DIVINE EDUCATION CENTRE

MATHEMATICS
LESSON NOTES TERM 2 2025
0784540287/0751565742

PRIMARY FIVE

PATTERNS AND SEQUENCE (REVISION)

DIVISIBILITY TEST

(A) Divisibility test for 2.

Note: A number is divisible by two when

I. It is on even number.
II. Its last digit is even **i.e.,** ending with either 0, 2, 4, 6, 8.

Examples

Which of the following numbers is divisible by 2?

(i) 30 ⟶ even ends with 0.
(ii) 35 ⟶ Not even ends with 5.
(iii) 49 ⟶ Not divisible. (odd)

Activity

1. Without dividing, which of the following numbers is exactly divisible by 2?

(a) 10 15 22 27 30
(b) 235 78092 3476 2227 100
(c) 86420 24683 135794 97681 425368

(B) Divisibility test for three

A number is divisible by 3 if the sum of its digits is divisible by 3 or is a multiple of 3.

Examples

1. Without dividing, show that 144 is divisible by 3.

Sum of its digits

144 = 1 + 4 + 4

= 9

9 is a multiple of 3

144 is divisible by 3

2. Show that 1263 is divisible by 3.

Sum of its digits

1 2 6 3 = 1 + 2 + 6 + 3

= 12

12 is a multiple of 3

1 2 6 3 is divisible by 3.

Activity

Without dividing show that the following numbers are

(a) 27 (b) 309 (c) 435

DIVISIBILITY TEST FOR FIVE

A number is divisible by 5 if the last digit either 0 or 5.

Example

320 20 350 3545 are divisible by 5.

Activity

Which of the following numbers are divisible by five?

(a) 35 (b) 37 (c) 495 (d) 100,500 (e) 397657

FINDING LOWEST COMMON MULTIPLE NUMBERS (L.C.M) L.C.D

A multiple is a product of any two numbers.

A multiple is a number got after multiplying a given number by counting number.

Review finding multiples of numbers.

Example 1

Find the LCM of 12 and 18.

Soln

M_{12} = {12, 24, 36, 48, 60, …}

M_{18} = {18, 36, 54, 72, …}

LCM = 36

Example II

Find the LCM of 18 and 24.

Soln

2	18	24
2	9	12
2	9	6
3	9	3
3	3	1
	1	1

LCM = 2 x 2 x 2 x 3 x 3

= 72

Example III

What is the LCM of 20 and 18?

Soln

2	20	18
2	10	9
3	5	9
3	5	3
5	5	1
	1	1

LCM = 2 x 2 x 3 x 5

= 180

Example III

Find the LCM of 8 , 12 and 30.

2	8	12	30	
2	4	6	15	
2	2	3	15	
3	1	3	15	
5	1	1	5	
	1	1	1	

Factorise / divide the three number using their prime factors.

LCM = 2 x 2 x 2 x 3 x 5

= 120

Activity

Find the LCM of the following numbers

1. 8 and 16
2. 12 and 15
3. 9 and 12
4. 15 and 24
5. 30 and 24
6. 32 and 24
7. 60 and 45
8. 9, 12 and 24
9. 12,15 and 20
10. 24, 18 and 30.

GREATEST COMMON FACTORS

-A factor is a number that divides a given number exactly.

-GCF is the largest number that can divide the given number exactly.

FINDING GREATEST COMMON FACTORS (G.C.F / H.C.F / G.C.D)

Examples

Find the GCF of 12 and 18

Soln

F_{12} = {1 , 2, 3, 4 , 6, 12}

F_{18} = {1, 2, 3, 6 , 9 , 18}

GCF = 6

Example II

Find the GCF of 20 and 30.

2	20	30
5	10	15
	2	3

Factorise using the numbers that can divide the given two numbers exactly

GCF = 3 x 5

= 10

Example III

Work out the GCF 9 and 12.

Soln

3	9	12
	3	4

GCF = 3

Example IV

Find the the LCF of 12 and 8.

Soln

Note:

The lowest common factor of any given number is 1.

F_{12} = {1, 2, 3, 4, 6, 12}

F_8 = {1, 2, 4, 8}

LCF = 1

Activity

1. Find the GCF of each pair of numbers.

(a) 12 and 18 (b) 12 and 24 (c)24 and 36 (d) 9 and 21

(e) 34 and 12 (f) 40 and 30 (g) 72 and 96 (h) 33 and 44

(i) 49 and 63

2. Find the L.C.F of (i) 6 and 9

(ii) 12 and 15

(iii) 14 and 21

TYPES OF NUMBERS

WHOLE NUMBERS

(a) These are positive integers include zero (0).

(b) These are numbers that are not fractions. The first whole number is zero (0)

Examples

{0, 1, 2, 3, 4, 5, 6, 7, 8, ---}

COUNTING /NATURAL NUMBERS

These are numbers that show concrete quantity of things

Note:

The first counting number is 1

Examples {1, 2, 3, 4, 5, 6, 7 …)

Counting numbers have a pattern of +1 and -1 in ascending and descending orders respectively.

EVEN NUMBERS

These are numbers that can be exactly divisible by two. The first even number is zero (0). Example {0, 2, 4, 6, 8, ---}

Even numbers have a pattern of +2 and -2 in ascending and descending orders respectively.

ODD NUMBERS

These are numbers when divided by two, give a remainder 1.

The first odd number is one (1)

Example {1, 2, 3, 7, 9, …}

Odd numbers have a pattern of +2 and -2 in ascending and descending orders respectively.

PRIME NUMBERS

These are numbers with only two factors i.e., one and itself.

The first prime number is 2.

Note:

These number have no clear pattern.

Examples {2, 3, 5, 7, 11, 13, 17, …)

COMPOSITE NUMBERS

These are numbers with more than two factors.

The first composite number is 4

Examples {4, 6, 8, 9, 10, 12, 14, 15, …)

TRIANGULAR NUMBERS

These are numbers got by adding consecutive counting numbers.

The first triangle number is I

Example {1, 3, 6, 10, 15, 21, …}

FINDING TRIANGULAR NUMBERS

Example I

$n = \frac{n(n+1)}{2}$

Find the 3rd triangle number.

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

Soln

3rd No. = 1 + 2 + 3

= 6

6

Example II

What is the 5th triangular number?

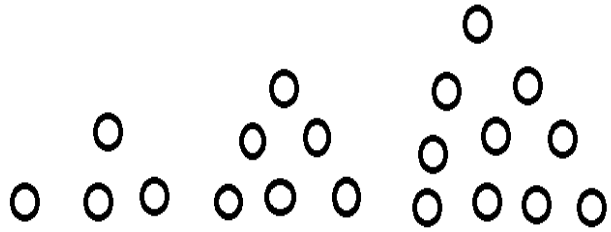
Soln

5th No. = 1 + 2 + 3 + 4 + 5

= 15

Example III

Complete the sequence



_____

Activity

1. Find the 4th triangular number.
2. What is the sum of the 2nd and 5th triangular number.
3. Find the sum of the next two numbers in the sequence.

   1, 3, 6, 10, 15, _____, _____
4. Find the product of the next two numbers in the sequence.

   55, 45, 36, 28, _____, _____

PRIME NUMBERS AND PRIME FACTORISATRION

PRIME FACTORISATION

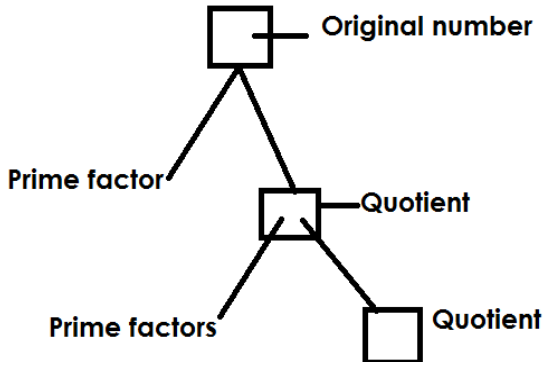
This is the writing of a number as a product of its prime factors.

Prime factors of a number are represented in two ways;

I. Multiplication form/ Power form
II. Subscript / Set notation form.

Prime factorising number.

a) Using a factor tree

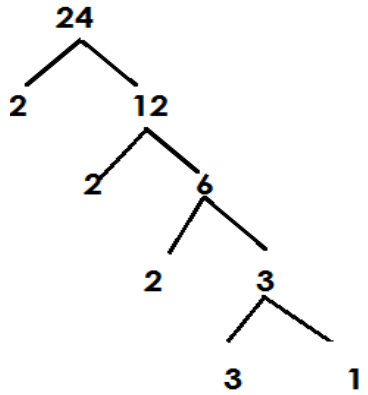


Example I

Prime factorise 24 and represent the prime factors in

I. Multiplication form
II. Set notation form

Soln



(i) Multiplication form

$F_{12} = 2 \times 2 \times 2 \times 3$

Power form / super script form

$F_{24} = (2 \times 2 \times 2) \times 3$

$= 2^3 \times 3^1$

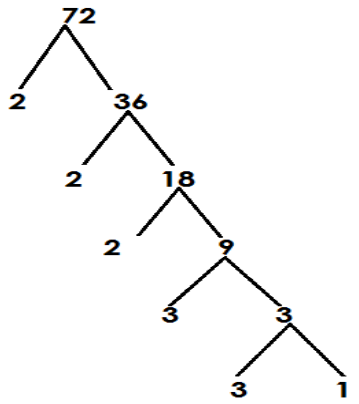
Set notation / subscript form

$F24 = \{2_1, 22, 2_3, 3_1\}$

Example II

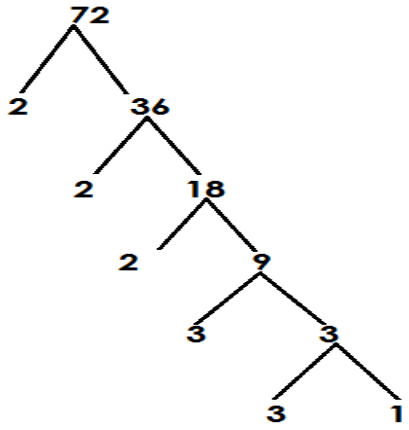
Prime factorise 72

(a) Giving your answer in multiplication form.



F72 = 2 x 2 x 2 x 3 x 3

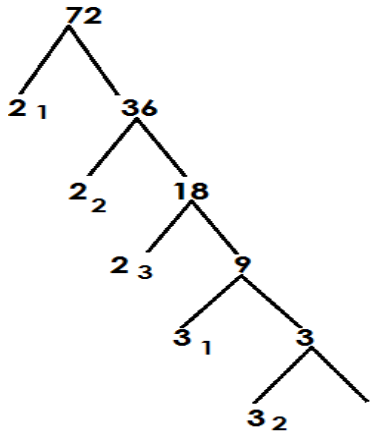
(b) Give your answer in set notation /sub script form.



F12 = (2 x 2 x 2) x (3 x 3)

$= 2^3 \times 3^2$

(c) Give your answer in subscript form.



F12 = $(2_1, 2_2, 2_3, 3_1, 3_2)$

b) Using ladder method

Examples

1. Prime factorise 36

2	36
2	18
3	9
3	3
	1

Multiplication form

= 2 x 2 x 3 x 3

Power form /superscript

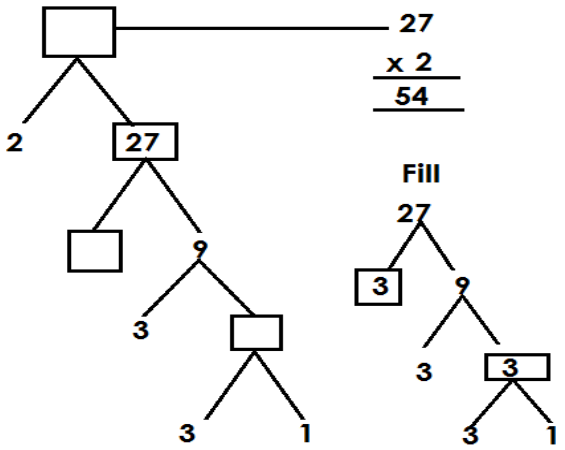
= 2 x 2 x 3 x 3

= 2^2 x 3^2

Subscript form / set notation

F_{36} = {2_1, 2_2, 3_1, 3_2}

2. Fill in the missing numbers



Activity

1. Prime factorise each of the following and show your answer in power form.

(a) 18 (b) 40 (c) 30 (d) 45

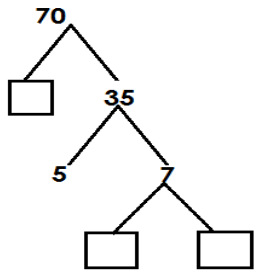
2. Prime factorise each of the following numbers using set notation/ subscripts.

(a) 10 (b) 20 (c) 60 (d) 49

3. Express the following numbers as a product of their prime factors.

(a) 15 (b) 90 (c) 120 (d) 100

4. Complete the factor tree below.



FINDING THE PRIME FACTORISED NUMBER

Examples

Find the number which is prime factor to give.

$= \{2_1, 2_2, 2_3, 3_1\}$

$= (2 \times 2) \times (2 \times 3)$

$= (4 \times 6)$

$= 24$

Find the number whose factorization is $2_2 \times 3_2 \times 5_1$

$= (2 \times 2) \times (3 \times 3) \times 5$

$= 4 \times 9 \times 5$

$= 36 \times 5$

$= 180$

Which number was prime factorised to give $2^2 \times 5^2$?

$= 2^2 \times 5^2$

$= 2 \times 2 \times 5 \times 5$

$= 100$

Activity

Find the number whose prime factorization are given below.

1. $\{2^1, 2^2, 2^3)$
2. $\{2^1, 2^2, 3^1, 3^2\}$

(c) $(2^2 \times 3^1)$

(d) $2^1 \times 3^2 \times 5^1$

(e) $7^2 \times 5^1$

(f) $2^4 \times 3^1$

REPRESENTING PRIME FACTOR ON A VENN DIAGRAM

Examples

Show prime factors of 12 and 15 on venn diagram

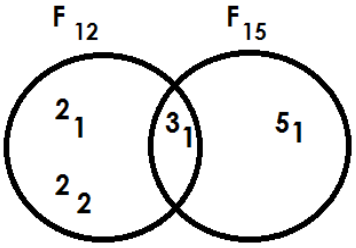
F_{12} =

2	12
2	6
3	3
1	1

F_{15} =

3	15
5	5
	1

F12 = $\{2_1, 2_2, 3_1\}$ F15 = $\{3_1, 5_1\}$



Prime factorise 30 and 36 and represent them on a venn diagram.

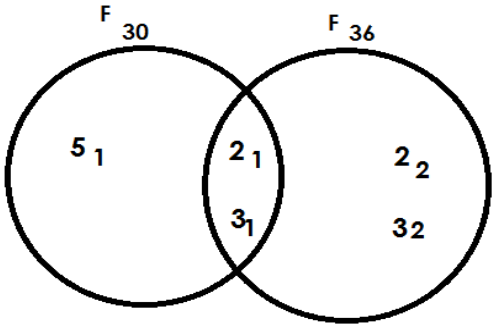
PF_{30} =

2_1	30
3_1	15
5_1	5
	1

PF_{36} =

2_1	36
2_2	18
3_1	9
3_2	3
	1

$PF_{30} = \{2_1, 3_1, 5_1,\}$

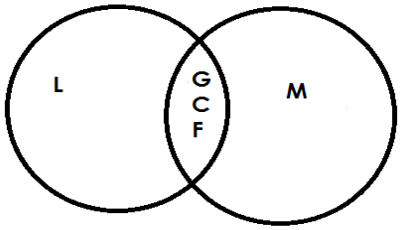


Activity

1. Draw venn diagram to represent the prime factors for the following pairs of numbers.

(a)24 and 30. (b)30 and 48 (c)18 and 20. (d) 15 and 20

Find LCM AND G.C.F from a Venn diagram.

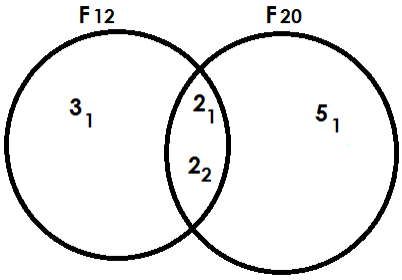


L.C.M = product of intersection

G.C.F = product of union

Example I

Use the venn diagram below to answer question that follow.



Find the G.C.F of F_{12} and F_{20}

G.C.F = Product of intersection

= $2_1 \times 2_2$

= 2 x 2

= 4

(ii) Find the L.C.M of F12 and F20

L.C.M = Product of union

= $3_1 \times 2_1 \times 2_2 \times 5_1$

= 3 x 2 x 3 x 5

= 6 x 10

= 60

(ii) Find the L.C.M of F12 and F20

L.C.M = Product of Union

= $3_1 \times 2_1 \times 2_2 \times 5$

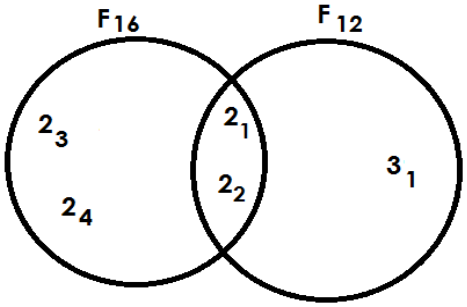
= 3 x 2 x 2 x 5

= 6 x 10

= 60

Activity

1. Study the venn diagram and answer the questions that follow.



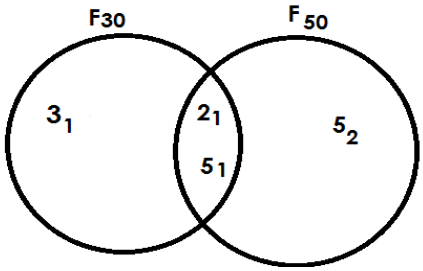
(i) Find (i) F_{16} n F_{12}

(ii) The G.C.F of 16 and 12

(iii) F_{16} u F_{12}

(iv) L.C.M of F_{16} and F_{12}

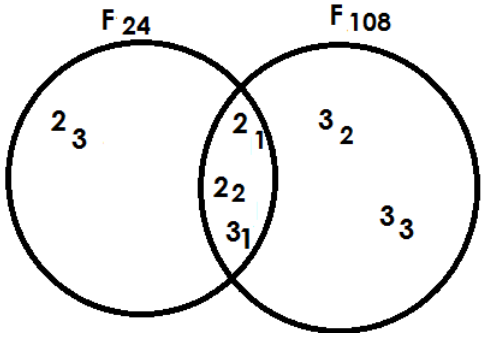
2. Study the venn diagram and answer the questions that follow.



(a) Find the G.C.F of 30 and 50.

(b) Find the L.C.M of F30 and 50.

3. Study the venn diagram and answer the questions that follow.



(i) Find F_{24}n F_{108}

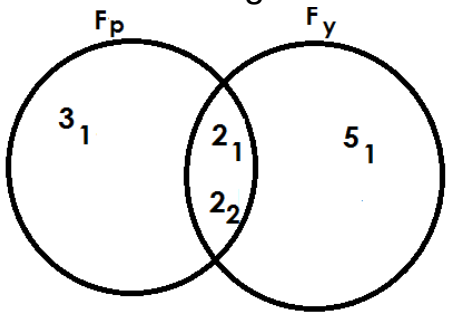
(ii) Find the G.C.F of 24 and 108

(iii) Find the L.C.M of 24 and 108

FINDING UNKNOWNS ON AVENN DIAGRAM

Example I

1. Use the venn diagram below to answer questions.



Find the value of

(ii) P

$P = 3_1 \times 2_1 \times 2_2$

$P = 3 \times 2 \times 2$

$= 12$

(ii) y

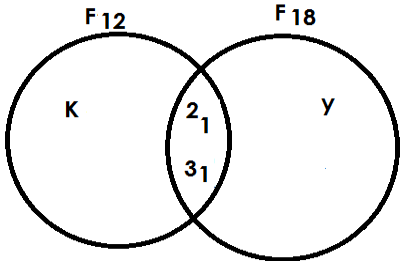
$Fy = 2_1 \times 2_2 \times 5_1$

$= 2 \times 2 \times 5$

$= 20$

Example II

2. The venn diagram below shows F12 and F18. Use it to answer question.



Find the value of K.

Soln

$K + 2_1 \times 3_1 = 12$

$K + 2_1 \times 3 = 12$

$\frac{6K}{6} = \frac{12}{6}$

$K = 2_2$

Find the value of y.

$y \times 2_1 \times 3_1 = 18$

$y \times 2_1 \times 3_1 = 18$

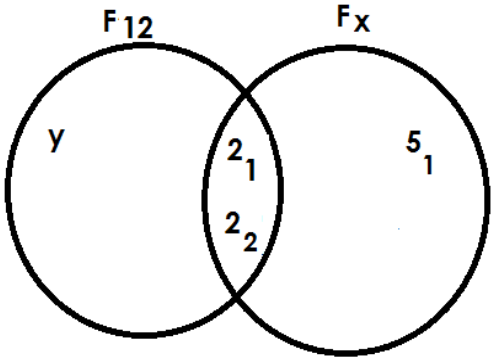
$6y = 18$

$\frac{6y}{6} = \frac{18}{6}$ 3

$y = 3_2$

Example III

3. Below is a venn diagram use I to answer questions.



Find the value of x

$x = 2_1 \times 2_2 \times 5^1$

$= 2 \times 2 \times 5$

$= 20$

Find the value of y

$y \times 2_1 \times 2_2 = 12$

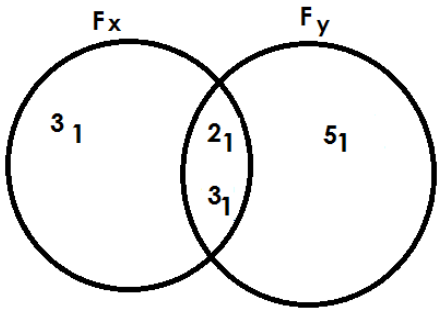
$y \times 2 \times 2 = 12$

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

$y = 3_1$

Activity

1. Study the venn diagrams below and answer the questions.



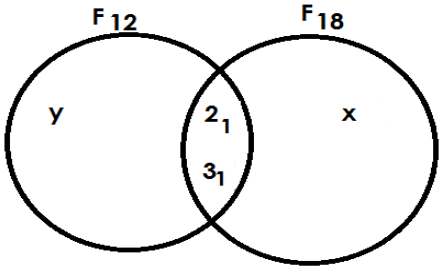
(a) Find the value of (i) X

(ii) y

(b) Find the G.C.F of x and y.

(c) Find the L.C.M of x and y.

2. Study the venn diagrams below and answer the questions.

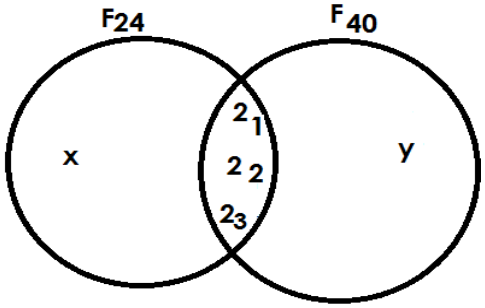


(a) Find the value of (i) X

(b) Find the G.C.F of 12 and 18.

(c) Find the L.C.M of 12 and 18.

