ . \ 0 \ 0 \\
 \hline
 6 \ 5 \ . \ 6 \ 5
 \end{array}$$

## EXERCISE

1.  $4.96 + 1.7 + 0.36$

4.)  $65.5 + 4.5 + 20.8$

2.  $2.7 + 8.92 + 0.37$

5)  $0.56 + 5.8 + 58.00$

3.  $2.76 + 3.85 + 1.09$

)E( 6)  $0.22 + 2.22 + 22.22$

1. Work out:  $97.4 - 13.69$

$$\begin{array}{r}
 6 \quad 13 \quad 10 \\
 9 \cancel{7} \cdot \cancel{4} \quad 0 \\
 -1 \quad 3 \cdot \quad 6 \quad 9 \\
 \hline
 8 \quad 3 \cdot \quad 7 \quad 1
 \end{array}$$

2. Work out:  $63 - 19.78$

$$\begin{array}{r}
 5 \quad 12 \quad 9 \quad 10 \\
 \cancel{6} \quad \cancel{3} \cdot \quad 0 \quad 0 \\
 -1 \quad 9 \cdot \quad 7 \quad 8 \\
 \hline
 4 \quad 3 \cdot \quad 2 \quad 2
 \end{array}$$

*Ref: Mk pupils' bk7 page 81 - 83*

2. A rope is 12.41m long. If 6.345m length is cut, what length of the wire remains?

$$\begin{array}{r}
 12 \quad 3 \quad 10 \quad 10 \\
 \cancel{1} \quad 2 \cdot \quad \cancel{4} \quad \cancel{1} \quad 0 \\
 -0 \quad 6 \cdot \quad 3 \quad 4 \quad 5 \\
 \hline
 0 \quad 6 \cdot \quad 0 \quad 6 \quad 5
 \end{array}$$

6.065 m length remained

### Activity

1. Work out the following

d)  $79.8 - 19.5$

a)  $8.54 - 2.34$

e)  $7.9 - 4.5$

b)  $166 - 66.9$

f)  $57.9 - 3.51$

c)  $14.9 - 3.51$

2. The distance between two rooms is 12.416m. If the third room is 6.416m away from the first room. What is the distance between the first and third?

3. A nurse draws 1.415 ml of medicine from a bottle containing 5ml. What amount of medicine remains in the bottle?

## MULTIPLICATION INVOLVING DECIMALS

### Examples

Work out the following;

a)  $0.4 \times 0.2$

$$\frac{4}{10} \times \frac{2}{10} = \frac{8}{100}$$

$$= 0.08$$

b)  $0.12 \times 0.03$

$$\frac{12}{100} \times \frac{3}{100} = \frac{36}{10000}$$

$$= 0.0036$$

c)  $0.48 \times 6$

$$\begin{array}{r} 48 \\ 100 \\ \times 6 \\ \hline 288 \\ 100 \end{array}$$

d)  $15 \times 0.03$

$$\begin{array}{r} 15 \\ 100 \\ \times \frac{3}{100} \\ \hline 45 \\ 100 \end{array}$$

2.88

0.45

e)  $(0.08)^2$

$0.08 \times 0.08$

$$\frac{8}{100} \times \frac{8}{100} = \frac{16}{10000}$$

$$= 0.0016$$

*Ref: Mk pupils' bk7 pages 83*

### Activity

1. Work out the following

i)  $0.4 \times 0.3$

ii)  $0.6 \times 0.5$

iii)  $10 \times 0.5$

iv)  $0.9 \times 2$

v)  $(0.4)^3$

vi)  $13.25 \times 0.06$

vii)  $16.08 \times 4$

viii)  $14.7 \times 0.9$

3. A cylinder carries 4.350ml of water. If there are 4 similar cylinders, how much water do they carry

## DIVISION INVOLVING DECIMALS

### Examples

Simplify the following:

a)  $0.2 \div 0.6$

$$\frac{2}{10} \div \frac{6}{10}$$

$$\begin{array}{r} 1 \\ 2 \cancel{1} \times \frac{10}{\cancel{6}3} \\ \hline 1 \\ \hline 3 \end{array}$$

b)  $0.072 \div 0.8$

$$\frac{72}{1000} \div \frac{8}{10}$$

$$\begin{array}{r} 72 \cancel{9} \times \frac{10}{\cancel{8}} \\ \hline 9 \\ \hline 100 \end{array}$$

$$c) 0.32 \div 4$$

$$\frac{32}{100} \div \frac{4}{1}$$

$$\frac{2}{100} \times \frac{1}{4}$$

$$\frac{2}{25}$$

$$d) 50 \div 0.18$$

$$\frac{50}{1} \div \frac{18}{100}$$

$$\frac{1}{50} \times \frac{100}{18}$$

$$\frac{1}{9}$$

$$a) 3.6 \div 0.18$$

$$\frac{36}{10} \div \frac{18}{100}$$

$$\frac{2}{10} \times \frac{100}{18}$$

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

$$2 \times 10$$

$$20$$

2. A rope measuring 3.75m was cut into 5 equal parts. What was the length of each part?

$$3.75 \div 5$$

$$\frac{375}{100} \div \frac{5}{1}$$

$$\frac{75}{100} \times \frac{1}{5}$$

$$\frac{75}{100}$$

0.75 m long

### Activity

1. Simplify the following:

- a)  $0.4 \div 0.16$
- b)  $0.8 \div 20$
- c)  $40 \div 0.5$
- d)  $2.8 \div 2$
- e)  $25.75 \div 2.25$
- f)  $1.08 \div 0.12$
- g)  $100 \div 0.5$
- h)  $0.07 \div 56$

2. Kapalaga has 8.75kg of salt to be packed in packets of 0.25kg each. How many packets will he make?

Ref: Mk pupils' bk7 pages 84 -87

## MIXED OPERATION ON DECIMALS

### Examples

Simplify the following:

a)  $\frac{0.24 \times 0.3}{0.8}$

$$\left( \frac{24}{100} \times \frac{3}{10} \right) \div \frac{8}{10}$$

$$\frac{\cancel{2}^3}{\cancel{100}} \times \frac{3}{\cancel{10}} \times \frac{10}{\cancel{8}}$$

$$\frac{3 \times 3 \times 1}{100 \times 1 \times 1}$$

$$\begin{array}{r} 9 \\ \hline 100 \\ \underline{0.0} \end{array}$$

c)  $\frac{3.25 + 5.75}{0.03}$

$$(3.25 + 5.75) \div 0.03$$

$$9 \div 0.03$$

$$\frac{9}{1} \div \frac{3}{100}$$

$$\frac{\cancel{9}^3}{1} \times \frac{100}{\cancel{3}^1}$$

$$\underline{\underline{300}}$$

### Activity

Simplify the following.

a)  $\frac{4.2 \times 4.8}{9.6}$

b)  $\frac{20 \times 0.4}{0.05}$

c)  $\frac{4.5 \times 1.6}{1.5 \times 48}$

d)  $\frac{15 \times (0.3)^2}{0.8}$

e)  $\frac{0.03 + 0.6}{0.9 \times 0.2}$

f)  $\frac{0.72 - 0.4}{0.16 \times 2}$

g)  $\frac{0.36 \times 0.4}{0.48 - 0.36}$

b)  $\frac{5.6 \times 0.81}{0.27 \times 28}$

$$\left( \frac{56}{10} \times \frac{81}{100} \right) \div \left( \frac{27}{100} \times \frac{28}{100} \right)$$

$$\left( \frac{\cancel{5}^1}{\cancel{10}^1} \times \frac{\cancel{8}^3}{\cancel{100}^1} \right) \times \left( \frac{\cancel{10}^1}{\cancel{27}^1} \times \frac{\cancel{100}^1}{\cancel{56}^1} \right)$$

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

$$\underline{\underline{15}}$$

d)  $\frac{0.36 \times 0.4}{0.08 - 0.02}$

$$(0.08 - 0.02) = 0.06$$

$$\left( \frac{36}{100} \times \frac{4}{10} \right) \div \frac{6}{100}$$

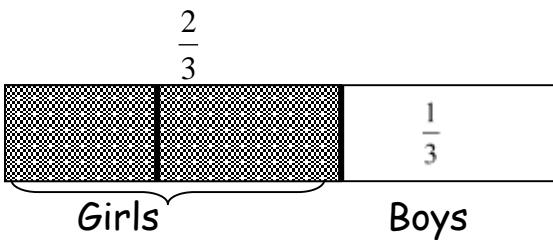
$$\left( \frac{\cancel{3}^6}{100} \times \frac{4}{10} \right) \times \frac{100}{\cancel{6}^1}$$

$$\frac{6 \times 4 \times 1 \times 1}{1 \times 10 \times 1 \times 1} =$$

$$\frac{24}{10} = \underline{\underline{0.24}}$$

## APPLICATION OF FRACTIONS

1. In a class of 60 pupils  $\frac{2}{3}$  are girls and the rest are boys.



a) Find the fraction of the boys.

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

b) How many boys are there?

$$\frac{1}{3} \times 60 \\ \underline{1} \\ 1 \times 20 \\ = \underline{20 \text{ boys}}$$

c) How many girls are there?

$$\frac{2}{3} \times 60 \\ \underline{2} \\ 2 \times 20$$

40 girls

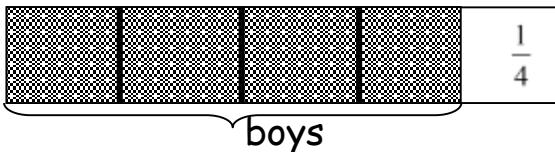
d) How many more girls are there than the boys?

$$\begin{array}{r} 40 \\ - 20 \\ \hline 20 \end{array}$$

20 more girls

3. In a class of 270 boys,  $\frac{3}{4}$  are boys and the rest are girls.

a) Find the fraction of girls



$\frac{1}{4}$  are girls

Method II

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

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

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

b) How many pupils are there in the class?

Method I

$$\begin{aligned} 3 \text{ parts} &\longrightarrow 270 \text{ pupils} \\ 1 \text{ part} &\longrightarrow (270 \div 3) \text{ pupils} \\ 1 \text{ part} &\longrightarrow 90 \text{ pupils} \\ 4 \text{ parts} &\longrightarrow (90 \times 4) \text{ pupils} \\ \underline{4 \text{ parts}} &\longrightarrow \underline{360 \text{ pupils}} \end{aligned}$$

Method II

Let  $m$  be the total number of pupils

$$\frac{3}{4} \text{ of } m = 270$$

$$\frac{3}{4} \times m = 270$$

$$\frac{3m}{4} = 270$$

$$\frac{3m}{4} \times \frac{1}{1} = 270 \times 4$$

$$\frac{3m}{4} = \frac{90}{1}$$

$$\underline{\underline{m = 360}}$$

c) How many more boys than girls are in the class?

$$(360 - 270) \text{ girls} \quad | \quad (270 - 90)$$

$$90 \text{ girls} \quad | \quad \underline{180 \text{ more boys}}$$

### Activity

- Mary ate  $\frac{2}{9}$  of a cake in the morning,  $\frac{3}{9}$  in the afternoon and the rest in evening.
  - What portion of a cake did she eat in both morning and afternoon?
  - What fraction did she eat in the evening?
- In a school of 560 pupils,  $\frac{3}{8}$  are girls and the rest are boys.
  - Find the fraction of boys.
  - How many girls are in the class?
  - How many more girls than boys are in the class?
- There are 320 boys in a school. If  $\frac{3}{8}$  are girls.

- a) Find the fraction of girls  
 b) How many pupils are in the school?  
 c) Find the number of girls.

## APPLICATION OF FRACTIONS

### Examples

1. If a quarter of a number is 20. Find the number.

#### Method I

$$\begin{array}{ll} \text{1 part} & 20 \\ \text{4 parts} & \longrightarrow (2 \times 40) \\ \text{4 parts} & \longrightarrow 80 \end{array}$$

The number is 80

#### Method II

Let  $w$  be the total number of pupils

$$\begin{aligned} \frac{1}{4} \text{ of } w &= 20 \\ \frac{1}{4} \times w &= 20 \\ \frac{w}{4} &= 20 \\ \frac{w}{4} \times 4^{\cancel{1}} &= 20 \times 4 \\ w &= 80 \end{aligned}$$

The number is 80

2. If  $\frac{2}{3}$  of a number is 36, what is half of it?

$$\begin{array}{ll} \text{2 parts} & \longrightarrow 36 \\ \text{1 part} & \longrightarrow (36 \div 2) \\ \text{1 part} & \longrightarrow 18 \\ \text{3 parts} & \longrightarrow (3 \times 18) \\ \text{3 parts} & \longrightarrow 54 \\ \frac{1}{2} \times 54 & \cancel{2}^{\cancel{27}} \end{array}$$

Half of a number is 27

#### Method II

Let  $m$  be the total number of pupils

$$\frac{2}{3} \text{ of } m = 36$$

$$\frac{2}{3} \times m = 36$$

$$\frac{2m}{3} = 36$$

$$\frac{2m}{3} \times \frac{1}{2} = 36 \times 2$$

$$2m = 72$$
$$\frac{2m}{2} = \frac{72}{2}$$

$$m = 36$$
$$\frac{1}{2} \times 54$$

27

3. A car broke down after covering  $\frac{2}{7}$  of a journey. If it had covered 60km, how far was the whole journey?

2 parts  $\longrightarrow$  60km

1 part  $\longrightarrow$   $(60 \div 2)$ km

1 part  $\longrightarrow$  30km

7 parts  $\longrightarrow$   $(7 \times 30)$ km

3 parts  $\longrightarrow$  210km

The journey was 210km

Method II

Let m be the total distance of the journey.

$$\frac{2}{7} \text{ of } m = 60$$

$$\frac{2}{7} \times m = 60$$

$$\frac{2m}{7} = 60$$

$$\frac{2m}{7} \times \frac{1}{2} = 60 \times 7$$

$$2m = 60 \times 7$$

$$\frac{2m}{2} = \frac{60 \times 7}{2}$$

$$m = 210$$

The journey was 210k

4. The Link bus broke down after covering  $\frac{4}{9}$  of a journey. If was left with 100km

to cover the whole journey,

a) How far was the whole journey?

$$\begin{aligned}1 - \frac{4}{9} &= \frac{9}{9} - \frac{4}{9} \\ \frac{9-4}{9} &= \frac{5}{9}\end{aligned}$$

5 parts  $\longrightarrow$  100km

1 part  $\longrightarrow$   $(100 \div 5)$  km

1 part  $\longrightarrow$  20km

9 parts  $\longrightarrow$   $(20 \times 9)$  km

9 parts  $\longrightarrow$  180km

The journey was 180km

Method II (apply algebra)

Activity

1. In a club of 100 participants, 0.4 are females and the rest are males.

a) Find the fraction of males

b) How many more males than females are there?

