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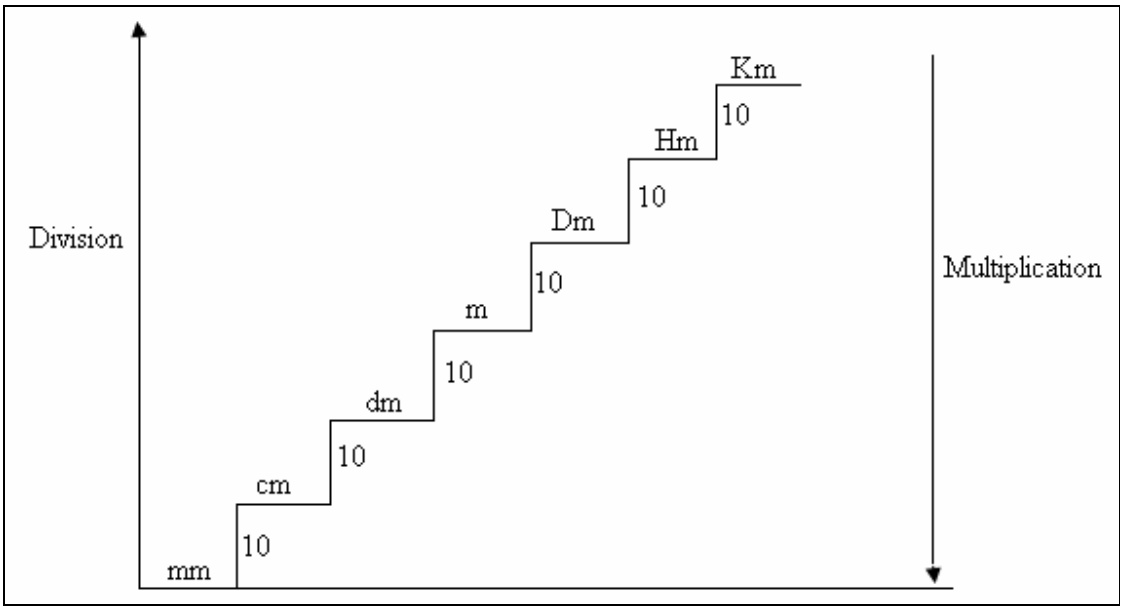
GENERAL MATHEMATICS FORMULAE

Length

The units of length that are used include the following:

- millimetre (mm)
- centimetre (cm)
- decimetre (dm)
- Metre (m)
- Dekametre (Dm)
- Hectometre (Hm)
- Kilometre (Km)

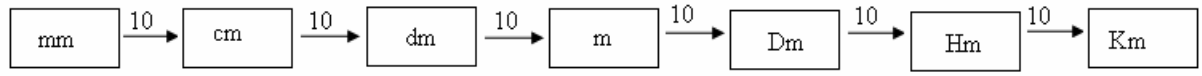


From the illustration:

- 10mm = 1cm
- 10cm = 1dm
- 10dm = 1m
- 10m = 1 Dm

- 10Dm = 1Hm
- 10 Hm = 1Km

The relationship between the units of lengths may be clearly seen if the units are written with a 10 between them.



So to find how many small units are equivalent to another, multiply the number of tens between the units, hence:

- Km 1
- Hm 10
- Dm 100
- M 1000
- dm 10000
- cm 100000
- mm 1000000

Mass

- 1000 g = 1Kg
- 1000 Kg = 1Tonne
- 1000000 g = 1Tonne

Volume and Capacity

- 1 cm^3 = 1 Ml (millilitre)
- 1000 cm^3 = 1 L (litre)
- 100 cm^3 = 1 dl (decilitre)
- 1 m^3 = 1000 litre
- 1000000 cm^3 = 1 m^3

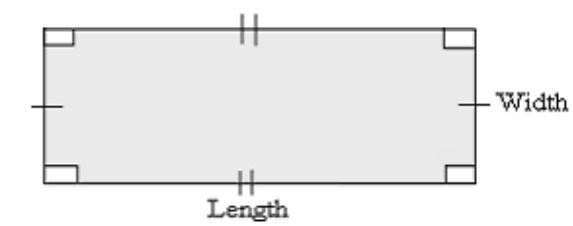
- 10 dl = 1 Litre
- 1000ml = 1 Litre

Time

- 60 Seconds = 1 Minute
- 60 Minutes = 1Hour
- 3600 Seconds = 1 Hour
- 24 Hours = 1 day
- 7 Days = 1 Week

Area

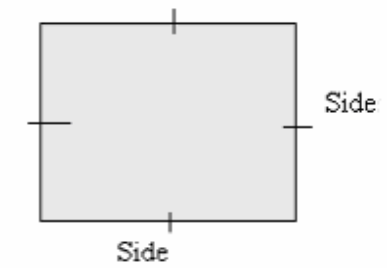
a) Rectangle



Area = Length x Width

A = L X W

b) Square

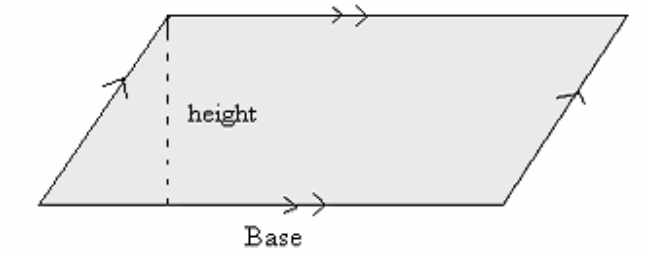


Area = Side x Side

A = S x S

A = S^2

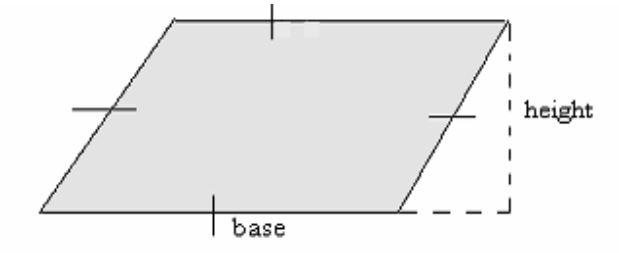
c) Parallelogram



A = base x Height

A = b x h

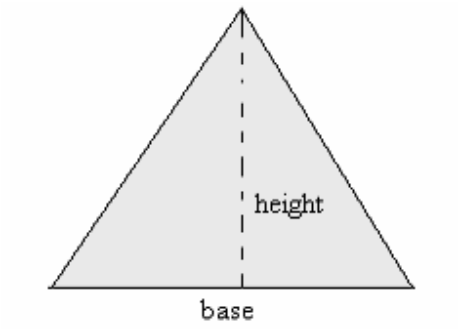
d) Rhombus



Area = base x height

A = b x h

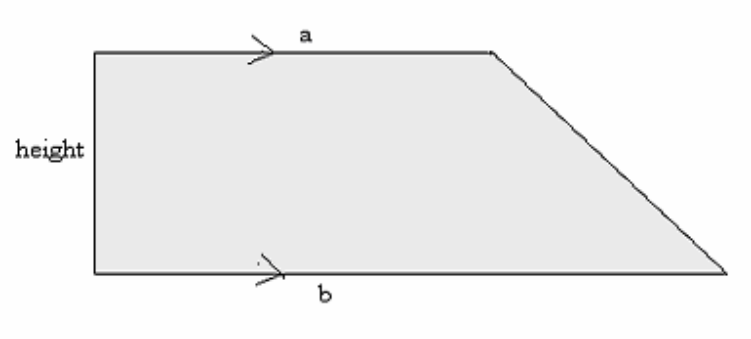
e) Triangle



Area = $\frac{1}{2}$ base x height

A = $\frac{1}{2}$ b x h

f) Trapezium



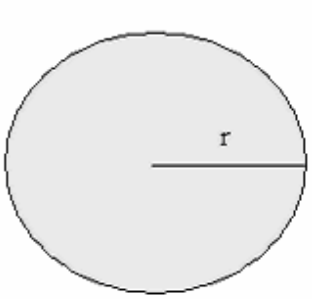
Area = $\frac{1}{2}$ x sum of parallel lines x height

A = $\frac{1}{2}$ (a + b) x h

A = $\frac{1}{2}$ h (a + b)

g) Circle, half circle, quarter circle

i) Circle



Area = Π x radius x radius

A = Π x r x r

A = Πr^2

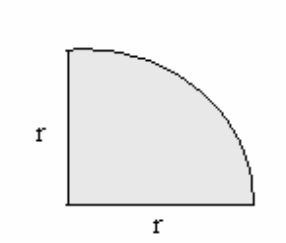
ii) Half circle

Area = Area of a full circle ÷ 2

$A = \frac{\Pi r^2}{2}$

$A = \frac{1}{2} \Pi r^2$

iii) Quarter circle



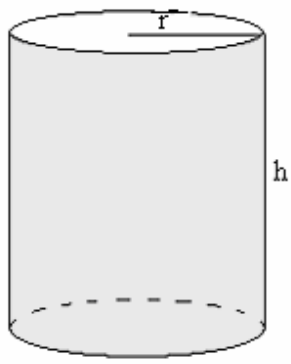
A = Area of the full circle ÷ 4

$A = \Pi r^2 \div 4$

$A = \frac{1}{4}\Pi r^2$

Note: $\Pi = \frac{22}{7}$ or 3.14 or $3\frac{1}{7}$

Surface Area



a) Cylinder

T.S.A = Area of circular ends + area of the curved surface

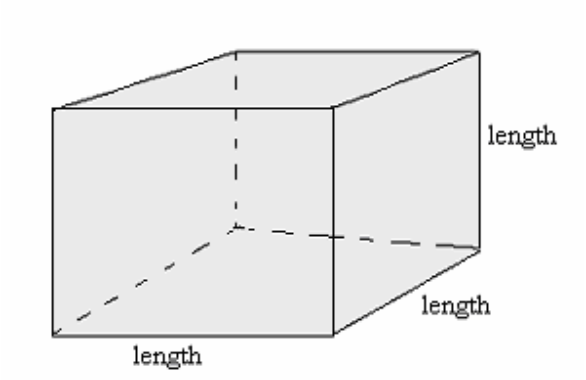
=

$2\pi r^2$ + Πdh (if closed both ends)

T.S.A = Πr^2 + Πdh (if open one end)

T.S.A = Πdh (if open both ends/pipe)

b) Cube



T.S.A = Total area of all the six faces

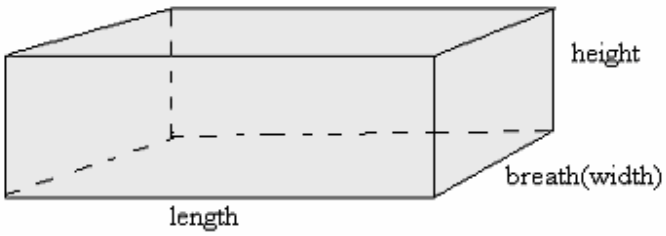
= 6 x L x L

= 6L^2 (if closed)

or

= 5L^2 (if open one end)

c) Cuboid



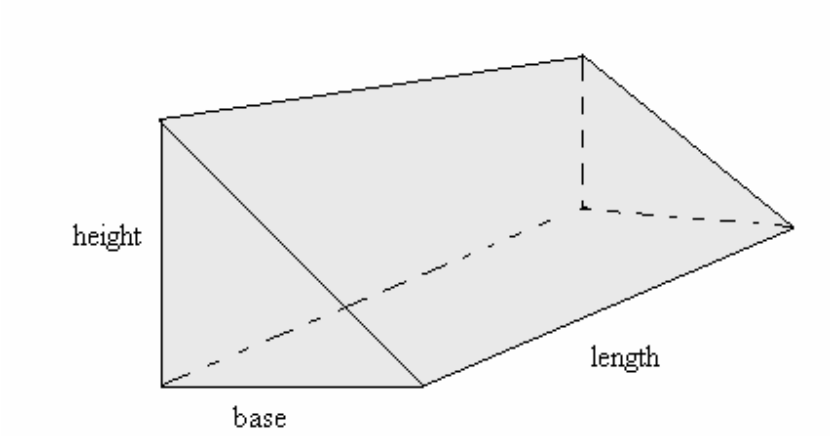
T.S.A = Total area for the six faces

= 2 (L x w) + 2 (L x h) + 2 (w x h)

or

= (L x w) + 2 (L x h) + 2(w x h) (if open on top)

d) Triangular prism



T.S.A = Area of all the 5 faces of the prism

Volume of cylinder and rectangular shapes

a) Cylinder

Volume = Base area x height

= Πr^2 x height

= $\Pi r^2 h$

b) Rectangular shape

Volume = Base area x height

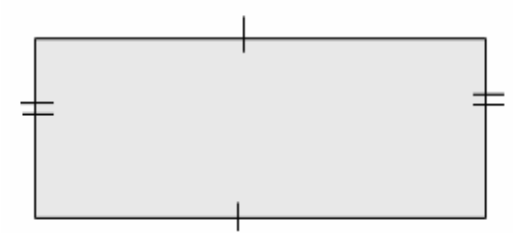
V = L x w x h

Note: Depending on the cross-section, the volume of any shape / solid is given by.