3. Study the venn diagrams below and answer the questions.



(a) Find value of (i) m

(ii) n

(c) Find the G.C.F of F_m and 30

(d) Find the L.C.M of F_m and 30

SQUARE NUMBERS

Square number is a number got by multiplying a counting number itself twice.

e.g. 2 x 2 = 4

square

FINDING SQUARE NUMBERS

Find the square of 2

Soln

22 = 2 x 2

= 4

Example II

Find the square of 5

Soln

5^2 = 5 x 5

= 25

Example II

Find the square of n

n^2 = n x n

= n^2

Activity

Find the square of the following numbers.

(a) 6

(b) 7

(c) 8

(d) 10

(e) 12

(f) 13

FINDING SQUARE ROOTS

A square root is a number that was multiplied by itself to get a square.

e.g $4 \times 4 = 16 \longrightarrow$ square

$\longrightarrow$ square root

A square root symbol is $\sqrt{}$

Note:

In findind square root, the following is done;

- ✓ First introduce the square root symbol to the given number whose square root is needed.
- ✓ Prime factorise the given number.
- ✓ Pair the prime factors.
- ✓ Pick one factor from each pair.
- ✓ Multiply the picked prime factors if more than one. The product got will be the square root.

Example I

Find the square root 36.

2	36
2	18
3	9
3	3
	1

$\sqrt{36} = \sqrt{(2 \times 2) \times (3 \times 3)}$

$= 2 \times 3$

$= 6$

Example

Find the square root of 49

Soln

49 =

7	49
7	7
	1

$\sqrt{49} = \sqrt{(7 \times 7)}$

$\sqrt{49} = 7$

Example III

Find the square root 256

$\sqrt{256}$ =

2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2

$\sqrt{256} = \sqrt{(2 \times 2) \times (2 \times 2) \times (2 \times 2) \times (2 \times 2)}$

$= (2 \times 2) \times (2 \times 2)$

$= 4 \times 4$

$= 16$

Activity

1. Find the square root of the following.

(a) 4

(b) 16

(c) 25

(d) 64

(e) 81

(f) 100

(g) 144

Application of square root.

1. What number was multiplied by itself to get 16.

Let the number be m

$m \times m = 16$

$\sqrt{m^2} = 16$

$\sqrt{m \times m} =$

2	16
2	8
2	4
2	2
	1

$m = \sqrt{(2 \times 2) \times (2 \times 2)}$

$m = 2 \times 2$

$m = 4$

Example II

The area of square is 64cm2. Find length of each side.

Soln

Let each side be n

$n \times n = 64$

$n^2 = 64$

$n^2 = \sqrt{64}$

$(n \times n) =$

2	64
2	32
2	16
2	8
2	4
2	2
	1

$n = \sqrt{(2 \times 2) \times (2 \times 2) \times (2 \times 2)}$

$n = 2 \times 2 \times 2$

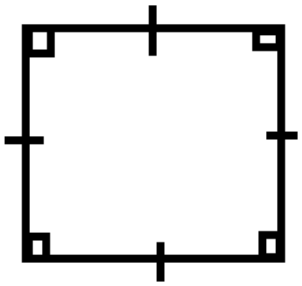
$= 8cm$

Activity

1. The area of a square is 36cm2. Find the length of side.

2. When a number is multiplied by itself the result is 144. Find the number.

3. Area of a square garden below is 400m2.



(a) Find the value of K.

(b) Find its perimeter.

4. Find the number that was multiplied by itself to give 81.

5. A square room has an area of $16m^2$. Find the distance around the room.

FRACTIONS

A fraction is part of a whole.

REVIEW

- ✓ Types of fractions
- ✓ Expressing improper fractions as mixed numbers.
- ✓ Expressing mixed numbers as improper fractions.
- ✓ Equivalent fractions.

REDUCING FRACTIONS

Fractions can be reduced using prime factors.

Example 1

Reduce $\frac{12}{24}$

F_{12} =

2	12
2	6
3	3
	1

F_{24} =

2	24
2	12
2	6
3	3
	1

$$\frac{12}{24} = \frac{2 \times 2 \times 3}{2 \times 2 \times 2 \times 3}$$

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

Example II

Reduce $\frac{75}{100}$ to its lowest terms.

F_{12} =

3	75
5	25
5	5
	1

F_{100} =

2	100
2	50
5	25
5	5
	1

$$\frac{75}{100} = \frac{3 \times 5 \times 5}{2 \times 2 \times 5 \times 5}$$

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

Example III

Reduce $\frac{18}{24}$ to its lowest terms.

Note:

Fractions can also be reduced by dividing both numerator and denominator by GCF.

$\frac{18}{24} = 18 \div 6$ $\quad F_{18} = \{1, 2, 3, 6, 18\}$

$24 = 24 \div 6$ $\quad F_{24} = \{1, 2, 3, 4, 6, 8, 12, 24\}$

$= \frac{3}{4}$

Activity

Reduce the following fractions to their lowest forms.

1) $\frac{2}{4}$ 2) $\frac{8}{12}$ 3) $\frac{6}{18}$ 4) $\frac{30}{90}$ 5) $\frac{32}{56}$

6) $\frac{24}{72}$ 7) $\frac{21}{42}$ 8) $\frac{18}{36}$

ORDERING FRACTIONS

Note:

- Ascending order means from smallest to biggest.
- Descending order means from biggest to smallest.
- Find the LCM of denominators and the multiply it by all fractions to get their value in whole form.

Example I

Arrange the following fractions in ascending order

$\frac{1}{3}, \frac{1}{2}, \frac{1}{4}$

Soln

LCM =

2	**3**	**2**	**4**
2	**3**	**1**	**2**
3	**3**	**1**	**1**
	1	**1**	**1**

$= 2 \times 2 \times 3$

$= 12$

$\frac{1}{3}$ 4 $\frac{1}{3} \times \frac{12}{4}$ 4	$\frac{1}{2}$ 5 $\frac{1}{2} \times \frac{10}{5}$ 5	$\frac{1}{4}$ 3 $\frac{1}{4} \times \frac{12}{3}$ 3

Ascending order = $\frac{1}{4}, \frac{1}{3}, \frac{1}{2}$

Example II

Arrange the following fraction in a descending order: $\frac{5}{8}, \frac{7}{12}, \frac{3}{8}$

LCM =

2	8	12	8
2	4	6	4
2	2	3	2
3	1	3	1
	1	1	1

LCM = 2 x 2 x 2 x 3
= 24

$\frac{5}{8}$ 3 $\frac{5}{8} \times \frac{24}{}$ 5 x 3 15	$\frac{7}{12}$ 2 $\frac{7}{12} \times \frac{24}{}$ 2 x 7 14	$\frac{3}{8}$ 3 $\frac{3}{8} \times \frac{24}{}$ 3 x 3 9

Descending order = $\frac{5}{8}, \frac{7}{12}, \frac{3}{8}$

Activity

1. Arrange the following fractions in ascending order.

(a) $\frac{3}{4}, \frac{2}{3}, \frac{1}{2}$

(b) $\frac{5}{6}, \frac{5}{8}, \frac{5}{12}$

(c) $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{6}$

(d) $\frac{1}{2}, \frac{1}{4}, \frac{1}{9}$

2) Arrange the following fractions in a desending order

(a) $\frac{2}{3}, \frac{1}{12}, \frac{5}{6}$

(b) $\frac{7}{10}, \frac{5}{6}, \frac{12}{18}$

(c) $\frac{2}{3}, \frac{5}{9}, \frac{3}{5}$

(d) $\frac{1}{4}, \frac{2}{5}, \frac{3}{8}$

ADDITION OF SIMPLE FRACTIONS

Note:

All answers must be in their simplest forms i.e., either a simplifies proper fraction or a mixed number.

Examples

Add: $\frac{1}{4} + \frac{1}{2}$

LCM of the denominators =

2	4	2
2	2	1
	1	1

2 x 2 = 4

$\frac{1}{4} + \frac{1}{2} \quad \frac{(\frac{1}{4} \times 12) + (\frac{1}{2} \times 4)}{12}$

$= \frac{(1 \times 3) + (1 \times 2)}{12}$

$= \frac{1 + 2}{4} = \frac{3}{4}$

Or

$= \left(\frac{1 \times 2}{4 \times 2}\right) + \left(\frac{1 \times 4}{2 \times 4}\right)$

$= \frac{2}{8} + \frac{4}{8}$

$= \frac{6}{8}\ \frac{3}{4}$

$= \frac{3}{4}$

Example II

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

LCM =

2	6	8	
2	3	4	
2	3	2	
3	3	1	
1	1	1	

$$\frac{5}{6} + \frac{3}{8} = \left(\frac{5}{6} \times \frac{4}{4}\right) + \left(\frac{3}{8} \times \frac{3}{3}\right)$$

$$= \frac{(5 \times 4) + (3 \times 3)}{24}$$

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

$$= \frac{29}{24} \text{ 1 rem 5}$$

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

2 x 2 x 2 x 3

= 24

Activity

Add the following fraction.

1. $\frac{1}{3} + \frac{1}{2}$
2. $\frac{2}{3} + \frac{1}{5}$
3. $\frac{1}{5} + \frac{1}{3}$
4. $\frac{2}{5} + \frac{1}{6}$
5. $\frac{2}{9} + \frac{1}{6}$
6. $\frac{7}{15} + \frac{1}{6}$
7. $\frac{7}{8} + \frac{2}{3}$
8. $\frac{3}{4} + \frac{1}{5}$

ADDITION OF FRACTIONS TO WHOLE NUMBERS

Examples

Workout

$4\frac{1}{6} + 10$

$4\frac{1}{6} + 10 = (4 + 10) + \frac{1}{16}$

$= 14 + \frac{1}{6}$

$= 14\frac{1}{6}$

Example III

Add $4\frac{3}{8} + \frac{1}{2}$

Soln

$4 + (\frac{3}{8} + \frac{1}{2})$

4

$4 + (\frac{3}{\cancel{8}_{1}} + \cancel{8}^{1}) + (\frac{1}{\cancel{2}} \times 8)$

$4 + (3 + 4)$

8

$4 + \frac{7}{8}$

$4\frac{7}{8}$

Activity

Workout the following fractions

1. $\frac{1}{2} + 8$
2. $4\frac{3}{8} + 9$
3. $5 + 4\frac{2}{3}$
4. $\frac{5}{7} + 9$
5. $10 + 2\frac{3}{4}$
6. $15 + 5\frac{3}{9}$
6. $15 + 5\frac{3}{7}$
7. $1\frac{1}{2} + \frac{1}{4}$
8. $6\frac{1}{7} + \frac{3}{7}$
9. $1\frac{7}{8} + \frac{1}{2}$

ADDITION OF MIXED NUMBERS

Note:

Change the mixed numbers to improper fraction.

Use the LCM approach to work out

Example I

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

Soln

$1\frac{1}{2} + 3\frac{1}{4} = \frac{3}{2} + \frac{13}{4}$

4

2

$= \frac{(\frac{3}{2} \times 4) + (\frac{13}{4} \times 4)}{4}$

$= \frac{(3 \times 2) + (13 \times 1)}{4}$

$= \frac{6 + 13}{4}$

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

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

LCM = 12

$1\frac{1}{2} + 1\frac{1}{4} + 1\frac{1}{3} = \frac{3}{5} + \frac{5}{4} + \frac{4}{3}$

6 3 4

$= \frac{(\frac{3}{2} \times 12) + (\frac{5}{4} \times 12) + (\frac{4}{5} \times 12)}{12}$

$= \frac{(3 \times 6) + (5 \times 3) + (4 \times 4)}{12}$

$= \frac{18 + 15 + 16}{12}$

$= 49$ 4 rem 1

$= 4\frac{1}{12}$

Work out : $\frac{1}{15} + 1\frac{1}{3} + \frac{3}{5}$

$= \frac{1}{15} + 1\frac{1}{3} + \frac{3}{5} = \frac{1}{15} + \frac{4}{3} + \frac{3}{5}$

5 3

$= \frac{(\frac{1}{15} \times 15) + (\frac{4}{3} \times 15) + (\frac{3}{5} \times 15)}{15}$

$= \frac{1 + 20 + 9}{15}$

$= \frac{30}{15}2$

$= 2$

Activity

Workout the following

1. $3\frac{1}{2} + 4\frac{1}{3}$
2. $4\frac{1}{5} + 2\frac{1}{2}$
3. $1\frac{1}{6} + \frac{7}{15} + 1\frac{1}{3}$
4. $1\frac{2}{5} + \frac{2}{10} + \frac{3}{5}$
5. $\frac{1}{3} + 5\frac{1}{4} + \frac{1}{6}$
6. $\frac{3}{4} + 4\frac{1}{8} + 2\frac{5}{8}$
7. $2\frac{4}{9} + 3\frac{2}{9} + 3\frac{1}{2}$
8. $2\frac{1}{15} + 1\frac{3}{5} + 1\frac{3}{5}$
9. $3\frac{1}{6} + 2\frac{1}{5} + \frac{1}{15}$
10. $\frac{3}{5} + 1\frac{3}{4} + 4\frac{1}{2}$

WORD PROBLEMS INVOLVING ADDITION OF FRACTIONS

Example I

Tom read $\frac{1}{2}$ of the book on Monday and $\frac{1}{5}$ on Tuesday. Find the fraction of the book he read altogether.

Soln

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

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

$$= \frac{5 + 2}{10}$$

$$= \frac{7}{10}$$

Example II

A teacher spent $\frac{1}{3}$ an hour giving examples, $1\frac{1}{2}$ for exercise and $1\frac{1}{4}$ for making. How long was the lesson?

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

4 6 3

$=(\frac{1}{3} \times 12) + (\frac{3}{2} \times 12) + (\frac{1}{4} \times 12)$

$=(1 \times 4) + (3 \times 16) + (1 \times 3)$

$= 4 + 18 + 3$

12

$= \frac{25}{12} 2$ rem 1

$= 2\frac{1}{12}$ hrs

Activity

1. Mark filled $\frac{1}{2}$ of a tank with water in the morning and $\frac{2}{5}$ in the afternoon. Find the fraction of the tank that he filled with water.
2. James covered $\frac{1}{6}$ of the journey by bus and $\frac{4}{9}$ by taxi. What fraction of the journey did he cover?
3. Oluku gave $3\frac{1}{9}$ cakes to the son and $\frac{4}{9}$ to the daughter. How many cakes did he give out?
4. Mary had $1\frac{1}{2}$ sweets, Jane had $2\frac{3}{4}$ sweets and Rose had $\frac{3}{4}$ of a sweet. How many sweets did they have altogether?
5. $\frac{5}{18}$ of the wire is painted red, $\frac{1}{18}$ white and $\frac{1}{9}$ blue. How long is the wire?
6. $\frac{2}{3}$ of the land is for grazing, $\frac{1}{12}$ for planting crops and $\frac{1}{8}$ for construction. Find the size of the whole land.

SUBTRACTION OF SIMPLE FRACTIONS

Examples

Simplify: $\frac{3}{8} - \frac{1}{8}$

Son

$$\frac{3}{8} - \frac{1}{8} = \frac{3 - 1}{8}$$

$$= \frac{2}{8} \; \frac{1}{4}$$

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

Workout: $\frac{1}{2} - \frac{1}{3}$ **LCM**= 6

$$\frac{1}{2} - \frac{1}{3} = \frac{(\frac{1}{12} \times 6) - (\frac{1}{3} \times 6)}{6}$$

$$= \frac{(1 \times 3) - (1 \times 2)}{6}$$

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

Simplify $2\frac{1}{5} - 1\frac{1}{2}$ LCM = 10

Soln

$$2\frac{1}{5} - 1\frac{1}{2} = \frac{11}{5} - \frac{3}{2}$$

$$= \frac{(\frac{11}{5} \times 10) - (\frac{3}{2} \times 10)}{10}$$

$$= (\frac{11}{5} \times 10) - (\frac{11}{2} \times 10)$$

$$= \frac{(11 \times 2) - (3 \times 5)}{10}$$

$$= \frac{22 - 15}{10}$$

$$= \frac{7}{10}$$

Example IV

Work out: $5 - 1\frac{1}{3}$

Soln LCM = 3

$5 - 1\frac{1}{3} = \frac{5}{1} - \frac{4}{3}$

$= \frac{(5 \times 3) - (4 \times 3)}{1 \qquad 3}$

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

$= \frac{15 - 4}{3}$

$= 11 \text{ } 3 \text{ rem } 2$

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

Activity

Work out the following

(1) $\frac{4}{9} - \frac{1}{9}$

(2) $\frac{5}{6} - \frac{1}{6}$

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

(4) $\frac{5}{7} - \frac{2}{3}$

(5) $\frac{2}{3} - \frac{1}{4}$

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

(7) $2\frac{1}{5} - \frac{1}{10}$

(8) $3\frac{3}{4} - 1\frac{1}{2}$

(9) $3\frac{3}{4} - 1\frac{1}{2}$

(10) $6 - 1\frac{1}{9}$

(11) $8 - 3\frac{1}{4}$

(12) $12 - 5\frac{1}{6}$

WORD PROBLEMS INVOLVING FRACTIONS

Examples

Matama had $\frac{1}{6}$, what fraction of the sugar cane remained?

Soln LCM

Remaining fraction = $\frac{4}{5} - \frac{1}{6}$

$= \frac{\left(\frac{4}{5} \times 30\right) - \left(\frac{1}{6} \times 30\right)}{30}$ $= \frac{19}{30}$

$= \frac{24 - 5}{30}$

Example II

James had $5\frac{1}{3}$ cakes, he gave out $2\frac{1}{2}$ to mark. How many cakes did he remain with?

Soln

Note:

- Change mixed to improper

Remaining cakes = $5\frac{1}{3} - 2\frac{1}{2}$

$= \frac{16}{3} - \frac{5}{2}$

$= \frac{\left(16 \times 6^{2}\right) - \left(5 \times 6^{3}\right)}{6}$

$= \frac{(16 \times 2) - (5 \times 3)}{6}$

$= \frac{32 - 15}{6}$

$= \frac{17}{6}$ 2 rem 5

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

Example III

My father had 6 plots of land. If he gave out $2\frac{1}{4}$ to the children, find the number of plots of land that he remained with.

Soln LCM 4

Remaining plots

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

$= \frac{6}{1} - \frac{9}{4}$

$= \frac{\left(\frac{6}{1} \times 4\right) - \left(\frac{9}{\cancel{4}} \times \cancel{4}\right)}{4}$

$= \frac{24 - 9}{4}$

$= \cancel{1}5$ 3 rem 2

$\cancel{4}$

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

Activity

1. A girl had a $\frac{1}{2}$ glass full of water and used $\frac{1}{3}$ to take medicine. What fraction of water remained in the glass?
2. Moses was given $\frac{3}{4}$ of a sugar cane and he also gave out $\frac{1}{6}$ to his friend. What fraction for the sugar cane did he remain wit?
3. Mukasa had $3\frac{1}{3}$ oranges. If he gave out $1\frac{3}{4}$ to Peter, find the fraction of the oranges that remained.
4. There were $16\frac{1}{3}$ boxes of books in the store, if $8\frac{1}{2}$ boxes were given to primary five East class, how many boxes remained in the store?
5. Okello bough 4kg of rice and $2\frac{1}{3}$ were used. How many kg of rice remained?
6. After covering $\frac{1}{9}$ of the journey by a taxi, Wandera walked the remaining distance. Find fraction of the remaining distance.
7. Out of the 8 bars of soap that were bought we have so far used $6\frac{1}{9}$. Find the remaining band of soap.

ADDITION AND SUBTRACTION OF FRACTIONS.

Note:

Re-arrange the given fraction starting with addition.

Example I

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

Soln LCM = 12

$$\frac{1}{4} - \frac{1}{2} + \frac{1}{3} = \frac{1}{4} + \frac{1}{3} - \frac{1}{2}$$

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

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

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

$$= \frac{7 - 6}{12} \quad \Big| \quad = \frac{1}{12}$$

Example II

Simplify: $\frac{1}{4} - 2\frac{1}{2} + 4\frac{1}{3}$

Soln LCM = 12

$$\frac{1}{4} - 2\frac{1}{2} + 4\frac{1}{3} = \frac{1}{3} - \frac{5}{2} + \frac{13}{3}$$

$$= \frac{1}{4} + \frac{13}{3} - \frac{5}{2}$$

$$= \left(\frac{1}{\cancel{4}_{1}} \times \cancel{12}^{3}\right) + \left(\frac{13}{\cancel{3}_{1}} \times 12^{4}\right) - \left(\frac{5}{\cancel{2}_{1}} \times \cancel{12}^{6}\right)$$

$$= \frac{(3 + 52) - 30}{12}$$

$$= \frac{55 - 30}{12}$$

$$= \frac{22}{12} \text{ 1 rem 10}$$

$$= 1\frac{10}{12}$$

$$= \mathbf{1\frac{5}{6}}$$

ACTIVITY

Workout the following

1. $\frac{2}{3} - \frac{5}{6} + \frac{3}{4}$

2. $\frac{90}{20} - \frac{4}{3} + \frac{7}{10}$

3. $\frac{1}{2} + \frac{4}{5} - \frac{7}{10}$

4. $\frac{2}{3} + \frac{3}{5} - \frac{7}{15}$

5. $\frac{5}{12} + \frac{7}{12} - \frac{11}{12}$

6. $\frac{5}{12} - 1\frac{1}{2} + 7\frac{1}{4}$

7. $2\frac{1}{6} + 3\frac{1}{2} + 2\frac{1}{3}$

8. $\frac{1}{4} - 4\frac{1}{3} + 6\frac{1}{2}$

MULTIPLICATION OF WHOLES AND FRACTIONS

Examples

Simplify: $\frac{1}{2} \times 12$

Soln

$\frac{1}{2} \times 12 = \frac{1 \times 12^{6}}{2_{1}}$

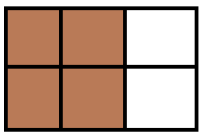
$= 1 \times 6$

$= 6$

Examples

2. Shade $\frac{2}{3}$ of the figure below

Soln



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

$= 4$ parts

Example II

Simplify: $\frac{1}{3} \times 10$

Soln

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

$= \frac{10}{3}$ 3 rem 1

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

Examples III

Work out: $\frac{2}{3} \times 24$

Soln

$\frac{2}{3} \times 24 = \frac{2}{\cancel{3}} \times \cancel{24}\ 8$

$= 2 \times 8$

$= 16$

Example IV

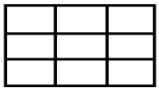
Simplify: $\frac{2}{7} \times 6$

$\frac{2}{7} \times 6 = \frac{2 \times 6}{7}$

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

Activity

Simplify the following

1. $\frac{1}{3} \times 3$
2. $\frac{2}{3} \times 15$
3. $6 \times \frac{2}{3}$
4. $\frac{1}{4} \times 12$
5. $\frac{5}{6} \times 36$
6. $\frac{4}{9} \times 18$
7. $\frac{1}{3} \times 8$
8. $\frac{3}{4} \times 9$
9. $\frac{2}{5} \times 9$
10. Shade $\frac{2}{9}$ of 
11. Shade $\frac{3}{4}$ 

MULTIPLICATION OF FRACTIONS BY FRACTIONS

Note:

Multiply numerator by numerator and denominator by denominator.

Examples.