2. If  $\frac{2}{5}$  of my salary is sh.80,000' How much is my salary?

3. If  $\frac{3}{4}$  of a number is 99. What  $\frac{1}{3}$  of it?

4. Joseph read  $\frac{3}{7}$  of a 96 paged book.

a) How many pages did he read?

b) How many pages were not read?

5. If  $\frac{7}{10}$  of a journey is 280km, how far is the whole journey?

6. After covering  $\frac{3}{4}$  of a journey, Onen was still left with 60km.

a) How far was the whole journey?

b) How many kilometers did he cover?

## APPLICATION OF FRACTIONS

Examples

1. Mulema spends  $\frac{1}{6}$  of his salary on fees,  $\frac{1}{3}$  on utilities and saves sh.240,000.

a) How much is the mulema's salary?

$$1 - \left(\frac{1}{6} + \frac{1}{3}\right) \quad \text{LCD} = 6$$

$$1 - \left( \frac{\frac{1}{6} \times \cancel{6}^1 + \frac{1}{3} \times \cancel{6}^2}{6} \right)$$

$$1 - \left( \frac{1+2}{6} \right)$$

$$1 - \frac{3}{6}$$

$$\frac{6}{6} - \frac{3}{6}$$

$$\frac{6}{6} - \frac{6}{6}$$

$$\cancel{3}^1$$

$$\cancel{6}^2$$

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

$$\frac{1}{2} \longrightarrow \text{sh.}240000$$

$$1 \text{ part} \longrightarrow \text{sh.}240000$$

$$2 \text{ parts} \longrightarrow (2 \times \text{sh.}240000)$$

$$2 \text{ parts} \longrightarrow \text{sh.}480000$$

b) How much does he spend on fees?

$$\frac{1}{6} \times \text{sh.}480000$$

$$\text{Sh.}80,000$$

2. A girl spends  $\frac{1}{6}$  of her pocket money on soda and  $\frac{1}{4}$  of the remainder on transport and she was left with sh.30000. How much was her pocket money?

remainder	transport	savings
$1 - \frac{1}{6}$ $\frac{6}{6} - \frac{1}{6}$ $\frac{6}{6} - \frac{6}{6}$ $6 - 1$ $\underline{6}$ $5$ $\frac{5}{6}$	$\frac{5}{6} \times \frac{1}{4}$ $\frac{5}{24}$	$\frac{5}{6} - \frac{5}{24}$ $\frac{5}{6} \times \frac{4}{24} + \frac{5}{24} \times \frac{1}{24}$ $\underline{24}$ $20 - 5$ $\underline{24}$ $15$ $\underline{24}$ $5$ $\underline{8}$

$$\frac{5}{8} \longrightarrow \text{sh.}30000$$

$$5 \text{ parts} \longrightarrow (\text{sh.}30000 \div 5)$$

$$1 \text{ part} \longrightarrow \text{sh.}6000$$

$$8 \text{ parts} \longrightarrow (8 \times \text{sh.}6000)$$

$$8 \text{ parts} \longrightarrow \text{sh.}48,000$$

c) How much more did she spend on transport than on fees?

$$\begin{array}{r} 5 \\ \underline{-} \quad 1 \\ 24 \quad 6 \\ \hline 5 \times 24 - \frac{1}{6} \times 24 \\ \hline 24 \\ 5 - 4 \\ \hline 24 \\ 1 \\ \hline 24 \\ 1 \times \text{sh. } 48000 \\ \hline 1 \\ 2000 \end{array}$$

Sh. 2000 more

3. In Namasuba,  $\frac{1}{8}$  of the population are connected to Airtel,  $\frac{3}{5}$  to MTN,  $\frac{1}{12}$  to UTL and the rest to other networks. If 46000 people are connected to other networks, what is the total population of Namasuba?

$$\begin{array}{l} 1 - \left( \frac{1}{8} + \frac{3}{5} + \frac{7}{12} \right) \quad \text{LCD} = 120 \\ 2 - \left( \frac{1}{8} \times 120 + \frac{3}{5} \times 120 + \frac{1}{12} \times 120 \right) \\ 120 - \frac{(15 + 72 + 10)}{120} \end{array}$$

$$\frac{120}{120} - \frac{(15 + 72 + 10)}{120}$$

$$\frac{120}{120} - \frac{97}{120} = \frac{23}{120}$$

$$\frac{23}{120} \longrightarrow 46000$$

$$23 \text{ parts} \longrightarrow (46000 \div 23) \text{ people}$$

$$1 \text{ part} \longrightarrow 2000 \text{ people}$$

$$120 \text{ parts} \longrightarrow (120 \times 2000) \text{ people}$$

$$120 \text{ parts} \longrightarrow 240,000 \text{ people}$$

240,000 people are in Namasuba

c) How many people are connected to MTN?

$$\frac{3}{5} \times 48000 \text{ people}$$

$$3 \times 48000 \text{ people}$$

$$\underline{144,000 \text{ people}}$$

4. A woman spends her monthly salary as follows:  $\frac{1}{4}$  on rent,  $\frac{1}{3}$  on food,  $\frac{1}{2}$  of the remainder on fees and saves the rest.

a) What fraction does he save?

Remainder

$$1 - \left( \frac{1}{4} + \frac{1}{3} \right)$$

LCD = 12

$$\frac{12}{12} - \left( \frac{\frac{1}{4} \times 12 + \frac{1}{3} \times 12}{12} \right)$$

$$\frac{12}{12} - \frac{(3+4)}{12}$$

$$\frac{\frac{12}{12} - \frac{7}{12}}{12 - 9} =$$
$$\frac{\frac{5}{12}}{12}$$

fees

$$\frac{5}{12} \times \frac{1}{2}$$
$$\frac{5}{24}$$

Savings

$$\frac{5}{12} - \frac{1}{4}$$

LCD = 12

$$\frac{\frac{5}{12} - \frac{1}{4}}{12}$$
$$\frac{5 - 3}{12}$$
$$\frac{2}{12}$$
$$\underline{\underline{12}} 6$$

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

b) If she spent sh.300,0000 on fees, how much is her salary?

$$\frac{5}{12} \longrightarrow \text{sh.}300000$$

5parts → (sh.300000 ÷ 5)

1part → sh. 60000

12parts → (12 × sh.60000)

12 parts → sh.720,000

## Activity

1. Out of a cake, Jim ate  $\frac{2}{5}$ , Joan ate  $\frac{1}{3}$  and Peter ate the rest.

  - What portion of a cake did Peter eat?
  - If Peter's portion weighed 20grams, what was the total weight of the pancake?

2. Nakku,Nanziri and Namata owned a business .Nakku's share was  $\frac{2}{11}$  of the share capital,Nanziri shared  $\frac{5}{11}$  and Namata's share was sh.56000.

  - What fraction of the shares did Namata contribute?
  - How much money did they contribute altogether?

Kamuntu got  $\frac{2}{3}$  of his father's land. He then gave out  $\frac{1}{3}$  of his share to Natukunda his sister. What fraction of the land did Natukunda get?

A man spent  $\frac{1}{2}$  of his salary on food,  $\frac{1}{2}$  of the remainder on rent and saved 60000.Find the man's salary.

of a wire is painted black,  $\frac{2}{5}$  of the remainder is painted green, the rest of the metres were painted red.How long was the wire?

During the prefectoral elections, Jackson, Jacob and James contested for adboyship such that Jackson got  $\frac{1}{4}$  of votes cast, Jacob got  $\frac{2}{5}$ ,James got  $\frac{1}{2}$  of the remaining number and the rest were spoilt.If 70 votes were spoilt.

What fraction of the total votes got spoilt?

How many people cast the votes?

How many more votes did Jacob get than Jackson?

7. A man distributed his piece of land among his three children as follows; $\frac{1}{8}$  to Joshua,  $\frac{1}{4}$  to Martin, $\frac{1}{2}$  to Marvin and remained with 64 hectares.

  - What fraction of the land did the man remain with?
  - What was the total size of the land?

## APPLICATION OF FRACTIONS

### Examples

1. A tank was  $\frac{5}{7}$  full. When 220 litres were drawn, it remained  $\frac{2}{5}$  full. Find the full capacity of the tank.

$$\begin{array}{r} \frac{5}{7} - \frac{2}{5} \\ \hline (\frac{5}{7} \times 35) - (\frac{2}{5} \times 35) \\ \hline 25 - 14 \\ \hline 35 \\ \hline 11 \end{array} \quad \text{LCD} = 35$$

Method II (reciprocal)

$$\frac{35}{11} \times 20 \text{ litres}$$

$$35 \times 20 \text{ litres} \\ 700 \text{ litres}$$

- $\frac{11}{35}$  → 220 litres  
 $11$  →  $(220 \div 11)$  litres  
1 part → 20 litres  
35 parts →  $(35 \times 20)$  litres  
35 parts → 700 litres

2. A tank is  $\frac{2}{5}$  full of water. When 60 litres are added, the tank becomes  $\frac{11}{15}$  full

- a) How many litres does the tank hold when completely full?

$$\begin{array}{r} \frac{11}{15} - \frac{2}{5} \\ \hline (\frac{11}{15} \times 15) - (\frac{2}{5} \times 15) \\ \hline 11 - 6 \\ \hline 15 \\ \hline 5 \\ \hline 15 \\ \hline 3 \end{array} \quad \text{LCD} = 15$$

Method I (reciprocal)

$$\frac{3}{1} \times 60 \text{ litres} \\ 3 \times 60 \text{ litres} \\ 180 \text{ litres}$$

Method II

- $\frac{1}{3}$  → 60 litres  
1 → 60 litres  
3 parts →  $(3 \times 60)$  litres  
3 parts → 180 litres

b) How many litres does it hold when half full?

$$\frac{1}{2} \times 180 \text{ litres}$$

90 litres

It holds 90 litres when half full.

### Activity

1. A tank is  $\frac{2}{5}$  full of water. When 80 litres are removed, the tank becomes  $\frac{1}{6}$  full.

How many litres does it hold when completely full?

2. A tank is  $\frac{1}{5}$  full of water. When 240 litres are added, the tank becomes  $\frac{9}{20}$  full.

How many litres does it hold when it is  $\frac{2}{3}$  full?

### APPLICATION OF FRACTIONS

#### Examples

1. Tap A can fill the tank in 6 minutes and tap B can fill the same tank in 3 minutes. How long will both tanks take to fill the tank if they are opened at the same time?

$$1 \div \left( \frac{1}{6} + \frac{1}{3} \right) \text{ minutes}$$
$$1 \div \left( \frac{1}{6} \times 2 + \frac{1}{3} \times 2 \right) \text{ minutes}$$

$$1 \div \left( \frac{1+2}{6} \right) \text{ minutes}$$

$$\left( \frac{6}{6} \div \frac{3}{6} \right) \text{ minutes}$$

$$\left( \frac{6^2}{6} \times \frac{6^1}{3^1} \right) \text{ minutes}$$

2 minutes

Both taps take 2 minutes to fill the tank

2. Tap A takes 3 minutes to fill the tank and tap B takes 4 minutes to draw water from the tank. How many minutes will it take to fill the tank if both taps are left open at the same time?

$$1 \div \left( \frac{1}{3} - \frac{1}{4} \right) \text{ minutes}$$

$$\text{LCD} = 12$$

#### Method II

$$\frac{\text{product}}{\text{sum}}$$

$$\left( \frac{6 \times 3}{3 + 4} \right) \text{ minutes}$$

$$\frac{18}{9} \text{ minutes}$$

1

2 minutes

Both taps take 2 minutes

$$1 \div \left( \frac{\frac{1}{3} \times 12 - \frac{1}{4} \times 12}{12} \right) \text{ minutes}$$

$$1 \div \left( \frac{\frac{4}{12} - \frac{3}{12}}{12} \right) \text{ minutes}$$

$$\left( \frac{12}{12} \div \frac{1}{12} \right) \text{ minutes}$$

$$\left( \frac{12}{12} \times \frac{1}{1} \right) \text{ minutes}$$

12 minutes

Both taps fill in 12 minutes

### Method II

product  
differerence

$$\left( \frac{3 \times 4}{4 - 3} \right) \text{ minutes}$$

$$\frac{12}{1} \text{ minutes}$$

12 minutes

Both taps take 12 minutes to fill the tank

3. Tap K takes 6 minutes to fill a tank and tap L takes 36 minutes to fill the same tank but tap M take only 9 minutes to empty the same tank. If all taps are opened at the same time, how many minutes will they take to fill the tank?

$$1 \div \left( \frac{1}{6} + \frac{1}{36} - \frac{1}{9} \right) \text{ minutes}$$