V = Area of cross-section x height/length

Perimeter

a) Rectangle

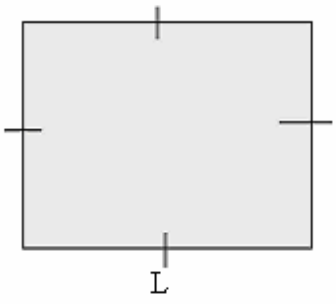


P = Length + Length + Width + Width

= L + L + W + W

= 2L + 2W or 2(L + W)

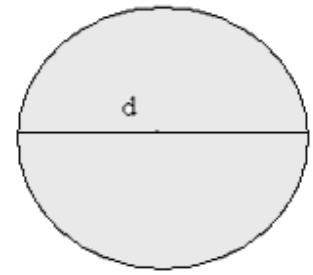
b) Square



P = L + L + L + L

= 4L

c) Circle

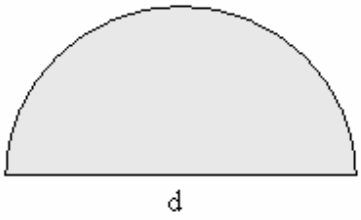


C = Π x diameter

= Πd or 2Πr

Note: Perimeter of a full circle is called *circumference*

d) Half a circle



Perimeter = circumference + diameter

$P = \frac{1}{2}\Pi d + d$

Note: For triangles and irregular shapes, JUST ADD THE DISTANCE ALL ROUND.

Expressing area of large shapes

a) Hectare – A shape that measures 100m by 100m

Therefore 1ha = $(100 \times 100)m^2$

1 ha = $10000m^2$

b) Are – a piece / shape that measures 10m by 10m

Therefore 1 are = 10 x 10

1 are = $100m^2$

Hence:

1 ha = $10000m^2$

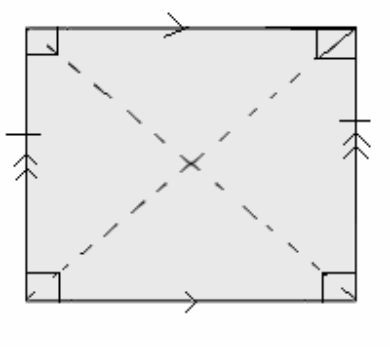
1are = $100m^2$

1ha = 100ares

PROPERTIES OF GEOMETRIC SHAPES

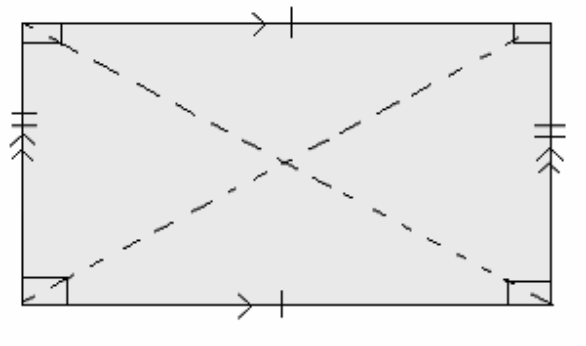
General Geometric Shapes

a) Square



- All sides are equal
- Opposite sides are parallel
- Each interior angle is a right angle (90^0)
- The interior angles total up to 360^0
- Diagonals bisect each other at right angles.
- Diagonals measure the same length and bisect interior angles.

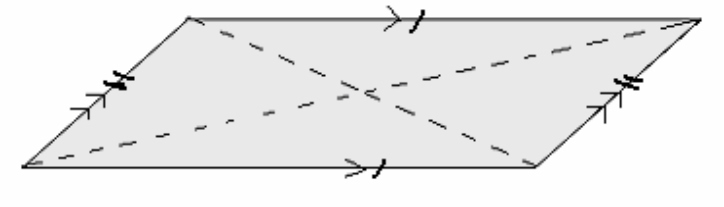
b) Rectangle



- Opposite sides are equal

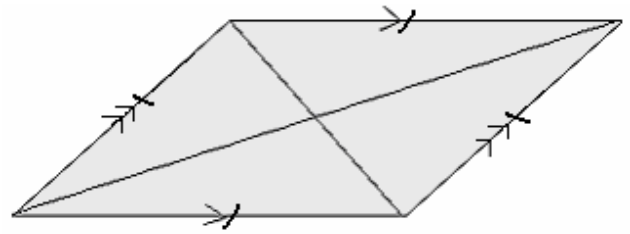
- Each interior angle is 90^0 and they all add up to 360^0
- Diagonals are equal
- Diagonals bisect each other but **NOT** at right angles

c) Parallelogram



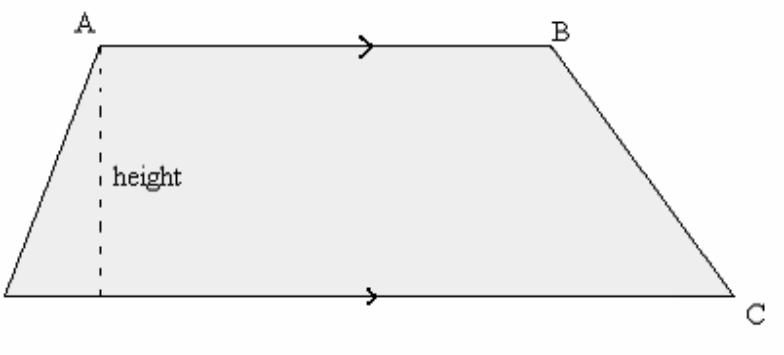
- Opposite sides are equal and parallel
- Opposite angles are equal
- Diagonals bisect each other
- Diagonals are not equal
- Adjacent angles are supplementary (add up to 180^0)

d) Rhombus



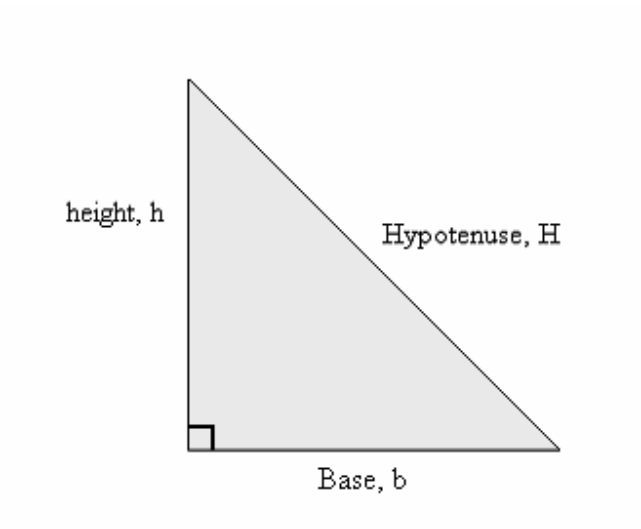
- All sides are equal
- Opposite sides are parallel
- Opposite angles are equal
- Diagonals bisect each other at 90^0
- Diagonals bisect the interior angles

e) Trapezium



- The sum of the interior angles is 360^0
- Has a pair of parallel lines which are **not** of the same length
- Has a perpendicular height joining the two parallel lines

f) Right-angled triangle (Pythagorean relationship)

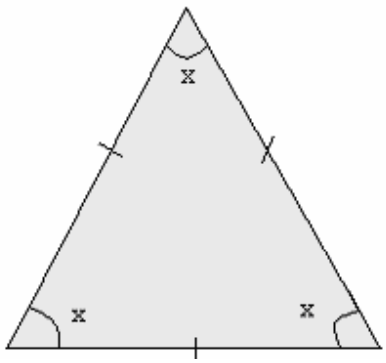


a) $H^2 = b^2 + h^2$
b) $b^2 = H^2 - h^2$
c) $H^2 = H^2 - b^2$

Examples of relationships

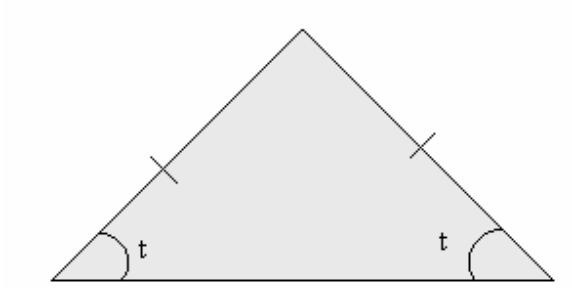
Base	**Height**	**Hypotenuse**
3	4	5
6	8	10
5	12	13
7	24	25
8	15	17
9	40	41

g) Equilateral triangle



- All sides are equal
- All angles are equal
- The sum of interior angles is 180^0
- Each angle measures 60^0