Simplify: $\frac{1}{3} \times \frac{1}{4}$

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

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

$\frac{1}{12}$

Example II

Simplify: $\frac{2}{3} \times \frac{5}{6}$

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

$= \frac{5}{9}$

Activity

Simplify the following

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

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

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

6. $\frac{3}{4} \times \frac{1}{3}$

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

7. $\frac{3}{8} \times \frac{4}{5}$

4. $\frac{1}{10} \times \frac{1}{9}$

8. $\frac{2}{9} \times \frac{3}{10}$

MULITIPLICATION OF MIXED NUMBERS

Note:

-Change mixed number to improve fractions then multiple numerator by numerator and denominator by denominator.

Example 1

Simplify: $1\frac{1}{2}$ x $\frac{1}{3}$

Soln

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

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

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

Example II

Simplify $5\frac{1}{5}$ x $3\frac{1}{3}$

Soln

$$5\frac{1}{5} \times 3\frac{1}{3} = \frac{26}{5} \times \frac{10}{3}$$

$$= \frac{26}{\cancel{5}} \times \frac{\cancel{10}}{3}$$

$$= \begin{array}{r} 11 \text{ rem } 1 \\ \cancel{52} \\ 3 \end{array}$$

$$= 17\frac{1}{3}$$

Activity

Simplify the following

1. $1\frac{1}{2}$ x $1\frac{1}{2}$ 2. $1\frac{1}{4}$ x $\frac{1}{5}$ 3. $1\frac{1}{4}$ x $\frac{1}{5}$ 4. $1\frac{1}{4}$ x $1\frac{1}{5}$
5. $1\frac{1}{3}$ x $2\frac{1}{5}$ 6. $2\frac{1}{4}$ x $1\frac{1}{3}$

MULTIPLICATION OF FRACTIONS USING "OF"

NOTE:

The word of can be replaced by X a multiplication symbol (X)

Example I

Simplify: $\frac{1}{2}$ of 16

$\frac{1}{2}$ of 16 $= \frac{1}{2} \times 16^{8}$

$= 1 \times 8$

$= 8$

Example II

Simplify: $\frac{2}{3}$ of 10

Soln

$\frac{2}{3}$ of 10 $= \frac{2}{3} \times 10$

$= \frac{2 \times 10}{3}$

$= \frac{20}{3}$ 6rem 2

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

Example III

What is $\frac{2}{3}$ of $\frac{5}{6}$

Soln

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

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

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

$= \frac{5}{9}$

Example IV

Simplify: $4\frac{5}{6}$ of 30

Soln

$4\frac{5}{6}$ of 30 = $\frac{29}{6}$ x 30

$= \frac{29}{\cancel{6}_{1}} \times \frac{\cancel{30}^{5}}{}$

= 145

Activity

Simplify the following

(1) $\frac{1}{2}$ of 30 (2) $\frac{2}{3}$ of 12 (3) $2\frac{1}{4}$ of 24

(4) $\frac{2}{3}$ of $\frac{3}{8}$ (5) $\frac{1}{4}$ of $\frac{1}{3}$ (6) $\frac{2}{3}$ of $\frac{3}{10}$

(7) $1\frac{5}{7}$ of $3\frac{1}{2}$ (8) $2\frac{2}{5}$ of $3\frac{3}{4}$ (9) $1\frac{5}{7}$ of $3\frac{1}{2}$

APPLICATION OF MULTIPLICATION OF FRACTIONS

Example 1

What is $\frac{1}{4}$ of an hour

Soln

NB: Change 1 hr to minutes

1 hour = 60min

= $\frac{\mathbf{1}}{\mathbf{4}}$ of 60 minutes

$\frac{\mathbf{1}}{\mathbf{4}}$ of 1 hour = $\frac{1}{4}$ x 60 minutes

$= \frac{1}{\cancel{4}_{1}} \times \frac{\cancel{60}^{15}}{}$

= 15 minutes

Example II

What is $\frac{2}{3}$ of 18

Soln

$\frac{2}{3}$ of 18 $= \frac{2}{3} \times \frac{18^{6}}{3_{1}} = 2 \times 6 = 12$

Example III

A man spent $\frac{3}{4}$ of his salary on food, if his salary was sh.120,000. How much did he spend on food?

Food $= \frac{3}{4} \times$ sh 120,000

$= \frac{3}{4} \times$ sh120,000

$=$ sh 3×30000

$=$ sh 90,000

Activity

1. What is $\frac{1}{6}$ of 24 kg?
2. What is $\frac{3}{4}$ of sh 400?
3. Find $\frac{1}{4}$ of 1 kg.
4. Tom read $\frac{3}{5}$ of his book that contains 500 pages, how many pages did he read?
5. Mandela covered $\frac{3}{7}$ of 280km by a taxi, how many km did he cover by a taxi?
6. In a village of 1800 people $\frac{1}{9}$ of them are children, how many children are on the village?
7. $\frac{2}{5}$ of my salary is spent on rent. If my salary is sh200,000, how much do I spend on rent

FINDING RECIPROCALS / MULTIPLICATIVE INVERSE

A reciprocal is fraction that when multiplied by a given number the result in one (1)

Example 1

Find the reciprocal of $\frac{2}{3}$

Soln

Let the reciprocal be K

$2 \times K = 1$

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

$2K \times 3 = 1 \times 3$

3

$2K = 3$

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

$2 \quad 2$

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

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

OR

$\text{Reciprocal} = 1 \div \frac{2}{3}$

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

$= \frac{3}{2}$

Example II

Find the reciprocal of $2\frac{1}{3}$

Soln

Let the reciprocal be K

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

$\frac{7}{3} K = 1$

$\frac{7}{3} K = 1 \times 3$

$7K = 3$

$\frac{7K}{7} = \frac{3}{7}$

$K = \frac{3}{7}$

Example III

What is the reciprocal of 5?

Let the reciprocal be P

$5 \times P = 1$

$5P = 1$

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

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

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

Example IV

Find the reciprocal of 0.6

Let the reciprocal be y

$0.6 \times y = 1$

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

$\frac{6y}{10} = 1$

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

$6y = 10$

$\frac{6y}{6} = \frac{10}{6}$

$Y = \frac{10}{6}$

Activity

Find the reciprocal of the following.

(1) $\frac{3}{4}$ (4) $2\frac{1}{2}$ (7) 4 (10) 0.3

(2) $\frac{4}{7}$ (5) $3\frac{1}{4}$ (8) 12 (11) 1.4

(3) $\frac{4}{9}$ (6) $4\frac{1}{5}$ (9) 7 (12) 0.9

DIVISION OF FRACTIONS BY WHOLES AND WHOLES BY FRACTIONS.

Steps to take:

Maintain the first fraction, change the division sign to multiplication sign then reciprocate the second fraction.

Example I

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

Soln

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

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

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

$= \frac{1}{3}$

Example II

Simplify: $3\frac{1}{2} \div 35$

$3\frac{1}{2} \div 35 = \frac{7}{2} \div \frac{35}{1}$

$= \frac{7}{2} \times \frac{1}{35}$

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

$= \frac{1}{10}$

Example III

Simplify: $6 \div \frac{1}{4}$

Soln

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

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

$= 24$

Example IV

Divide: $8 \div 2\frac{1}{2}$

Soln

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

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

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

$= \frac{16}{5}$ 3 rem 1

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

Activity

Work out the following

a) $\frac{2}{5} \div 2$

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

c) $\frac{1}{3} \div 3$

d) $16 \div \frac{4}{3}$

e) $\frac{4}{5} \div 3$

f) $9 \div \frac{4}{5}$

DIVISION OF WHOLES AND BY FRACTIONS USING REPEATED ADDITION.

Example

Divide $2 \div \frac{1}{4}$ using repeated addition.

Step1

Find the equivalent fraction of 2 whose denominator is 4.

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

Step2

Divide $\frac{8}{4}$ using repeated subtraction

$$2 \div \frac{1}{4} \longrightarrow \frac{8}{4} \div \frac{1}{4}$$

$\frac{8}{4} - \frac{1}{4} = \frac{7}{4}$ 1st

$\frac{7}{4} - \frac{1}{4} = \frac{6}{4}$ 2nd

$\frac{6}{4} - \frac{1}{4} = \frac{5}{4}$ 3rd

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

$\frac{4}{4} - \frac{1}{4} = \frac{3}{4}$ 5th

$\frac{3}{4} - \frac{1}{4} = \frac{2}{4}$ 6th

$\frac{2}{4} - \frac{1}{4} = \frac{1}{4}$ 7th

$\frac{1}{4} - \frac{1}{4} = 0$ 8th

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

Activity.

Work out the following using repeated subtraction

(i) $1 \div \frac{1}{4}$

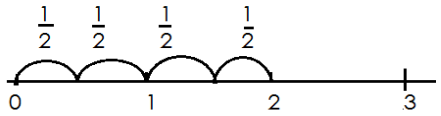
(ii) $5 \div \frac{1}{2}$

(iii) $2 \div \frac{2}{3}$

DIVISION OF WHOLES AND BY FRACTIONS USING A NUMBERLINE.

Example.

Divide $2 \div \frac{1}{2}$ using a numberline.



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

Activity.

(c) Work out the following using a number line

(a) $2 \div \frac{1}{3}$ (b) $8 \div \frac{3}{4}$ (c) $2 \div \frac{1}{4}$

Division of fraction by fractions

Example

Divide: $\frac{1}{3} \div \frac{1}{4}$

Soln

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

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

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

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

Example II

Simplify: $\frac{4}{5} \div \frac{2}{15}$

$= \frac{4}{5} \div \frac{2}{15}$

$= \frac{4}{5} \times \frac{15}{2}$

$= 6$

Example II

Simplify: $\frac{1}{2} \div 2\frac{1}{2}$

Soln.

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

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

$= \frac{1}{5}$

Example IV

Simplify: $2\frac{1}{3} \div 3\frac{1}{2}$

Soln

$= \frac{7}{3} + \frac{7}{2}$

$= \frac{7}{3} + \frac{2}{7}$

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

$= \frac{2}{3}$

Activity.

Work out the following

(1) $\frac{1}{2} \div \frac{1}{8}$ **(4)** $\frac{1}{5} \div \frac{1}{4}$ **(7)** $\frac{1}{4} \div 4\frac{1}{4}$

(2) $\frac{3}{4} \div \frac{1}{2}$ **(5)** $\frac{1}{2} \div 2\frac{1}{3}$ **(8)** $2\frac{1}{4} \div 1\frac{1}{4}$

(3) $\frac{1}{3} \div \frac{1}{6}$ **(6)** $\frac{1}{3} \div 2\frac{1}{3}$ **(9)** $2\frac{1}{4} \div 1\frac{1}{4}$

(10) $2\frac{1}{2} \div \frac{1}{2}$

APPLICATION OF FRACTIONS INVOLVING DIVISION

Example I

How many $\frac{1}{3}$ Chapatis can be got from 2 Chapati?

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

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

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

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

$= 6$

Example II

How many $\frac{1}{4}$ litre bottles of milk can be get from 1 $\frac{1}{2}$ litres

No. of bottle $= 4\frac{1}{2} \div \frac{1}{4}$

$= \frac{9}{2} \div \frac{1}{4}$

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

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

$= 18$ bottles

Example III

How many small packets of $1\frac{1}{2}$ kg can be got from a sack of $9\frac{2}{3}$ kg?

No. of packets $= 9\frac{2}{3} \div 1\frac{1}{3}$

$= \frac{29}{3} \div \frac{4}{3}$

$= \frac{29}{3} \times \frac{3}{4}$ (1)

$= \frac{29}{4}$ 7rem 1

$= 7\frac{1}{4}$ packets

Activity

1) How many $\frac{1}{4}$ cakes be got from 3 cakes?

2) If we use $\frac{1}{5}$ kg of sugar per day, how many days shall we use $12\frac{3}{5}$ kg.

3) How many $\frac{1}{2}$ litre bottle can get got forty litre jerry can?

4) A farmer has $7\frac{1}{2}$ hectares of land, to be divided into plots of $1\frac{1}{4}$ hectares, how many plots will he get?

5) A bag contains $5\frac{1}{2}$kg of maize. Find to be number of $\frac{1}{2}$kg packets that will be obtained.

6) A woman has $13\frac{1}{3}$kg of sugar. How many packets each $\frac{2}{3}$ kg does she have?

7) 12 litres of milk were given to child if each get $\frac{1}{4}$ litre of milk, how many children were server altogether?

DECIMAL FRACTIONS

- Decimals are fraction whose denomitors are multiples of ten.
- A decimal number is a number with a decimal point separating whole numbers and fractions.
- To the left of a decimal point, there are whole numbers and to the right, there are decimal number. (fractions)
- Decimal places are the number of digits after a decimal point.

CHANGING COMMON FRACTIONS TO DECIMAL FRACTIONS

(A) Without multiples of ten as denominators.

Examples

Change to a decimal fraction

Soln

$\frac{1}{2}$ =

$$
\begin{array}{r}
0.5 \\
2\overline{)\,10} \\
-\,10 \\
\hline
0\ \ 0
\end{array}
$$

$\frac{1}{2}$ = 0.5

Change $\frac{2}{5}$ to decimal fraction

$\frac{2}{5}$ = 2 ÷ 5

$$\begin{array}{r} 0.4 \\ 5\overline{)\,20} \\ 4 \times 5 = \underline{\;20} \end{array}$$

$\frac{2}{5}$ = 0.4

Change $\frac{3}{4}$ to a decimal.

$$\begin{array}{rl} & 0.75 \\ \frac{3}{4} = & 4\overline{)\,30} \\ & -\;\underline{28} \\ & -\;\;20 \\ 5 \times 4 & \;\;\underline{20} \end{array}$$

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

Activity

Express the following fractions as decimals

(a) $\frac{1}{5}$ (b) $\frac{3}{5}$ (c) $\frac{1}{4}$ (d) $\frac{2}{10}$ (e) $\frac{4}{24}$ (f) $\frac{3}{20}$ (g) $\frac{7}{50}$

(B) Given multiples of 10 as denominator

The number of zeros “0” of the denominator in a common fraction is equal to the number of decimal places.

Examples

Express the following as decimals

(a) $\frac{1}{10}$ = 0.1 (one zero, one decimal place)

(b) $\frac{25}{10}$ = 2.5 (one zero, one decimal place)

(c) $\frac{25}{100}$= 0.25 (two zeros, 2 decimal places)

(d) $\frac{625}{100}$ = 0.625 (3 zeros, 3 decimal places)

(e) $\frac{3}{1000}$ = 0.003 (3 zeros, 3 decimal places)

Activity

Express these as decimal fractions

(a) $\frac{3}{10}$ (b) $\frac{5}{100}$ (c) $\frac{15}{10}$ (d) $\frac{16}{100}$

(e) $\frac{375}{100}$ (f) $\frac{456}{100}$ (g) $\frac{100}{1000}$

CHANGING DECIMALS TO COMMON FRACTION

Example I

(a) 0.5 = $\frac{\mathbf{5}}{\mathbf{100}}$ (1 decimal 1 zero)

(b) 0.0.5 = $\frac{\mathbf{5}}{\mathbf{100}}$ (2 decimal 2 zero)

(c) 0.003 = $\frac{\mathbf{3}}{\mathbf{100}}$ (3 decimal 3 zeros)

Example II

(a) 6.9 = $\frac{\mathbf{69}}{\mathbf{10}}$

= $6\frac{9}{10}$

(b) 6.09

= $\frac{609}{100}$

= $\frac{609}{100}$

(c) 8.625 = $\frac{8625}{1000}$

= $8\frac{625}{100}$

Activity

Express the following decimals as fractions.

(a) 0.1
(b) 0.001
(c) 0.25
(d) 9.08
(e) 14.9
(f) 49.8
(g) 3.78
(h) 9.008
(i) 9.09

CHANGING MIXED FRACTIONS TO DECIMALS

Examples

(a) $3\frac{1}{10}$ $= \frac{(10 \times 3) + 1}{10}$

$= \frac{30 + 1}{10}$

$= \frac{31}{10}$

$= 3.1$

(b) $7\frac{5}{100} = \frac{(100 \times 7) + 5}{100}$

$= \frac{700 + 5}{100}$

$= \frac{705}{100}$

$= 7.05$

(c) $9\frac{75}{100} = \frac{(1000 \times 9) + 75}{100}$

$= \frac{9000 + 75}{100}$

$= \frac{9075}{100}$

$= 90.75$

(d) $7\frac{5}{1000} = \frac{(1000 \times 7) + 5}{1000}$

$= \frac{7005}{1000}$

$= 7.005$

Activity

Express these mixed fractions as decimals fractions.

(a) $9\frac{5}{10}$

(b) $7\frac{5}{10}$

(c) $3\frac{4}{1000}$

(d) $3\frac{4}{100}$

(e) $7\frac{5}{100}$

(f) $4\frac{4}{100}$

Comparing decimals using symbols

Use >, < or = to complete the following statements.

(a) 0.2 0.5

Soln

0.2 _____ 0.5

$\frac{2}{10} < \frac{5}{10}$

$\frac{2}{10} \times 10 \quad \frac{5}{10} \times 10$

(b) 0.4 _____ 0.25

Soln

$\frac{4}{10} > \frac{25}{100}$

$\frac{4}{10} \times 100 \quad \frac{25}{100} \times 100$

$10 \quad 100$

$40 \quad 25$

(c) 0.5 0.15

Soln

$\frac{0.5}{10} > \frac{0.15}{100}$

$\frac{5 \times 100}{10} \quad \frac{15}{100}$

$50 \quad 15$

Activity

Use >< or = complete

(a) 0.2_____ 0.9

(b) 3.2 _____ 2.5

(c) 0.5 _____ 0.05

(d) 4.5 _____ 4.05

(e) 20.5_____ 2.05

(f) 40.3 _____ 44.3

ORDERING DECIMALS IN ASENDING AND DESCENDING

Note:

- Change decimals to common fractions.
- Find the LCM of all denominators.
- Multiply each fraction by LCM
- Take the biggest denominator to the LCM

Examples

1. Arrange the following fraction in ascending order 0.22, 0.2, 1.2

   Change to simple fraction = $\frac{22}{100}, \frac{2}{10}, \frac{12}{10}$

   LCM = 100

0.22	0.2	1.2
$= \frac{22}{100}$ x 100 = 22 (2^{nd})	$= \frac{2}{10}$ x 100 = 20 (3^{rd})	$= \frac{12}{10}$ x 100 = 120 (1^{st})

   Required order = 0.2, 0.22, 1.2

2. Arrange the following fraction in descending order.0.1, 1.1, 0.11

   LCM = 100

0.1 $\frac{1}{100}$ x 100 10	1.1 $\frac{11}{10}$ x 100 110	0.11 $\frac{11}{100}$ x 100 11
3^{rd}	1^{st}	2^{nd}

   The order = 1.1, 0.11, 0.1

3. Arrange from the biggest 0.22, 0.2, 0.202

   LCM = 1000

0.22 $\frac{22}{100}$ $\frac{22}{100}$ x 1000 = 220	0.2 $\frac{2}{10}$ $\frac{2}{10}$ x 1000 = 200	0.202 $\frac{202}{1000}$ $\frac{202}{1000}$ x 1000 = 202
1^{st}	3^{rd}	2^{nd}

   Required order = 220, 202, 200

Activity

1. **Arrange the following fractions in ascending order**

(a) 0.1, 03, 0.33
(b) 0.8, 8.08, 0.88
(c) 3.4, 0.34, 3.04
(d) 0.9, 0.09, 9,9

2. **Arrange the following fraction in descending order**

(a) 0.3, 0.07, 0.15
(b) 7.7, 0.77, 0.11
(c) 0.404, 0.044, 0.11
(d) 0.1, 303, 0.33

ADDITION OF DECIMAL FRACTIONS.

Note

-Arrange vertically according to place values.
-Place the decimal points in line

Examples

1. Add: 0. 4 5 + 1 3. 2 + 5 2. 0 0

	T	O	.	Tth	Hth
		0	.	4	5
	1	3	.	2	0
+	5	2	.	0	0
	6	5	.	6	5

2. Add: 1 4. 9 + 8. 0 2 + 3 6. 4 8

	T	O	.	Tth	Hth
	1	4	.	9	0
+	0	8	.	0	2
	3	6	.	4	8
	5	9	.	4	0

ACTIVITY

Add the following

1. 4.96 + 1.7 + 0.36
2. 0.58 + 5.8 + 58.00
3. 0.22 + 2.22 + 22.22
4. 2.76 + 3.85 + 1.09
5. 65.6 + 4.5 + 20.8
6. 0.35 + 12.2 + 51.0
7. 2.7 + 8.92 + 0.37
8. 0.45 + 1.32 + 52.00

SUBTRACTION OF DECIMALS

Examples

1. Subtract: 97.4 - 13.69

T	O	.	Tth	Hth	
9	~~6~~7	.	~~13~~4	0	10 - 9 = 1
-1	3	.	6	9	13 - 6 = 7
8	3	.	7	1	9 - 1 = 8

2. Subtract: 97. 4 - 13.69

T	O	.	Tth	Hth	
5	~~6~~ 12 ~~3~~	.	~~4~~ 9 ~~0~~	10	10 - 8 = 2
-1	9	.	7	8	9 - 7 = 2
4	3	.	2	2	12 - 9 = 3

3. Subtract: 97.4 – 13.69

T	O	.	Tth	Hth	
9	~~6~~7	.	~~13~~4	10	10 - 9 = 1
-1	3	.	6	9	13 - 9 = 7
8	3	.	7	1	

Activity

(a) 73 - 19.5

(b) 12 – 9.5

(c) 57.9 – 3.51

(d) 7.2 - 5.36

(e) 50. 12 – 17.48

(f) 8.54 – 2.34

(g) 14.9 – 3.51

(h) 166 – 66.9

ADDITION AND SUBSTRACTION OF DECIMAL FRACTIONS

Note:

- First re-arrange by adding first then subtract.
- A number takes a sign before it.

Example

1. Work out 13.75 – 27 + 91.25

   13.75 – 27 + 91.25

   T O th Hth T O Tth Hth T O

   (1 3. 7 5 + 9 1. 2 5) – 2 7

   ```
    0  9
   ~~1~~~~0~~ 5 . 0 0
   - 2  7 . 0 0
   ------------------
     7  8 . 0 0
   ------------------
   ```

2. Work out 4.000 - 2.625 + 33.000

   (4.000 + 33.000) – 2.625

   O Tth Hth Thth T O Th HthThth O Tth Hth Thth

   4. 0 0 0 + 3 3. 0 0 0 - 2 . 6 2 5

   ```
          T  O  .  Tth  Hth  Thth
             4  .  0    0    0
   +      3  3  .  0    0    0
   ------------------------------
          3  7  .  0    0    0
   ------------------------------
   ```

<u>Activity</u>

Work out the following

1. 35.1 - 44. 3 + 17.6
2. 8.24 + 22.9 – 78
3. 2.76 + 1.69 – 2.85
4. 7.982 – 9.082 + 4.007
5. 5.625 – 8 + 4.375
6. 23.7 – 65.9 + 82.6
7. 12 – 0.75 + 0.75
8. 65.6 - 45.9 + 0.36

MULTIPLICATION OF DECIMAL FRACTION BY 10, 100 AND 1000

Note:

-Change the decimals to common fractions then multiply by 10, 100, 1000.