LCD = 36

$$1 \div \left( \frac{\frac{1}{6} \times 36 + \frac{1}{36} \times 36 - \frac{1}{9} \times 36}{36} \right) \text{ minutes}$$

$$1 \div \left( \frac{6 + 1 - 4}{36} \right) \text{ minutes}$$

$$1 \div \left( \frac{36}{36} \div \frac{3}{36} \right) \text{ minutes}$$

$$\frac{36}{1} \times \frac{1}{3} \text{ minutes}$$

12 minutes

All taps fill in 12 minutes

### Method II

product  
sum

$$\frac{6 \times 36}{6 + 36} \text{ minutes}$$

$$\frac{36}{42} \text{ minutes}$$

$$\frac{36}{7}$$

product  
differerence

$$\frac{36}{7} \times 9$$

$$\frac{36}{9 - \frac{36}{7}}$$

$$\frac{324}{7} \div \left( \frac{9}{1} - \frac{36}{7} \right)$$

$$\frac{324}{7} \div \left( \frac{9}{1} - \frac{36}{7} \right)$$

$$\frac{324}{7} \div \frac{\frac{9}{1} \times 7 - \frac{36}{7} \times 7}{7}$$

$$\frac{324}{7} \div \frac{63 - 36}{7}$$

$$\frac{324}{7} \div \frac{27}{7}$$

$$\frac{12}{\cancel{324}} \times \frac{7}{\cancel{27}}$$

$$1$$

All taps take 12 minutes

4. Taps A, D and E are connected together. Tap A takes 12 minutes to fill a tank. Tap D takes 24 minutes to fill the tank but tap E takes 16 minutes to draw water from the tank. If the tank holds 480 litres of water when full.

a) How many litres does tap A pour into the tank?

$$\frac{1}{12} \times 480 \text{ litres}$$

$$\frac{1}{12} \times 480$$

$$1$$

$$40$$

$$\text{litres}$$

Tap A fills 40 litres

b).How many litres does tap A and tap D pour into the tank after one minute?

$$\left( \frac{1}{12} + \frac{1}{24} \right) \times 480 \text{ litres} \quad \text{LCD} = 24$$

$$\left( \frac{\frac{1}{12} \times 24 + \frac{1}{24} \times 24}{24} \right) \times 480 \text{ litres}$$

$$\frac{2+1}{24} \times 480 \text{ litres}$$

$$\frac{3}{24} \times 480$$

$$1$$

$$20$$

$$\text{litres}$$

$$3 \times 20 \text{ litres}$$

$$60 \text{ litres}$$

c) How long will all taps take to fill the tank if they are opened at the same time?

$$1 \div \left( \frac{1}{12} + \frac{1}{24} \right) - \frac{1}{16} \text{ minutes} \quad \text{LCD} = 48$$

$$1 \div \left( \frac{\cancel{1}_{12} \times \cancel{4}_4 + \cancel{1}_{24} \times \cancel{4}_2 - \cancel{1}_{16} \times \cancel{4}_3}{48} \right) \text{ minutes}$$

$$1 \div \left( \frac{4+2-3}{48} \right) \text{ minutes}$$

$$1 \div \left( \frac{6-3}{48} \right) \text{ minutes}$$

$$\left( \frac{48}{48} \div \frac{3}{48} \right) \text{ minutes}$$

$$\frac{\cancel{48}_1}{\cancel{48}_1} \times \frac{\cancel{48}^1_1}{\cancel{3}_1} \text{ minutes}$$

16 minutes

All taps fill in 16 minutes

Method II  
Also apply  $\frac{\text{product}}{\text{sum}}$

### Activity

- Tap A takes 9 minutes to fill the tank. Tap B takes 12 minutes to fill the same tank. How many minutes will both taps take to fill the tank if they are opened at the same time?
- Tap X takes 6 minutes to fill the tank and tap Z takes 8 minutes to empty the same tank. If both taps are opened at the same time, how many minutes will they take to fill the tank?
- Tap M takes 9 minutes to fill the tank, tap N takes 12 minutes and tap K takes only 18 minutes. If all the taps are left open at the same time, how many minutes will they take to fill the tank?
- Tap Q fills  $\frac{1}{24}$  of a tank in one minute and tap P fills  $\frac{1}{48}$  of a tank in one minute. How long will both tapes take to fill the tank if they are left open at the same time?
- When taps A and B are turned on at same time, fill the tank in 6 minutes. If tap B is turned on alone fill the tank in 8 minutes. How long will tap A take to fill the tank alone?

6. Tap R, S and T are joined to a tank. Tap R takes 9 minutes to fill a tank and tap S takes 12 minutes to fill the same tank, but tap T takes only 6 minutes to empty the tank. If the tank holds 9600 litres of water.
- How much water is put in the tank by tap R in one minutes?
  - How much water is drawn from the tank by tap T?
  - How many litres water tap R and tap S pour into the tank in one minute?
  - How long will it take to fill the tank, if all taps are left open at the same time?
7. Akiiki can dig a garden in 8 days and Banard can dig the same garden in 10 days.
- What fraction of the garden can they dig in one day if both work together?
  - What fraction of the garden is left after both have been working together for 4 days?

## RATIOS AND PROPORTIONS

A ratio is a comparison of two or more numbers by division.

E.g. 2: 3 which is read as two to three.

NOTE:

- Ratios must be expressed in their lowest terms
- Ratios have no units

## EXPRESSING RATIOS AS FRACTIONS

i) Express 2 : 3 as a fraction.

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

ii) The ratio of boys to girls in a class is 3 : 4, express this as a fraction.

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

iii) Express  $\frac{3}{8}$  to  $\frac{9}{10}$  as a simplified fraction.

$$\frac{3}{8} \div \frac{9}{10}$$

$$\frac{1}{3} \times \frac{10}{9}$$

$$\frac{8}{4} \times \frac{9}{3}$$

5

12

5:12

Activity:

1. The ratio of boys to girls in a class is 4:3. Express this ratio as a fraction
2. The ratio of teachers to pupils in a class is 4:70. Express this ratio as a fraction
3. The ratio of sheep to goats to cows in Kilevu's farm is 3:4:5 respectively.
  - a) What is fraction of sheep to goats?
  - b) What is the fraction of sheep to cows?
  - c) What is the fraction of goats to all animals on the farm?
4. Express  $\frac{3}{10}$  to  $\frac{5}{20}$  as a simplified fraction.

## EXPRESSING FRACTIONS AS RATIOS

NB: Ratios are written from simplified fractions.

Examples

- 1) Express  $\frac{1}{3}$  as a ratio.

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

- 2)  $\frac{5}{6}$  of a class are present and the rest are absent.

- a) Express the fraction of pupils present as a ratio.

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

- b) Express the fraction of absentees in a class as a ratio.

$$\begin{aligned}\frac{6}{6} - \frac{5}{6} &= \frac{6-5}{6} \\ &= \frac{1}{6}\end{aligned}$$

4. Namanda severed  $\frac{30}{40}$  of her birthday cake.

- a) Express the part served as a ratio.

$$3 \cancel{30} : 4 \cancel{40}$$

$$\underline{\underline{3 : 4}}$$

b) Express the remaining portion as a ratio

$$\begin{aligned}\frac{40}{40} - \frac{30}{40} &= \frac{40-30}{40} \\ &= \frac{10}{40}\end{aligned}$$

$$\begin{array}{c} 10 : 40 \\ \underline{1} \quad \underline{4} \\ 1:4 \end{array}$$

### Activity

1. Express the fractions below;

a)  $\frac{40}{120}$       b)  $\frac{25}{100}$       c)  $1\frac{3}{7}$

2.  $\frac{8}{9}$  of pupils in a class are present. Express this fraction as a ratio.

3. Andrew used  $\frac{4}{10}$  of his library book and saved the rest. Express the portion his saved as a ratio.

4.  $\frac{1}{3}$  of pupils in a school are girls.

a) What ratio of the whole class are girls?

b) What ratio of the whole class are boys?

c) What is the ratio of boys to girls?

Ref: New MK pupils book 6  
pages 125-126

## EXPRESSING QUANTITIES AS RATIOS

When comparing two or more quantities, ratios must be expressed in the same units and in the lowest terms.

### Remember

A day	24 hours		
A week	7 days	1 fortnight	14days
A month		1 decade	10years
1 hour	60 minutes	1 silver Jubilee	25years
1 minute	60 seconds	1 generation	30years
1 second	60 microseconds	1 Golden Jubilee	50years
1 dozen	12articles	1 diamond Jubilee	75years
1 gross	144 items	1 century	100years
1kg	1000g	1 millennium	1000years
1 tone	1000kg		

## Example

1. Henry has 12 books and John has 20 books. What is the ratio of Henry's books to John's books?

$$\begin{array}{ccc} \text{Henry} & \text{to} & \text{John} \\ 12 & : & 20 \\ \frac{12}{4} & : & \frac{20}{4} \xrightarrow{\text{Reduce}} \\ \underline{3 : 5} & & \end{array}$$

2. Express 20 minutes as a ratio of 1 Hr.

$$1\text{Hr} = 60\text{minutes}$$

$$20\text{ min} : 60\text{min}$$

$$\begin{array}{ccc} \frac{20}{20} & : & \frac{60}{20} \xrightarrow{\text{Reduce}} \\ \underline{1 : 3} & & \end{array}$$

3. What is the ratio of 20cm to 2m?

$$1\text{m} = 100\text{cm}$$

$$2\text{m} = 2 \times 100\text{cm}$$

$$2\text{m} = 200\text{cm}$$

$$\cancel{20\text{ cm}} : \cancel{200\text{ cm}}$$

$$1 : 10$$

4. What is 12 years as a ratio of a generation?

$$1\text{ generation} = 30\text{years}$$

$$\cancel{12\text{ years}} : \cancel{30\text{ years}}$$

$$5 : 6$$

The ratio is 5:6

5. A class has 20 boys and 30 girls.

- a) What is the ratio of boys to girls?

Boys: Girls

$$\cancel{20 : 30}$$

$$2 : 3$$

- c) What is the ratio of girls to boys?

$$\cancel{30 : 20}$$

$$3 : 2$$

- d) What ratio of the whole class are boys?

Total = (20+30) pupils

$$= 50$$

Boys : total

$$20 : 50$$

$$2 : 5$$

Activity

Ref: New MK pupils book 6  
pages 127

1. Find the ratio of the following:

a) 80cm to 40cm      b) 10g to 5kg      c) 1week to 14days

d) 1hour to 40minutes      e) 15years to a golden Jubilee

f) 18 objects to 2dozen.

2. Mary has 60 sweets and James has 20 sweets. What is the ratio of James' sweets to Mary's books?

3. In a school, there are 240 boys and 300girls.

a)What is the ratio of boys to girls?

b) What ratio of the total class are boys?

5. There are 120 pupils in a class.40 participate in football and the rest play other games. What ratio of the whole class play other games?

6. In a village, 60 farmers grow beans, 40 grow cabbages and 90 grow maize. Find the ratio of farmers who;

a) grow beans to those who grow cabbages

b)grow cabbages to those who grow maize

c) grow beans to the total number of farmers in the village.

## INCREASING QUANTITES

Examples

1. Increase 80kg in as a ratio of 5:4.

$$\frac{\text{new}}{\text{old}} \times \text{quantity}$$
$$\frac{5}{4} \times 20$$
$$\frac{5}{4} \times 80\text{kg}$$

100kg

2. Increase sh.2400 in the ratio of 5:3

Old quantity = 80kg

4part  $\longrightarrow$  80kg

1part  $\longrightarrow$   $(80 \div 4)$

1 part  $\longrightarrow$  20kg

5 part  $\longrightarrow$   $(5 \times 20)\text{kg}$

New qty  $\longrightarrow$  100kg

$\frac{\text{new}}{\text{old}} \times \text{quantity}$

$$\frac{5}{3} \times \text{sh. } 2400$$

Sh.4000

Old quantity = sh.2000
3part $\longrightarrow$ sh.2400
1part $\longrightarrow$ (sh.2400 $\div$ 3)
1 part $\longrightarrow$ sh.800
5 part $\longrightarrow$ (5 $\times$ sh.800)
New qty $\longrightarrow$ sh.4000

### ACTIVITY

1. Increase sh.300 in a ratio of 2:1
2. Increase 240 in a ratio of 3:2
3. Emma's far had 15 cows. The number increased in a ratio of 4:3. How many animals are on the farm?
4. The number of pupils in a school is 800. This year, it has increased in a ratio of 6:5. How many pupils are in the school this year?
5. The number of bicycles in Martin's shop last year was 18000. This year it has increased in a ratio of 7:5. How many bicycles are in Marin's shop this year?
6. A school increased the price of uniform from sh.80000 in a ratio of 11:10. what is the new price of the uniform?

### FINDING RATIO OF INCREASE

#### Examples

1. A salary was sh.100000. It has been increased to sh.120000. In what ratio has it been increased?

New : Old

~~sh.120000 : sh.100000~~

~~12 : 10~~

~~6 : 5~~

The salary increased in a ratio of 6:5

2. A class had 35 pupils last term. The number has now increased by 5 pupils. In what ratio has the number increased?

New : Old

new qty = (35+5)

=40

~~40 : 35~~

~~8 : 7~~

The number increased in a ratio of 8:7

**Activity**

1. Akot is now earning sh.30000 as a wage but he was earning sh.25000 before. In what ratio has his wage increased?
2. A man's salary was increased from sh.180000 to sh.240000. In what ratio did his salary increase?
3. The price of petrol was sh.700 a litre last week. If it has increased to sh.1200 a litre, in what ratio has the price increased?
4. What is the ratio of increased from 800 to 960?
5. A shoe seller used to sell 15000 pairs per month last year. The sales increased by 5000 pairs this year. In what ratio have the sales increased?
6. Amos had 260 cattle on his farm last year. This year, the number has increased by 40 cattle. In what ratio has the number of cattle increased?

**FINDING THE ORIGINAL VALUE AFTER INCREASE**

**Examples**

1. If the price of fuel is increased in a ratio of 6:5, it becomes sh.3600. What is the original price of fuel?

New	Old
6	5
Sh.3600	?

6 parts = sh.3600

1 part = sh.3600 ÷ 6

1 part = sh.500

5 parts =  $5 \times$  sh.500  
= sh.2500

The original amount was sh.2500

2. The number of pupils in a school increased in a ratio of 5:3 to 500 pupils. Find the original number of pupils in the school.