h) Isosceles triangle

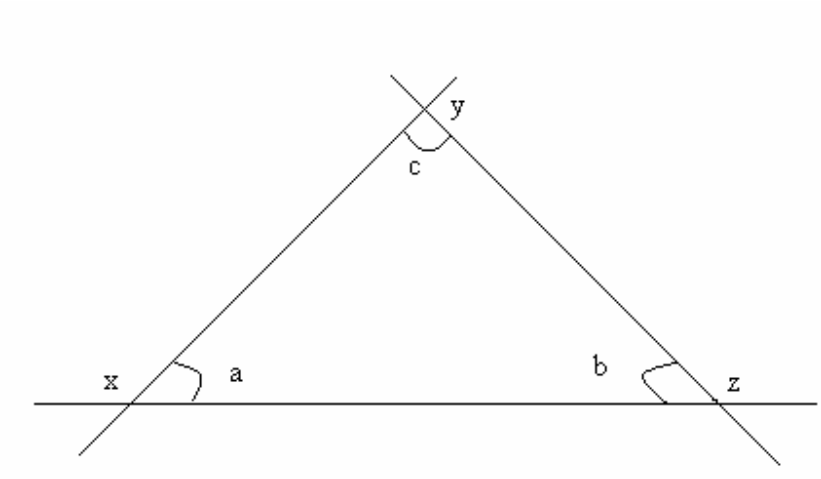


- Only two sides are equal
- Base angles are equal

Properties of Triangles and Parallel Lines

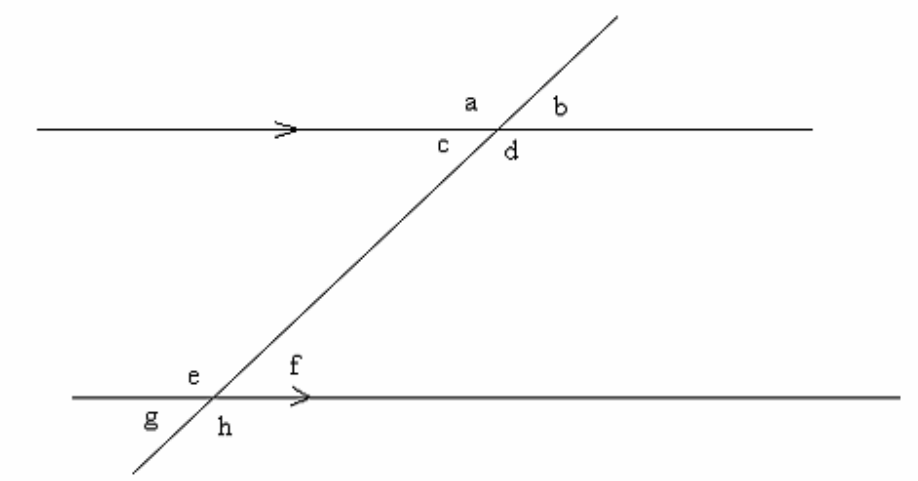
a) Triangle

Exterior angles & interior angles



- Angles x, y, and z are *exterior angles* while a, b, and c are *interior angles*.
- Exterior angles add up to 360^0 while interior angles add up to 180^0.
- Angles x, a; b, z; and c, y; are adjacent to each other and they add up to 180^0 (supplementary angles)

b) Parallel Lines and Transversal



a) Angles at a point e.g. a + b+ c + d = 360^0

b) Vertically opposite e.g. a/d, b/c, f/g, e/h. They are equal

c) Corresponding angles e.g. b/f, a/e, c/g, d/h. They are equal

d) Alternate angles e.g. c/f, d/e are always equal.

e) Co-interior angles e.g. c/e, d/f, are always equal.

f) Co-interior/allied angles e.g. c/e, d/f are formed by parallel lines. They are supplementary.

c) Speed, Distance and Time

The formulae related to speed, distance and time can be derived from the following triangle.

1. NUMBERS

1.1 Specific Objectives

By the end of this unit, the learner will be able to:

a) Read and write numbers in symbols and words

b) Work out squares and square roots of whole numbers, fractions and decimals

c) Convert fractions to percentages and vice versa

d) Work out problems involving operations on whole numbers, fractions, decimals and combined operations

e) Work out problems involving number sequence of whole numbers, fractions and decimals.

In this section you will need the following hints to solve the exercises:

- Place value of whole numbers
- Total value of whole numbers
- Multiplication of whole numbers/tables
- BODMAS
- LCM and GCD

1.2 Worked Exercise

1. What is four million seventy thousand and five hundred and thirty three?

A. 4,070,353 B. 4,070,533 C. 4,007,533 D. 4,700,533

Working

Using the place value table, the question can be solved as follows:

Millions	Hundred Thousands	Ten thousands	Thousands	Hundreds	tens	Ones
4	0	7	0	5	3	3

The correct answer is B (4070533)

2. What is the square root of $7\frac{9}{16}$

A. $7\frac{3}{4}$ B. $2\frac{3}{4}$ C. $1\frac{3}{8}$ D. $\frac{11}{16}$

Working

Step 1: Change the mixed fraction to improper $\frac{121}{16}$ Find the square root of both numerator and denominator.

Step 2: Find the square root of both numerator and denominator

$$= \frac{\sqrt{121}}{\sqrt{16}}$$

$$= \frac{11}{4}$$

Step 3: Change the improper fraction to mixed fraction

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

The correct answer is B

3. What is 25% as a fraction?

A $\frac{1}{5}$. B. $\frac{3}{4}$ C. $\frac{1}{2}$ D. $\frac{1}{4}$

Working

Step1: Express the percentage with 100 as a denominator.

$= \frac{25}{100}$

Step 2: Simplify

$= \frac{1}{4}$ The correct answer is D

4. What is the value of $\frac{1}{3}$ of $(\frac{1}{2} + \frac{1}{9}) \div \frac{1}{6}$

A. $\frac{11}{324}$ B. $\frac{1}{99}$ C. $1\frac{2}{9}$ D. $\frac{4}{11}$

Working

Step1: Using the order of operation, BODMAS, solve the brackets first.

$\frac{1}{2} + \frac{1}{9} = \frac{9+2}{18}$

$= \frac{11}{18}$

Step 2: Open brackets and calculate 'of '

$= \frac{1}{3}$ of $(\frac{11}{18}) \div \frac{1}{6}$

$= \frac{1}{3}$ of $(\frac{11}{18}) \div \frac{1}{6}$

$= \frac{11}{54} \div \frac{1}{6}$

Step3: Calculate the division part

$= \frac{11}{54} \div \frac{1}{6}$

$= \frac{11}{54} \times \frac{6}{1}$ (multiply by the reciprocal of $\frac{1}{6}$

$= \frac{11}{9}$

Step 4: Change the improper fraction to mixed fraction.

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

The correct answer is C.

5. The price of radio is Sh1800. The price was reduced by 15% during an auction. How much is the price after the reduction?

A. Sh270 B.Sh2070 C. sh1530 D. sh1785

Working

Marked price = Sh1800

Percentage decrease = 15%

New price

85% of Sh1800 (100% - 15%)

$= \frac{85 \times 1800}{100}$

= Sh1, 530

The correct answer is Sh 1530 (**C**)

6. In a certain year a tea factory produced 2500 tonnes of tea leaves. The following year the tonnes increased to 4000. What is the percentage increase?

A .160% B. $62\frac{1}{2}\%$ C. 60% D $37\frac{1}{2}$ %

Working

First year = 2500 tonnes

Second year = 4000 tonnes

Increase = 1500 tonnes (4000-2500)

% Increase = $\frac{\text{Increase}}{\text{Original}} \times 100$

$= \left(\frac{1500}{2500} \times 100\right)\%$

$= 60\%$

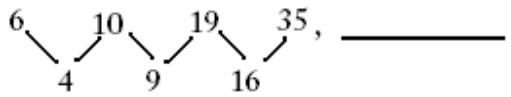
The correct answer is C (60%)

7. What is the next number in the sequence below.

6, 10, 19, 35, …..

A. 60 B. 84 C. 71 D51

Working



2^2 3^2 4^2

The next difference is $5^2 = 25$

The next number is $35 + 25 = 60$

The correct answer is A (60)

2. MEASUREMENTS

2.1 Objectives

Length, Perimeter and Area

Specific objectives:

a) Work out problems involving conversions of units of length

b) Work out problems involving perimeter and circumference.

c) Work out area of triangle, circles cuboids and quadrilaterals.

d) Work out surfaced area of cubes, cuboids and cylinders.

2.2 Worked Exercise

1. Tracy used a piece of wire $8\frac{1}{2}$ m long to support tomato plants in the garden. The wire was cut

into pieces of 28cm long. How many complete pieces were obtained?

A. 85 B. 30 C. 20 D 30.10

Working

1 M = 100cm

$8\frac{1}{2}$ m = ?

$8\frac{1}{2}$ x 100 = 850cm

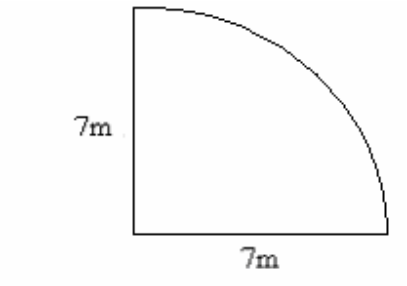
1 piece = 28 cm

? = 850cm

$= \frac{850}{28}$

= 30 complete pieces remainder 10cm

2. The figure below represents a flower garden



What is the perimeter of the garden?

A. 25m B. 38.5m C.11m D. 44m

Working

$P = \frac{1}{4}\Pi d + r + r$

$= (\frac{1}{4} \times \frac{22}{7} \times 14) + (7+7)$

$= 11 + 14$

$= 25$ m

The correct answer is A (25)

3. The parallel sides of a trapezium measure 10cm by 18cm respectively. If the distance between the parallel sides is 8cm, what is the area of the trapezium in cm²?

A. 224 B. 112 C. 108 D. 84

Working

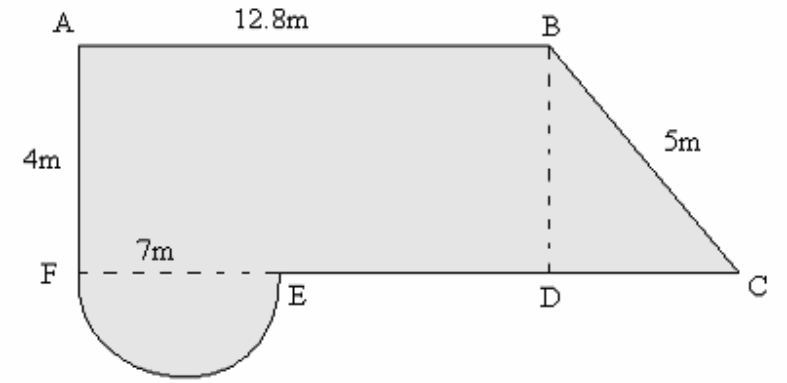
Area of a trapezium $= \frac{1}{2} h (a + b)$

$= \frac{1}{2} \times 8 \times (10+18)$

$= \frac{1}{2} \times 8 \times 28$

$= 112cm^2$

4. The figure below shows vegetable garden.



What is the perimeter?

A. 0.526m B. 5.26m C. 52.6m D. 526m

Working

Perimeter of semi-circle

$= \frac{1}{2} \pi d$ (Circumference only)

$= \frac{1}{2} \times 2 \times \frac{22}{7} \times 7$

$= 22m$

To get DC $= \sqrt{25} - \sqrt{16}$

$= \sqrt{9}$

$= 3m$

Length DE $=$ AB – ED

$= 12.8 - 7$

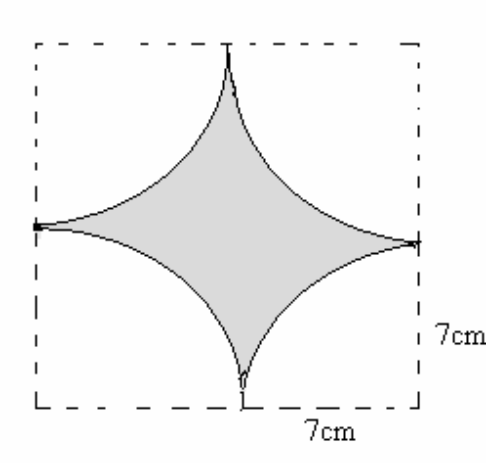
$= 5.8m$

Total length 12.8+ 5 + 3 + 5.8 + 22 + 4

= 52.6 m

The correct answer is (52.6)

5. What is the perimeter of the following shape?



A. 88cm B. 44cm C.176cm D56cm

Working

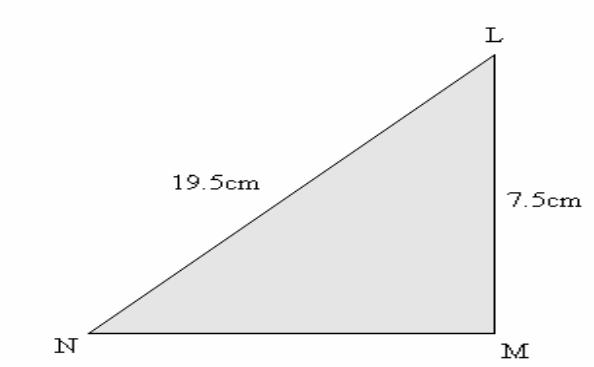
P = circumference of a circle of radius 7cm

= $2\prod r$

= $2 \times \frac{22}{7} \times 7$

= (44 cm)

6. The figure below shows a right angled triangle LMN in which LM = 7.5cm and LN = 19.5cm



What is the area of the triangle in cm²?