Examples

1. Multiply 6.25 x 10

$\frac{625}{100}$ x 10

$= \frac{62.5}{10}$

= 62.5

2. Multiply 6.25 x 100

Soln

$\frac{625}{100}$x 100

= 625

3. Multiply 6.25 x 1000

$= \frac{625}{100}$ x 1000

= 625 x 10

= 6250

4. Multiply 7.425 x 10

Soln

$\frac{7425}{1000}$x 10

$= \frac{74.25}{100}$

= 74.25

5. Multiply 7.425 x 100

7.425 x 100

$\frac{74.25}{1000}$ x 100

= 742.5

= 742.5

6. Multiply 4.325 x 1000

$\frac{4325}{1000}$ x 1000

= 4325

ACTIVITY

Multiply the following

1. 0.12 x 10
2. 15.6 x 10
3. 13.489 x 10
4. 15.6 x 100
5. 9.46 x 100
6. 0.875 x 100
7. 30.729 x 100
8. 0.125 x 1000

MULTIPLICATION OF DECIMAL BY A DECIMAL.

NOTE: First change decimals to common fractions before multiplying.

1. Multiply 2.3 x 0.2

Soln

$\frac{23}{10} \times \frac{2}{10}$

$= \frac{23 \times 2}{10 \times 10}$

$= \frac{46}{100}$

$= 0.46$

2. Work out 3.75 x 2.4

Soln

3.75 x 2.4

$= \frac{375 \times 24}{100 \times 10}$

$= \frac{375 \times 24}{100 \times 10}$

$= \frac{9000}{1000}$

$= 9$

3. Multiply 0.018 x 0.4

Soln

$= \frac{18}{1000} \times \frac{4}{10}$

$= \frac{18 \times 4}{1000 \times 10}$

$= \frac{72}{10000}$

$= 0.0072$

Activity

Multiply the following

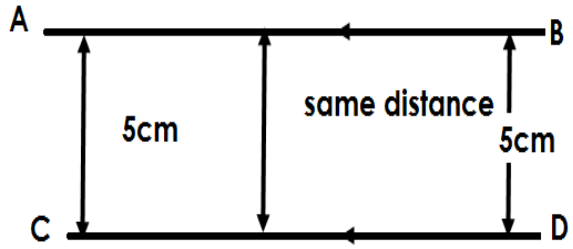
1. 0.6 x 0.06
2. 0.2 x 0.03
3. 2 x 05
4. 3.02 x 0.9
5. 7.2 x 8
6. 0.8 x 24
7. 2.5 x 2.5
8. 0.03 x 0.3
9. 3.6 x 0.11

LINES,ANGLES AND GEOMETRIC SHAPES

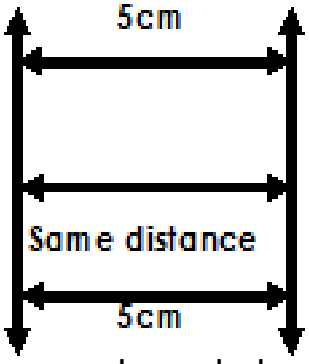
Parallel lines

These are lines which do not meet because they are of the same distance apart.

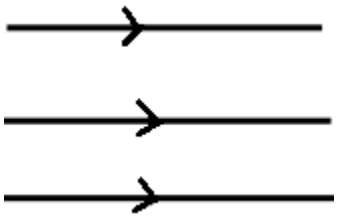
Example I

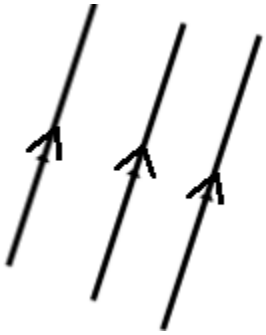


Example II



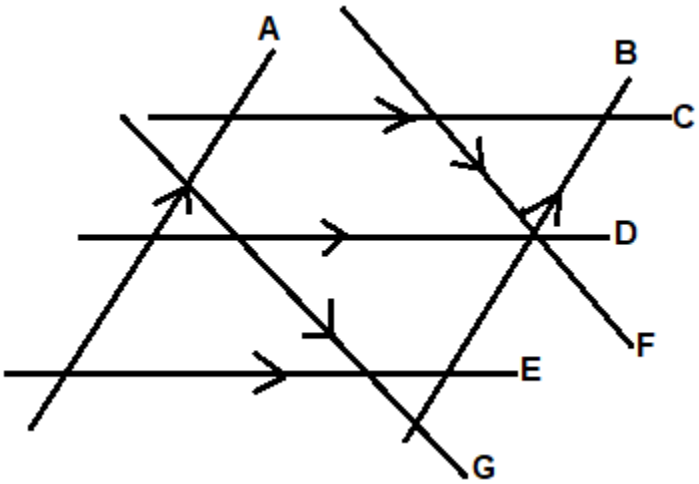
To show that the given lines are parallel we use signs as shows below.





Activities

Which of the lines above are parallel lines?



Drawing parallel lines

1. Using a ruler

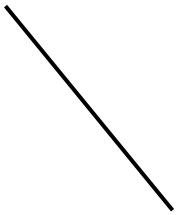
Place a ruler on the paper, then draw a line on each side of the ruler.

2. **Using a ruler and a set square**

Procedure

Step I

Draw a line AB and mark point P where the other parallel line shall pass



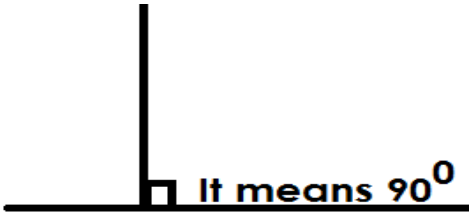
Drawing and identifying perpendicular lines

Perpendicular lines are lines which meet at an angle of 90^0.

Note:

When perpendicular lines meet, they make a square corner called a right angle.

The symbol for perpendicular.



Drawing perpendicular lines

Procedure

-Use a ruler and a set square.

Step I

1. Draw a horizontal line.

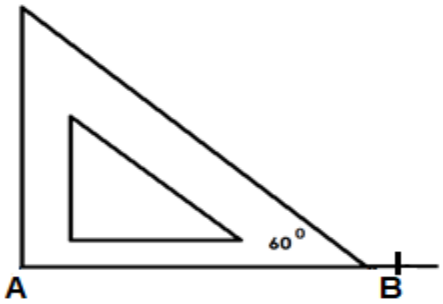
Step II

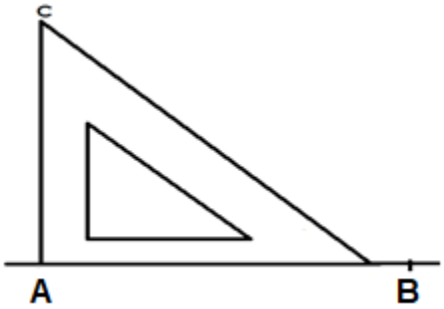
Place a 60^0- set square at A as shown in (a) below.

Step III

Draw a line from A to C using a pencil as in (b) below.

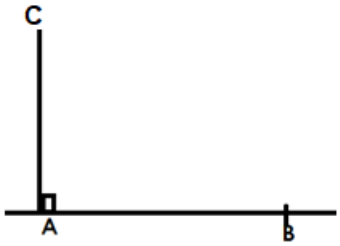
(a)

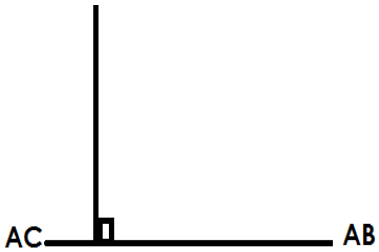




Step 4

Remove the set square and your lines will look like this.



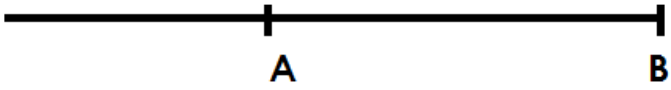


Therefore, Ac is perpendicular to AB

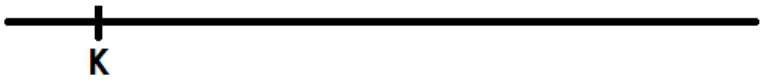
Activity

Draw a perpendicular line at the point shown using a pencil and a set square.

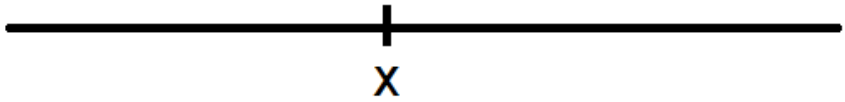
1.



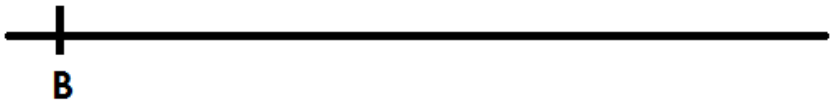
2.



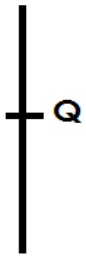
3.



4.



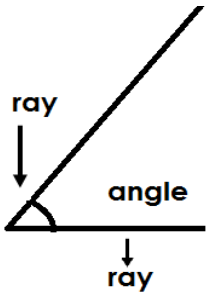
5.



TYPES OF ANGLES

An angle is the amount of turning between two straight lines at a fixed point.

Illustration.



Types of angles.

1) Acute angle

This is an angle which is less than 90^0

The smallest acute angle is 1^0 and the largest is 89^0.

Illustration.

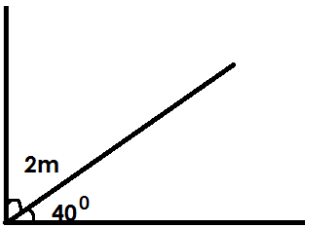
2) Right angle

This is an angle which measures exactly 90^0.

Illustration.

Finding un known angles in a right angle

Find the value of m.



$2m + 40^0 + = 90^0$

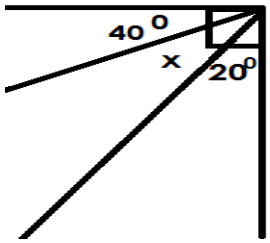
$2m + 40^0 – 40^0 = 90^0 – 40^0$

$\frac{2m}{2} = 50^0$

$\frac{2m}{2} = \frac{50^{025}}{2}$

$m = 25^0$

Find the value of K in the diagram below.



$K + 40^0 + 20^0 = 90^0$

$K + 60^0 = 90^0$

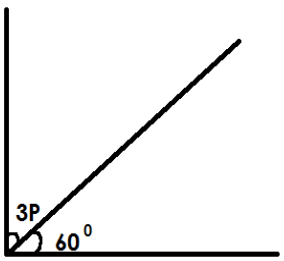
$K + 60^0 - 60^0 = 90^0 - 60^0$

$K = 30^0$

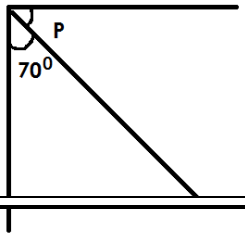
Activity

Find the value of unknowns in the following

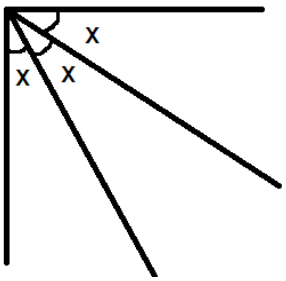
(1)



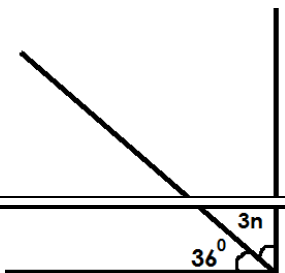
(2)



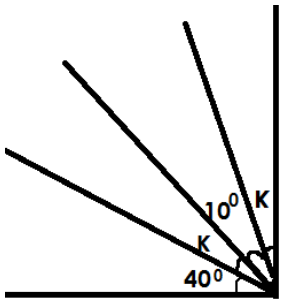
(4)



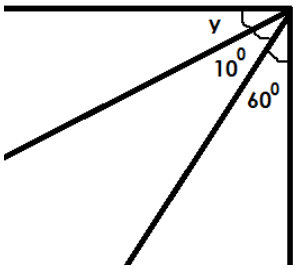
(5)



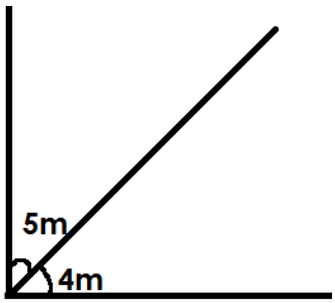
(3)



(4)



(6)



3) Obtuse angle

This is an angle great that measures above 90^0 but less than 180^0.

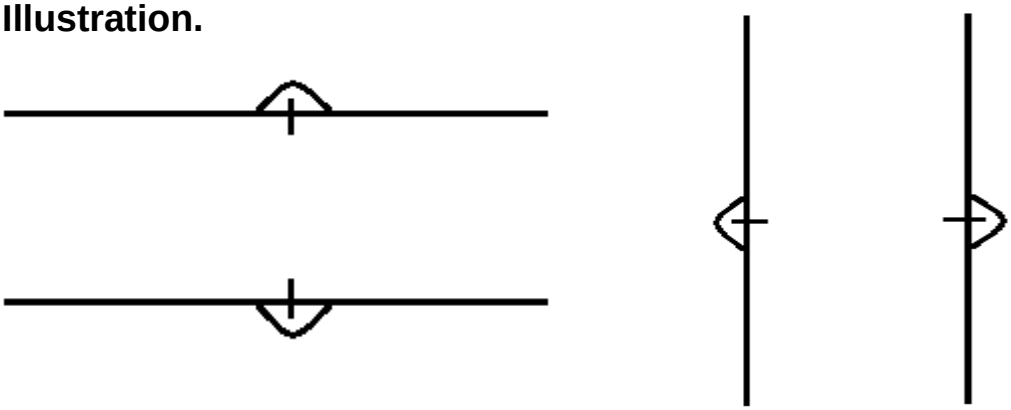
The smallest obtuse angle is 91^0 and the largest is 179^0.

Illustration.

4) Straight line angle

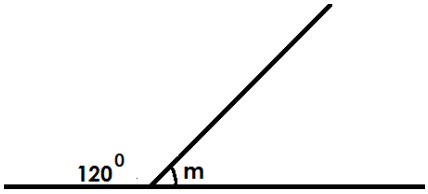
This is an angle which measures exactly $180^{0.}$

Illustration.



Finding the un known angles on a straight line

Find the value of m

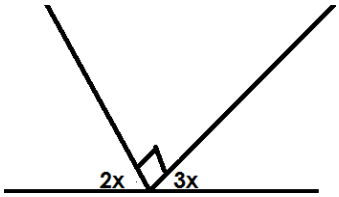


$m + 120^0 = 180^0$

$m + 120^0 - 120^0 = 180^0$ (supp < s)

$m = 60^0$

Find the value of x in the figure below.



$2x + 3x + 90^0 = 180^0$ (supp <s)

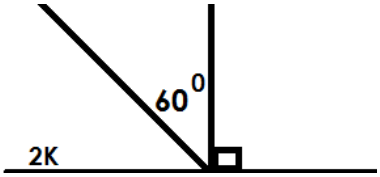
$5x + 90^0 = 180^0$

$5x + 90^0 - 90^0 = 180^0 - 90^0$

$\frac{5x}{5} = \frac{90^0}{5}$

$x = 18^0$

Find the value of K



$2K + 60^0 + 90^0 = 180^0$ (supp<s)

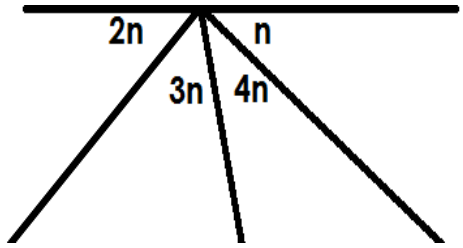
$2K + 150^0 = 180^0$

$2K + 150^0 - 150^0 = 180^0 - 150^0$

$\frac{2K}{2} = \frac{30^0}{2}$ 15

$K = 15$

Find the value of n



$2n + 3n + 4n + n = 180$ (supp<s)

$10n = 180^0$

$\frac{10n}{10} = \frac{180^0}{10}$

$n = 18^0$

Three angles n, 70^0, and 80^0 are supplementary angles. Find the value of n.

$n + 70^0 + 80^0 = 180^0$

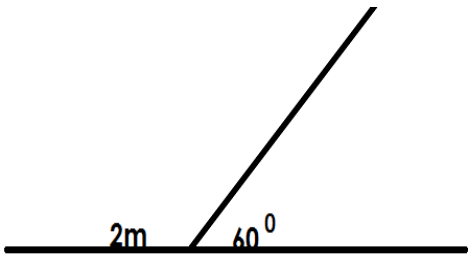
$n + 150^0 = 180^0$

$n + 150^0 - 150^0 = 180^0 - 150^0$

$n = 30^0$

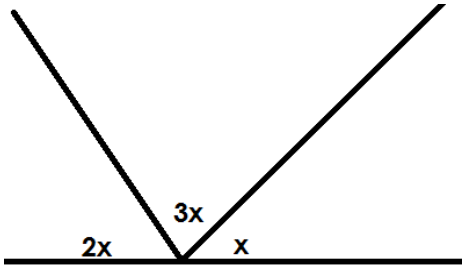
Activity

1. Find the value of m

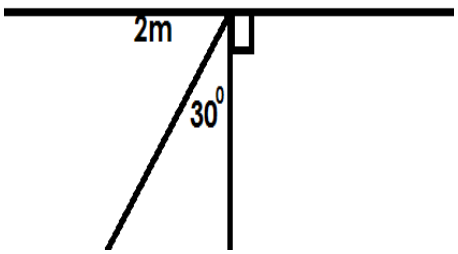


2. Find the value of the unknown angles

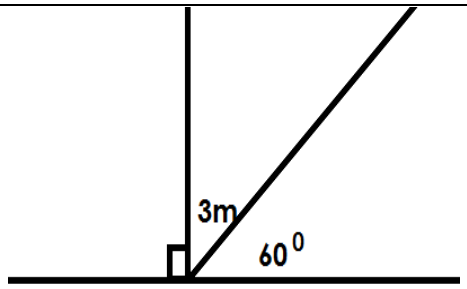
(a)



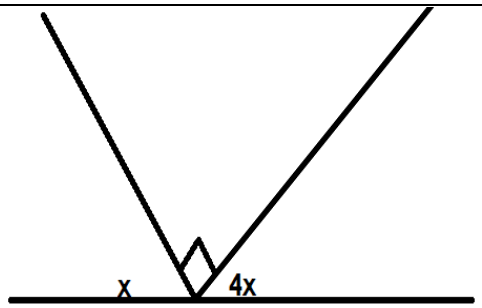
(b)



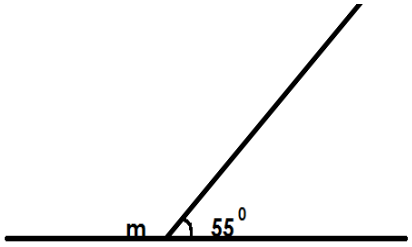
(c)



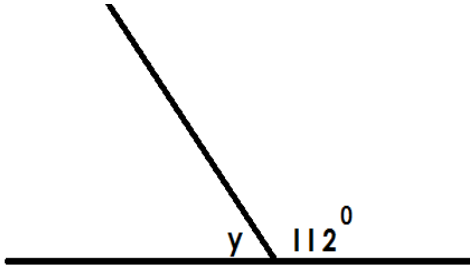
(d)



(e)



(f)

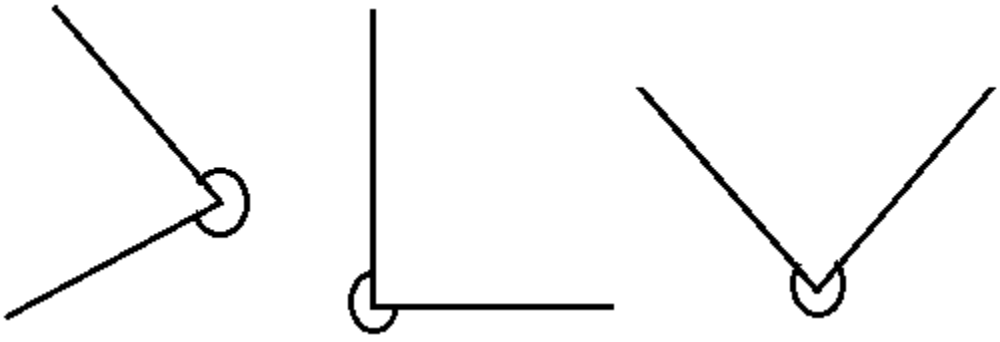


5) Reflex angle

This is an angle greater than 180^0 but less that 360^0.

The smallest reflex angle is 181^0 and the largest is 359^0.

Illustration.



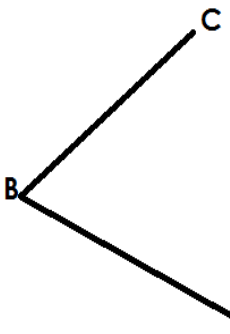
6) Centre angles (revolution)

This is an angle which measures exactly 360^0

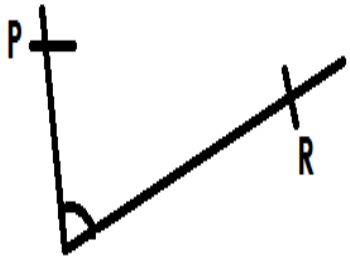
Illustration.

MEASURING DIFFERENT ANGLES USING APROTRACTOR

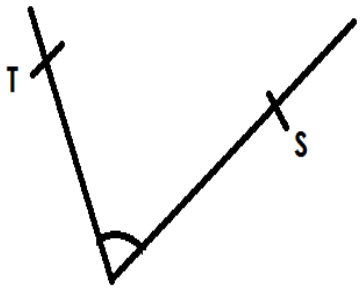
(a)



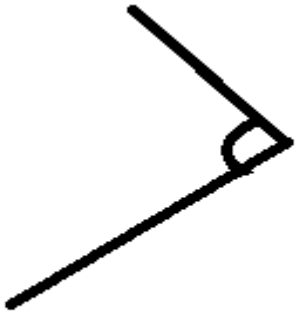
(b)



(c)

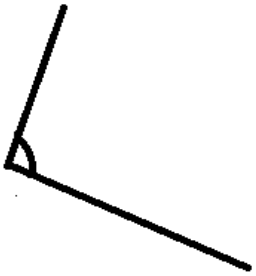


(d)



(e)

(f)



DRAWING DIFFERENT ANGLES USING A PROTRACTOR

Using a ruler pencil and protractor draw the following angles.

(a) 60^0 (b) 50^0 (c) 75^0

(d) 120^0 (e) 135^0

DRAWING DIFFERENT ANGLES USING A RULER AND PAIR OF COMPASSES ONLY

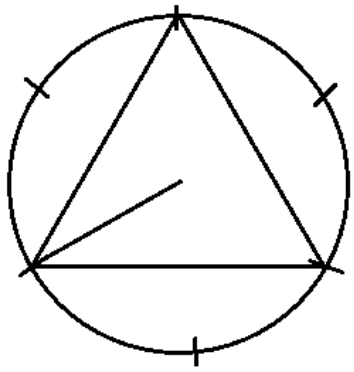
Using a ruler and pair of compasses only, construct the following angles.

(a) 60^0 (b) 90^0 (c) 45^0 (d) 120^0

CONSTRUCTING AND EQUILATERAL TRIANGLE IN A CIRCLE GIVEN RADIUS.