New	Old
5	3
500	?

$$\begin{aligned}
 5 \text{ parts} &= 500 \\
 1 \text{ part} &= 500 \div 5 \\
 1 \text{ part} &= 100 \\
 3 \text{ parts} &= 3 \times 100 \\
 &= 300
 \end{aligned}$$

The original number of pupils was 300

### Activity

- When  $x$  is increased in a ratio of 8:5, it becomes 240. Find the value of  $x$ .
- If  $p$  is increased in a ratio of 7:2, it becomes 280. What is the original amount?
- There are 500 pupils in a school this year. This number increased in a ratio of 5:4. Find the initial number of pupils in the school.
- There were  $y$  birds on a farm. The number increased in a ratio of 11:6. If the current number of birds is 330 birds, how many birds were on the farm before?
- When the number of covid 19 vaccines increased in a ratio of 9:4, it became 36000. Find the original number of vaccines.

## DECREASING QUANTITIES IN RATIOS

### EXAMPLES

- Decrease sh.2000 in a ratio of 3:5

$$\begin{aligned}
 &\frac{\text{new}}{\text{old}} \times \text{quantity} \\
 &\frac{3}{5} \times \cancel{\text{sh.2000}}^{\text{400}} \\
 &\quad \cancel{1} \\
 &3 \times \text{sh.400} \\
 &\text{Sh.1200}
 \end{aligned}$$

Old quantity = sh.2000
5part → sh.2000
1part → (sh.2000 ÷ 5)
1 part → sh.400
3 part → (3 × sh.400)
New qty → sh.1200

- Decrease 400 in a ratio of 3:4

$$\begin{aligned}
 &\frac{\text{new}}{\text{old}} \times \text{quantity} \\
 &\frac{3}{4} \times \cancel{400}^{\text{100}} \\
 &\quad \cancel{1} \\
 &3 \times 100 \\
 &\underline{300}
 \end{aligned}$$

Old quantity = 400
4part → 400
1part → 400 ÷ 4
1 part → 100
3 part → 3 × 100
New qty → 300

## Activity

1. Decrease 2500 in a ratio of 3:5.
2. Decrease 3600 in a ratio of 5:9.
3. A man's salary decreased in a ratio of 1:2. What is the new salary, if the old salary was sh.30000?
4. The marked price of a radio is sh.9000. A man bought a radio at a reduced price in a ratio of 7:9. How much did he pay for the radio?
5. An article used to cost sh.4000. The price decreased in a ratio of 2:5. What is the new cost of an article?

## FINDING RATIO OF DECREASE

### Examples

1. The number of pupils in a class has decreased from 40 to 35 pupils. In what ratio has the number decreased?

New : old

$\frac{35}{40}$

$7 : 8$

The number decreased in a ratio of 7:8

2. Hawa's salary was sh.500000. It has been decreased by sh.100000. In what ratio has the salary increased?

$$\text{New qty} = (\text{sh.}500000 - \text{sh.}100000)$$

$$= \text{sh.}400000$$

New : old

$$\frac{\text{sh.}400000}{\text{sh.}500000}$$

$$\underline{4 : 5}$$

## Activity

1. Mukasa had 20 mangoes. If 4 mangoes were rotten, in what ratio did the number of mangoes decrease?
2. The ministry supplied 2800 text books last year. This year, the supply has decreased by 800 books. Find the ratio of decrease.
3. The price of a radio was sh.70000. It was decreased by sh.7000. In what ratio has the price decreased?
4. Mary produced 450 eggs on her farm last year. This year the production has dropped by 150 eggs. Find the ratio of decrease.

5. The temperature of Mabale has reduced from  $42^{\circ}\text{C}$  to  $36^{\circ}\text{C}$ . In what ratio has the temperature decreased?
6. The number of born babies in our division was 3600 last year. This year the number has decreased by 600 babies. In what ratio has the number reduced?
7. A farmer had 400 birds on a farm. If 80 birds died suddenly, find the ratio of decrease.

## FINDING THE ORIGINAL VALUE AFTER DECREASE.

### Examples

1. The price of a shirt decreased in a ratio of 2:3 to sh.9000. Find the original price of the shirt.

New	Old
2	3
Sh.9000	?

$$2 \text{ part} = \text{sh.9000}$$

$$1 \text{ part} = (\text{sh.9000} \div 2)$$

$$1 \text{ part} = \text{sh.4500}$$

$$3 \text{ parts} = \text{sh.4500} \times 3$$

$$\underline{3 \text{ parts} = \text{sh.13500}}$$

method II) NB: apply algebra

2. When  $x$  books is decreased in a ratio of 4:5, it becomes 160. Find the value of  $x$ .

New	Old
4	5
160	?

$$4 \text{ part} = 160$$

$$1 \text{ part} = (160 \div 4)$$

$$1 \text{ part} = 40$$

$$5 \text{ parts} = 40 \times 5$$

$$5 \text{ parts} = 200$$

$$\underline{X = 200 \text{ books}}$$

method II) NB: apply algebra

## Activity

1. When p is decreased in a ratio of 5:8, it becomes 250. Find the value of p.
2. If m is decreased in a ratio of 2:7, it becomes 280. What is the original amount?
3. There are 500 pupils in a school this year. This number decreased in a ratio of 4:5. Find the initial number of pupils in the school.
4. There were y birds on a farm. The number decreased in a ratio of 6:11. If the current number of birds is 360 birds, how many birds were on the farm before?
5. When the number of Covid 19 vaccines increased in a ratio of 9:4, it became 36000. Find the original number of vaccines.

## SHARING QUANTITIES IN RATIO

### Examples

1. Share sh.1200 in a ratio of 1:4

$$\text{Total parts} = 1 + 4$$

$$= 5$$

$$1^{\text{st}} \text{ share} = \frac{1}{5} \times \text{sh. } 1200$$

$$= \text{sh. } 240$$

$$2^{\text{nd}} \text{ share} = \frac{4}{5} \times \text{sh. } 1200$$

$$= 4 \times \text{sh. } 240$$

$$= \text{sh. } 1060$$

2. Share 7200 books between school A and school B in a ratio of 4:5.

$$\text{Total parts} = 4 + 5$$

$$= 9$$

$$9 \text{ parts} = 7200$$

$$1 \text{ part} = 7200 \div 9$$

$$1 \text{ part} = 800 \text{ books}$$

$$A's \text{ share} = 4 \times 800$$

$$= 3200 \text{ books}$$

$$B's \text{ share} = 5 \times 800$$

$$= 4000 \text{ books}$$

3. Divide 36 mangoes in a ratio of 4:5

$$\text{Total parts} = 4 + 5$$

$$= 9$$

$$4 \text{ parts} = 36$$

$$1 \text{ part} = 36 \div 9$$

$$1 \text{ part} = 4 \text{ mangoes}$$

$$1\text{st share} = (4 \times 4) \text{ mangoes}$$

$$= 16 \text{ mangoes}$$

$$2\text{nd share} = 5 \times 2 \text{ mangoes}$$

$$\underline{2\text{nd share} = 20 \text{ mangoes}}$$

3. Rose, Joy and Jacob share 720 oranges in a ratio of 3:5:4 respectively.

a) How many oranges does each get?

Method I

$$\text{Total parts} = 3 + 5 + 4$$

$$= 12 \text{ parts}$$

$$\text{Rose's share} = \frac{3}{12} \times 720 \text{ oranges}$$

1

$$= (3 \times 60) \text{ oranges}$$

$$\underline{= 180 \text{ oranges}}$$

$$\text{Joy's share} = \frac{5}{12} \times 720 \text{ oranges}$$

1

$$= (5 \times 60) \text{ oranges}$$

$$\underline{= 300 \text{ oranges}}$$

$$\text{Jacob's share} = \frac{4}{12} \times 720 \text{ oranges}$$

1

$$= (4 \times 60) \text{ oranges}$$

$$\underline{= 240 \text{ oranges}}$$

Method II

$$\text{Total parts} = 3 + 5 + 4$$

$$= 12$$

$$12 \text{ parts} = 720 \text{ oranges}$$

$$1 \text{ part} = 720 \div 12$$

$$1 \text{ part} = 60 \text{ oranges}$$

$$\text{Rose's share} = (3 \times 60 \text{ oranges})$$

= 180 oranges

Joy's share =  $5 \times 60$  oranges

= 300 oranges

Jacob's share =  $4 \times 60$  oranges

= 240 oranges

b) How many more mangoes did Jacob get than Rose

(240 - 180) mangoes

60 more mangoes

### Activity

1. Share 180 I a ratio of 7:2

2. Divide 3600 km in a ratio of 3:2

3. Share 450 cakes in a ratio of 5:4

4. A man's salary of sh.240000 was shared between his two sons John and James in a ratio of 11:13 respectively. How much did each get?

5. Dan and Mike share some money in a ratio of 3:5 respectively. How much did each get if they shared sh.64000.

6. The ratio of boys to girls in a school is 7:4. If there are 748 pupils, how many girls are there?

7. A sum of sh.48000 was shared by three sisters Jessica, Jenifer and Jackeline in a ratio of 1:2; 3 respectively.

a) How much did each get?

b) How much more did Jackeline get than Jessica?

8. There are 400 pupils in a certain school. The ratio of girls to boys is 1:4 respectively.

a) How many girls are there?

b) How many more boys than girls are there in the school?

## FINDNING THE AMOUNT SHARED

### Examples

1. The ratio of males to females in a club is 2:3 respectively. If there are 20 males. How many people are there?

males	females	Total
2	3	5
20	?	?

Method I

$$\begin{array}{r} 5 \\ \times 10 \\ \hline 50 \end{array}$$

$$\begin{aligned} 2 \text{ parts} &= 20 \\ 1 \text{ part} &= 20 \div 2 \\ 1 \text{ part} &= 10 \\ 5 \text{ parts} &= (5 \times 10) \\ &= 50 \end{aligned}$$

There are 50 people

2. The ratio of green to yellow fruits in a basket is 3:4 respectively. If there 8 yellow fruits, how many fruits are there altogether?

green	yellow	Total
3	4	7
?	8	?

Method I

$$\begin{array}{r} 7 \\ \times 2 \\ \hline 14 \end{array}$$

There are 14 fruits altogether.

Method ii

$$\begin{aligned} 4 \text{ parts} &= 8 \\ 1 \text{ part} &= 8 \div 4 \\ 1 \text{ part} &= 2 \\ 7 \text{ parts} &= (2 \times 10) \\ &= 14 \end{aligned}$$

There are 14 fruits altogether

3. Dan, Dennis and Dax shared a certain amount of money in a ratio of 2:3:5 respectively .If Dennis got sh.9000.

a) How much did they share altogether?

Dan	Dennis	Dax	Total
2	3	5	10
Sh.9000	?	?	?

Method I

$$\begin{array}{r} 10 \\ \times sh.9000 \\ \hline 2 \\ \hline 1 \\ 10 \times sh.4500 \end{array}$$

Sh.45000

Method ii

$$\begin{aligned} 2 \text{ parts} &= sh.9000 \\ 1 \text{ part} &= sh.9000 \div 2 \\ 1 \text{ part} &= sh.4500 \\ 10 \text{ parts} &= (10 \times sh.4500) \\ &= sh.45000 \end{aligned}$$

5. They shared sh.45000 altogether

c) How much more did Dax get than Dan?

$$\text{Difference in shares} = (5-2)$$

$$= 3 \text{ more shares}$$

$$1 \text{ part} = \text{sh.}4500$$

$$3 \text{ parts} = 3 \times \text{sh.}4500$$

$$= \underline{\text{sh.}13500 \text{ more}}$$

### Activity

1. A and B shared a sum of money in a ratio of 3:4, if A got sh.12000.

a) How much did B get?

b) How much did they share altogether?

2. A, B and C contributed some for a business in a ratio of 3:4:5

respectively. If C contributed 1000 dollars.

a) How much did they contribute altogether?

b) How much did each of the rest contribute?

3. The ratio of boys to girls in a class is 1:2 respectively. If there are 14 boys, how many girls are in the class?

4. A basket contains ripe and raw fruits in a ratio of 7:3. If there are 21 ripe fruits, how many more ripe fruits than raw ones?

5. A man distributed his land among his three sons Jans, Jant and Jose in a ratio of 4:7:5 respectively. If Jant got sh.280 hectares.

a) How many hectares did Jose get?

b) How much land was distributed?

c) How much more land did Jans get than Jose?

## COMPARING SHARES

### Examples

1. A mother share some fruits between her two daughters Nam and Nante in a ratio of 5:8 respectively. If Nante got 15 more fruits than Nam.

a) How many fruits did they share altogether?

Nam	Nante	Total
5	8	13
?	?	?

Difference in shares = 8-5  
= 3 more shares

Method I

$$\frac{13}{3} \times \frac{5}{1}$$

$$13 \times 5$$

65 fruits

Method ii

$$3 \text{ parts} = 15$$

$$1 \text{ part} = 15 \div 3$$

$$1 \text{ part} = 5$$

$$13 \text{ parts} = (5 \times 13)$$

$$= 65$$

They shared 65 fruits altogether

b) How many fruits did Nam get?

$$1 \text{ part} = 5 \text{ fruits}$$

$$5 \text{ parts} = 5 \times 5 \text{ fruits}$$

$$= \underline{\underline{25 \text{ fruits}}}$$

2. Nankya shared some money among Moso, Matia and Mounzi in a ratio of 2:3:5 respectively. If Mounzi got sh.15000 more than Moso.

a) How much did she share altogether?