A. 18 B. 67.5 C. 27 D. 34.5

Working

Apply Pythagoras relation in triangle LMN

$LN^2 = LM^2 + NM^2$

$Nm^2 = LN^2 - LN^2$

$= 19.5^2 - 7.5^2$

$= 380.25 - 56.25$

$= 324$

$NM = \sqrt{324}$

$= 18$ cm

Area of triangle LMN

$= \frac{1}{2}$ Base x height

$= \frac{1}{2} \times 18 \times 7.5$

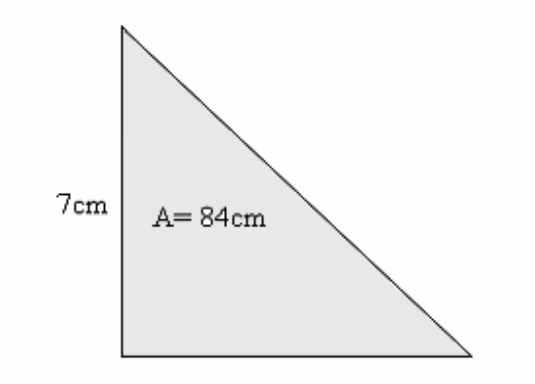
$= 67.5cm^2$

The correct answer is B ($67.5cm^2$)

7. The area of a right-angled triangle is 84cm². If the height of the triangle is 7cm, what is the length of the longest side?

A. 25cm B. 24cm C. 19cm D. 12cm

Working



The Pythagoras relationship states that

$H^2 = b^2 + h^2$

But Area $= \frac{1}{2}bh$

$84 = \frac{1}{2} \times b \times 7$

$84 \times 2 = 7b$

$24 = b$

$\therefore H^2 = 24^2 + 7^2$

$H^2 = 576 + 49$

$H^2 = 625$

$H = 25$

Therefore the correct answer is 25cm (A)

8. What is the surface area of an open cylinder whose radius is 6.3cm and height of 25cm.

A 114.74cm² B1239.48cm² C 3118.50cm² D 619cm²

Working

Total surface area = $\pi r^2 + \pi dh$

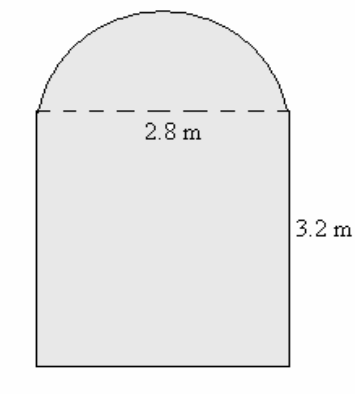
= $(\frac{22}{7} \times 6.3 \times 6.3) + 2 \times \frac{22}{7} \times 6.3 \times 25$

= $124.74 + 990$

= $1114.74\ cm^2$

The correct answer is $1114.74\ cm^2$ (A)

9. A Welder made a door with a design as shown below.



What is its area? (Take $\prod = \frac{22}{7}$)

A. $15.12m^2$ B. $12.04m^2$ C $13.36m^2$ D. $21.28m^2$

Working

Area of the semi- circle = $\frac{1}{2} \prod r^2$

= $\frac{1}{2} x \frac{22}{7} \times 1.4 \times 1.4$

= $3.08m^2$

Area of the rectangle = L x w

= 3.2 x 2.8

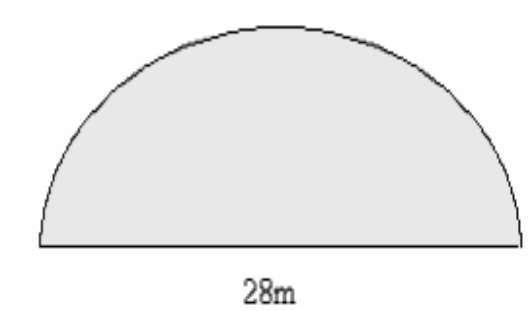
= 8.96 m²

Total area = (3.08 + 8.96)m²

= 12.04 m²

The correct answer is B (12.04m²)

10. The diagram below represents a plot with a diameter of 28 meters.



The plot was fenced by erecting posts 4m apart. How many posts were used ? ($\prod = \frac{22}{7}$)

A. 12 B. 17 C.18 D 19

Working

Perimeter = $\frac{1}{2}\Pi$ d + d

= ($\frac{1}{2}$ x $\frac{22}{7}$ x 28 + 28)

= 72 m

No of posts = $\frac{\text{Perimeter}}{\text{Interval}}$

= $\frac{72}{4}$

= 18 posts

The correct answer is C (18)

3. VOLUME, CAPACITY AND MASS

3.1 Specific Objectives

By the end of this unit, the learner should be able to:

a) Calculate the volume of cubes, cuboids, cylinders and triangular prisms.

b) Work out problems involving conversion of units of capacity to units of volumes and vice-versa.

c) Work out problems involving conversion of units of mass.

3.2 Worked Exercises

1. A Jerry can contains 5 litres of juice. This juice is used to fill 3 containers each of radius 7 cm and height of 10cm. How many milliliters of juice are left in the jerry can?

A.380 B.480 C. 400 D. 420

Working

Volume of container: = $\pi r^2 h$

= $\frac{22}{7}$ x 7 x 7 x 10

= 1540 cm^3

Volume of 3 such containers

= (1540x3) cm^3

= 4620 cm^3

Volume of juice in jerry can = (5 x 1000)

= 5000cm^3

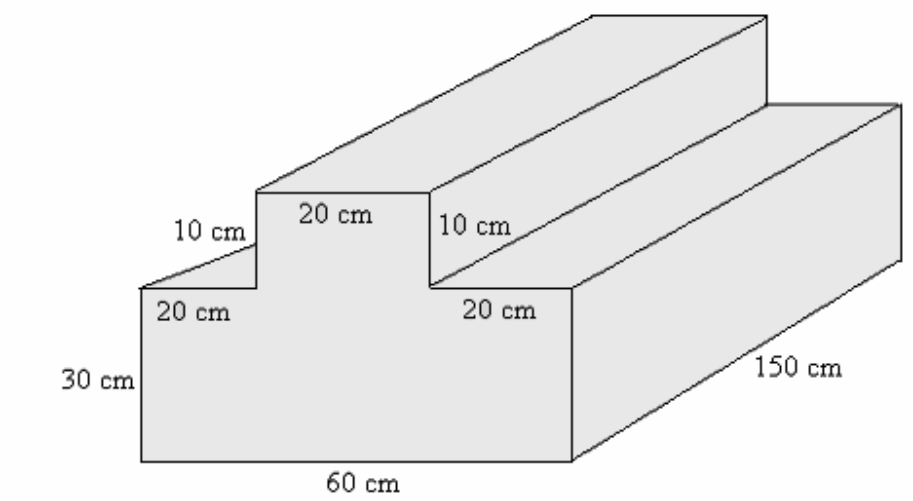
Volume of juice left = (5000-4620) cm^3

= 380 cm^3

= 380 ml

The correct answer is A (380ml)

2. The diagram below represents a solid whose dimensions are shown.



What is the volume in cm^3?

A.30000 B.300000 C.3000 D.3000000

Working

Volume = Area of the Cross-section x length

Volume of the top = (20 x 10 x 150)

= $30{,}000cm^3$

Volume of the bottom = 60 x 30 x150

= $270{,}000cm^3$

Whole solid = top + bottom

= 30,000 + 270,000

= $300{,}000cm^3$

The correct answer is B (300 000)

3. In the month of October, a farmer delivered 48750kg of maize to a miller. In November the amount of maize delivered was 1850kg more than that of October. The amount delivered in December was 2450kg less than that of November. What was the total mass, in tonnes, was delivered by the farmer in the 3 months?

A.145.65 B. 147.5 C.152.4 D. 150.55

Working

October	=	48750 kg
November	=	(48750+1850) kg
	=	50,600 kg
December	=	50,600-2,450) kg
	=	48,150 kg
Total mass	=	48750+50600 +48150
	=	(147500/1000) tonnes
	=	147.5 tonnes.

The correct answer is B (147.5)

4. A rectangular tank measures 1.2m by 80cm by 50cm. water is poured into the tank to a height of 15cm. How many more liters of water are needed to fill the tank?

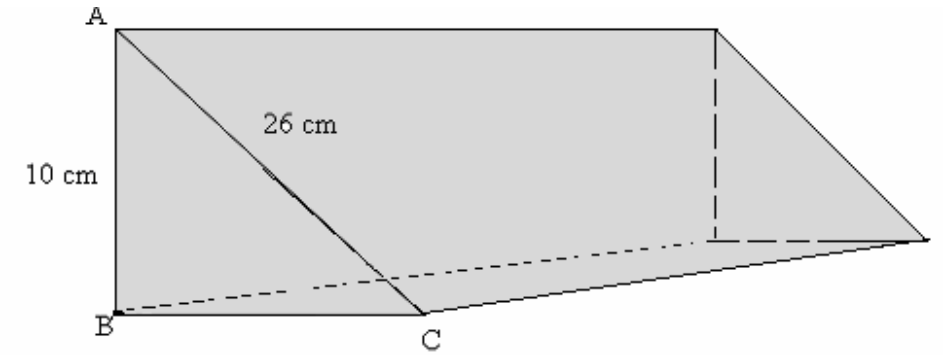
A.144 B.14.4 C.33.6 D.336

Working

Capacity of the tank	=	120 x 80 x 50
	=	$480{,}000cm^3$
Convert to litres	=	$\frac{(480{,}000)}{1000}$
	=	480litres
Volume of the water poured	=	120 x 80 x 50
	=	$144000cm^3$
Convert to litres	=	$\frac{(144000)}{1000}$
	=	144 litres
Volume of water needed	=	480 – 144
	=	366litres.

The correct answer is D (366)

5. The diagram below represents a solid triangular prism.



What is the volume in cm^3?

A.2400 B. 2000 C.5200 D.576

Working

Apply Pythagorean relation in triangle ABC

BC = $\sqrt{26^2 - 10^2}$

= $\sqrt{576}$

= 24cm

Volume = Area of the Cross section x length

= $\frac{1}{2}$ x 24 x 10x 20

= $2400cm^3$

The correct answer is A ($2400cm^3$)

6. A cylindrical tank has a radius of 2m and a height of 1.5m. The tank was filled with water to a depth of 0.5M. What is the volume of water in the tank, in litres? ($\Pi = 3.14$)

A.6280 B.628 C.9240 D.18840

Working

Volume = $\Pi r^2 h$

= 3.14 x 2 x 2 x 0.5

= 6.28 m^3

In litres = (6.28 x1000) litres

= 6280 litres

The correct answer A (6280)

7. When processed, 7kg of coffee beans produce 1kg of processed coffee. Processed coffee is then packed in 50kg bags. A farmer delivered 5.6 tonnes of coffee berries in one month. How many bags were obtained?