Procedures

- Mark a point. Using a given radius, draw a circle from the point drawn.
- Make equidistant arcs on the circumference using the given radius.
- Join the arcs by skipping one at a time to draw the equilateral triangle.



Activity

1. Construct an equilateral triangle in a circle given the following radii.

(a) 6cm

(b) 4cm

(c) 5.5cm

(d) 4.8cm

CONSTRUCTING AN EQUILATERAL TRIANGLE GIVEN SIDES

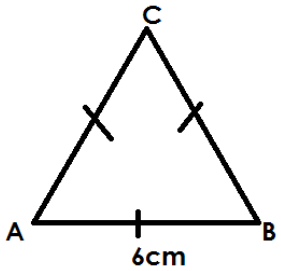
Procedures

- Draw a sketch
- Draw a base line of the given length.
- The using the same length, draw arcs and join to make an equilateral triangle.

Example

Using a ruler and pair of compasses only, construct and equilateral triangle ABC of side. 6cm.

Sketch



Accurate drawing

- Measure and draw a line AB of 6cm.
- Press the compass needle of the compass at either point A or B using the same length of 6cm to draw line / side AC or BC = 6cm.
- Then join the three sides to form an equilateral triangle ABC of sides 6cm.

Activity

1. Using a ruler and pair of compasses only construct.

(a) An equatorial triangle PQR of sides 5cm.

(b) An equilateral triangle TNs of sides 4.8cm.

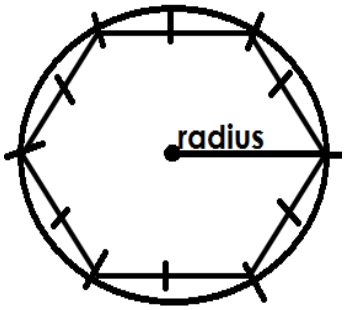
(c) An equilateral triangle ABC of sides 4.50cm.

(d) An equilateral triangle XYZ of sides 5.3cm.

CONSTRUCTING A REGULAR HEXAGON

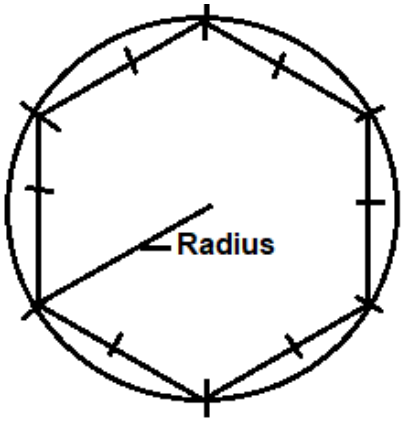
A regular hexagon is a polygon with all its 6 sides equal and its interior angles also equal.

Sketch



Procedures

- Draw a point.
- Using the given radius roll the compass from point to make the circle.
- Cut off equal arcs on the circumference using the given radius.
- Join all the points on the circumference to make the polygon.



Activity

1. Using a ruler and a pair of compasses only, construct aregular hexagon with the following sides.

(a) 4cm

(b) 4.8cm

(c) 5cm

(d) 6cm

LINES OF FOLDING SYMMETRY

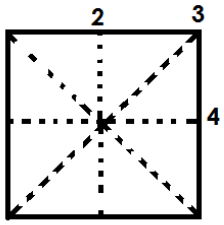
Definition

Is a line that divides a figure into 2 equal parts, which cover each other completely.

A figure is said to be symmetric if it has atleast one line of symmetry.

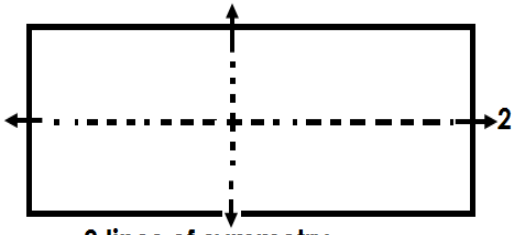
LINES OF SYMMETRY IN DFIFFERENT SHAPES.

(a) Square



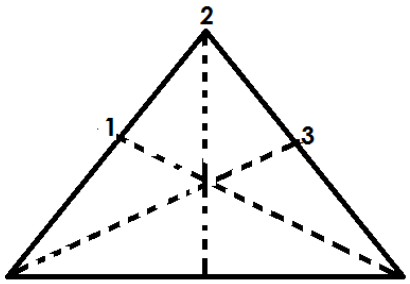
4 lines of symmetry

(b) Rectangle



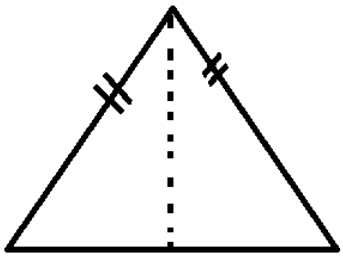
2 lines of symmetry

(c) Equilateral triangle



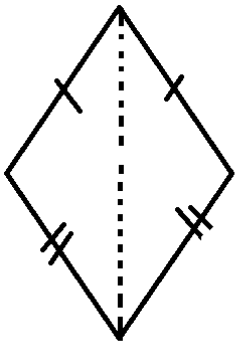
3 lines of symmetry

(d) Isosceles triangle



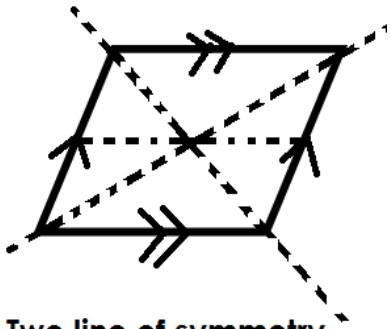
One line of symmetry

(e) Kite



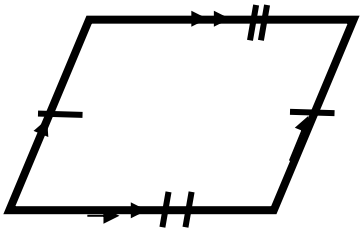
One line of symmetry

(f) Rhiombus



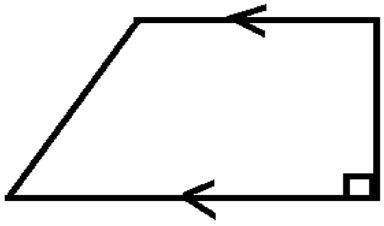
Two line of symmetry

(g) Parallelogram



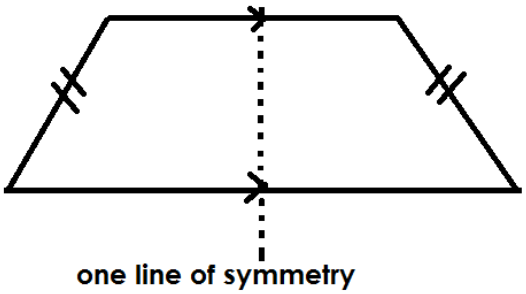
No line of symmetry

(h) Right Trapezium

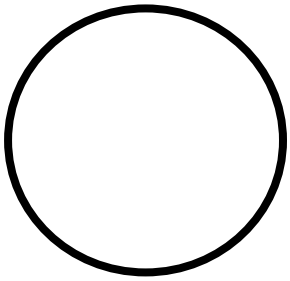


No line of symmetry

(i) Isosceles trapezium

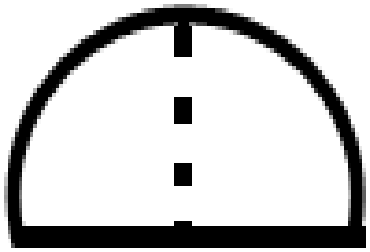


(k) Circle



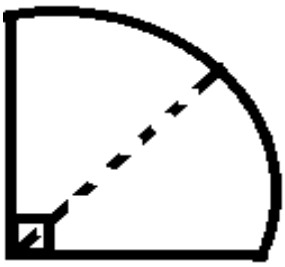
Many lines of symmetry

(j) Semi circle



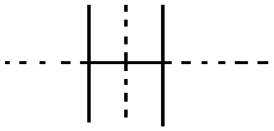
One line of symmetry

(l) Quadrant



One line of symmetry

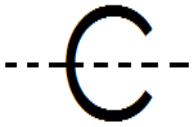
LINES OF FOLDING SYMMETRY IN LETTERS

(1) 

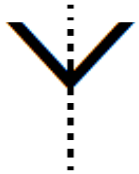
Two lines of symmetry

(2) 

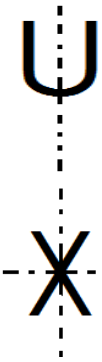
One line of symmetry

(3) 

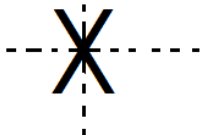
One line of symmetry

(4) 

One line of symmetry

(5) 

One line of symmetry

(6) 

Two lines of symmetry

(7) 

One lines of symmetry

(8) 

One line of symmetry

Note:

All regular polygons have number of lines of symmetry that is equal to these number of sides.

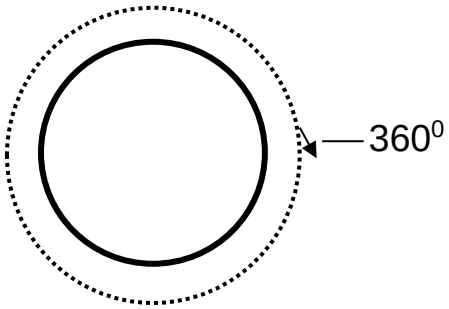
Name of regular polygon	No. of lines of symmetry
- Equilateral triangle	3
- Square	4
- Pentagon	5
- Hexagon	6
- Septagon	7
- Octagon	8
- Nonagon	9
- Decagon	10
- Nou-Decagon	11
- Duo decagon	12

REVOLUTIONS / ROTATIONS / TURNS

A revolution is a complete turn, i.e., a rotation from one point and back to the same point.

A complete revolution is made of $360^{\mathbf{0}}$.

Illustration



FINDING PARTS OF A REVOLUTIONS.

Examples

1. Find $\frac{1}{2}$ of a revolution.

   1 revolution = 360^0

   $\frac{1}{2}$ a revolution = $\frac{1}{2} \times 360^0$

   $= 180^0$

2. What angle is $\frac{2}{5}$ of a revolution?

1 revolution = 360^{0}

$\frac{2}{4}$ of a rev = $\frac{2}{5}$ x 360^{0} 72^{0}

= 144^{0}

Activity

1. Find the angle that is $\frac{1}{4}$ of a revolution.

2. Which angle is $\frac{1}{3}$ of revolution?

3. Matama turned $\frac{3}{4}$ of a revolution which angle did he make?

4. How many degrees are in $\frac{3}{5}$ of a revolution?

5. Find $\frac{1}{9}$ of a revolution.

6. How many degrees can one make if he turns through $\frac{3}{10}$ of a revolution.

7. Find the angle that is $\frac{4}{9}$ a revolution.

FINDING NUMBER OF REVOLUTIONS

Example I

How many revolutions are in 720^{0}?

Soln

360^{0} = 1 rev

1^{0} = $\frac{1}{360}$ x $\frac{2}{120}$

= 2 revolutions

Example II

Find number of revolutions in are in 540

Soln

360^0 = 1 rev

$1^{\mathbf{0}}$ = $\frac{\mathbf{1}}{\mathbf{360}}$ rev

540^0 = $\left(\frac{1}{\cancel{360}} \times \cancel{540}\right)$ Revolutions

$\cancel{4}$ 63

2

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

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

Activity

1. Find number of revolutions in 1080^0 revolutions.
2. How many complete rotations are in 180^0.
3. Find the number of revolutions in 900^0.
4. How many revolutions are in 360^0 revolution?
5. Calculate number of revolutions in 45^0.
6. How many revolutions are in $36^{\mathbf{0}}$?
7. Find number of turns in $360^{\mathbf{0}}$.
8. How many revolutions are in $3260^{\mathbf{0}}$?
9. Find the number of turns in $3600^{\mathbf{0}}$.

ANGLES FORMED ON A COMPASS.

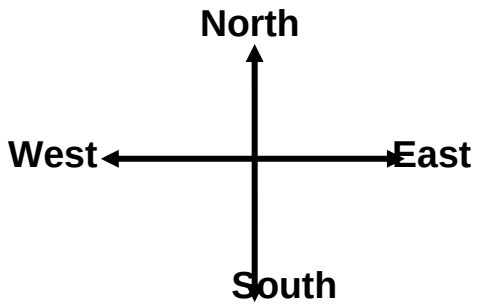
A compass has two types of points i.e.

- Major cardinal points
- Minor / secondary cardinal points

Major cardinal points

- North (N)
- South (S)
- East (E)
- West (W)

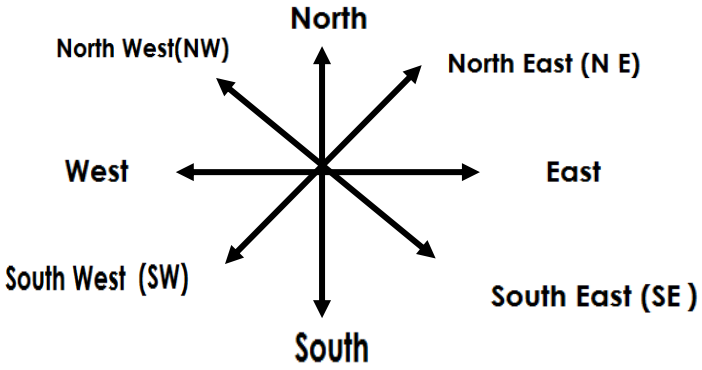
Illustration



Minor cardinal points / secondary points

- North East (NE)
- South East (SE)
- North West (NW)
- South West (SW)

Illustration

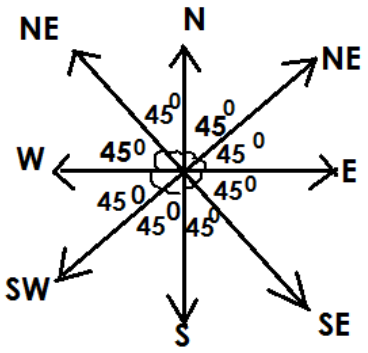


Note:

Since a complete revolution is equal to 360^0,

$$1 \text{ sector} = \frac{360}{8} = 45^0$$

ANGLES BETWEEN COMPASS DIRECTIONS

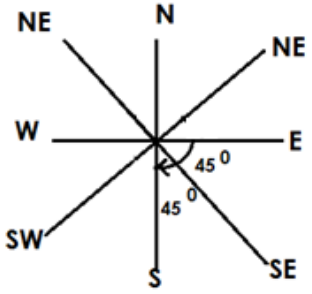


Note:

A smaller angle is the smallest sector between given points and largest angle is the largest sector between the two given points.

Examples

What is the smallest angle between East and South?

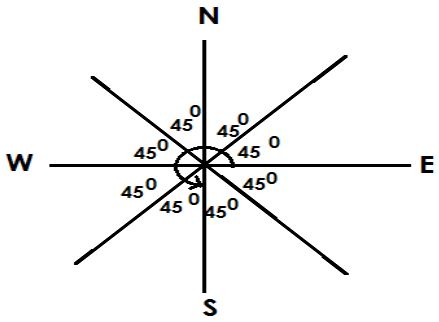


I sector = 45^0

2 sectors = 45×2

= 90^0

Find the larger angle between East and South.

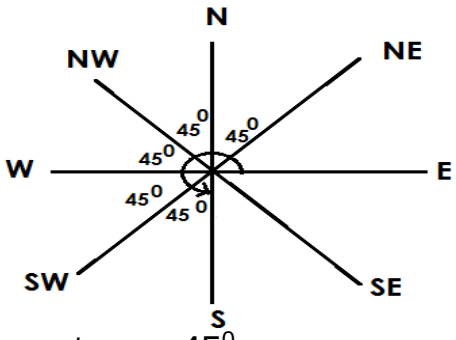


1 sector = 45^0

6 sectors = 6 x 45^0

= 270^0

What is the larger angle between South and North East?



1 sector = 45^0

5 sectors = 5 x 45^0

= 225^0

Activity

1. Find the smaller angle between the following compass points.

(a) N and S.E

(b) NW and W

(c) NE and SW

(d) NW and NE

(e) E AND S

2. Find the larger angle between the following points.

(a) SE and W

(b) E and S

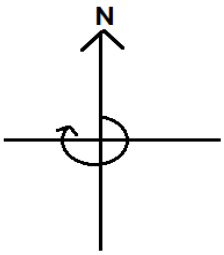
(c) N and NE

(d) NE and SW

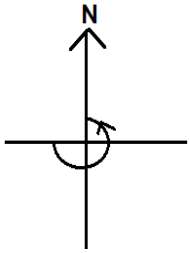
(e) W and NW

CLOCK WISE AND ANTI CLOCK WISE DIRECTION.

Clock wise (right-hand turn)



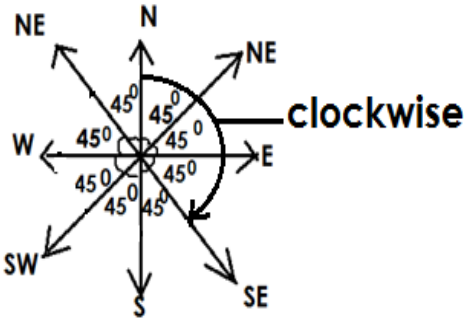
Anti clockwise (left-hand turn)



FINDING DIRECTION GIVEN ANGLES

Examples

Jane was facing North, she turned clockwise through and angle of 135^0. In which direction did she face.



No. of sector = $\frac{\textbf{Given angle}}{\textbf{45}}$

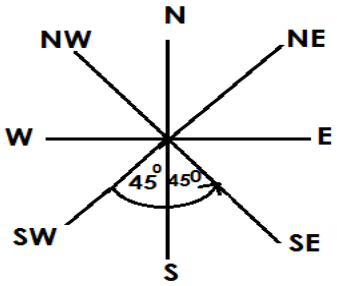
$= \frac{\textbf{135}}{\textbf{45}}$

= 3 sectors

She faced in South East

Example II

Musa was facing in North West. He turned through an angle of 90^0anti wise. In which directions is he facing now?



No. of sectors = $\frac{\text{Angle given}}{45^0}$

$= \frac{90^0}{45^0}$

2 sectors

He is facing in South East.

Activity

1. Alex was facing North East. He turned through an angle of 90^0 anticlockwise. Find his new direction.

2. A pilot was facing North on setting off, he turned through an angle of 180^0clockwise in which direction did he take?

3. Wandella was facing in South West. He turned through an angle 135^0 clockwise find his new direction.

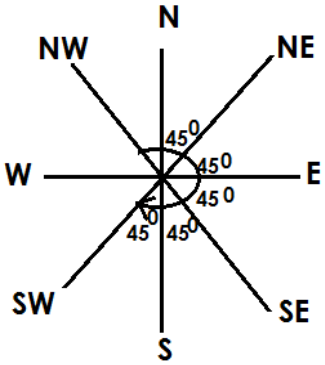
4. Mukataza was facing in North West. If he turned through an angle of 225 anti clock wise. Find his new direction.

5. Find the direction Wakate will face if he turns through an angle of 315^0 from North East clock wise.

FINDING ANGLES WHEN GIVEN DIRECTION

Example I

A man was facing North. He turned clockwise to face South West. Find the angle turned.



1 sector = 45^0

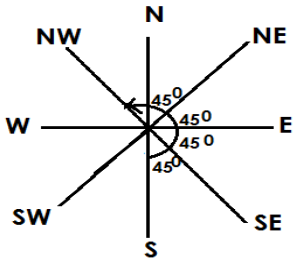
5 sector = 5×45^0

= 225^0

He turned through an angle of 225^0

Example II

Find the angle turned from South to North West anti clock wise.



1 sector = 45^0

5 sectors = 5×45^0

Therefore, the angle turned through is 225^0

Activity

1. Through what angle can Okello from North to North East clockwise.

2. Find the angle that can be turned from North to South East anti clock wise.

3. What angle is made by a clockwise turn from South to North East?

4. James facing South East. He decided to turn anti clockwise to North. Through what angle did he turn?

5. Damali sat in class facing in South West If she was told to turn clockwise to face East, find the angle turned.

CALCULATING MISSING ANGLES.

(A) COMPLEMENTARY ANGLES

These are two angles that add upto 90^0 and originating from on point.

Examples

Given that 2m and 40° are complementary angles,find the value of m.

$2m + 40^0 + = 90^0$

$2m + 40^0 - 40^0 = 90^0 - 40^0$

$\frac{2m}{2} = 50^0$

$\frac{2m}{2} = \frac{50^{025}}{2}$

$m = 25^0$

Given that k + 20° and 40° are complementary angles,find the value of k

$K + 40^0 + 20^0 = 90^0$

$K + 60^0 = 90^0$

$K + 60^0 - 60^0 = 90^0 - 60^0$

$K = 30^0$

Activity

1. Given that 2p and 60° are complementary angles,find the value of p.
2. Given that 2x and x are complementary angles,find the value of x
3. Given that p and 70° are complementary angles,find the value of p
4. Given that 3n and 36° are complementary angles,find the value of n.
5. Given that 4m and 5m are complementary angles,find the value of m.
6. Given that y + 10° and 60° are complementary angles,find the value of y.
7. Find the complement of 32°
8. Find the complement of 60°
9. The complement of k is 40°. Find the value of k
10. The complement of y + 27° is 30°. Find the value of y

SUPPLEMENTARY ANGLES

These are the two angles that add up to 180^0 and originating from one point.

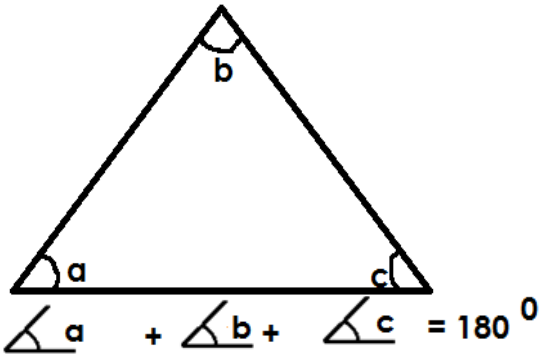
Activity

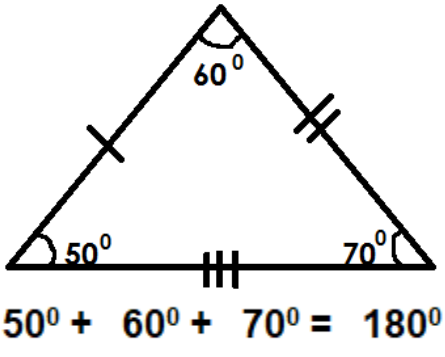
1. Given that 2p and 60° are supplementary angles,find the value of p.
2. Given that 2x and 3x are supplementary angles,find the value of x
3. Given that p and 70° are supplementary angles,find the value of p
4. Given that 3n and 30° are supplementary angles,find the value of n.
5. Given that 4m and 5m are supplementary angles,find the value of m.
6. Given that y + 10° and 60° are supplementary angles,find the value of y.
7. Find the supplement of 112°
8. Find the supplement of 60°
9. The supplement of k is 40°. Find the value of k
10. The supplement of y + 70° is 30°. Find the value of y

INTERIOR ANGLE SUM O F TRIANGLES

Note:

A triangle has three interior angles which add upto 180^0.