Moso	Moso	Mounzi	Total
2	3	5	10
?	?	?	?

$$\begin{aligned} \text{Difference} &= 5-2 \\ &= 3 \end{aligned}$$

Method I

$$\frac{10}{3} \times \frac{5000}{1} \times 15000$$

$$\begin{aligned} 10 \times \text{sh.}5000 \\ \underline{\underline{\text{Sh.}50000}} \end{aligned}$$

b) How much did Moso get?

$$1 \text{ part} = \text{sh.}5000$$

Method ii

$$\begin{aligned} 3 \text{ parts} &= \text{sh.}15000 \\ 1 \text{ part} &= \text{sh.}15000 \div 3 \\ 1 \text{ part} &= \text{sh.}5000 \\ 10 \text{ parts} &= (10 \times \text{sh.}5000) \\ &= \text{sh.}50000 \end{aligned}$$

She shared sh.50000 fruits altogether

2parts =  $2 \times \text{sh.}5000$

$$= \text{sh.}10000$$

3. The ratio of children to men to women in a church was 3:4:1 respectively. If there were 200 less women than children.

a) How many people were in the church?

children	Men	women	Total
3	4	1	8
?	?	?	?

Difference = 3-1  
= 2 less shares

Method I

$$\begin{array}{r} 8 \\ \frac{1}{2} \\ \hline 100 \\ 1 \times 200 \end{array}$$

$8 \times 100$  people  
800 people

b) How many were in the church?

1 part = 100 people

4parts =  $4 \times 100$   
= 400 men

Method ii  
2 parts = 200

$$1 \text{ part} = 200 \div 2$$

1 part = 100 people

8 parts =  $8 \times 100$ ) people  
=800 people

800 people were in the church

### Activity

1. A and B shared some money in a ratio of 2:5 respectively. If B got sh.6000 more than A.

a) Find the share of A.

b) Find the total share.

2. X and K shared some money in a ratio of 3:7 respectively. If K got sh.400000 more than X.

a) Find the total share.

b) Find the share of X.

3. Tracy, Anisha and Jackie shared a certain amount of money in a ratio of 3:4:5 respectively. If Tracy got sh.60000 less than Jackie.

a) How much did each get?

How much did they share altogether?

4. Obama, Bush and Clinton contributed money to African countries in a ratio of 2:3:5 respectively. If Clinton contributed \$30000 more than Obama.
  - a) How many dollars did they contribute altogether?
  - b) How many dollars did Bush contribute?
5. The ratio of the length to width of a rectangle is 3:2 respectively. If its perimeter is 40cm.
  - a) Find its actual length and width.
  - b) Find its area.

## PROPORTIONS

Proportions are ways of comparing quantities.

### DIRECT PROPORTION

This is a type of proportion in which the two quantities decrease or increase in the same ratio.

Examples

1. One book costs sh.900. What is the cost of 7 similar books?

1 book costs sh.900

7 books cost  $(7 \times \text{sh.}900)$

7 similar books cost sh.6300

2. The cost of 3 kg of sugar is sh.12900. Find the cost of 1kg.

3kg cost sh.12900

1 kg costs  $(\text{sh.}12900 \div 3)$

1 kg costs sh.4300

3. The cost of 4 pieces of cloth is sh.20000. Find the cost of 9 similar pieces of cloth.

4 pieces cost sh.20000

1 piece cost  $(\text{sh.}20000 \div 4)$

1 piece costs sh.5000

9 similar pieces cost  $(\text{sh.}5000 \times 9)$

9 pieces cost sh.45000

4. The cost of 5 blankets is sh.300000. How many blankets can I buy for sh.420000?

Sh.300000 buy 5 blankets

Sh.1 buys  $\frac{5}{300000}$  blankets

Sh.420000 buy  $\frac{1}{60000} \times 420000$ )blankets

Sh.420000 buy 7 blankets

### Activity

1. The cost of 4 mangoes is sh.800. What is the cost of 9 similar mangoes.

2. If 5kg of sugar cost sh.25000, what is the cost of 8 kg of sugar?

3. 2 dozen of pens cost sh.36000. What is the cost of 9 pens?

4. There are 24 pupils in a class. Every child contributes sh.1500 for a trip.

a) How much money do they contribute altogether?

b) How many children paid sh.18000?

5. A car moves 48km in 20 minutes. How far will it go for 1 hour?

6.5metres of a cloth make 2 shirts. How many metres of a cloth are needed to make 8 shirts?

6. One man got \$800. How many dollars will 5 men get at the same rate?

7. One pen cost sh.1200. Find the cost of 8 similar pens at the same rate.

8. The cost of 6 shirts is sh.180000. How many shirts can be bought for sh.270000 if sold at the same rate?

### INDIRECT /INVERSE PROPORTIONS

The increase in one side of quantity leads to the decrease in the corresponding side and vice versa

#### Examples

1.6men can do a piece of work in 6 days. How long will 9 men take to do the same piece of work?

$$\text{Force} \times \text{time} = \text{force} \times \text{time}$$

$$9 \times t = 6 \times 6$$

$$9t = 36$$

$$\frac{9t}{9} = \frac{36}{9}$$

$$T = 4$$

The will take 4 days

2. Two children can dig a school garden in 8 days. How many men can dig the same garden in 4 days?

Force  $\times$  time = force  $\times$  time

$$4 \times f = 2 \times 8$$

$$4f = 16$$

$$\frac{4f}{4} = \frac{16}{4}$$
$$f = 4$$

4 men can dig the same garden in 4 days

3. Twelve technicians can paint a building in 10 days. How many more technicians are needed to paint the same building in 8 days?

$$f \times t = f \times t$$

$$f \times 8 = 12 \times 10$$

$$8f = 120$$

$$\frac{8f}{8} = \frac{120}{8}$$
$$f = 15$$

$$(15 - 12) \text{ more}$$

3 more technicians are needed to paint the same building

4. Twelve men can build a classroom in 5 days.

a) How many men are needed to do same job in 10 days?

$$f \times t = f \times t$$

$$f \times 10 = 12 \times 5$$

$$10f = 60$$

$$\frac{10f}{10} = \frac{60}{10}$$
$$f = 6$$

6 men are needed

c) How many days will 15 men take to do the same piece of work?

$$f \times t = f \times t$$

$$15 \times t = 12 \times 5$$

$$15t = 60$$

$$\frac{15t}{15} = \frac{60}{10}$$
$$t = 4$$

The will take 4 days

## Activity

1. It takes 12 men 4 days to do a piece of work. How long would it take 8 men to do same job?
2. 13 handkerchiefs take 15 minutes to dry in a hot sun. How long will 10 handkerchiefs take if they are exposed to sunshine at the same time?
3. 16 eyes can see 20 birds on a tree. How many birds would 8 eyes see if no bird flies away?
4. 10 miners take 4 days to crash a lorryful of stones.
  - a) How long will 8 miners take to do the same work?
  - b) How many more miner are needed to do the same work in 2 days?
5. A tailor makes 8 shirts in a day. How long does it take to make 128 shirts if working at the same rate?
6. It takes 6 hours for 5 girls to peel cassava which can feed 900 people. How many girls will peel the same amount of cassava in one hour?
7. 6 Porters can mow a compound in 4 days. How many porters will mow the same compound in 2 days?

## **PERCENTAGES**

Percent means every hundred or out of one hundred.

% is the symbol used for percent

10 out of one hundred pupils can be written as  $\frac{10}{100}$  which means 10%

## **CHANGING PERCENTAGES IN FRACTIONS**

### **Examples**

Convert the following into fractions

a) .25%

$$\% \longrightarrow \frac{1}{100}$$

$$25 \times \frac{1}{100}$$
$$\frac{25}{100}$$
$$\frac{1}{4}$$

$$25\% = \frac{1}{4}$$

b) 65%

1

$$\% \longrightarrow \frac{1}{100}$$

$$65 \times \frac{1}{100}$$

$$\begin{array}{r} \underline{\phantom{0}13} \\ 65 \\ \hline 100 \\ -20 \\ \hline \end{array}$$

$$65\% = \frac{13}{20}$$

c)  $33\frac{1}{3}\%$

$$\% \xrightarrow{\quad} \frac{1}{100}$$

$$33\frac{1}{3} \times \frac{1}{100}$$

$$\frac{1}{\cancel{100}} \times \frac{1}{\cancel{100}}$$

$$33\frac{1}{3}\% = \frac{1}{3}$$

d)  $16\frac{2}{3}\%$

$$16\frac{2}{3} \times \frac{1}{100}$$

1

$$\begin{array}{r} \overline{3} \\ \times \quad \overline{100} \\ \hline \end{array}$$

$$16\frac{2}{3}\% = \frac{1}{6}$$

## Activity

## Activity

Convert the following percentages in simplified common fractions.

- a) 50%      b) 19%      c) 95%      d) 70      e)  $66\frac{2}{3}\%$   
f)  $33\frac{1}{2}\%$       g)  $37\frac{1}{2}\%$       h)  $12\frac{1}{2}\%$

# EXPRESSING FRACTIONS AS PERCENTAGES

## Examples

Convert the following fractions into percentages

$$\text{i) } \frac{4}{5} \times \frac{4}{5} \times 100\% = \underline{\underline{64\%}}$$

$$5 \times 20\%$$

80%

ii)

$$\frac{2}{3} \times 100\%$$

$$\frac{200}{3}\%$$
  
$$66\frac{2}{3}\%$$

iii)  $\frac{9}{40}$

$$\frac{9}{40}$$
  
$$\frac{9}{40} \times 100\% =$$
  
$$\frac{225}{40} =$$
  
$$22\frac{1}{2}\%$$

iv)  $\frac{1}{8}$

$$\frac{1}{8}$$
  
$$\frac{1}{8} \times 100\% =$$
  
$$\frac{25}{8} =$$
  
$$22\frac{1}{2}\%$$

$$\frac{25}{2}\%$$
  
$$12\frac{1}{2}\%$$

### Activity

Convert the following fractions into percentages.

i)

$$\frac{7}{40}$$

ii)  $\frac{11}{20}$

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

iv)  $\frac{8}{25}$

v)  $\frac{4}{10}$

vi)  $\frac{3}{5}$

## CHANGING PERCENTAGE TO DECIMALS AND VICE VERSA

### Examples

1. Convert 25% to decimals:

$$25\% = \frac{25}{100} \\ = 0.25$$

2. Convert 112% into a decimal.

$$112\% = \frac{112}{100} \\ = 1.12$$

3. Express 1.5% as a decimal.

$$1.5\% = \frac{15}{10000} \\ = 0.0015$$

4. Change 0.6 to a percentage:

$$0.6 = \frac{6}{10} \\ = \frac{2}{10} \times 100\% \\ 1$$

$$0.2 = 20\%$$

5. Change 0.15 to a percentage.

$$0.15 = \frac{15}{100} \\ = \frac{15}{100} \times 100\% \\ 1$$

$$0.15 = 15\%$$

6. Convert 0.014 into a percentage.

$$0.014 = \frac{14}{1000} \\ = \frac{14}{1000} \times 100\% \\ 10$$

$$0.014 = \frac{14}{10}\%$$

$$0.014 = 1.4\%$$

7. Convert 2.8 into a percentage.

$$2.8 = \frac{28}{10}$$

$$= \frac{28}{10} \times 100\% \\ 1$$

$$2.8 = 280\%$$

1. Convert the following into percentages;

- a) 0.3    b) 0.25    c) 0.003    d) 1.8    e) 3.0

2. Express the following percentages as decimals

- a) 10%    b) 42%    c)  $37\frac{1}{2}\%$     d)  $6\frac{1}{4}\%$     e) 3.9%    f) 1.2%

## EXPRESSING PERCENTAGES AS RATIOS

### Examples

1. Express the following percentages as ratios:

iv)  $\frac{1}{4} : \frac{1}{3}$

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

$$\frac{3}{4} \times \frac{25}{1}$$

$$= 3 \times 25\%$$

$$= 75\%$$

4. Express the following percentages as ratios

### Examples

i) 60%

$$60\% = \frac{60}{100}$$

$$60 : 100$$

$$6 : 10$$

$$3 : 5$$

ii)  $37\frac{1}{2}\%$

$$= \frac{65}{2} \times \frac{1}{100}$$

$$\frac{65}{200}$$

$$65 : 200$$

$$13 : 40$$

iii)  $66\frac{2}{3}\%$

$$= \frac{200}{3} \times \frac{1}{100}$$

$$\frac{200}{300}$$

$$200 : 300$$

$$2 : 3$$

$$66\frac{2}{3}\% = 2 : 35\%$$

iv)  $5\% = \frac{5}{100}$

10

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

Ratio = 1:20

### Activity

Express the following percentages as ratios

- a) 20% b) 75% c) 130% d) 70% e)  $33\frac{1}{3}\%$  f)  $83\frac{1}{3}\%$  g)  $12\frac{1}{2}\%$

## EXPRESSING RATIOS AS PERCENTAGES

### Examples

Convert the following ratios into percentages

a) 2:5

$$\frac{2}{5} \times \frac{20}{1} \%$$

$$(2 \times 20\%)$$

$$40\%$$

b) 7:8

$$7:8$$

$$\frac{7}{8} \times \frac{25}{2} \%$$

$$\frac{175}{2}\%$$

87 $\frac{1}{2}$ %

c)  $\frac{1}{4} : \frac{1}{3}$

$$\left(\frac{1}{4} \times \frac{3}{4}\right) \times 100\%$$

$$\frac{3}{4} \times 100\%$$

$$3 \times 25\%$$

75%

d)  $\frac{2}{3}$  to  $\frac{4}{7}$

$$\left(\frac{2}{3} \div \frac{4}{7}\right) \times 100\%$$

$$\left(\frac{2}{3} \times \frac{7}{4}\right) \times 100\%$$

$$\frac{2}{3} \times 100\%$$

3

$$\frac{200}{3}\%$$

$$66\frac{2}{3}\%$$

## Activity

- Convert the following ratios into percentages.

a) 1:2    b) 1:5    c) 3:8    d) 7:10    e) 5:6    f)  $\frac{1}{5} : \frac{1}{4}$

## FINDING PARTS OF PERCENTAGES

### Examples

- If 40% of a class is absent, what percentage is present?