A.12 B.16 C. 40 D.20

Working

Mass of coffee berries = 5.6tonnes

= 5.6x1000

= 5600kg

Mass obtained = $\frac{5600}{7}$

= 800kg

Number of bags = 800 ÷ 50

= 16 bags

The correct answer is B (16)

8. A rectangular container whose base measures 40cm by 60cm has 30 liters of water when full. Find the height of the container in cm.

A.0125 B 1.25 C.12.5 D 125

Working

V = base area x height

Height = $\frac{\text{volume}}{\text{base area}}$

Volume = 30 litres

= 30x1000

= $30{,}000cm^3$

Height = $\frac{30{,}000}{2400}$

= 12.5cm

The correct answer is C (12.5)

9. A shopkeeper had 43 litres sand 5 litres and 5 dl of paraffin. He packed all the paraffin in 7.5 dl-containers. How many containers did he fill?

A. 58 B. 5.8 C. 6 D. 60

Working

Convert decilitres into litres

1 dl = $\frac{1}{10}$ litres

5 dl = $\frac{5}{10}$ litres

7.5 dl = $\frac{7.5}{10}$ litres

= 0.75 litres

Hence 43 litres 5dl = 43.5 litres

No of containers = $\frac{43.5}{0.75}$

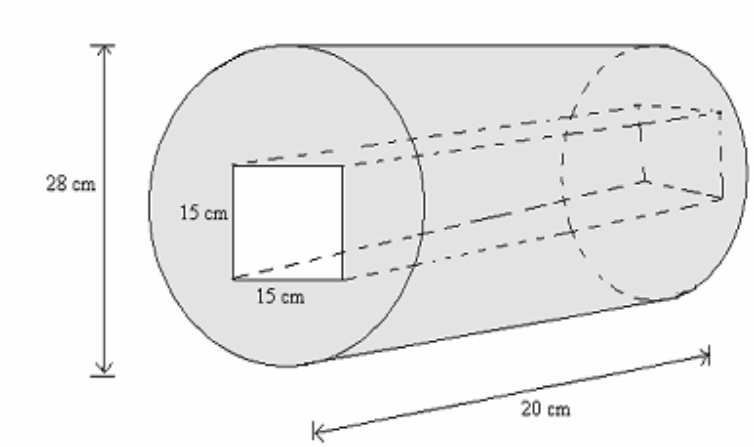
= 58 containers

The correct answer is 58 (A)

10. The figure below shows a cylindrical solid of diameter 28cm and length 20 cm. A-square hole of side 1.5 cm has been removed. What is the volume of the material in the solid, in $3cm^3$?

A.12320 B. 4500 C 8400 D 7820

Working



Volume of solid = volume of a cylinder - volume of the square hole

= ($\frac{22}{7}$x 14 x 14x 20) - (15 x 15 x 20)

= 12320 - 4500

= 7,820 cm^3

The correct answer is D (7,820cm^3)

4. MONEY

4.1 Specific Objectives

By the end of the unit, the learner should be able to:

a) Work out problems involving percentage profit and loss

b) Work out problems involving bills.

c) Solve problems involving discount, percentage, discount, commission and percentage commission

d) Work out problems involving hire purchase

e) Work out problems involving simple interest

f) Work out problems involving compound interest

g) Work out problems involving postal charges

4.2 Worked Exercise

1. Mutiso paid sh.330 for an item after the shopkeeper gave him a 12% discount. What was the marked price of the radio?

A.sh300 B. sh369.60 C. sh375 D. sh350

Working

Marked price = 100%

Discount = 12%

S.P = 100% - 12%

= 88%

∴ If 88 % = 330

100% = ?

$\frac{100 \times 300}{88}$ = Sh375

The correct answer is C (375)

2. Olang' borrowed sh.54000 from a bank which charged interest at the rate of 18% p.a. He repaid the whole loan after 8 months .How much did he pay back?

A sh6480 B. sh60, 480 C.sh14580 D. sh77760

Working

$$I = \frac{PRT}{100}$$

$$= \frac{54000 \times 18 \times 8}{100 \times 12}$$

$$= sh6480$$

Amount = P + I

= (54,000 + 6,480) shillings

= Ksh 60, 480

The correct answer is B

3. The cash price of a microwave is sh. 18000. The hire purchase price of the microwave is 20% more than the cash price. Bernice bought it on hire purchase terms by paying 40% of the hire purchase price as the deposit and the balance equal monthly installments of sh1620. How many installments did she pay?

A. 12 B. 10 C. 9 D. 8

Working

Let the cash price be 100%

Hire purchase = 100% + 20%

= 120% of the cash price

$$= \frac{120}{100} \times 1800$$

= sh.21, 600

Deposit = 40% of HPP

$$= \frac{40}{100} \times 21{,}600$$

= sh.8, 640

HPP = D + MI

$$I = \frac{HPP - D}{MI}$$

$$= \frac{21600 - 8640}{1620}$$

$$= 8 \text{ Months}$$

The correct answer is D (8)

4. Salim deposited sh25000 in a bank which paid compound interest at the rate of 10% per annum. If he withdraws all his money af $1\frac{1}{2}$ years, how much interest did his money gain?

A. sh5250 B. sh2500 C. sh1375 D. sh387

Working

Interest for year 1

$$I = \frac{PRT}{100}$$

$$= \frac{25000 \times 10 \times 1}{100}$$

$$= \text{Sh2500}$$

$$\text{Amount} = 25000 + 2500$$

$$= 27{,}500$$

Interest for 2nd year

$$I = \frac{PRT}{100}$$

$$= \frac{27{,}500 \times 10 \times ½}{100}$$

$$= \text{Sh13775}$$

Total interest (2,500 + 1,375)

$$= \text{Sh3875}$$

The correct answer is D (Sh 3875)

5. Kamaru bought bananas in groups of 20 at sh20 per group. He grouped them into smaller groups of 5 bananas each and sold them at sh10 per group. What percentage profit did he make?

A. 40% B. 50% C. 60 % D. 70%

Working

For every 20 bananas = sh 25

One group produces 4 smaller groups of 5 bananas each

$\therefore$ S. P = 4x 10

= sh40

B.P price = sh25

Profit = 40 – 25

= sh15

% profit = $\frac{P}{BP} \times 100$

= 60%

The correct answer is C (60).

6. A shopkeeper bought 3 trays of eggs at sh 150 per tray. On the way to the shop, he realized 20% of the eggs were broken. He sold the rest at sh 72 per dozen. How much loss did he make?

A.sh450 B.sh432 C.sh18 D.sh28

Working

B.P for 3 trays = 3 x 150

= sh450

Number of eggs = 3 x 30

= 90 eggs

20% eggs broke = $\frac{20}{100} \times 90$

	=	18 eggs broken
Therefore remained	=	(90 - 18) eggs
	=	72 eggs
1 dozen	=	12 eggs
?	=	72 eggs
	=	6 dozens
1 dozen	=	sh.72
6 dozens	=	?
Loss	=	B.P – S.P
	=	450 - 432
	=	sh18

The correct answer is C (sh18)

7. A Salesperson earns a basic salary of sh7500 per month. He is also paid a 5% commission on all sales above sh30, 000. In a certain month his total earnings were sh.14250. What was his total sales for that month?

A.sh135000 B.sh285000 C. sh165000 D.sh315000

Working

Commission	=	sh14250 – sh7500
	=	sh6750
∴ 5%	=	sh6750
100%	=	?
	=	$\frac{100}{5}$ x 6750
	=	Sh. 135,000
Total sales	=	(135,000 + 30,000)
	=	sh165000

The correct answer is C (sh 165,000)

8. Shiku bought the following items from a shop

6kg of sugar @ sh45

$\frac{1}{2}$ of tea for sh90

3 kg of rice @ sh30

2kg of fat @ sh70

If she used one thousand shillings to pay for the items, what balance did she receive?

A.sh410 B.sh455 C.sh590 D.sh765

Working

Shiku's Bill

Item	Sh	ct
6kg sugar @ sh45	270	00
½ kg tea for sh90	90	00
3kg rice @ sh30	90	00
2kg fat @ sh70	140	00
Total	590	00

Total expenditure = sh590

Balance = sh1000 – sh590

The correct answer is = sh410 (A)

9. Maranga paid sh4, 400 for a bicycle after he was given a 12% discount. James bought the same item from a different shop and was given a 15%. How much more than James did Maranga pay for the bicycle?

A.sh250 B. sh300 C. sh750 D. sh150

Working

Maranga B.P = 100% - 12%

= 88%

$\therefore \frac{4400}{88} \times 100$ = sh5000

James B.P = 100% - 15%

= 85%

$(\frac{85 \times 100}{4400})$ = sh4,250

How much more? = (5000-4250) shillings

= sh750

The correct answer is C (750)

10. The table below shows postal charges for sending letters;

Mass of letter	Sh	ct
Up to 20g	25	00
Over 20g up to 50g	30	00
Over 50g up to 100g	35	00
Over 100g up to 250g	50	00
Over 250g up to 500g	85	00
Over 500g up to 1kg	135	00
Over 1kg up to 2kg	190	00

Namu posted two letters each weighing 95g and another one weighing 450g. How much did he pay at the post office?

A. sh120 B. sh135 C. sh155 D. sh240

Working

Two letters

95g _____ Sh35.00

95g _____Sh35 .00

Another 450g_____Sh85.00

sh 155.00

The correct answer is C (sh155)

5. TIME, SPEED AND TEMPERATURE

5.1 Specific Objectives

By the end of this unit, the learner should be able to:

a) Work out problems involving time, speed, distance and average speed.

b) Work out problems involving temperature in degree Celsius.

5.2 Worked Exercise

1. An airplane took $4\frac{1}{2}$ hours to fly from Cairo to Zambia. If it landed in Nairobi at Nairobi at 0215 h on Saturday, when did it take off from Cairo?

A. Friday 2145 h B. Saturday 2245h C. Friday 2245h D. Saturday 2145 h

Working

The time the aeroplane took from midnight to 0215h of Saturday = 2h 15min

The difference (4h 30min – 2h 15min) is the time the aero plane took on Friday night.

Time on Friday night

	h	min
	4	30
-	2	15
	2	15

= 2h 15min before midnight

Time of takeoff from Cairo

	h	min
	24	00
-	2	15
	21	45 on Friday

The correct answer is A (Friday 2145 h)

2. A train let Mombasa on Monday at 2125 h and took sixteen and half hours to reach Kisauni. When did the train reach Kisumu?

A. Tuesday 1.55 a.m B. Tuesday 1.55 p.m C. Wednesday 1.55 p.m D. Monday 1:55 a.m

Working

Monday: from 2125h to midnight = 2400h - 2125h

= 2h 35min

Tuesday: Number of hours traveled from midnight

= 16h 30min - 2h 35 min

= 13h 55min

The train arrived at Kisumu on Tuesday at 1355h

This is the same as 1.55p.m

The correct answer is B (Tuesday 1.55pm)

3. A meeting started at quarter to noon. If the meeting lasted for 2 h 35min, what time in 24-h clock system did the meeting end?

A. 1320h B. 1420h C. 1310h D. 1410h

Working

The meeting started at 11.45

Add the meeting time

=	h	min
	11	45
	+ 2	35
	14	20

The meeting ended at 1420h

The correct answer is B (1420 h)

4. A wall clock gains 3 seconds every one hour. The clock was set correct at 1pm on Tuesday. What time was it showing at 1pm on Friday on the following week?

Working

The number of days from Tuesday 1 pm to Friday 1pm the following week = 10days.

Number of hours = (24 x 10) = 240 hrs.