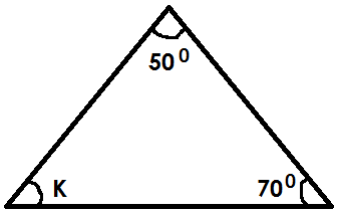
TYPES OF TRIANGLES

A. Scalene triangle.

Note: A scalene triangle has non of its sides and angles equal.

Examples

1. Find the size of angle marked with letter K.



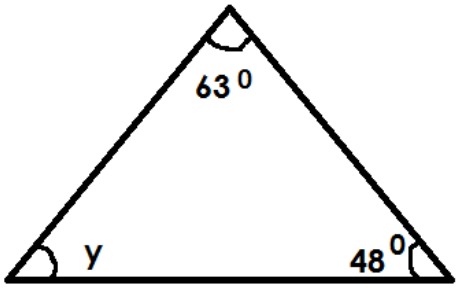
$K + 50^0 + 70^0 = 180^0$

$K + 120^0 = 180^0$

$K + 120^0 - 120^0 = 180^0 - 120^0$

$K = 60^0$

2. Find the unknown angle in the triangle below



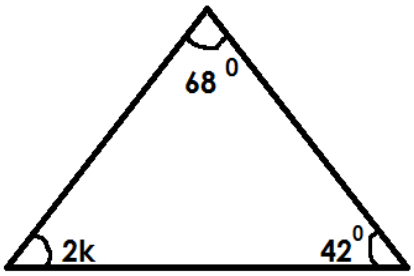
$y + 63^0 + 48^0 = 180^0$

$y + 111^0 = 180^0$

$y + 111^0 - 111^0 = 180^0$

$y = 69^0$

3. Find the unknown angle in the figure below.



$2K + 68^0 + 42^0 = 180^0$

$2K + 110^0 = 180^0$

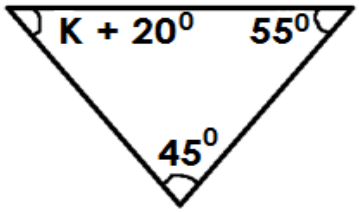
$2K + 110^0 - 111^0 = 180^0 - 110^0$

$2K = 70^0$

$\frac{2K}{2} = \frac{70^0}{2}$

$K = 35^0$

4. Find the unknown angle in the triangle below.



$K + 20^0 + 45^0 + 55^0 = 180_0$

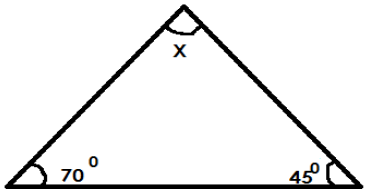
$K + 120^0 = 180^0$

$K + 120^0 - 1200 = 180^0 - 120^0$

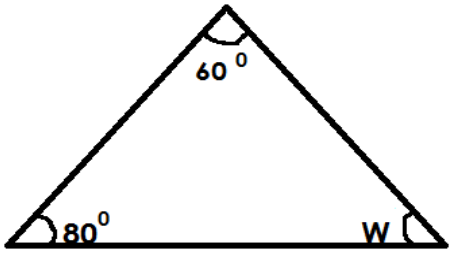
$K = 60^0$

Activity

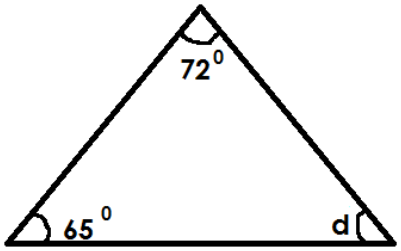
1. Find the value of X in degrees.



2. Find the size of unknown angle.

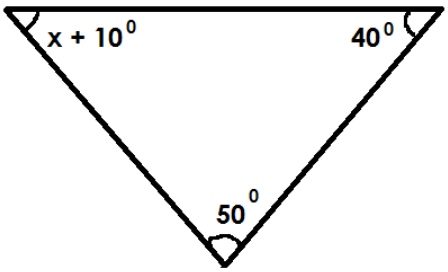


3. Calculate the value of Y in degrees

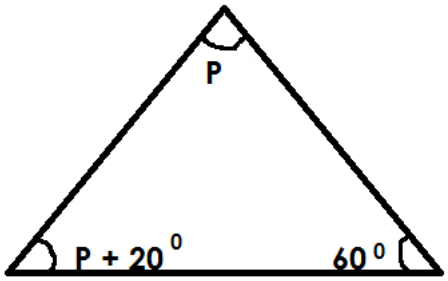


4. Find the unknown angle in the triange below.

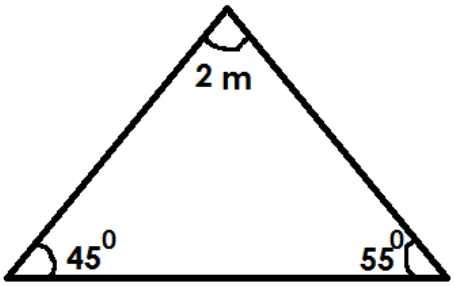
(a)



(b)



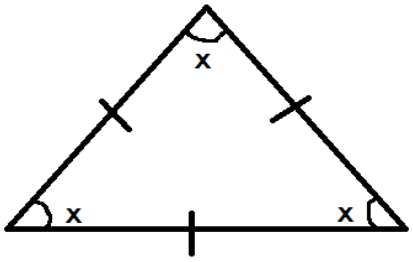
(c)



B. Equilateral triangle

Note:

All its three interior angles are equal



$\angle a + \angle b + \angle c = 180^0$

$x + x + x = 180^0$

$3x = 180^0$

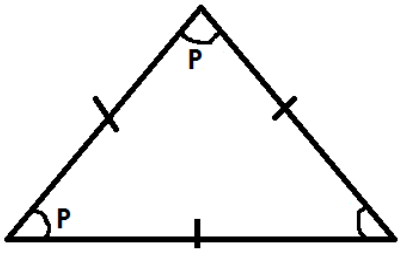
$\frac{3x}{3} = \frac{180^0}{3}$

$x = 60^0$

Each interior angle of an equilateral triangle is equal to 60^0.

Examples

1. Find the value of P in the figure below.



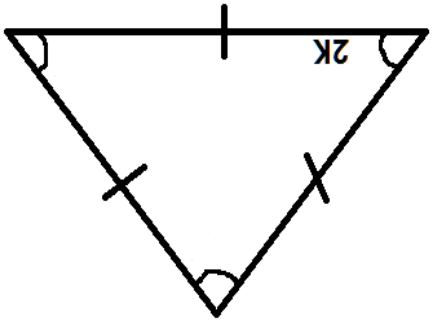
$P + P = 180^0$

$3p = 180^0$

$\frac{3P}{3} = \frac{180^0}{3}$

$P = 60^0$

2. Find the value of K in the triangle below.



$2K + 2K + 2K = 180^0$

$6K = 180^0$

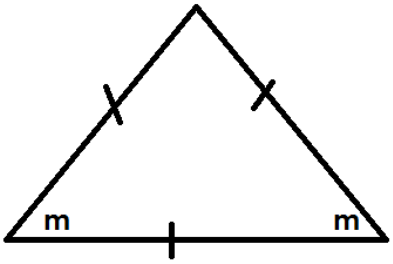
$\frac{6K}{6} = \frac{180^0}{6}$

$K = 30^0$

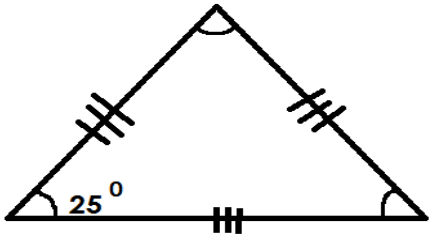
Activity

1. Find the size of the unknown angle in each of the triangle below.

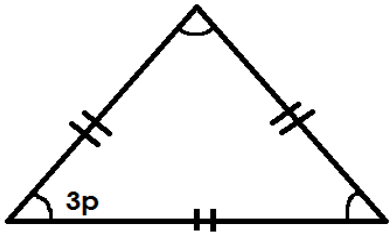
a.



d.



(c)

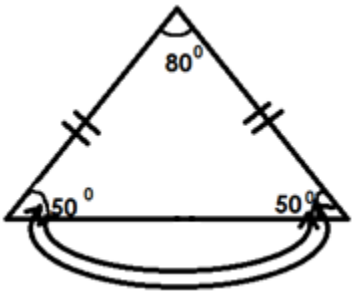


C. Isosceles triangle.

Note:

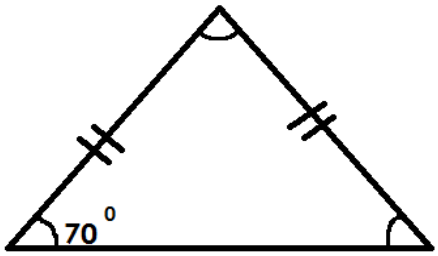
In an isosceles triangle, the two adjacent sides are equal making the two adjacent angles equal. (base angles are equal)

Base angles are formed on the line that is different from others**.**



Examples

1. Find the unknown angle in the figure below.



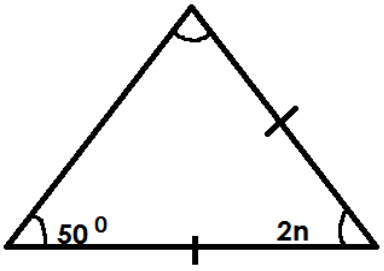
$x + 70^0 + 70^0 = 180^0$

$x + 140^0 = 180^0$

$x + 140^0 - 140^0 = 180^0 - 140^0$

$x = 40^0$

2. Find the value of P in the triangle below.



$2n + 50^0 + 50^0 = 180^0$

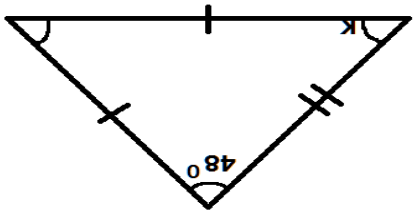
$2n + 110^0 = 180^0$

$2n + 110^0 - 110^0 = 180^0 - 110^0$

$\frac{2n}{2} = \frac{70^0}{2}$

$n = 35^0$

3. Find the value of K in the figure below.



$K + K + 48^0 = 180^0$

$2K + 48^0 = 180^0$

$2K + 48^0 + 48^0 = 180^0 - 48^0$

$2K = 132^0$

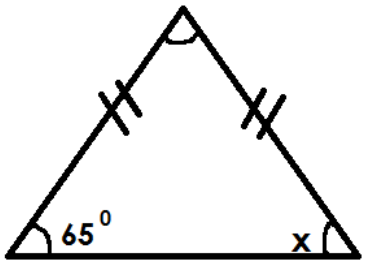
$\frac{2K}{2} = \frac{132^0}{2}$

$K = 60^0$

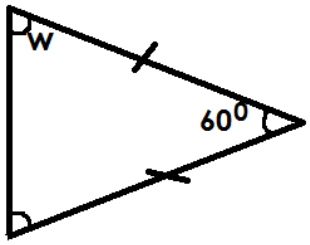
Activity

1. Find the size of unknown angles in the triangles below.

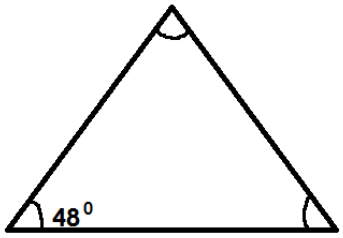
(a)



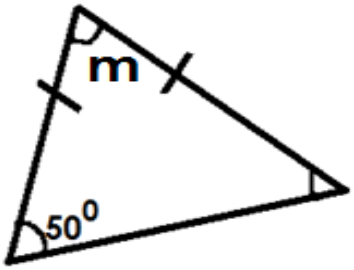
(d)



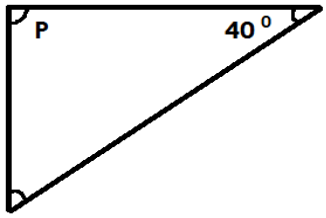
(b)



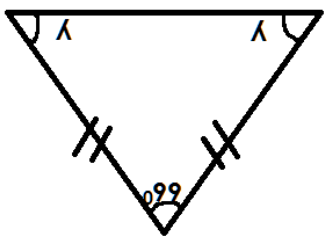
(e)



(c)



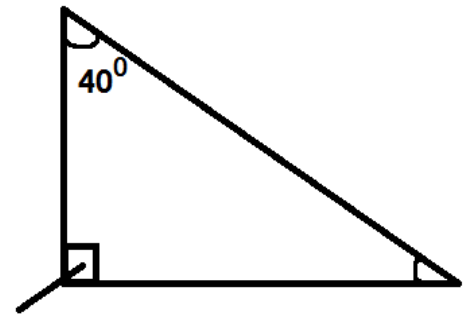
(f)



D. Right angled triangle.

Note

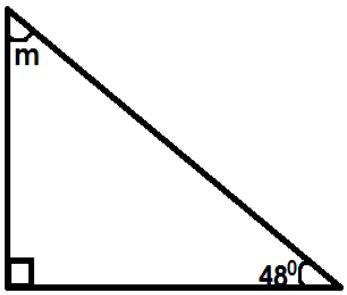
In a right-angled triangle, one of its three interior angles measures 90^0 indicated by the symbol; ⌞



Right angle

Examples

1. Find the value of m in the figure below.



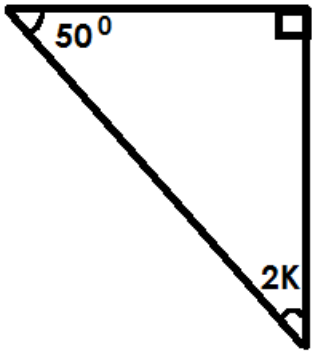
$m + m\ 48^0 + 90^0 = 180^0$

$m + 138^0 = 180^0$

$m + 138^0 - 138^0 = 180^0 - 138^0$

$m = 42^0$

2. Find the unknown angle in the figure below.



$2K + 50^0 + 90^0 = 180^0$

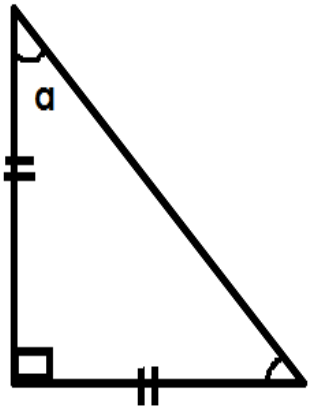
$2K + 140^0 = 180^0$

$2K + 140^0 - 140^0 = 180^0 - 140^0$

$\frac{2K}{2} = \frac{40^{0\ 20}}{2}$

$K = 20$

3. Find the value of a in the figure below.



Soln

$a + a + 90^0 = 180^0$

$2a + 90^0 = 180^0$

$2a + 90^0 - 90^0 = 180^0$

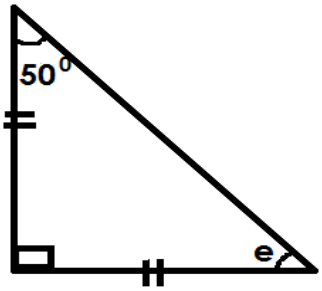
$\frac{2a}{2} = \frac{90^0}{2}$

$a = 45^0$

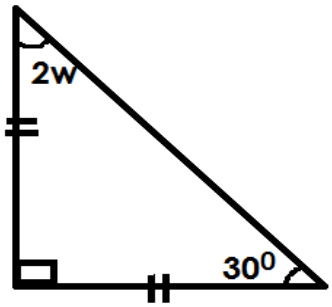
Activity

1. Find the size of the unknown angle in degrees.

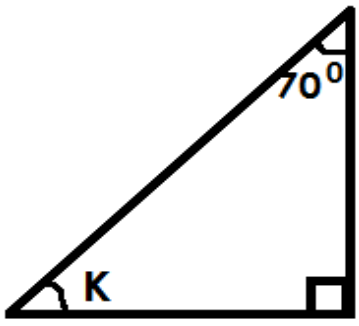
(a)



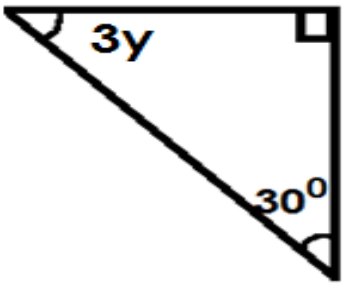
(b)



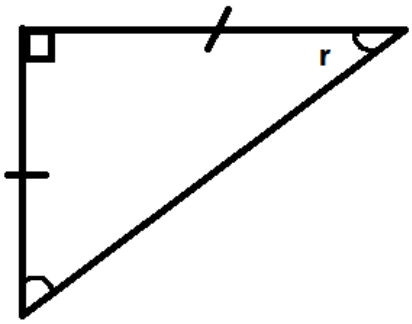
(c)



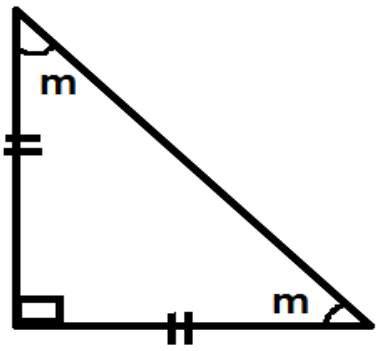
(d)



(e)



(f)



DATA HANDLING

STATISTICS

Statistics is a collection of information shown in numbers.

Terms used

Mode	is the number that appears most in given data.
Range	is the difference between the highest and the lowest number.
Median	Is the middle number got after arranging in ascending order or descending order.
Modal frequency	Is the number of times the mode appears.
Mean /average	Mean is the uniform distribution of numbers, events, marks or scores.
NB	Mean or average is the result got after dividing the sum of items by their number.

FINDING, MODE, RANGE, MEDIAN AND MEAN/AVERAGE AND MODAL FREQUENCY

Examples

1. Given the list of numbers 1, 4, 6, 7, 8, 4

(a) Find the mode

Soln

No.	Frequence
1	1
4	2
6	1
7	1
8	1

Mode = 4

(b) Find the range

Soln

Range = H – L

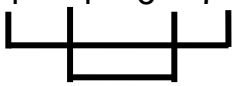
= 8 – 1

Range = 7

c. Work out the median

Soln

Median = 4 4 6 7 8



Median = $\frac{4 + 6}{2}$

= $\frac{10}{2}$

$\therefore$ Medium = 5

d. Find the mean

Soln

Mean = $\frac{\text{sum of items}}{\text{No. of items}}$

Mean = $\frac{1 + 4 + 4 + 6 + 7 + 8}{6}$

Mean = $\frac{30}{6}$

Mean = 5

(e) Find the modal frequency

No	Frequency
1	1
4	2
6	1
7	1
8	1

The modal frequency = 2.

2. Richard scored the following marks in his end of term 1 examinations.

35, 50, 60, 45, 60

1. What was his range.

Range = Highest – lowest

= 60 – 35

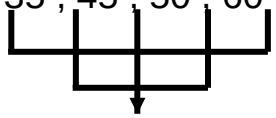
Range = 25 marks

(b) Find his median mark.

Soln

Ascending

Median = 35 , 45 , 50 , 60 , 60



50

Median = 50 marks

c. Find the modal mark.

Soln

No	frequency
35	1
45	1
50	1
60	2

The modal mark is 60.

d. Calculate his average mark.

$$\text{Average} = \frac{\text{sum of items}}{\text{No of items}}$$

$$\text{Average} = \frac{250}{5}$$

$$\text{Average} = 50$$

e. Find the modal frequency

Soln

No	**frequency**
35	1
45	1
50	1
60	2

The modal frequency is 2

Activity

1. Given the numbers 2, 4, 7, 2, 8 and 1.

(a) Find the mode

(b) Find the range.

(c) Calculate the median

(d) Workout the mean

2. Use the information below to answer question that follow.

3, 6, 7, 4, 5, 1, 4

a. Find the range

b. Workout the mode

c. Workout the mean

d. Find the average

e. Find the modal frequency

3. The boy scored the frequency marks in a test use them to answer questions.

5, 7, 2, 6, 10, 6

a. What is the highest mark?

b. Find the range.

c. What is the median mark?

d. Work out modal mark.

e. Find the mean.

Statistics is a collection of information shown in number.

FINDING RANGE MODE MEDIAN AND MEAN OF GROUPED DATA

Example

1. The table below shows marks scored by pupils in a test.

Marks scored	40	50	30	60
No. of pupils	3	2	4	1

(a) How many pupils did the test?

3 + 2 + 4 + 1

= 10 pupils

(b) Find the modal mark

30

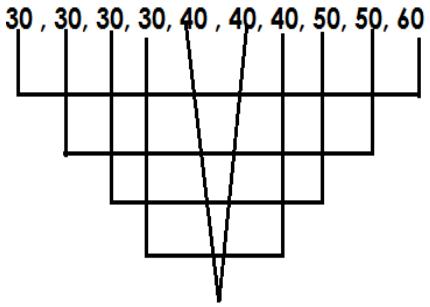
(c) Find the range of the mark.

Range = highest – lowest

= 60 - 30

= 30

(d) Find the median mark.



$$\frac{40 + 40}{2}$$

$$= \frac{80}{2}$$

Median = 40

(c) Calculate the average mark

$$\text{Average} = \frac{\text{Sum of items}}{\text{No. of items}}$$

$$\text{AV} = \frac{(40 \times 30) + (50 \times 2) + (30 \times 4) + (60 \times 1)}{10}$$

$$\text{AV} = \frac{120 + 100 + 120 + 60}{10}$$

$$\text{AV} = \frac{400}{10}$$

AV = 40

Activity

1. The teacher recorded the weight of pupils as shown in the table below.

Weight in kg	40	20	25	30
No. of pupils	1	3	2	4

(a) How many pupils were weighed?
(b) Find the modal weight.
(c) Find the range of the weight.
(d) Find the medium weight
(e) Calculate the mean weight.

2. Below is a table showing marks scored by pupils in at test.

Marks scored	70	50	80	90
Number of pupils	2	3	4	1

(a) How many children did the test?
(b) Work out the modal mark.
(c) Find the range of marks.
(d) Work out the medium mark.
(e) Calculate the average mark.

3. The table below shows goals scored by different teams.

Number of goals	2	3	6	7	10
Number of pupils	4	1	2	1	2

(a) How many teams participated?
(b) Workout the modal score.
(c) Find the range of score.
(d) Find the median score.
(e) Work out the mean score.

MORE ON FINDING RANGE, MODE, MEDIAN AND MEAN OF GROUPED DATA.

Examples

Complete the table

Marks	No of pupils	Total
40	……	120
……	4	80 ……
60	2	……
……	1	90

No of pupils = $\frac{120}{40}$

= 30

Marks = $\frac{80}{4}$

= 20

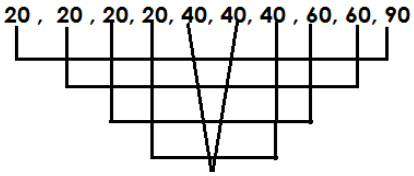
Total = 60 x 2

= 120

Marks $\frac{90}{1}$

= 90

b. Find the median mark



median = $\frac{80}{2}$

Median = 40

Use the table below to answer questions that foolw.