Those absent = 40%

Those present = 100% - 40%

$$= 60\%$$

### Method II

Let the %ge of those present be y

$$y + 40\% = 100\%$$

$$y + 40\% - 40\% = 100\% - 40\%$$

$$y = 60\%$$

2. 35% of the pupils in a school like rice, 10% like potatoes while the rest like posho, what percentage of pupils like posho?

$$\begin{aligned}\text{Percentage for posho} &= 100\% - (35 + 10)\% \\ &= 100\% - 45\% \\ &= \underline{\underline{55\%}}\end{aligned}$$

### Method II

Let the %ge of those who like posho be  $x$

$$\begin{aligned}x + 10\% + 35\% &= 100\% \\ x + 45\% &= 100\% \\ x + 45\% - 45\% &= 100\% - 45\% \\ x &= \underline{\underline{55\%}}\end{aligned}$$

3. There are 20% more boys than girls in a class. What is the percentage of?

a) girls

let the percentage of girls be  $k$

Girls' %	Boys' %	Total %
$k$	$(k+20)\%$	100

$$\begin{aligned}k + k + 20\% &= 100\% \\ 40 \quad 2k + 20\% &= 100\% \\ 2k 20\% - 20\% &= 100\% - 20\% \\ 2k &= 80\%\end{aligned}$$

$$\frac{2k}{2} = \frac{80}{2}$$

$$k = \underline{\underline{40\%}}$$

girls %ge = 40%

b) boys' %ge

$$\begin{aligned}k + 20\% \\ (20 + 40)\% \\ 60\%\end{aligned}$$

4. There are 40% less foreigners than national in our school. Find the percentage of foreign pupils in the school

Let the percentage of nationals be  $m$

nationals' %	foreigners' %	Total %
m	(m - 40)%	100

$$m + m - 40\% = 100\%$$

$$2m - 40\% = 100\%$$

$$2m - 40\% + 40\% = 100\% + 40\%$$

$$2m = 140\%$$

$$\frac{2m}{2} = \frac{140}{2}$$

$$M = 70\%$$

$$\% \text{ge of foreigners} = 70\% - 40\%$$

$$= 30\%$$

### Activity

1. A child ate 40% of a cake. What percentage remained?
2. Mr.Kimera sold 60% of his land. What percentage of his land was left?
3. A child read 25% of book on Monday, 38% on Tuesday, and 16% on Wednesday. What percentage is left to be read?
4. On a samba, 20% are bananas, 25% are coffee trees and 30% are cotton trees. What percentage is left for other crops?
5. 40% of Ugandans watch NTV, 30% watch NBS TV, 15% watch Salt TV and the rest watch other stations. What percentage of the population watch other stations?
6. There were 60% more females than males in the market. What is the percentage of;
  - a) males in the market.
  - b) females of females.
7. There are 50% less men than women in the village.
  - a) Find the percentage of women.
  - b) What is the percentage of men?

# EXPRESSING QUANTITIES AS PERCENTAGES

## Remember

A day                    24 hours

A week                    7 days

A month

1 hour                    60 minutes

1 minute                 60 seconds

1 second                60 microseconds

1 dozen                  12 articles

1 gross                  144 items

1kg                      1000g

1 tone                  1000kg

1 fortnight	14 days
1 decade	10 years
1 silver Jubilee	25 years
1 generation	30 years
1 Golden Jubilee	50 years
1 diamond Jubilee	75 years
1 century	100 years
1 millennium	1000 years

## Examples

- Express 500g as a percentage of 2kg.

$$1\text{kg} = 1000\text{g}$$

$$2\text{kg} = 2 \times 1000\text{g}$$

$$2\text{kg} = 2000\text{g}$$

$$\frac{500}{2000} \times 100\% \\ \frac{1}{4} \\ 25\%$$

- Express 6 articles as a percentage of 2 dozen.

$$1\text{dozen} = 12\text{ articles}$$

$$2\text{doz} = 2 \times 12$$

$$2\text{doz} = 24\text{ articles}$$

$$\frac{6}{24} \times 100\% \\ \frac{1}{4} \\ 25\%$$

- What percentage of 1 litre is 250cm<sup>3</sup>?

$$1\text{ litre} = 1000\text{cm}^3$$

$$\frac{25}{1000} \times 100\% = \frac{1}{4} \times 100\% = 25\%$$

4. In a school of 1000 pupils, 450 are boys and the rest are girls. What percentage are:
- a) girls?

$$\frac{45}{1000} \times 100\% = \frac{1}{10} \times 100\% = 10\%$$

- 45%
- b) boys?
- 100% - 45%  
55%
- Activity
1. Express 20 as a percentage of 60.
  2. Express 200g as a percentage of 3kg.
  3. What percentage of 18 books are 9 books?
  4. Write 3 as a percentage of 50.
  5. A bag contains 18 blue pens and 32 red pens. What percentage of pens are red?

6. A pupils got the following score from four tests:

Eng 24 out of 32	math 32 out of 40
SST 32 out of 50	Scie 18 out of 24

Which subject was best done?

7. In a school of 500 pupils, 290 pupils have lunch at school, 160 pupils pack their own lunch and the rest do not have lunch at all.
    - a) What percentage of pupils have lunch at school?
    - b) What percentage of pupils do not have lunch at all?
- There are 20 players in a camp. 4 play tennis, 11 play football and others play both games.
- a) What percentage play tennis?
  - b) What percentage play both football and tennis?

8. A 20 litre jerrycans has 15 litres of water. What percentage of the jerrycans is empty?

## FINDING QUANTITIES EQUIVALENT TO GIVEN PERCENTAGES

Examples:

1. What is 40% of 150?

$$\begin{aligned} & \frac{40}{100} \times 150 \\ & = 4 \times 15 \\ & = 60 \end{aligned}$$

2. A piece of land is 200 hectares. A farmer used 60% of it for cultivation. How much land is used for cultivation?

$$\text{Cultivation} = 60\% \text{ of } 200$$

$$\begin{aligned} & = \frac{60}{100} \times 200 \text{ hectares} \\ & = 60 \times 2 \text{ hectares} \\ & = 120 \text{ hectares} \end{aligned}$$

3. If 20% of a number is 40. What is the number?

Let the number be  $x$  or:

$$20\% \text{ of } x = 40$$

$$\begin{aligned} & \frac{20}{100} \times x = 40 \\ & \frac{x}{5} = 40 \times 5 \end{aligned}$$

$$X = 200$$

$$20\% \text{ of a number} = 40$$

$$1\% = (40 \div 20)$$

$$1\% = 2$$

$$100\% = 2 \times 100$$

$$= 200$$

3. What is 50% of 2kg?

$$1\text{kg} = 1000\text{g}$$

$$2\text{kg} = 2 \times 1000\text{g}$$

$$2\text{kg} = 2000\text{g}$$

$$100\% = 2000\text{g}$$

$$1\% = 2000 \div 100$$

$$1\% = 20$$

$$50\% = 50 \times 20\text{g}$$

$$\underline{\underline{50\% = 1000g}}$$

method II

$$1\text{kg} = 1000\text{g}$$

$$2\text{kg} = 2 \times 1000\text{g}$$

$$2\text{kg} = 2000\text{g}$$

$$\frac{50}{100} \times 2000\text{g}$$

$$\frac{50}{100} \times 2000\text{g}$$

$$50 \times 20 \text{ g}$$

$$\underline{\underline{1000g}}$$

4. What is  $12\frac{1}{4}\%$  of 490?

$$\frac{49}{4}\% \times 400$$

$$(\frac{49}{4} \times \frac{1}{100}) \times 4000$$

$$\frac{49}{400} \times 4000$$

$$49 \times 10$$

$$\underline{490}$$

5. What is 25% of 3 dozen?

$$1\text{doz} = 12$$

$$3 = 3 \times 12$$

$$3 = 36$$

$$\begin{array}{r} 125 \\ \times 36 \\ \hline 100 \\ 36 \\ \hline 45 \end{array}$$

$$\underline{\underline{9}}$$

### Activity

What is;

a) 12% of 240?

b) 10% of 240?

c)  $37\frac{1}{2}\%$

d)  $33\frac{1}{3}\%$

e)  $16\frac{2}{3}\%$  of 810

f) 25% of 1 metre

g) 10% of an hour

h) 90% of 3 hours

i) 30% of a gross

j) 25% of a tonne

k) 60% of 3 minutes of a clock.

*Ref: New MK pupils book 7  
pages 111 & 112*

## SHARING QUANTITIES USING PERCENTAGES

### Examples

1. In a class of 400 pupils, 30% are girls and the rest are boys.

a) How many boys are in the school?

Let %ge of boys be y

$$Y + 30\% = 100\%$$

$$Y + 30\% - 30\% = 100\% - 30\%$$

$$Y = 70\%$$

$$100\% = 400$$

$$1\% = 400 \div 100$$

$$1\% = 4$$

$$70\% = 4 \times 70$$

$$70\% = 280$$

There are 280 boys

b) How many more boys than girls?

$$(400 - 280) \text{ girls}$$

$$120 \text{ girls}$$

$$(280 - 120)$$

$$160 \text{ more boys}$$

II

$$70\% - 30\%$$

$$40\%$$

$$1\% = 4$$

$$40\% = 4 \times 40$$

$$40\% = 160$$

160 more boys

2. There are 20% more children than adults in a family of 20 people.

a) What percentage of the family are adults?

let the percentage of adults be k

adults' %	Chn's %	Total %
k	(K+20)%	100

$$k + k + 20\% = 100\%$$

$$2k + 20\% = 100\%$$

$$2k 20\% - 20\% = 100\% - 20\%$$

$$2k = 80\%$$

$$\frac{2k}{2} = \frac{80}{2}$$

$$k = 40\%$$

$$\text{Adults' \%ge} = 40\%$$

Let %ge of boys be y

$$y + 30\% = 100\%$$

$$y + 30\% - 30\% = 100\% - 30\%$$

$$y = 70\%$$

$$\frac{70}{100} \times 400$$

$$70 \times 4$$

280 boys

III

$$70\% - 30\%$$

$$40\%$$

$$\frac{40}{100} \times 400$$

$$40 \times 4$$

160 more boys

II

$$\begin{aligned} \text{Chn's \%} &= (20+40)\% \\ &= 60\% \end{aligned}$$

$$\frac{60}{100} \times 20$$

$$6 \times 2$$

12 children

b) How many children are in the family?

I

$$\text{Chn's \%} = (20+40)\%$$

$$= 60\%$$

$$100\% = 20$$

$$1\% = 20 \div 100$$

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

$$60\% = \frac{1}{5} \times 12$$

$$60\% = 12 \text{ children}$$

There are 12 children

c) How many more children are there?

$$(20-12) \text{ adults}$$

$$8 \text{ adults}$$

$$(12-8)$$

4more children

3. There are 30% less male teachers than female teachers in a school. If the school has 140 teachers altogether.

a) How many male teachers are in the school?

Let the percentage of female teachers be m

females' %	males' %	Total %
m	(m - 30)%	100

$$m + m - 30\% = 100\%$$

$$2m - 30\% = 100\%$$

$$2m - 30\% + 30\% = 100\% + 0\%$$

$$2m = 130\%$$

$$\frac{2m}{2} = \frac{130}{2}$$

$$M = 65\%$$

$$\% \text{ge of males} = 100\% - 65\%$$

$$= 35\%$$

$$100\% = 140$$

$$1\% = 140 \div 100$$

$$1\% = \frac{14}{10}$$

$$35\% = \frac{\frac{14}{10}}{\frac{10}{2}} \times \frac{7}{35}$$

$35\% = 49$  male teachers

There are 49 male teachers

c) How many more female teachers than males are on the staff?

$$(140 - 49)$$

99 females

$$(99 - 49)$$

50 more females than males.

### Activity

1. In a class, 10% of the pupils are absent. How pupils are present if there are 60pupils?
2. A salon get 80 customers a day. If 30% are male and the rest are female.
  - a) How many males visit the salon?
  - b) How many more females than males visit the salon?
3. Out of 350 people who attended a conference, 40% were Baganda, 20% were Banyankore and the rest were Langi.
  - a) How many Langi attended the conference?
  - b) How many more Banganda than Banyankore attended the conference?
4. A fruiter sold 10% mangoes, 40% oranges and the rest passion fruits.
  - a) How many passion fruits did he sell?
  - b) How many mangoes and oranges were sold altogether?
5. In a library there are 300 textbooks. If 10% are English, 30% are math, 15% are SST and the rest are Science. How many books are there for each subject?
6. There are 50% more women than men in a club of 400 people.
  - a) How many men participants are in the club?
  - b) How many more women than men are there?
7. In a class of 360 pupils, there are 10% less foreign students than nationals.
  - a) Find the number of students who are national.
  - b) Express the number of foreign students as a ratio of the whole class.

## FORMING AND SOLVING EQUATIONS INVOLVING PERCENTAGES

### Examples

1. If 10% of a number is 40. Find the number?

$$10\% = 40$$

$$1\% = 40 \div 10$$

$$1\% = 4$$

$$100\% = 4 \times 100$$

$$100\% = 400$$

The number is 400

Let the number be k

$$\frac{1}{100} \text{ of } k = 40$$

$$\frac{1}{10} k \times \frac{10}{1} = 40 \times \frac{10}{1}$$

$$k = 400$$

The number is 400

II

$$\frac{100}{10} \times 40$$

$$100 \times 4$$

$$\underline{\underline{400}}$$

2. 20% of pupils in a school are girls. If there 140 boys, how many pupils are in the school?

$$20\% = 140$$

$$1\% = 140 \div 20$$

$$1\% = 7$$

$$100\% = 7 \times 100$$

$$100\% = 700$$

The are 700 pupils in the school.

## APPLICATION OF PERCENTAGES

### EXAMPLES:

1. Nanyonjo earns sh. 12,000. She spends 75% and saves the rest.

i) How much does she spend?