The clock gains 3 seconds after every hour in ten days.

240 x 3 = 720 seconds

Min = $\frac{720}{60}$

= 12 min

Hence it will show 1 p.m. + 12 min

= 1.12 pm

In 24 h clock system

= 1312h

The correct answer is B (1312h)

5. A cyclist traveled from Nairobi to Nyeri for 4h 30min at a speed of 80km/h. He drove back to Nairobi taking 4 hours. What is his speed, in km/h?

A .90 B. 72 C. 80 D. 100

Working

Distance = speed x time

= 80 x $4\frac{1}{2}$

= 360 km

From Nyeri - Nairobi distance = 360km

Time taken = 4hrs

Therefore speed = $\frac{\text{Distance}}{\text{Time}}$

$= \frac{360}{4}$

= 90km/h

The correct answer is A (90km/hr)

6. A motorist crosses a bridge at a speed of 25m/s. What is his speed in km/hr?

A. 80 B. 90 C. 60 D 30

Working

When working out this kind of question we use a relationship,

If 10 m/s = 36 km/h

25m/s = ?

$= (\frac{25}{10} \times 36)$ km/h

= 90 km/h

The correct answer is B (90km/h)

7. The distance between Mombasa and Mtito Andei is 290km. A bus left Mombasa at 1035h and traveled to Mtito Andei at a speed of 50km/h. At what time did it arrive at Mtito Andei?

A. 1623h B.1523h C.1423h D.1723h

Working

Time = $\frac{\text{Distance}}{\text{Speed}}$

= $\frac{290}{50}$

= $5\frac{4}{5}$ hours or 5h 48min

Arrival time = Departure time = Time taken + Time taken

	=	h	min
		10	35
		+5	48
		16	23

The arrival time 1623 h

The correct answer is A (1623h)

8. Kamau drove from town M to town N a distance of 150 km. He started at 9.30 am and arrived at town N at 11.00 am. He stayed in town for one hour and 50 minutes. He drove back reaching town M at 2.30pm. Calculate Kamau's average speed for the whole journey.

A. 90km/h B. 100km/h C. 60km/h D. 150 km/h

Working

Total distance from M to N and back

= 150 x 2

= 300 km

Total time taken

From 9.30 - 11.00 = 1 h 30 min

Time spent in town

= 1 h 50 min

Time taken from N to M

= 1430h – 1250h

= 1h 40min

Total time = 5 hours

Average speed = $\frac{\text{Total distance}}{\text{Total time taken}}$

= $\frac{300}{5}$

= (60km/h)

The correct answer is C (60km/h)

9. The temperature of an object was 20º C below the freezing point. It was warmed until there was a rise of 40º in temperature. What is the reading in the thermometer?

A. 60 Cº B. 40Cº C. 20Cº D. 20Cº

Working

Below freezing point means; - 20

Rose by 40º

Therefore - 20º + 40 = 20 C

The correct answer is C (20º C)

6. GEOMETRY

6.1 Specific Objectives

By the end of this unit, the learner should be able to:

a) Construct triangles,

b) Construct circles touching the three sides of a triangle.

c) Work out problems using Pythagorean Theorem,

d) Construct of parallelogram and rhombuses,

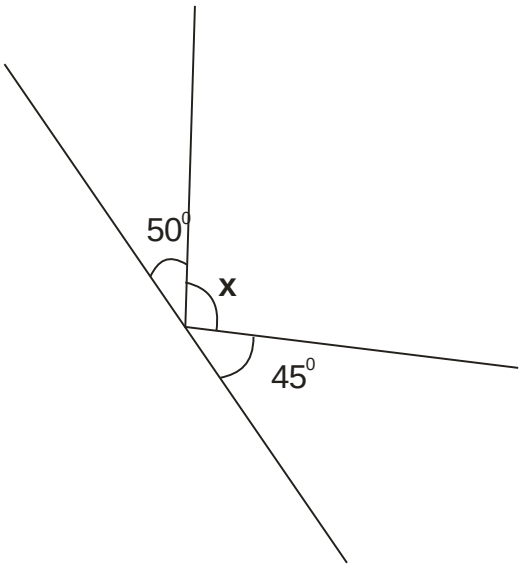
e) Work out problems involving properties of square, rectangles, parallelograms, rhombuses and trapeziums and angles on straight lines,

f) Recognize and identify triangular and square based pyramids and

g) Identify nets of pyramids and prisms.

Worked Exercise

1. Find the value of x in the following.



Working

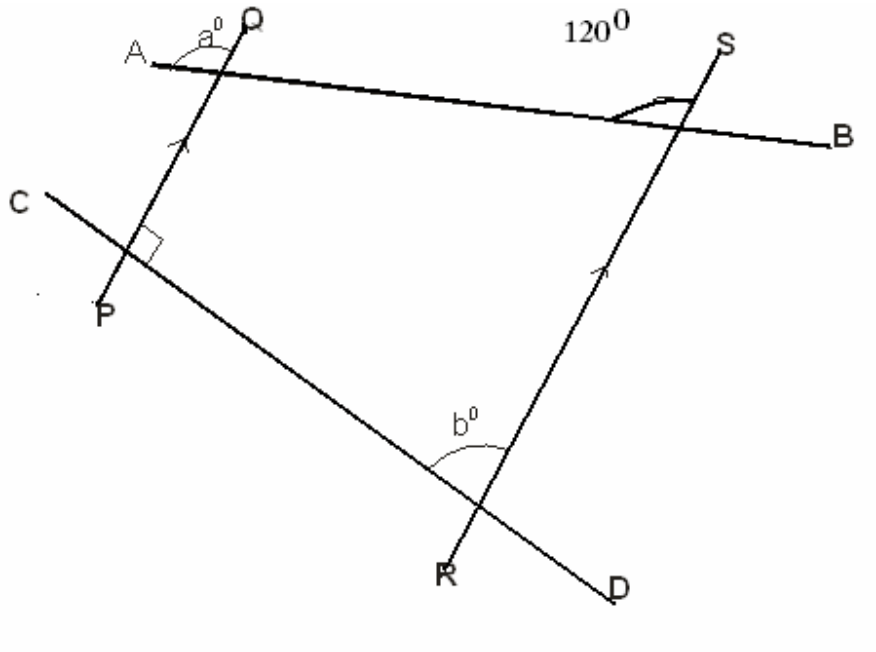
$X+45+50=180^0$ (Angles on a straight lines are supplementary i.e. add up to 180^0)

$X+95=180^0$

$X=85^0$

The value of $\underline{\underline{x=85^0}}$

2. Find the sum of angle "a" and angle "b" in the figure below.



Working

Lines AB and C D are transversals are Therefore $90+b = 180^0$ } Co-interior angles supplementally

Therefore $b=180-90$

$B = 90^0$

Angle $a = 120^0$ - (Corresponding angles)

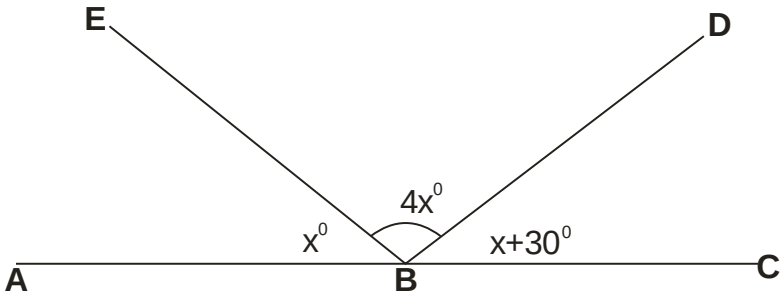
Therefore $a = 120^0$

Sum of a and b

$=120 + 90$

$= 210^0$

3. Find the size of angle marked A B D in the figure below.



Working

$X+4x+x+30=180^0$ (angles on a straight line are supplementary)

$= 6x+30=180$

$6x=180-30$

$6x = 150$

$X = 25$

Angle A B D $=x + 4X$

But $x = 25$

Therefore $25 + (4 \times 25)$

$= 25 + 100$

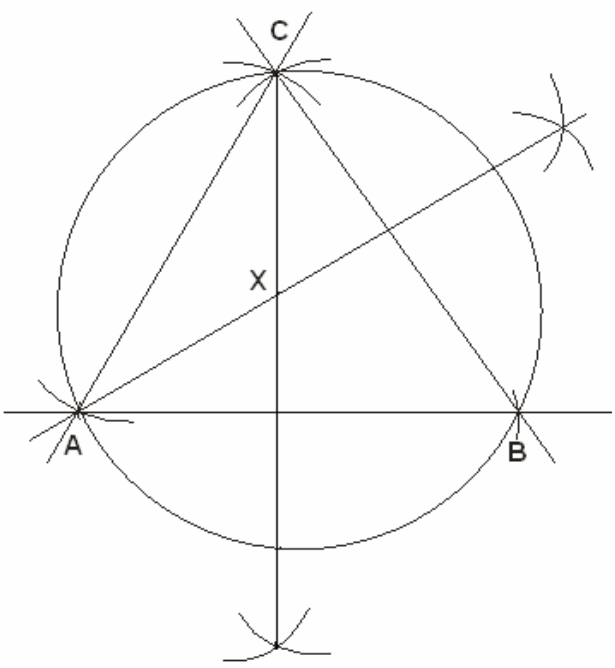
$= 125^0$

4. Draw an equilateral triangle A B C where Line AB = 6cm.
   Draw a circle touching the 3 vertices of the triangle. What is the radius of the circle?

Working

Steps:

i) Draw line A B = 6cm
ii) With A as the Centre with the same radius 6cm, mark off an arc above line A B.
iii) With B as the Centre with the same radius 6cm, mark off an arc above line A B to meet the arc in (II) above. Call the point of intersection point C
iv) Join C to A and C to B
v) Bisect line A B and B C and let the bisectors meet at point X.
vi) With X as the Centre, draw a circle passing through points A, B and C.
vii) Measure the radius of the circle.