Marks	No of pupils	Total
80	IIII	……
……	IIII	180
60	……..	120
……	IIIII	160

a. Complete the above table

Total = 80 x 4

= 240

Marks = $\frac{180}{60}$ 30

= 30

Tallies = $\frac{120}{60}$

= 2

Marks = $\frac{160}{8}$ 20

Marks = 20

(b) Find the median marks

Median = 20, 20, 20, 20, 20, 20, 20, 20, 30, 30, 30, 30, 30, 30, 60, 60, 80, 80, 80, 80

$$\text{Median} = \frac{30 + 30}{2}$$

$$\text{Median} = \frac{60}{2}$$

Median = 30

c. Find the mean mark

Soln

$$\text{Mean} = \frac{\text{Sum of item}}{\text{No of items}}$$

$$\text{Mean} = \frac{(20 \times 8) + (30 \times 60) + (60 \times 2) + (80 \times 4)}{4 + 6 + 2 + 8}$$

$$\text{Mean} = \frac{780}{20}$$

= 39

ACTIVITY

1. Use the table below to answer the questions that follow.

Marks	No of pupils	Total
80	2	……..
40	……	120
……..	1	50
70	……..	280

(a) Complete the above table

(b) How many pupils are in the class.

(c) Find range of marks.

(d) Calculate the average mark.

(e) What is the median mark.

2. Use the table below to answer questions.

Marks	**No of pupils**	**Total**
40	**I I**	……..
…….	**~~IIII~~ I**	180
80	…….	160
……	**I**	90

(a) Complete the table

(b) Find the modal mark

(c) Calculate the range mark

Graphs and interpretation of date.

A graph is a picture or diagram used to show facts or numbers.

Tallies

Tallies are marks used to count and group things is five.

Examples

(a) | — **1**

(b) || — **2**

(c) ||| — **3**

(d) |||| — **4**

(e) 𝍸 — **5**

(g) 𝍸 𝍸 || — **12**

(f) 𝍸 𝍸 𝍸 — **15**

Activity

1. Study and complete the tally marks below.

(a) ||| _____

(b) 𝍸 |||| _____

(c) 𝍸 𝍸 | _____

(d) 𝍸 𝍸 ||| _____

(e) 𝍸 𝍸 𝍸 𝍸 _____

(f) 𝍸 𝍸 _____

(g) 𝍸 _____

(h) 𝍸 𝍸 𝍸 𝍸 _____

2. The table below shows the number of goals scored by different teams. Use it to answer questions that follow.

Teams	Goals scored
Iganga	𝍸 𝍸 ||||
Kampala	𝍸 ||||
Mbarara FC	𝍸 𝍸 𝍸 ||
Kaliro FC	𝍸 𝍸 𝍸
Wakiso FC	𝍸 𝍸
Entebbe FC	𝍸 |||
Kajjansi FC	𝍸 𝍸 𝍸 ||||

a. How many goals did Iganga FC score?

b. Which team scored the highest number of goals?

c. How many goals were scored by Mbarara FC and Entebbe FC altogether?

d. Find the number of goals scored by Kampala FC, Kaliro FC.

e. Find the total number of goals scored by all teams.

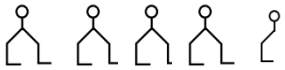
3. Complete correctly

Number	Tallies
19	.....
.....	𝍸 𝍸 𝍸
.....	𝍸 |||
26	.....
.....	𝍸 𝍸 𝍸 |||
30	.....
.....	𝍸 𝍸
22	.....

SCALE INTERPRETATION

Examples

Given that  represents 10 pupils find the number of pupils represented by



Soln

1 picture = 10

$4\frac{1}{2}$ pic = $(4\frac{1}{2} \times 10)$ pupils

$= \frac{9}{\cancel{2}_{1}} \times \cancel{10}^{5}$ pupils

= 45 pupils

If  represents 20 balls. Draw pictures to represents 70 balls.

Soln

20 balls = 1 picture.

1 ball = $\frac{1}{20}$ = pic

70 balls = $\frac{1}{\cancel{20}} \times 7\cancel{0}$

$= \frac{7}{3}$ 3 rem 1

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

Activity

1. If  represents 50 trees. Find the number of trees represented by

2) Given that  represents 20 books. How many books are represented by

3) Given that  represents 40 oranges. Draw pictures to represent 200 oranges.

4) If  represents 150 balls draw balls to represent 450 balls.

5) Given that  represents 8 chairs draw pictures to represent 72 chairs.

GRAPHS AND DATE HANDLING

Review: -

- Interpretation of pictographs
- Drawing pictographs

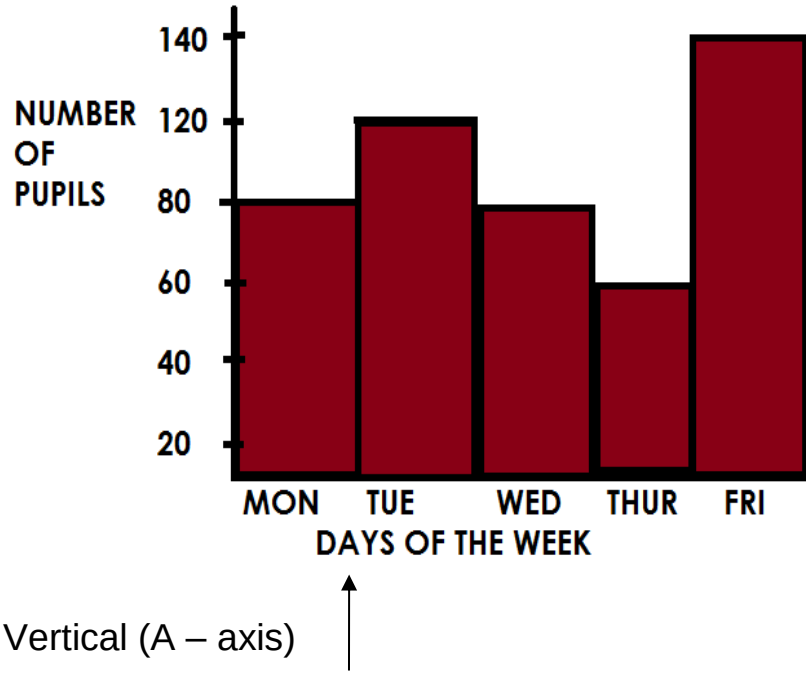
BARS GRAPHS

This is a type of graphs were information / data is represented by use of columns and blocks.

INTERPRETATION OF BAR GRAPHS

Example 1

The graph below shows the attendance of pupils of primary five in a week.



Vertical (A – axis)

Horizontal axis (x – axis) ⟶

Note:

While dealing with graphs, identify the vertical scale (axis) and the horizontal scale (x – axis)

A scale

This is the quantity / number that is represented by one square.

-1 square one the vertical / axis represents 20 pupils.

-1 square on the horizontal axis represents one (1) day.

Questions

(a) On which day was the attendance height.

It was Friday.

(b) How many pupils were present on Tuesday?

120 pupils

(c) Which two days had the same attendance?

Monday and Wednesday

(d) How many pupils attended on Tuesday and Thursday?

Tue ⟶ 1 2 0 pupils

Thur ⟶ + 6 0 pupils

1 8 0 pupils

(e) Find the range in the attendance of pupils

Range = H - L

= 1 4 0 pupils

- 6 0 pupils

8 0 pupils

(f) Calculate the average attendance of pupils in the class.

$$\text{Average} = \frac{\text{Sum of all items}}{\text{No. of items}}$$

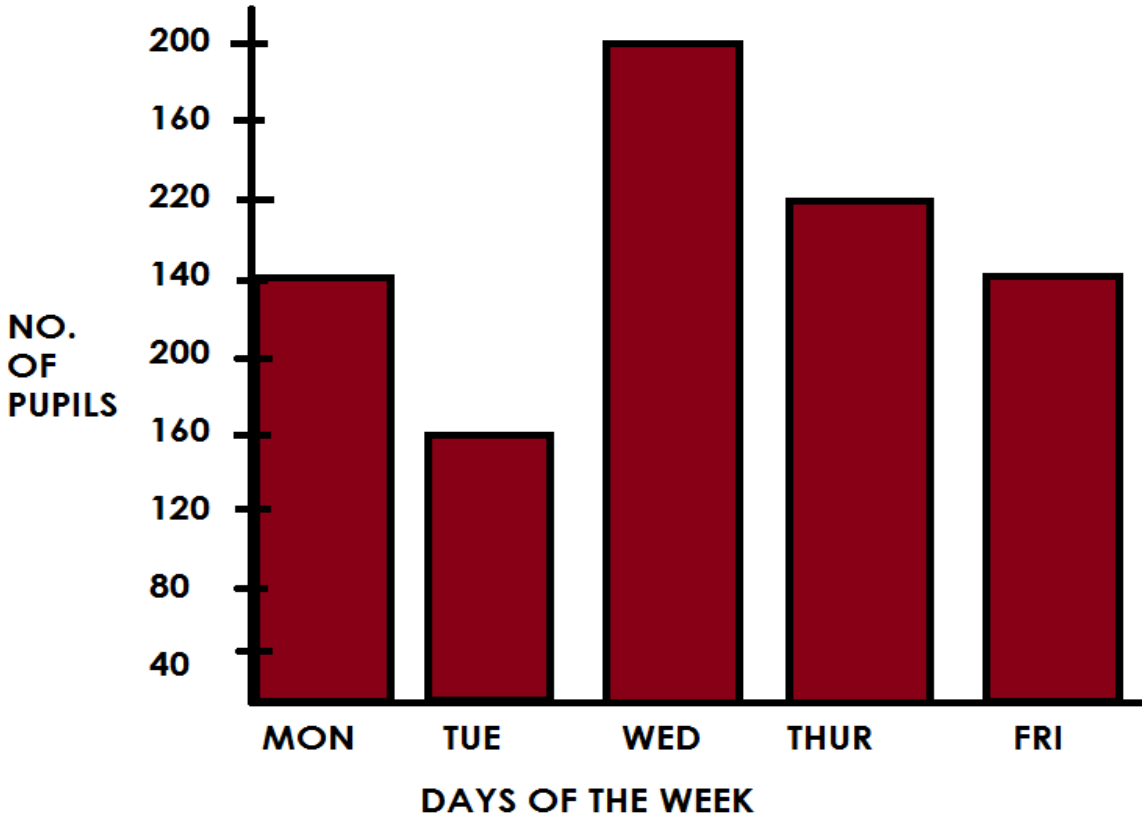
$$= \frac{80 + 120 + 80 + 140}{5}$$

$$= \frac{480}{5} \quad 96$$

= 96 pupils

Activity

1. Study the graph and answer the questions below.



Questions

(a) State the vertical scale.

(b) What is the horizontal scale.

(c) How many pupils attended on Thursday?

(d) Find the total attendance of pupils on Monday and Friday.

(e) Which day had the lowest attendance?

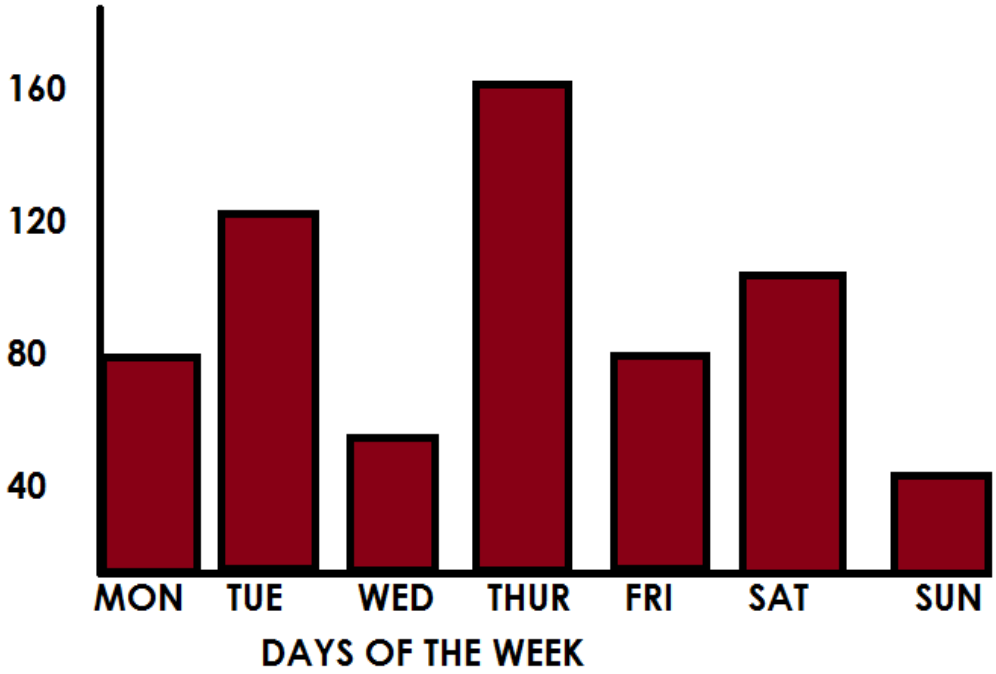
(f) Identify the day that had the height attendance.

(g) Find the median attendance.

(h) Calculate the range in the attendance of pupils for the whole week.

(i) Work out the average attendance of pupils of the whole week.

2) The graph below shows number of eggs sold in a week.



Questions

(a) How many eggs were sold on Wednesday?

(b) Which day had the height attendance?

(c) Identify the two days that had the same attendance.

(d) If eggs were packed on trays each 30 eggs, how many trays were produced on Monday and Sunday?

(e) Calculate the average number of eggs produced from Monday to Friday.

(f) Find the range in the production of eggs for whole week.

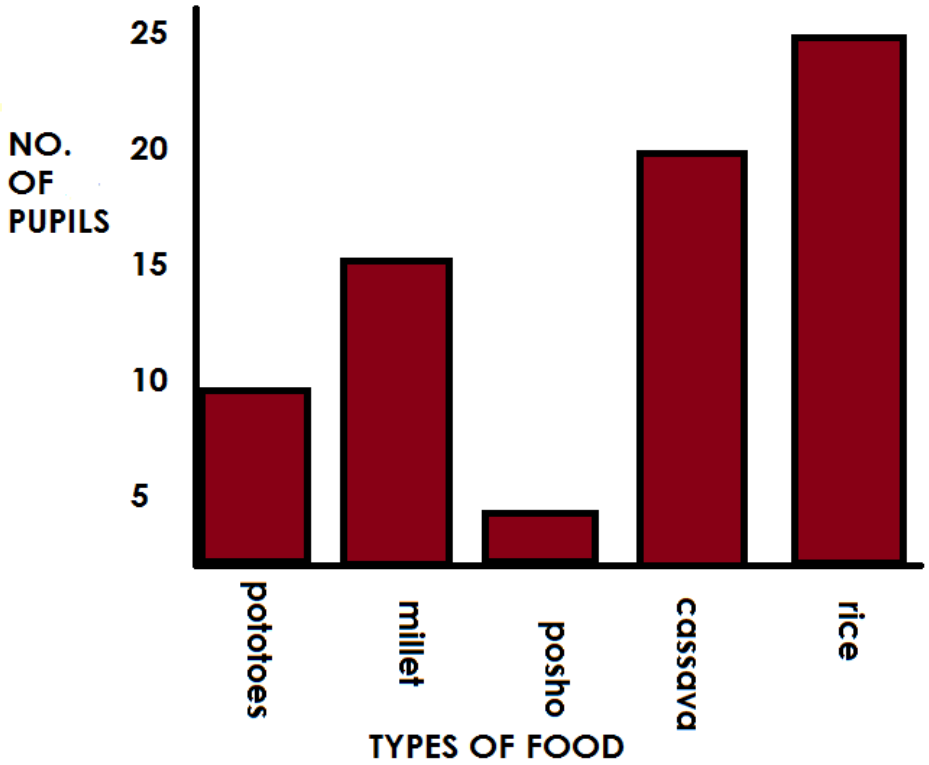
DRAWING BARS GRAPHS

- The graph should be well labeled.
- All graphs are drawn on a scale.
- If the scale is not given, come up with the vertical and horizontal scale before representing information on a bar graph.
- A good graph should have a title.

Example I

The table below shows types of food liked by pupils in P.5.

No. of pupils	10	15	5	20	25
Types of food	Potatoes	Millet	Posho	Cassava	Rice



Questions

(a) How many pupils like rice?

(b) Find the range of pupils.

(c) How many pupils are in primary five?

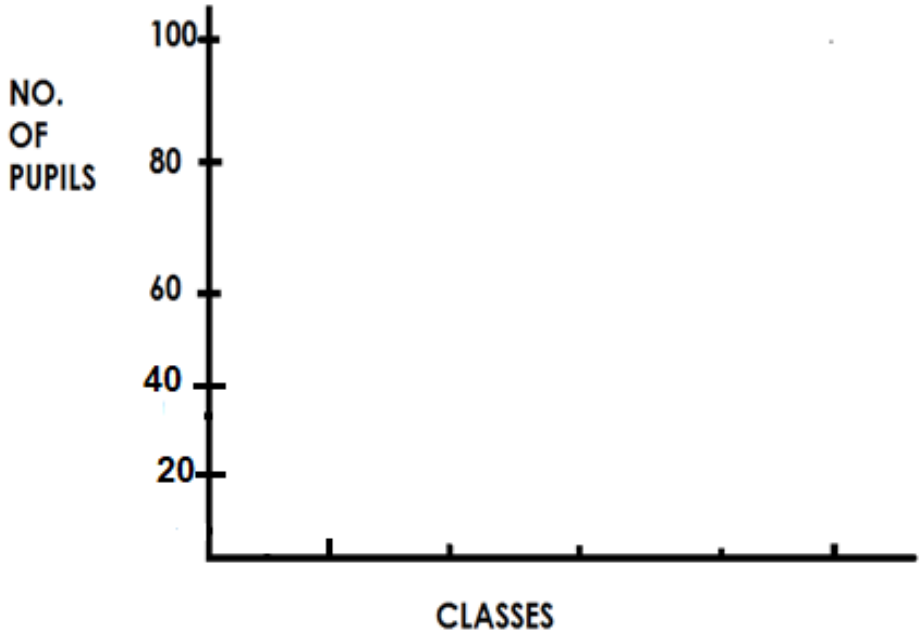
(d) Calculate the average number of pupils.

Activity

The table below shows pupils of St. Anthony Primary School.

No. of pupils	40	100	40	80	60
Class	P.1	P.2	P.3	P.4	P.5

Show the above information on the graph below.



(a) Which class has the highest number of pupils?
(b) How many pupils are in P.1 and P.4?
(c) Calculate the average number of pupils in the school.

2. The table below shows the average between rainfall at the Mt. Elgon between March and August. Study the table carefully.

Month	March	April	May	June	July	August
Rainfall	30cm	65cm	50cm	70cm	80cm	70cm

(i) Draw a bar line graph to represent the information in the table.
(ii) Choose a title for your graph.
(iii) What is the scale on your vertical axis?
(iv) What is shown on your horizontal axis?
(v) What is shown on your vertical axis?

LINE GRAPH

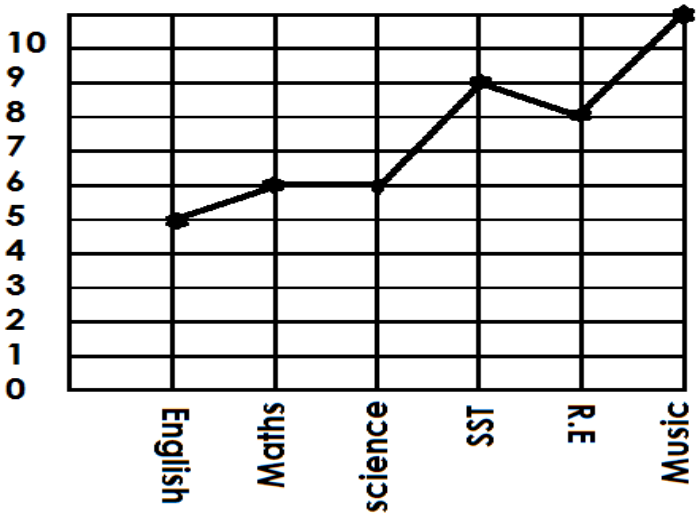
Line graphs are often used to show how something changes over a period of time.

Example I

The following were numbers of correct answers scored in different subjects.

SUBJECTS	NUMBERS OF CORRECT ANSWERS
English	5
Maths	6
SST	9
SCI	6
R.E.	8
Music	10

Draw a line graph and represent the above data.



(a) What was Mukobe's score in SST?

Mukobe scored 9 in SST.

(b) How many questions did Mukobe fail in Maths?

10 – 6 = 4 Mukobe failed 4 questions.

(c) In which subjects did Muobe have all answers correct?

Mukobe got all members correct in music.

(d) Workout Mukobe's total score in all five subjects

= 5 + 6 + 6 + 9 + 8 + 1 0

= 4 4

Activity.

1. The table below shows marks scored by Alex in a test which was marked out of 10.

Subject	**Marks scored.**
ENGLISH (ENG)	8
MATHEMATICS (MTC)	10
SCIENCE (SCI)	4
SOCIALSTUDIES (SST)	6
RELIGIOUS EDUCATION (R.E)	5

Draw a line graph and represent the above information.

2. Below are different ages of pupils in P.3.

Pupils Name	**Age**
Alex	8
Musa	7
Ali	9
Alice	10
Ruth	8
Faith	8

Draw a line graph and represent the above data

3. Use the information below showing number of people in different families to draw a line graph.

Family.	Number of people.
Kato's family	11
Mubiru's family	8
Ariho's family.	9
Kiiza's family.	10

4. The table below shows Kasita's daily sales for a week.

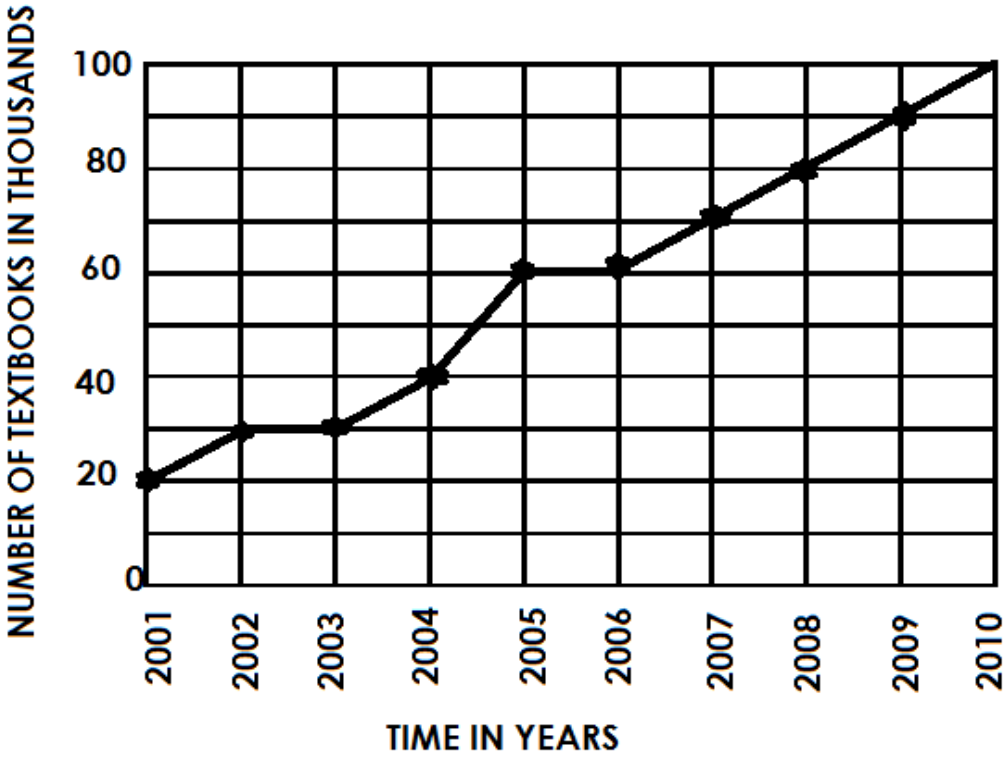
Day	Mon	Tue	Wed	Thur	Fri	Sat
Sales in (sh)	20,000	15,000	25,000	30,000	40,000	35,000

(a) Draw a graph to show the information in the table.