Solution:

$$= 75\% \text{ of } 12,000 \text{ sh.}$$

$$= \frac{75}{100} \times 12,000$$

$$= 75 \times 120$$

$$= \underline{\underline{9,000}}$$

ii) How much does she save?

$$\begin{aligned}
 & (100\% - 75\%) \text{ of } 12,000 \quad \text{or} \quad 12,000\% \\
 & = 25\% \text{ of } 12,000 \quad - \frac{9000}{3000}\% \\
 & = \frac{25}{100} \times 12000 \\
 & = 25 \times 120 \\
 & = 3000
 \end{aligned}$$

2. If 30% of my salary is spent on food and I save shs 21,000. What is my salary?

Solution:

Let the salary be p. Method 11

Total	Food	savings
100%	30%	100%-30% = 70%

$$\begin{aligned}
 & 70\% \text{ of } p = 21,000 \quad \text{percentage saved} \\
 & 70 \times p = 21,000 \quad 100\%-30\% = 70\% \\
 & \frac{70}{100} \times p = 21,000 \quad 70\% \text{ of salary} = 21,000 \\
 & \frac{7p}{10} = 210,000 \quad 10\% \text{ of salary} = \frac{21000}{7} \\
 & p = \frac{210,000}{7} \quad 100\% \text{ of salary} = 300 \times 100 \\
 & p = 30,000\%
 \end{aligned}$$

*Ref: New MK pupils book 7  
pages 111 & 112*

## CONTENT: INCREASING QUANTITIES USING PERCENTAGES

Examples:

1. Increase 800 by 20%

$$\begin{aligned}
 \text{New amount} &= 100\% + 20\% \text{ of old amount} \\
 &= 120\% \times \text{sh.} .800 \\
 &= \frac{120}{100} \times 800 \\
 &= \underline{\text{sh.} .960}
 \end{aligned}$$

2. Increase 800 pupils by  $12\frac{1}{2}\%$

$$\begin{aligned}
 \text{New number} &= 100\% + 12\frac{1}{2}\% \text{ of } 800 \text{ pupils} \\
 &= \frac{225\%}{2} \times 800 \text{ pupils}
 \end{aligned}$$

$$\begin{aligned}
 &= \frac{225}{2} \div \frac{100}{1} \times \frac{800}{1} \\
 &= \frac{225}{2} \times \frac{1}{100} \times \frac{800}{1} \\
 &= (225 \times 4) \text{ pupils} \\
 &= \underline{\underline{900 \text{ pupils}}}
 \end{aligned}$$

3. Increase sh.4800 by 10% and then by 20%.

$$\begin{aligned}
 \text{Old amount} &= \text{sh.4800} \\
 10\% \text{ increment} &= 100\% + 10\% = 110\% \\
 20\% \text{ increment} &= 100\% + 20\% = 120\% \\
 &= 110\% \times 120\% \text{ of sh.4800} \\
 &= \frac{110}{100} \times \frac{120}{100} \times \text{sh.4800} \\
 &= 11 \times 12 \times \text{sh.48} \\
 &= \underline{\underline{\text{sh.6336 new amount}}}
 \end{aligned}$$

#### EVALUATION ACTIVITY:

1. Increase 600 grams by 25%
2. Increase 300 by 30%
3. Increase 10 by 10%
4. Increase 480 girls by 20% and then by 25%
5. Increase 1200 cows by  $22\frac{1}{2}\%$
6. Increase 240 vehicles by  $66\frac{2}{3}\%$
7. The school enrolment is 600 people. The predicted increase in 10 years is 35%. What will be enrolment in 10 years.
8. The price of a radio was increased by 30% from sh.90000. What is the new price of the radio?

*Ref: New MK pupils book 7  
pages 115 & 116*

#### FINDING THE QUANTITY INCREASED BY A PERCENTAGE

##### Examples

1. What amount of money when increased by 20% becomes sh.14400?  
Old % = 100%

$$\text{New percentage} = 100\% + 20\%$$

$$= 120\%$$

$$120\% \longrightarrow \text{sh.14400}$$

$$120\% = \text{sh.14400}$$

$$1\% = \text{sh.}14400 \div 120$$

$$1\% = \text{sh.}120$$

$$100\% = \text{sh.}120 \times 100$$

$$100\% = \text{sh.}12000$$

The amount is sh.12000

2. After increasing a certain amount of money by  $12\frac{1}{2}\%$  it becomes sh.27000.

What was the sum of money before?

Original percentage = 100%

$$\text{New \%ge} = 100\% + 12\frac{1}{2}\%$$

$$= 112\frac{1}{2}\%$$

$$112\frac{1}{2}\% \longrightarrow \text{sh.}27000$$

$$1\% = \text{sh.}27000 \div 112\frac{1}{2}\%$$

$$= \text{sh.}27000 \div \frac{225}{2}\%$$

$$= \text{sh.}27000 \div \left(\frac{225}{2} \times \frac{1}{100}\right)$$

$$= \text{sh.}27000 \div \frac{225}{200}$$

$$= \text{sh.}27000 \times \frac{40}{225}$$

$$\begin{array}{r} 40 \\ 225 \\ \hline 45 \\ 5 \end{array}$$

$$= \text{Sh.}3000 \times 8$$

$$= \text{sh.}24000$$

The sum was sh.24000

### Activity

1. When a number is increased by 30% it becomes 26000.What is the number?

2. After increasing a number by 15% it becomes 230.What is the number?

3. When coffee exports increased by m tonnes to 750 tonnes, if the increase was 25%.What is the value of m

4. When a number is increased by 10% and then by 20% it becomes 6336.What is the number?

5. When x is increased by 20% it becomes 720. Find the value of x.

## DECREASING QUANTITIES USING PERCENTAGES

### Examples

- Decrease 1500 by 10%

Original percentage = 100%

$$\begin{aligned}\text{New percentage} &= (100 - 10)\% \\ &= 90\%\end{aligned}$$

$$100\% = 1500$$

$$1\% = 1500 \div 100$$

$$1\% = 15$$

$$90\% = 15 \times 90$$

$$\underline{=1350}$$

- Decrease 4000 footballers by  $12\frac{1}{2}\%$

Original percentage = 100%

$$\begin{aligned}\text{New percentage} &= (100 - 12\frac{1}{2}\%) \% \\ &= 87\frac{1}{2}\%\end{aligned}$$

$$100\% = 1500$$

$$1\% = 4000 \div 100$$

$$1\% = 400$$

$$87\frac{1}{2}\% = 87\frac{1}{2}\% \times 40$$

$$\begin{aligned}&= \frac{175}{200} \times 400 \\ &\quad 8 \quad 1\end{aligned}$$

$$= 7 \times 50$$

$$\underline{= 350}$$

- When a man's salary is decreased by 10% and then by 20% it becomes

sh.720000. Find his original salary.

$$(100\% - 10\%) \times (100\% - 20\%) \times \text{sh.720000}$$

$$90\% \times 80\% \times \text{sh.720000}$$

$$\frac{90}{100} \times \frac{80}{100} \times \text{sh.720000}$$

$$9 \times 8 \times \text{sh.7200}$$

$$72 \times \text{sh.7200}$$

$$\underline{\text{Sh.518400}}$$

## Activity

1. There were 50 pupils in a class. The number has decreased by 10%. What is the new number?
2. There were 300 heads of cattle on a farm last year. This year, the number has reduced by 20%. How many heads of cattle does the farm have this year?
3. The cost of maize flour was sh.100 per kg. It was reduced by 10%. What is the new price of maize flour?
4. Decrease 4500 litres of water by 20% and then by 30%.
5. Decrease sh.1000 by 10% and then by 20%.
6. The number of pupils decreased by 10% for the first year and then by 15% by the second year. How many pupils are in the school if they were 1600 pupils?

## FINDING QUANTITY DECREASED BY A PERCENTAGE

### Examples

1. If a man's salary is decreased by 35%, it becomes 1560. What is his salary?

Original percentage = 100%

$$\begin{aligned}\text{New percentage} &= (100 - 35)\% \\ &= 65\%\end{aligned}$$

$$65\% = 1560$$

$$1\% = 1560 \div 65$$

$$1\% = \text{sh.}24$$

$$100\% = 24 \times 100$$

$$=\text{sh.}2400$$

2. When a number is decreased by 20%, it becomes 1080. Find the number.

Original percentage = 100%

$$\begin{aligned}\text{New percentage} &= (100 - 20)\% \\ &= 80\%\end{aligned}$$

$$80\% = 1080$$

$$1\% = 1080 \div 80$$

$$1\% = .13.5$$

$$100\% = .13.5 \times 100$$

$$=\text{sh.}1350$$

## Activity

1. What sum of money when decreased by 20% become sh.10800?
2. A teacher's salary decreased by 20% to sh.200000.What was the salary before?
3. After reducing the price of a TV by 25%, a customer paid sh.300000.What was the original price of the TV?
4. A car was bought at sh.4, 800,000 after decrease of 20% of the original price. What was the price of the car before the decrease?
5. When k is decreased by 20% it becomes sh.80000. Find the value of k.

## FINDING PERCENTAGE INCREASE AND PERCENTAGE DECREASE

### Examples

1. When 143 porters are increased by x% they become 168.Calculate the value of x.

$$\text{Increase} = 168 - 143$$

$$= 25$$

$$\% \text{increase} = \frac{\text{increase}}{\text{original quantity}} \times 100\%$$

$$= \frac{\frac{1}{24}}{\frac{144}{6}} \times 100\%$$

$$= \frac{100}{6}\%$$

$$= 16\frac{4}{6}\%$$

$$= 16\frac{2}{3}\%$$

2. When 240 is decreased it becomes 192.Calculate the percentage discount.

$$\text{Decrease} = 240 - 192$$

$$= 48$$

$$\% \text{Decrease} = \frac{\text{Decrease}}{\text{original quantity}} \times 100\%$$

$$= \frac{\frac{1}{48}}{\frac{240}{10}} \times 100\%$$

$$= 10\%$$

3. When 480 is increased by  $x\%$ , it becomes 540. Find the value of  $x$ .

$$\text{Increase} = 540 - 480$$

$$= 60$$

$$\% \text{increase} = \frac{\text{increase}}{\text{original quantity}} \times 100\%$$

$$= \frac{60}{480} \times 100\%$$

$\frac{1}{4}$   
 $\frac{25}{100}$   
2

$$= 12\frac{1}{2}\%$$

4. When 1500 is decreased by  $y\%$  it becomes 1350. Find the value of  $y$ .

$$\text{Decrease} = 1500 - 1350$$

$$= 150$$

$$\% \text{Decrease} = \frac{\text{Decrease}}{\text{original quantity}} \times 100\%$$

$$= \frac{150}{1500} \times 100\%$$

$\frac{1}{10}$

$$= 10\%$$

### Activity

- When 400 litres is increased by  $p\%$ , they become 440 litres. Find the value of  $p$ .
- When sh.12000 is decreased by  $n\%$ , it becomes sh.1020. Calculate the value of  $n$ .
- When sh.24000 is increased by  $y$  it becomes 25920. Calculate the value of  $y$ .
- By what percentage will 800 be increased to become 960?
- When 4800 is increased by  $x\%$ , it becomes 5280. Calculate the value of  $x$ .
- When sh.1200 is decreased by  $y\%$  it becomes 1020.
- When 1000 is decreased by  $k\%$ , it becomes 900. Calculate the value of  $k$ .
- When 1020 is decreased by  $p\%$  it becomes 816. Calculate the value of  $p$ .
- When 240 is decreased by  $m\%$  it becomes 180. Calculate the value of  $m$ .
- A student's pocket money was reduced from sh.24000 to sh.1920. By what percentage did it decrease.

## PERCENTAGE PROFIT AND LOSS

### PERCENTAGE PROFIT

Examples:

1. An article was bought at sh.100,000 and sold at sh. 120,000. Calculate the percentage profit.

Cost price = sh.100,000

100%

Selling price= sh.120,000

Profit= sh.120,000 - sh.100,000

= sh.20,000

Percentage loss:

percentage profit

$$= \frac{\text{profit}}{\text{CP}} \times 100\%$$

CP

$$= \frac{\text{sh.}20,000}{\text{sh.}100,000} \times 100\%$$

$$= 20\%$$

2. I bought a house at \$120,000 but I was forced to sell it at \$ 100,000. Find my percentage loss.

Buying price = \$120,000

Selling price = \$ 100,000

Loss= Bp-Sp

\$120,000 - \$100,000

=\$20,000

percentage loss

$$= \frac{\text{loss}}{\text{cost price}} \times 100\%$$

cost price

$$= \frac{\$20,000}{\$120,000} \times 100\%$$

\$120,000

$$= 16\frac{2}{3}\%$$

### Activity

1. Paul bought a TV set at sh.200000 and sold it at sh.250000.Fiind the percentage profit.
2. A chair was bought at sh.80000 and was sold at sh.90000.calculate the percentage gain.
3. The profit on a goat which was sold at sh.480000 was sh.30000.Calculate the percentage gain.
4. A man bought a motorcycle at sh.6000000 and sold it at sh.7000000. Calculate his percentage profit.
5. A lady sold a shirt for sh.85000 making a profit of sh.5000.Calculate her percentage gain.
6. Veronica bought an article at sh.1200000 and sold it at sh.1000000.Calculatye her percentage loss.

7. Cinderella bought a skirt at sh.40000 and sold it at sh.30000. Find her percentage loss.

8. After buying a radio at sh.600000 and was forced to sell it at sh.480000. Find my percentage loss.

9. By selling a pair of shoes at sh.80000, a trader made a loss of sh.8000. calculate his percentage loss.

10. A trader sold a tin of oil for sh.60000 and made a loss of sh.15000. Calculate his percentage loss.

*Ref: New MK pupils book 7  
pages 123 & 124*

## APPLICATION OF PERCENTAGE PROFIT AND PERCENTAGE LOSS

### Examples

1. After selling an article at sh.21000, a trader made a profit of 20%. calculate the cost price of the article.

Original percentage = 100%

$$\begin{aligned}\text{New percentage} &= 100 + 20\% \\ &= 120\%\end{aligned}$$

$$120\% = \text{sh.}21000$$

$$1\% = \text{sh.}21000 \div 120$$

$$1\% = \text{sh.}175$$

$$100\% = \text{sh.}175 \times 100$$

$$\text{Sh.}17500$$

The cost price was sh.17500

2. By selling a pair of shoes at sh.45000, a trader made a loss of 10%.

- a) Calculate the cost price of the article.