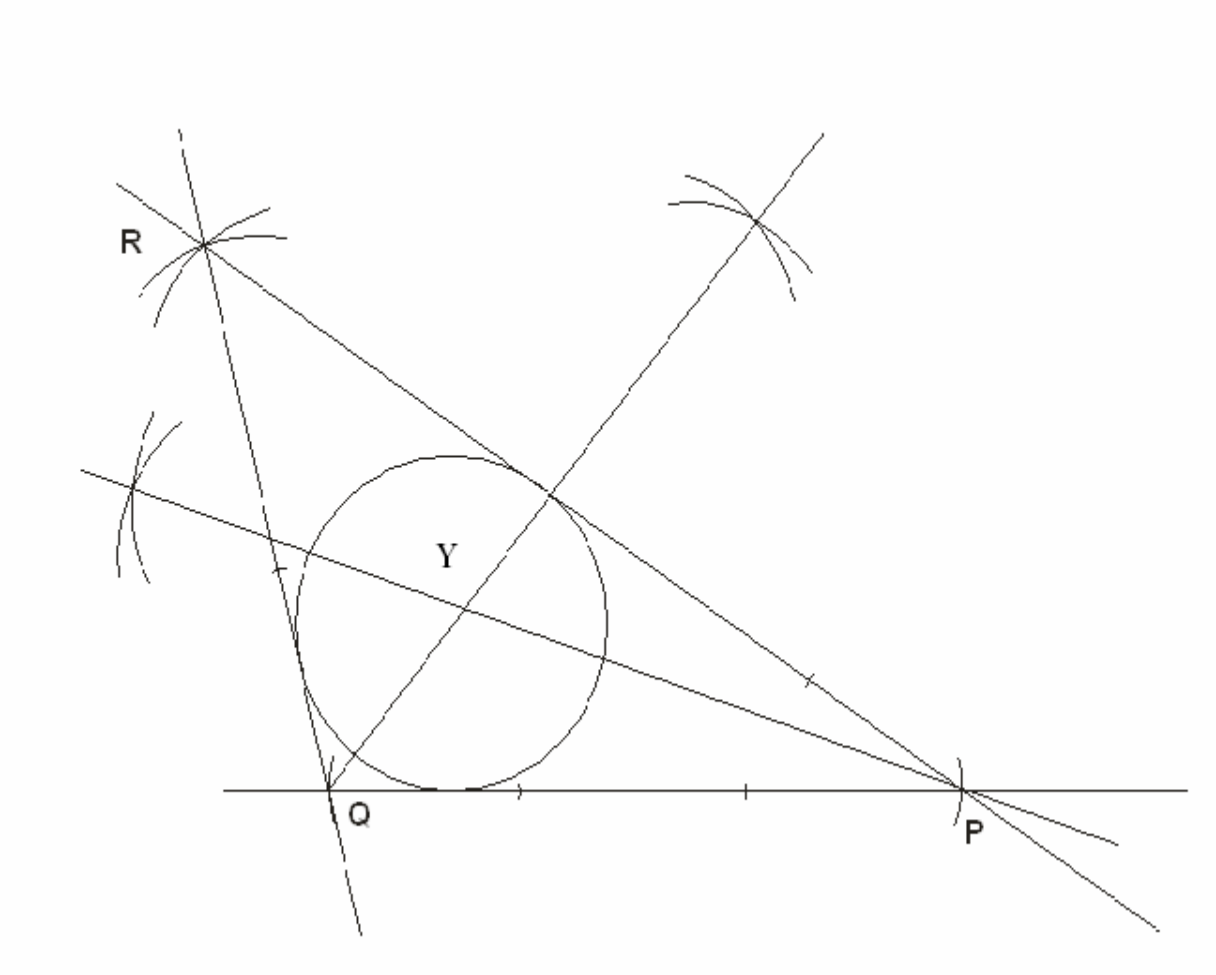


5. Construct a triangle P Q R in which Q P = 6cm. Q R = 4cm and P R =8cm. Draw a circle that touches the 3 sides of the triangle, measure the radius of the circle.

Working

i) Draw line Q P 6cm
ii) With Centre Q, make an arc 4cm above line Q P.
iii) With Centre P, make an arc 8cm above line Q P and let the arc meet the one in (II) above. Label the point of intersection as R.
iv) Join R to P and R to Q.
v) Bisect any two angles and let the bisectors meet at point Y.

vi) With Y as the Centre, draw a circle that touches the 3 sides of the triangle.

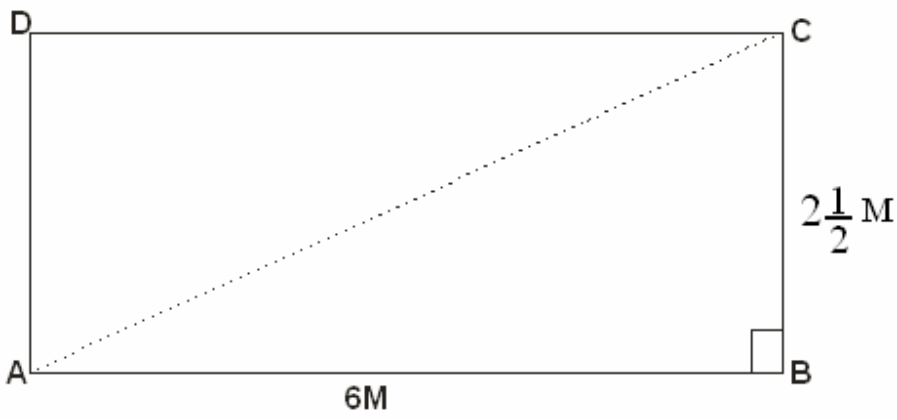


Construction

R = 3.5cm

6. A rectangle measures 6cm by $2\frac{1}{2}$ cm. What is the length of the diagonal?

Working



$AC^2 = AB^2 + BC^2$ [Pythagoras Theorem]

$AC^2 = 6^2 + 2\frac{1}{2}^2$

$AC^2 = 36 + 6.25$

$AC^2 = 42.25$

$AC = \sqrt{42.25}$

$= 6.5$ or $6\frac{1}{2}$

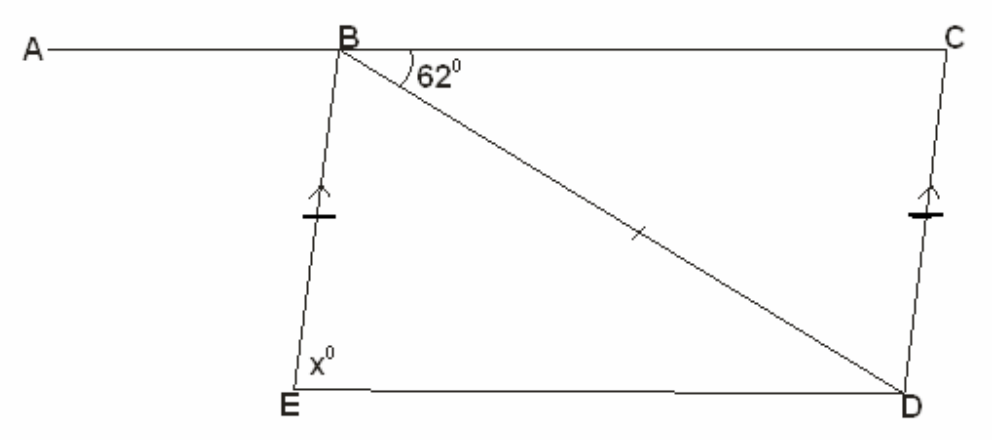
NB: The Pythagoras theorem states

$H^2 = B^2 + h^2$

$h^2 = H^2 - b^2$

$b^2 = H^2 - h^2$

7. In the figure below, A B C is a straight line and B C D E is a quadrilateral. Angle CBD = 62^0 and lines EB = BD = DC. Line EB is parallel to DC.



What is the size of angle BDE?

Working

Consider triangle BCD (isosceles triangle)

Therefore base angles are equal

CBD = 62^0

BCD = 62^0

Therefore, BDC = 180 – 124

= 56^0

Angle CDB = angle EBD [Alternate triangle]

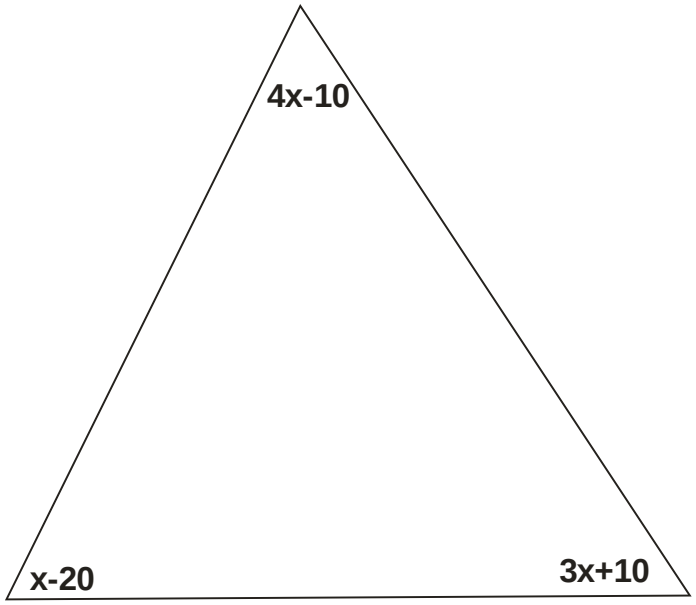
Therefore EBD = 56^0

Angle BDE = $\left(\frac{180 - 56}{2}\right)^0$

= 62^0

Therefore, BDE = 62^0

8. Find the size of the largest angle from the following triangle.



Working

$4X - 10 + x - 20 + 3x + 10 = 180$ [Angle sum of a triangle]

$8x - 20 = 180$

$8x = 200$

$X = 25$

$4x - 10$

$= (100 - 10)^0$

$= 90^0$ largest angle.

7. ALGEBRA

7.1 Specific Objectives

By the end of the unit, the learner should be able to:

a) Form and simplify algebraic expressions,

b) Work out the value of algebraic in one unknown and

c) Simplify inequalities in one unknown.

7.2 Worked Exercise

1. What is the value of x in the equation?

$2(3x - 2) = 3x + 8$

A. 12 B. $3\frac{1}{3}$ C. 5 D. 4

Working

$2(3x - 2) = 3x + 8$

Step 1: Open brackets

$6x - 4 = 3x + 8$

Step 2: Collect like terms and simplify

$6x - 3x = 8 + 4$

$3x = 12$

$x = 4$

The correct answer is D (4)

2. Francis has r shillings. John has s shillings. Ouma has sh.150 less than the total money of both Francis and John. Which one of the following expressions gives the total amount of money do the three men have?

A. $2r + 2s - 150$ B. $r + s - 150$ C. $2r + 2s + 300$ D. $r + s + 300$

Working

Francis = r

John = s

Ouma = $r + s - 150$

Total money = $r + s + r + s - 150$

= $2r + 2s - 150$

The correct answer is A ($2r + 2s - 150$)

3. If $x = 2$, $y = z - x$ and $z = 3$, What is the value of

$$\frac{3x - 4y + 2z}{2(x + 2y - z)}$$

A. 8 B. 5 C. 7 D. 4

Working

Substitute the values of x, y, and z

$$= \frac{(3x2) - (4x1) + (2x3)}{2(2+2 \times 1 - 3)}$$

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

$$= 4$$

The correct answer is D (4)

4. In a meeting there were 30 women than men and three times as many men as children.If there were 1,360 people altogether. What was the number of children in the meeting?

A. 220 B. 190 C. 600 D. 570

Working

Men $3x$

Children x

Women $3x + 30$

Total $7x + 30 = 1360$

$7x = 1360 - 30$

$7x = 1330$

$x = 190$

Children are 190

The correct answer is B (190)

5. What is the value of p in the equation?

$\frac{3}{4}(8p - 4) = 4p + 7$

A. 2 B. 5 C. $5\frac{1}{2}$ D. $2\frac{3}{8}$

Working

$\frac{3}{4}(8p - 4) = 4p + 7$

$6p - 3 = 4p + 7$ (opening brackets)

$6p - 4p = 7 + 3$ (collecting like terms)

$2p = 10$

$p = 5$ (Simplifying)

The correct answer is B (5)

6. Omammo is two years older than Temo and three years younger than Mbeti. The sum of their ages is 64 years. If Omamo's age is *m*, which of the following equations below can be used to find Omamo's age?

A. $3m + 1 = 64$ C. $3m - 5 = 64$

B. $3m - 1 = 64$ D. $3m + 5 = 64$

Working

Omamo = m

Temo = $m - 2$

Mbeti = $m + 3$

Total age = 64

$X + m - 2 + m + 3 = 64$

$m + m + m - 2 + 3 = 64$

$3m + 1 = 64$

The correct answer is A $(3m + 1) = 64$

7. What is the simplified form of $5x + \frac{1}{4}(8x - 2y)$

A. $37x - 8y$ B. $7x - \frac{1}{2y}$ C. $28x - 2y$ D. $7x - 2y$

Working

$5x + \frac{1}{4}(8x - 2y)$ *open brackets*

$5x + 2x - \frac{1}{2}y$ *simplify*

$= 7x - \frac{1}{2}y$

The correct answer is B $(7x - \frac{1}{2}y)$

8. TABLES AND GRAPHS

8.1 Specific Objectives

By the end of the unit, the learner should be able to:

a) Draw tables and graphs,

b) Interpret tables and graphs,

c) Identify median as a middle value in a set of ordered data and

d) Work our problems involving mean, mode and median.