(b) What is the difference between the highest and lowest sales?

(c) What is total value of sales for the six days?

5. The graph below shows text books received by primary schools in a district for ten years use it to answer questions that follow.



(a) In which year was the biggest number of text books received?

(b) How many text books were received in 2002?

(c) Calculate the total number of textbooks that were received in 2009 and 2000.

(d) Name the year in which 50,000 books were received.

(e) In which year was the least number of textbooks received?

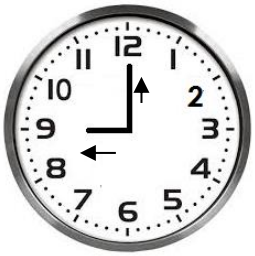
TIME

Telling time in a.m and p.m.

- a.m mean Ante Meridiem.
- a.m is the first part of the day hence morning time.
- a.m starts from 12:00 mid – night to 12:00mid- day
- p.m means post meridiem.
- p.m is the second part of the day hence afternoon and evening time.

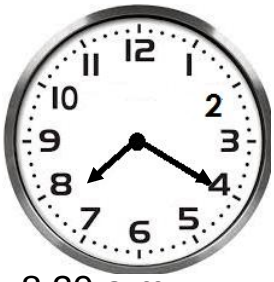
Example

(1) Write the time in a.m and p.m



9:00 a.m**or** 9:00p.m

(2) Write the meaning time on the clock face below.



8:20 a.m

(3) Write the morning time shown on the clock face below.

5: 50am

(4) Express 6 o'clock in the morning

Soln

6:00a.m

(5) 8 o'clock in the afternoon

Soln

8:00p.m

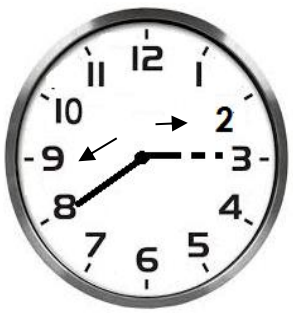
Activity

(1) Write the morning time shown on the face.

(2) Write the evening time shown on the clock face.

(3) Write the morning time on the clock face.

(4) Write the afternoon time shown on the clock face.



(5) Write the time using a.m or p.m

(a) The time when the first lesson begins at 8 o'clock.

(b) The time when you go to sleep at 9 o'clock.

(c) The time when we go home at a half past 5 o'clock.

(d) What time is a quarter to 9 o'clock in the morning.

(e) The time when we go to school at a half past 6 o'clock in the evening.

CHANGING HOURS TO MINUTES

Note:**1 hour = 60 minutes**

Examples.

Change 4 hours to minutes

1 hour = 60minutes

4 hours = (4 x 60) minutes

= 240minutes

Covert $2\frac{1}{2}$to minutes

1 hour = 60minutes

$2\frac{1}{2}$ hour $=2\frac{1}{2}$ x 60 minutes

$=\frac{5}{\cancel{2}_{1}}$ x $\cancel{60}^{30}$ minutes

= 150 minutes

Express $9\frac{1}{4}$ x 60mimutes

1 hour = 60minutes

$9\frac{1}{4}$ hours = $9\frac{1}{4}$ x 60minutes

$= \frac{37}{\cancel{4}}$ x $\cancel{60}^{15}$ minutes

= 555 minutes

Convert $3\frac{1}{4}$hours to minutes.

Soln

1 hours = 60minutes

$3\frac{1}{4}$hours $=3\frac{1}{4}$x 60 minutes

$= \frac{13}{\cancel{4}_{1}}$x $\cancel{60}^{15}$ minutes

= 195 minutes

Activity

1. Convert 4 hours to minutes.
2. Convert the following hours to minutes

(a) $1\frac{1}{2}$ hours (b) $4\frac{1}{2}$ hours (c) $6\frac{1}{2}$ hours (d) $7\frac{1}{2}$ hours

(e) $9\frac{1}{3}$ hours (f) $10\frac{1}{2}$ hours (g) $13\frac{1}{4}$ hours

CHANGING MINUTES TO HOURS

Note: 60minutes = 1 hour

Example

1. Change 240 minutes to hours.

Soln

60 minutes = 1hr

1 min $= \left(\frac{1}{60}\right)$ hours

240 mins $= \left(\frac{1}{\cancel{60}} \times \cancel{240}^{4}\right)$ hrs

$=$ 4hrs

2. Change 150 minutes to hours

Soln

60mins = 1hrs

1 min $= \left(\frac{1}{60} \times 555\right)$ hrs

$= \frac{555}{60}$ hours

$9\frac{1}{4}$ hrs

Activity

1. Change the following minutes into hours

(a) 120 minutes

(b) 360 minutes

(c) 210 minutes

(d) 135 minutes

2. The meeting lasted for 90 minutes. Express the time the meeting lasted in hours.

ADDITION OF TIME

Note:

We cannot have more than 59 minutes in the column of minutes.

Example

1. Add:

Hours	Minutes
2	40
1	10
3	50

2. Add:

Hours	Minutes
5	35
+ 2	45
8	20

3. Work out:

Hours	Minutes
1	30
+ 3	30
5	00

4. Add:

Hours	Minutes
4	25
+ 2	50
7	15

Activity

1. Add the following

(a)

Hrs	Min
3	20
+ 2	15

(b)

Hrs	Min
1	45
+ 2	25

(c)

Hrs	Min
3	50
+ 7	30

(d)

Hrs	Mins
3	15
+ 4	45

(e)

Hrs	Min
7	35
+ 2	24

(f)

Hrs	Min
1	45
+	45

2. Add 3hrs 35 minutes to 4 hrs 42 minutes.

3. Baguma walked for 2hrs 40minuted from his home to the river and for 1hr 50 minutes from the river to the market. How long did it take him to walk from home to the market?

SUBTRACTION OF TIME

Note:

When re-grouping in subtraction of hours and minutes, regroup 1 hour = 60 minutes.

Examples.

1. Subtract:

Hours	Minutes
7	45
+5	20
2	25

2. Work out:

Hours	Minutes
~~5~~ 6	~~10~~ 60
1	40
4	30

60 + 10 = 70
70 - 40 = 30

3. Subtract:

Hours	Minutes
6 ~~7~~	~~40~~ 60
- 2	55
4	45

(60 + 40) - 55
100 - 55 = 45

Activity

1. Subtract the following

(a)

Hr	Min
3	25
− 1	45

(d)

Hr	Min
8	12
- 3	40

(c)

Hr	Min
4	20
- 1	50

(e)

Hr	Min
6	45
- 1	20

(d)

Hrs	Min
5	35
- 2	40

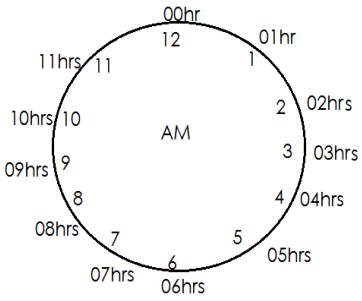
2. Ben took 3 hrs 25 min to move from home to town. If he walked 1hour 35min and took a taxi for the rest of the journey. How much time did he spend in the taxi?

3. Anukunda spent a total of 5hrs 20 minutes at school. She played for 1 hr 30 minutes for how long did she stay in class?

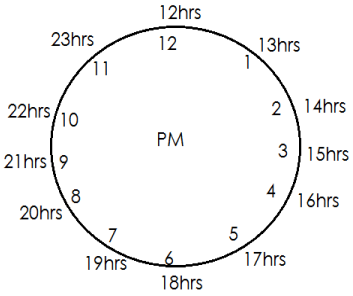
CHANGING TIME FROM 12 HOURS CLOCK TO 24 HOURS CLOCK.

Note:

- Time in 24 hour clock system is determined in hours (don't put a.m or p.m) .
- Dots separating hours and minutes are not written on time in 24-hour clock
- Time in 24-hour clock system is written using 4 digits.
- Given AM, use AM clock face whose first hour in 24 is 00hrs.



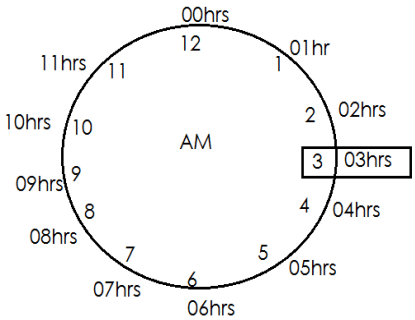
1. Give pm, we use pm clock face whose first hr in 24hour is 12 hours.



- Minutes, in 12-hour clock system remain the same in 24-hour clock system.

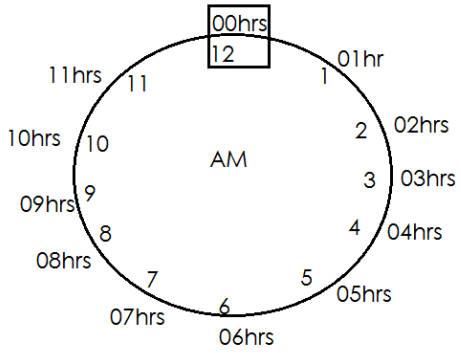
Examples

1. Express 3:45a.m to a 24 hours clock system.



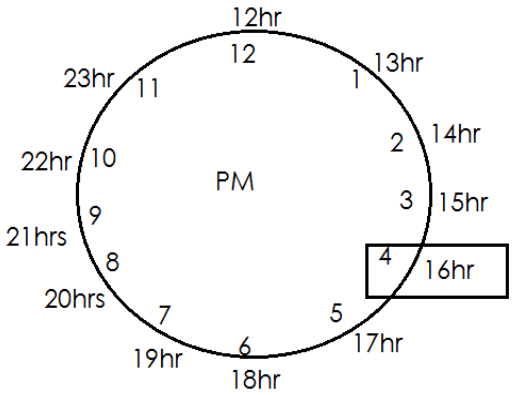
Therefore 3:45a.m = 0345hrs

2. Write 12:00midnight in 24-hour clock system.



∴ 12:00 midnight = 0000 hr

3. Express 4:35pm to 24hr clock system.



There 4:35 pm = 1635 hr.

Activities

1. Express 2:30pm to 24-hour clock system.
2. Change 3:20am to a 24-hour clock system.
3. Convert 4:25pm to a 24-hour clock system.
4. Convert the following to the 24-hour clock

(a) 11:28pm
(b) 11:00am
(c) 9:30am
(d) 8:25pm
(e) 2:35am
(f) 7:42am

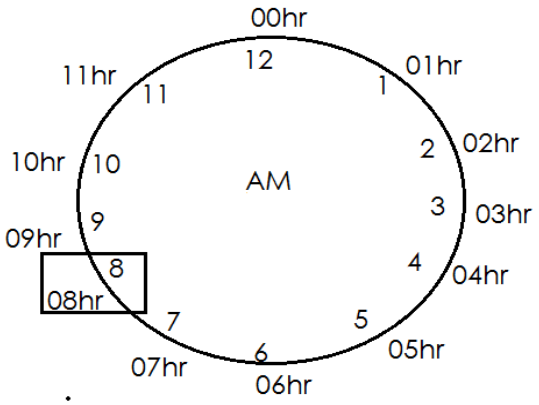
CHANGING 24 HOURS CLOCK SYSTEM TO 12 HOUR CLOCK SYSTEM

Note:

- When the 24-hour time is below 12 hours, that time is in am part of the day.
- When the 24-hour time is 12 hours and above, that time is pm.

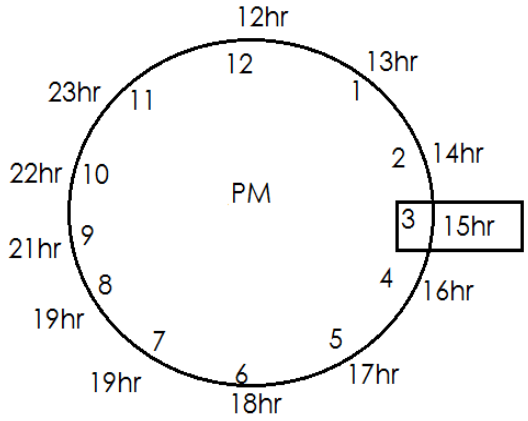
Examples

1. Change 085hr into 12-hour clock system



∴ 0825hr = 8:25a.m

2. Express 1520hr in 12-hour clock system.



∴ 1520 hrs = 3:15pm

Activity

Convert the following from 24 hours clock system to 12-hour clock system.

1. 1210 hrs
2. 2100hrs
3. 1745hrs
4. 1330hrs
5. 1612hrs
6. 1400hrs
7. 2315hrs

FINDING DURATION

Duration is the length of time something lasts.

Or

Duration is the time taken or used.

Note:

Duration = Ending time - starting time

Duration = ET - ST

Examples

A staff meeting started at 9:15a.m and ended at 11:45a.m. How long did it last?

Duration = ET - ST

	HR		MIN
Ending time →	11	:	45
Starting time →	9	:	15
Duration =	2		30

The meeting lasted for 2 hours 30 minutes

2. Tony started walking from his home at 7:30am and reaches town at 9:15a.m. How long was his journey?

HR	MIN	(60 + 15) - 38
9	15	75 - 38 = 37
- 7	38	
1	37	

The jouney lasted for 1hour 37 minutes.

3. Tom started an examination at 2:30pm and ended at4:30pm. How long did he take?

ET	HR		MIN
E.T	4	:	30
Starting time -	2	:	30
Duration	2		00

He took 2 hours

4. Jovan left Kampal for Nairobi at 6:00a.m and arrived in Nairobi at 8:20pm. How long did the journey take?

From 6:00am - Mid day (12:00)

HR		MIN
12	:	00
6	:	00
6	:	00

Then add

HR		MIN
6	:	00
+ 8	:	00
14	:	20

∴ The journey took 14 hours 20 minutes

Activity

1. A foot ball match started at 5:00pm and ended at6:50pm. How long did it last?
2. A party started at 10:30am and ended at 3:00pm. How long did the part take?
3. Kasule left Kampala for Kasese at 4:12a.m and arrived at 12:00noon. Find the time the journey lasted.
4. A lesson started at 8:00a.m and ended at 9:30a.m. How long did it take?
5. My father went to the garden at 7:40am and came back at 11:00a.m. He long did he take?
6. A speech day started at 8:15am and ended at 5:00p.m. How long was the speech day?

FINDING STARTING TIME A VENN ENDING TIME AND DURATION

Starting time = Ending time - Duration

S.T = E.T – D

Examples

A 2 hours meeting ended at 10:00a.m. At what time did it start?

ST = E.T - D

HR		MIN
10	:	00
- 2	:	00
8	:	00 am

The lesson started at 8:00a.m

A forty minutes lesson ended at 11:20a.m. At what time did start?

Soln = E.T - D

	HR		MIN	
10	~~11~~	:	~~20~~	60
-		:	40	
10		:	40	a.m

The lesson started at 10:40a.m

Example III

Our baby wake up at 11:00a.m.He took $1\frac{1}{2}$sleeping. At what time did it start sleeping?

Soln

E.T = HR MIN

D = ~~11~~ 60/00

− 1 30

9 30 am

$1\text{ hr} \frac{1}{2} \times \cancel{60}^{30}$

1 hr 30min

The baby started sleeping at 9:30a.m

Activity

1. A maths lesson which ended at 9:30am lasted for 2 hours. At what time did it started?
2. A fifty minutes lesson ended at 11:50am. At what time did it start?
3. A football match ended at 11:0pm if it lasted for 1 hr 30minutes. At what time did it start?
4. Bobi's speed speech lasted for 2hours 30min. If it ended at 11:50a.m. At what time did it start?
5. Richard sung for 40minutes. If he stopped at 9:20a.m. At what time did he start singing?

FINDING ENDING TIME WHEN GIVEN STARTING TIME AND DURATIONS

Ending time = Starting time + Duration

E.T = S.T + D

Examples

A lesson started at 8:00am and took 1 hours. At what time did it end?

E.T	=	S.T	+	D
		HR		MIN
S.T		8	:	00
	+	2	:	00
		10	:	00

It ended at 10:00am

Example II

A farmer who started digging at 7:20a.m used 3 $\frac{1}{2}$ hours. At what time did he end?

Soln

Time = $\frac{1}{\cancel{2}_{1}} \times \cancel{60}^{30}$min

3hr 30min

E.T	=	S.T	+	D
		HR		MIN
		7	:	20
	+	3	:	30
		10	:	50

He ended at 10:50am

Activity

1. A morning lesson started at 8:00a.m it took 2 hours. At what time did the lesson end?
2. A footbale match started at 3:30pm. If it took 1 $\frac{1}{2}$. At what time did it end?
3. A church service took 3 hours. It started at 4:30p.m. At what time did it end?
4. At what time did the shoe end it it started at 4:00pm and took 3 hours?
5. Our baby woke up at 11:00a.m. He took 1 $\frac{1}{2}$ hours sleeping. At what time did he start sleeping?

FINDING DISTANCE USING TIME AND SPEED

Note:

- Distance is a numerical measurement for how far apart objects or points are.
- Speed is the rate at which distance is covered.

Distance = Speed x Time

Therefore Distance = S X T

Examples

Find the distance a driver covers in 2 hrs at a speed of 90km/hr

Distance = S x T

$= \frac{90km}{1hr} \times 2hr$

$= 90km \times 2$

$= 180km$

A taxi takes $1\frac{1}{2}$hrs to cover a distance from Kampala to Mufuta at a speed of 60km/hr. Find the distance between Kampala and Mufuta.

Distance = S X T

$= 60km \times 1\frac{1}{2}hr$

$= \frac{3\ 60km}{1hr} \times \frac{3}{2}hr$

$= 30km \times 3$

$= 90km$

Find distance covered by a bus that travels at a speed of 12okm / hr in 40min.

Distance = S X T

$= \frac{120}{1\ hr} \times \frac{40hr}{60}$

$= 80km$

change minutes to hours by dividing given minutes by 40 min

Activity

1. A car moved at a speed of 50km/h for 3hrs. Find distance covered.
2. Find the distance covered by a cyclist moving at 15km/hr in 4hrs.
3. A motorist travelled from town A to B at a speed of 80km/hr in 2 hrs find the distance covered.
4. A school truck travelled for $2\frac{1}{2}$hrs at an average speed 60km per hours. What distance did it cover?
5. A cyclist travelled for $3\frac{1}{4}$ hours at a speed of 80km/hr. Find distance covered.
6. A car travelled for $4\frac{1}{2}$ hr at an average speed of 84km/hr. How long was the journey?
7. A car moving at 120km/hr take 20min to cover a journey. How long is the journey?
8. Musa takes 40min to covers a distance at a speed of 60km/hr. Find the speed used.
9. At a speed of 48km/hrMatama takes 45min to cover the journry, how long is the journey?

MORE ABOUT DISTANCE

Example I

A taxi left Jinja at 8:00am travelling to Kampala at a speed of 60km/hr. If it reached at 10:00am. Find the distance covered.

Soln

Time taken = ET - ST

Hrs		Min
10	:	00
-8	:	00
2	:	00

= 2hrs

D = S X T
= 60km / hr x 2hr
= $\frac{60km}{1hr} \times \frac{2hr}{1}$
= 120km

Activity

1. A car moves at a speed of 80km/hr from 2:00pm to 4:00pm. Find the distance covered.
2. Find the distance coverd by taxi travelling at an average speed of 90km/hr from 1:00pm to 4:00pm.
3. A bus moves at a speed of 70km/hr from 8:15am to 11:15am. Find the distance covered.
4. At a speed of 54km/hracylist left Katongo at 9:00am and arrived at Kampala at 10:30am. How far is Kampala from Katonga?
5. A cylist left Kampala at 11:00am and arrive Masaka at 1:00pm moving at a speed of 70km/hr. Calculate the distance covered.

FINDING TIME GIVEN DISTANCE AND SPEED.

Note: Time = Distance ÷ Speed

= D ÷ S

Time is measured in hours, minutes or seconds.

Examples

How long will a car take to cover a distance of 120km at a speed of 40km/hr.

T = D ÷S

= 120km ÷ 40km/hr

= 120km ÷ 40km

1hr

= 3hrs

3

= 120km x 1hr

40km

A motorist covered a distance of 90km a speed of 60km/hr. Find time used.

Time = D ÷ S

= 90km ÷ 60km/hr

= 90km ÷ 60km

1hr

= 90km x 1hr

60 km

2

1 rem 1

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

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

Activity

1. Peter has to cover a journey of 240km at a speed of 80km per hour. Find time taken.
2. Find time needed to cover a journey of 180km at a speed of 60km.
3. Calcualte time required for a car to cover a distance of 120km at a speed of 60km /hr.
4. Acyclistcoverd a distance of 100km ate a speed of 40km/hr. how many did he take?
5. How long will it take acyclist did he a distance of 80km at a speed of 20km/hr.
6. If a bus moves at 30km/hr and covers a distance of 240km, how long does it take to cover the journey?
7. A taxi travelled at a speed of 70km/hr to cover a distance of 245km. How long did it take?

FINDING SPEED GIVEN DISTANCE AND TIME

Speed = D ÷ T | Speed = $\frac{D}{T}$ if given whole numbers
Speed is measure in km/hr or m/sec

Examples

Find speed used to cover a distance of 150km is 5hrs.

Soln

$$\text{Speed} = \frac{D}{T}$$

$$= \frac{150}{5\text{hrs}}$$

$$= 30\text{km/hr}$$

A car covered a distance of 90km in $1\frac{1}{2}$hrs. Calcualte the speed used.

Speed = D ÷ T

= 90km ÷ $1\frac{1}{2}$hr

= 90km ÷ $\frac{3}{2}$hr

= 90kkm x $\frac{2}{3}$ hr

= 30km x $\frac{2}{1}$

= 60km/hr

At what speed did the bus travel to cover a distance of 80km in 40 minutes.

S = D ÷ T

= 80km ÷ $\frac{40}{60}$hr

2

= ~~8~~0km x $\frac{6\cancel{0}}{\cancel{4}0}$ hr

= 120km/hr

Activity

1. Find the speed needed for a motorist to cover a distance of 360km in 3hrs.
2. A driver covered a distance of 200km in 2hrs. At what speed was he travelling?
3. A cyclist covered a journey of 84km in 4 hrs. At what sped was he travelling?
4. Find speed used to cover a distance of 60km in $2\frac{1}{2}$ hr.
5. An athlethic covered a distance of 12km in $1\frac{1}{2}$hr find his speed.
6. A car covered 60km in$\frac{1}{2}$hours. How many km did it cover in eachhour?
7. Martha spends $6\frac{2}{3}$hours on the way from Mbale to Kampala a distance of 420km. At what speed was she travelling?
8. Find speed needed to cover a distance of 30km in 20 minutes.
9. Calculate speed used to cover a distance of 120km in 50 minutes.
10. Othieno covered a distance of 180km in 40 minutes. Calculate his speed in km/hr.