Original percentage = 100%

$$\begin{aligned}\text{New percentage} &= 100 - 10\% \\ &= 90\%\end{aligned}$$

$$90\% = \text{sh.}45000$$

$$1\% = \text{sh.}45000 \div 90$$

$$1\% = \text{sh.}500$$

$$100\% = \text{sh.}500 \times 100$$

Sh.50000

The cost price was sh.50000

c) How much did he lose?

$$\text{Loss} = \text{sh.}50000 - \text{sh.}45000$$

$$= \text{sh.}5000$$

He lost sh.5000

3. A book seller bought 30 books at sh.24000. At what price did he sell each book if he made a loss of 20%

$$\text{Cost of one book} = \text{sh.}24000 \div 30$$

$$= \text{sh.}800 \text{ (original)}$$

$$\text{New percentage} = 100 - 20\%$$

$$= 80\%$$

$$\text{Selling price} = \frac{80}{100} \times \text{sh.}800 \\ = \text{sh.}640$$

He sold each book at sh.640

3. The cost price of a 50Kg bag of sugar is sh.45000. At what price must he sell each kilogram in order to make a profit of 20%?

$$\text{Cost of one book} = \text{sh.}45000 \div 50$$

$$= \text{sh.}900 \text{ (original)}$$

$$\text{New percentage} = 100 + 20\%$$

$$= 120\%$$

$$\frac{120}{100} \times \text{sh.}900 \\ = \text{sh.}1080$$

He sold each book at sh.1080

4. After selling a pair of shoes at shs 21,000, a trader made a profit of 20%. Find the buying price of the pair of shoes.

Cost price as a percentage = 100%

Selling price as a percentage = 100% + 20% = 120%

120% represents = shs 21,000

1% represents = sh.21000

$$120$$

100% represents = 21,000  $\times 100$

$$= (25 \times 700) = \text{sh.}17,500$$

1. By selling his cow at sh. 34,000, Obala made a loss of 15%. How much did the cow cost?

**Loss = 15%**

**Cp = 100%**

**Sp = 100% - 15% = 85%**

**85% of cp = 34,000**

**85cp = 34,000**

$$\begin{array}{rcl} 100 & 400 \\ 85cp & = 34,000 \times 100 \\ 85 & 85 \\ Cp & = 400 \times \text{sh.}100 \\ \hline \text{Cost price} & = \text{sh.}40,000 \end{array}$$

*Ref: New MK pupils book 7  
pages 123 & 126*

### Activity

- After selling a book at sh.2200, a boy made a profit of 10%. Calculate the cost price.
- A trader offers an article at sh.72000 thus making a profit of 20%. Calculate the cost price.
- Because of a wet season, the cost of each bunch of matoke rose by 15%. Calculate the cost price of the article.
- A book seller bought 40 math textbooks at sh.20000. At what price must he sell each copy to get a profit of 15%?
- A trader bought 2bags containing 300 passion fruits, a bag at a cost of sh.25000 each. In each bag, there were x bad fruits the rest were sold at sh.400 for a heap of 5 fruits and made a profit of sh.4400. How many fruits were bad?
- Torrente sells gnuts in a city. He buys 3kg of gnuts at sh.1200 per day. He sells each spoonful at .10 and makes a profit sh.1600.

## FINDING DISCOUNT

**Example:**

1. The market price of a shirt was sh.1500. After a discount, a customer paid sh.1200.

a) How much was the discount?

$$\begin{aligned}\text{Discount} &= \text{marked price} - \text{cash price} \\ &= \text{sh.1500} - \text{sh.1200} \\ &= \text{sh.300}\end{aligned}$$

b) Calculate the percentage discount.

$$\begin{aligned}\text{Percentage discount} &= \frac{\text{discount}}{\text{marked price}} \times 100\% \\ &= \frac{300}{1500} \times 100\% \\ &= 20\%\end{aligned}$$

2. The marked price of a bicycle is sh. 60,000. A customer is offered a discount of 15%. How much money does the customer pay?

$$\begin{aligned}\text{Discount} &= 15\% \text{ of marked price} \\ &= \frac{15}{100} \times 60,000 \\ &= \text{sh.9000}\end{aligned}$$

$$\begin{aligned}\text{Amount paid} &= 100\% - 15\% \\ &= 85\% \text{ of sh.60,000} \\ &= \frac{85}{100} \times \text{sh.60,000} \\ &= 85 \times \text{sh.600} \\ &= \text{sh.51,000}\end{aligned}$$

*Ref: New MK pupils book 7  
pages 130 -131*

3. Cissy paid sh. 18,000 for a hand bag after being given a discount of 10%. Calculate the marked price.

$$\begin{aligned}\text{Cost price as \%age} &= 100\% \\ \text{Discount offered} &= 10\% \\ \text{Cissy paid} &= 100\% - 10\% \\ &= 90\%\end{aligned}$$

$$90\% = \text{sh.18000}$$

$$1\% = \text{sh.}18000 \div 90$$

$$1\% = \text{sh.}200$$

$$100\% = \text{sh.}200 \times 100$$

Sh.20000

The marked price was sh.20000 or apply algebra

4. Kamya was given a discount of 17% of the marked price which amounted to 8500 $\text{sh.}$ . Calculate the marked price and selling price.

$$\% \text{age discount} = 17\%$$

$$\text{Marked price} = 100\%$$

$$\text{Discount} = 8500\text{sh.}$$

$$17\% = \text{sh.}8500$$

$$1\% = 500$$

$$100\% = \text{sh.}500 \times 100$$

$$\underline{\text{Marked price} = \text{sh.}50000}$$

$$\text{Selling price} = \text{sh.}50000 - \text{sh.}8500$$

$$\underline{\underline{= \text{sh.}41500}}$$

1. The marked price of a book is sh.4000 If a customer is offered a 10% discount.

a) How much is the discount?

b) How much does the customer pay?

2. A set of chairs is marked sh.250000. If a customer is offered a 20% discount,

a) How much does the customer pay?

b) How much is the discount?

3. The marked price of a pair of trousers is sh.24000. A pedo bought four pairs and was given a discount of  $12\frac{1}{2}\%$ . What price did he pay for each pair?

4. Haji Ndeeba paid sh.8500000 for a car after being given a discount of 15%. What was the price of the car before the discount?

5. A whole seller gave a retailer a discount of 25% on an article whose marked price was sh.108000. The retailer added 8% for transport and 20% for VAT.

a) Calculate the marked price in the retail shop.

b) What profit does the retailer make?

6. The marked price of a dress is sh.11000, a watch at sh.15000, a pair of shoes at sh.35000. A customer who paid cash was given a discount of 10% on a dress, 20% on a watch, and 15% on a pair of shoes.
- Calculate the total discount.
  - How much did the customer pay for all the items?

## SIMPLE INTEREST

### Meaning of terms

**Principal (p):** This is money banked, borrowed or lent.

**Rate(R):** This is the percentage used to calculate interest.

**Time (T):** This is the period principal is invested.

**Interest (I):** It is the additional amount offered or paid back on principal.

**Amount (A):** It is the sum of interest and principal.

### Examples

1. A trader borrowed sh.400000 from a bank at an interest rate of 5% per annum.

a) How much interest must he pay after 6 months?

**Simple Interest = Principal × Rate × Time**

$$I = \text{sh.}400000 \times \frac{5}{100} \times \frac{6}{12}$$

$$I = \text{sh.}2000 \times 5$$

$$\underline{\underline{SI = \text{sh.}10000}}$$

b) What amount will the trader pay altogether?

**Amount = principal + Simple interest**

$$= \text{sh.}400000 + \text{sh.}10000$$

$$\underline{\underline{= \text{sh.}410000}}$$

2. A woman deposited sh. 40,000 for 5 years at a simple interest rate of  $2\frac{1}{2}\%$  per year.

a) Calculate her simple interest..

$$SI = PRT$$

$$SI = \text{sh.}40,000 \times 5 \times 2\frac{1}{2}\%$$

$$SI = sh.40,000 \times 5 \times \frac{5}{200}$$

$$SI = sh.200 \times 25$$

SI = sh 5,000

b) What amount will he get after 5 years?

$$\begin{aligned} \text{Amount} &= \text{principal} + \text{Simple interest} \\ &= sh.(40,000 + 5000) \\ &= \underline{\underline{sh. 45,00}} \end{aligned}$$

*Ref: New MK pupils book 7  
pages 132-133*

### Activity

1. A man borrowed sh.50000 at a rate of 15% per year. How much interest did he pay after 2 years?
2. A school kept sh.800000 in a bank at a rate of 15% per annum. How much will the school have on an account after:
  - a) 6months?
  - b) 4years?
3. Opolot takes a loan of 150000 at a rate of 8% per year.
  - a) What interest will he pay after 8 months?
  - b) How much will he pay altogether?
4. Find the simple interest and amount on;
  - a) Sh.7000 for 6months at 12% interest rate per year.
  - b) Sh.84000 for 5years at sh. $2\frac{1}{2}\%$  at 10% interest rate per annum.
  - c) Sh.70000 for 9 months at 15% interest rate yearly.

## FINDING THE PERCENTAGE RATE

### Example:

1. Calculate the rate of interest if sh.30,000 can yield a simple interest of sh. 1,125 in 9 months.

$$\text{Rate} = \frac{\text{Interest} \times 100}{\text{principal} \times \text{time}} \%$$

$$\text{Rate} = (\text{sh.}1125 \times 100) \div (\text{sh.}30000 \times \frac{9}{12}) \%$$

$$\text{Rate} = (\text{sh.}112500 \div \text{sh.}22500) \%$$

$$\underline{\underline{\text{Rate} = 5\%}}$$

*Ref: New MK pupils book 7  
pages 138-139*

### Activity

1. Sarah deposited sh.50000 on her savings account. At the end of 3years the simple interest earned was sh.15000.Calculate the rate of interest.
2. Calculate the rate of interest if sh.12000 yields sh.28800 interest in 4 years.
3. A trader borrowed sh.180000 for 3 years. He paid back a total sum Including the interest of sh.216000.calculate the percentage rate.
4. What is the interest rate on sh.20000 borrowed for 3 years and yielded an interest of sh.3600.
5. Otim borrowed sh.500000 for 6 months. She paid back a total of amount of sh.515000.calculate his interest rate.
6. If the interest on a loan of sh.140000 for 6 months is sh.5600.Find the interest rate.

*Ref: New MK pupils book 7  
page 140*

### CALCULATING PRINCIPAL

Examples:

1. What principal will yield sh.6,000 at 5% per year for 3 years?

$$\text{Principal} = \text{SI} \div (\text{R} \times \text{T})$$

$$P = \text{sh.}6000 \div \left( \frac{5}{100} \times 3 \right)$$

$$P = \text{sh.}6000 \div \frac{15}{100}$$

$$P = \text{sh.}6000 \times \frac{100}{45}$$

$$\underline{P = \text{sh.}40000}$$

2. A farmer borrowed money at  $12\frac{1}{2}\%$  per year. After 2 years, a simple interest of shs 8,000 was paid. Find the amount borrowed.

$$\text{Principal} = \text{SI} \div (\text{R} \times \text{T})$$

$$P = \text{sh.}8000 \div \left( 12\frac{1}{2}\% \times 2 \right)$$

$$P = \text{sh.}8000 \div \left( \frac{25}{200} \times 2 \right)$$

$$\underline{100}$$

$$P = \text{sh.}8000 \div \frac{50}{100}$$

$$P = \text{sh.}8000 \times \frac{\frac{2}{100}}{1}$$

$$\underline{\underline{P = \text{sh.}32000}}$$

### Activity

1. What sum of money will yield an interest of sh.3000 at an interest rate of 4% for 3 years?
2. What principal will yield sh.1200 interest at 5% for 9 months?
3. A company paid sh.120000 as an interest for a 3 years loan at 8% per annum. How much did the company borrow?
4. What principal will yield sh.2400 interest at a rate of 2% per annum for 3 years?
5. What principal will yield sh.3500 in  $2\frac{1}{2}\%$  at a rate of 7 years per year?

*Ref: New MK pupils book 7  
page 140*

### CALCULATING TIME TAKE

Example:

1. In what time will sh.12,000 yield an interest of sh.1,800 at 5% per year.

$$\text{Time} = \text{Interest} \div (\text{Principal} \times \text{Rate})$$

$$T = \text{sh.}1800 \div (\text{sh.}12000 \times \frac{5}{100})$$

$$T = \text{sh.}1800 \div \text{sh.}120 \times 5$$

$$T = \text{sh.}1800 \div \text{sh.}600$$

$$\underline{\underline{T = 3 \text{ years}}}$$

2. How long will sh.48,000 take to yield sh.5400 at a rate of 5% per year?

$$\text{Time} = \text{Interest} \div (\text{Principal} \times \text{Rate}) \text{years}$$

$$T = \text{sh.}5400 \div (\text{sh.}48000 \times \frac{5}{100}) \text{yr}$$

$$T = \text{sh.}5400 \div \text{sh.}480 \times 5$$

$$T = \text{sh.}5400 \div \text{sh.}2400$$

$$T = \frac{54}{24} \text{ years}$$

$$T = 2\frac{1}{4} \text{ years}$$

### Activity

1. A girl borrowed sh.50000 at a rate of 3% and paid sh.15000 as interest. How long did he use the money?
2. After what time will sh.12000 yield an interest of sh.1800 at 5%?
3. What time will sh.40000 yield an interest of sh.8000 at 10%?
4. A man borrowed sh.120000 at a rate of 20% per annum. How long will he take to pay the interest of sh.90000 on the loan?
5. A lady borrowed sh.50000 at a rate of 3% and paid sh.15000 as interest. How long did she use the money?

*Ref: New MK pupils book 7  
page 142*