8.2 Worked Exercise

1. Kariet ole Koria started from his home at 8.00a.m to Narok, a distance of 140km. After covering 80 km he rested for 30 minutes before proceeding with the journey.

Koinet Ole Koria's Journey

Calculate Koinet Ole Koria's average speed for the whole journey in km/h

Working

Total distance = 140km

Total time taken = $3\frac{1}{2}$hrs

Average speed = $\frac{\text{Distance covered}}{\text{Total time taken}}$

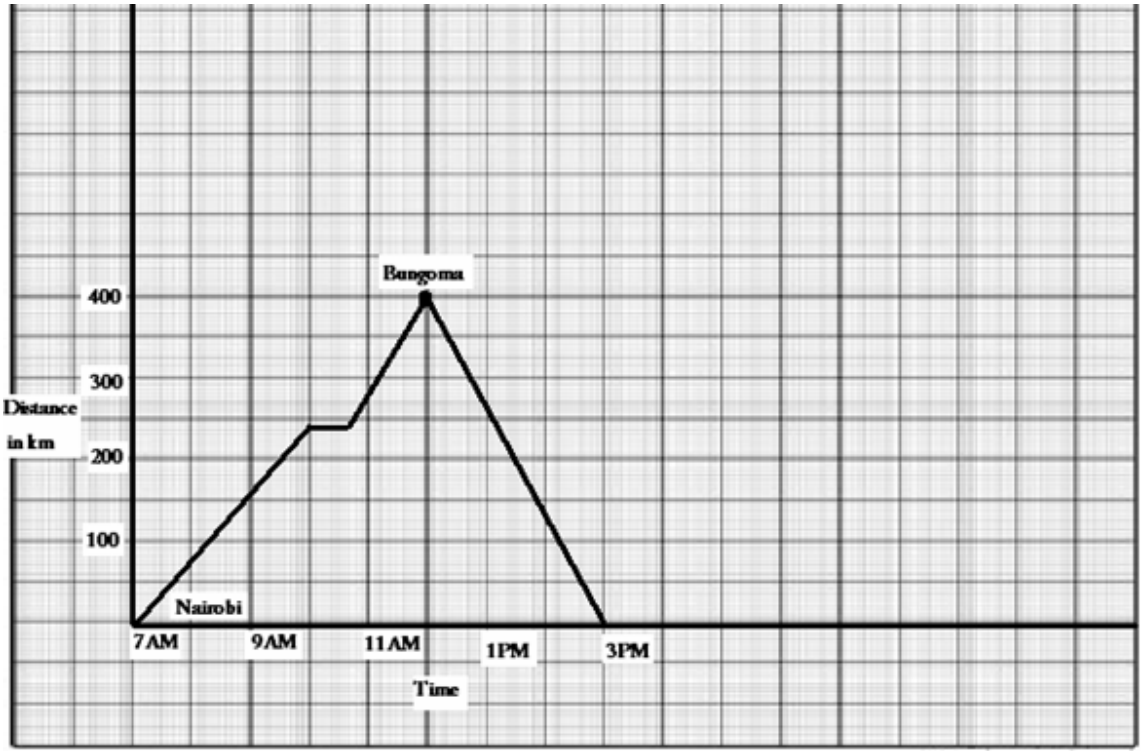
$= \frac{140}{3\frac{1}{2}}$

= 40 km/h

The correct answer is D (40 km/h)

2. The graph shown below represents Kabugi's journey from Nairobi to Bungoma and back.

Kabugi's Journey



What was his average speed for the whole journey?

A.53 $\frac{1}{3}$km/h B 50 km/h C. 100 km/h D 106 $\frac{2}{3}$km/h

Working

Total distance;

Nairobi – Bungoma = 400km

Bungoma - Nairobi = 400km

Total = 800km

Total time = 8 hours

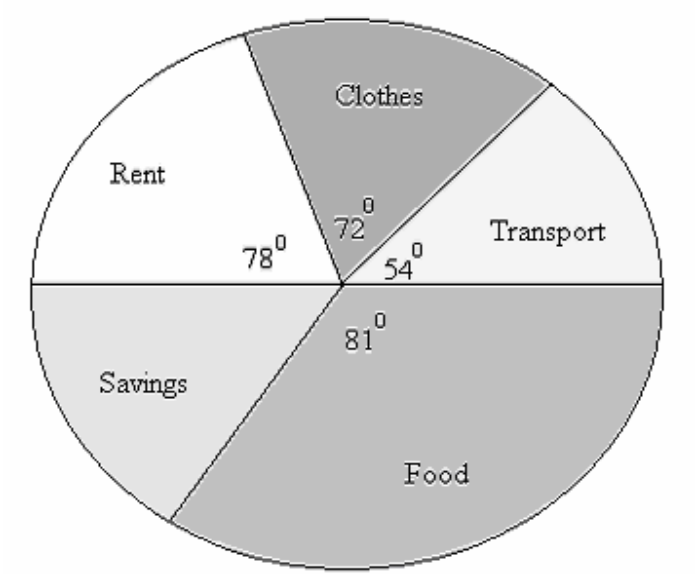
Average Speed = $\frac{\text{Total distance covered}}{\text{Total time taken}}$

= (800 ÷ 8)km/h

= 100km/hr

The correct answer is C (100km/h)

3. The pie chart shown below shows how Erastus spent his salary. How much did he spend on food and transport if he saved sh2500



A. Sh 4500 B. Sh 12000 C. Sh 2500 D. Sh 5000

Working

The angle representing savings

{360 - (78 + 72 + 54 + 81) } = 75º

If 75º = Sh 2500

360^0 = ?

= $\frac{(360 \times 2500)}{75}$

= Sh 12000

Food and transport = 54 + 81

= 135

$\frac{(135 \times 12000)}{360}$ Sh

= Sh 4500

The correct answer is A (Sh 4500)

4. Eleven standard 4 pupils of St. John school scored a test as follows 95, 50, 48, 63, 58, 75, 48, 44, 58, 84, 48. Which of the following a arrangements shows the mean, mode and median of the marks?

A. 58, 61, 48 B. 61, 48, 58 C. 61, 58, 48 D. 48, 58, 61

Working

Mean = $\frac{\text{Total marks}}{\text{No of children}}$

= 671 ÷ 11

= 61 marks

Median: 44, 48, 48, 48, 50, 58, 58, 63, 75, 84, 95

The number in the middle is 58.

Mode: is the number appearing many times.

The correct answer is B (61, 58, 48)

5. Njoroge scored as follow in a test.

70, 55, 80, 50, 55

What is his mean score?

A. 55 B. 62 C. 65 D 80

Working

Mean = (70 + 55 + 80 + 55) ÷ 5

9. SCALE DRAWING

9.1 Specific Objectives

By the end of this unit, the learner should be able to:

a) Reading and writing linear scale in ratio form.

b) Converting linear scale from statement form to ratio and from ratio to statement

c) Work out problems involving drawing.

9.2 Worked Exercise

1. The distance between two villages is 6.4KM. On the map of the region this distance is represented by a line 1.6 cm long. What is the scale of the map?

A. 1: 400000 B. 1: 40000 C. 1: 4000 D. 1: 4

Working

Actual distance = 6.4 km

Drawing length = 1.6cm

1 cm on the map = $\frac{6.4}{1.6}$

= 4km on the ground

But 1 km = (1000 x 100) cm

4km = 4 x 1000 x 100

= 400000cm

Therefore scale = 1: 400000

The correct answer is A (1: 400000)

2. A rectangular field measures 105 m. On a scale drawing of the field, the longer side is 7cm.What is the measurement of the width on this scale drawing?

A. 5 cm B.50 cm C.500 cm D.7.35cm

Working

7 cm represents 105 m

1 cm represents (105 ÷ 7)

Scale used,

1 cm represents 15m

? 75m

$$= \frac{(75 \times 1)}{15}$$

$$= 5\text{cm}$$

The correct answer is 5cm (A)

3. The scale on a plan is 1:20. How many cm will represent 1m on this plan?

A. 50 cm B. 50 cm C. 5 cm D. $2\frac{1}{2}$ cm

Working

1 : 20 scale means 1 cm on a drawing represents 20 cm on the ground.

1 cm represents 20cm

? 100cm

$$= \frac{100}{20}$$

$$= 5\text{cm}$$

The correct answer is C (5cm)

4. A rectangular field measuring 720m by 550m is to be represented on a scale drawing using the scale 1: 10,000. What is the perimeter of the drawing in centimetres?

A. 0.254 B. 2.54 C. 25.4 D. 254

Working

1: 10000 means 1 cm on the map represents 10000 cm on the ground

If 1 cm = 10,0000cm

? = 72,000cm

$= \left(\frac{72{,}000}{10{,}000}\right)$ cm

= 7.2cm

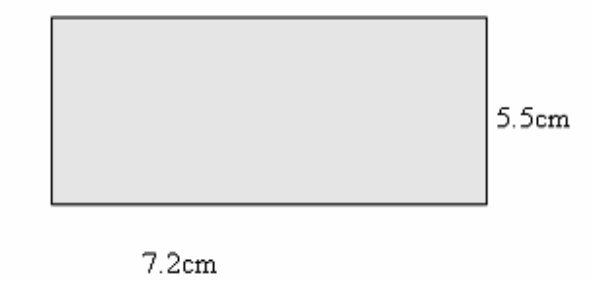
If 1cm = 10,000cm

= 55,000cm

$= \left(\frac{55{,}000}{10{,}000}\right)$ cm

= 5.5cm

Perimeter



P = 2(L+W)

= 2 (7.2 + 5.5)

= 25.4 cm

The correct answer is (C)

5. The scale of a map is 1: 50000. What is the length of this map of a road 20km long?

A. 40cm B. 400 cm C. 4000 cm D. 4 cm

Working

Scale 1 : 50000 means 1cm on the map represents 50000 cm on the ground.

∴ 20 km = 20 x 1000 x 100

= 2000000 cm

50,000cm represents = 1 cm

2,000,000 represents = 2,000,000 ÷ 50,000

= 40cm

The correct answer is A (40 cm)

10. RATIO AND PROPORTION

10.1 Specific Objectives

By the end of the unit, the learner should be able to:

a) Work out problems involving ratio,

b) Work out problems involving simple direct and indirect proportions and

c) Compare using ratio.

d) Sharing using ratio

e) Increase and decrease quantities using ratio

10.2 Worked Exercise

1. Muraya and Dan each made 126kg of a mixture of maize and beans. Muraya mixed maize and beans in the ratio 4:3 while Dan mixed maize and beans in the ratio 4:3 while Dan mixed maize and beans in the ratio of 5:4. How many more kilograms?

A. 2 B. 3 C. 4 D. 6

Working

In Muraya's mixture, maize: beans = 4:3

$\therefore$ maize = $\frac{\text{Ratio of maize}}{\text{Total ratio}} \times \text{No of kg}$

$= \frac{4}{7} \times 126$

$= 72$ kg

In Dan's mixture, maize: beans = 5: 4

Maize = $\frac{\text{Ratio of maize}}{\text{Total ratio}} \times \text{No of kg}$

$= \frac{5}{7} \times 126$

$= 70$kg

Difference = (72 - 70)kg

= 2kg

The correct answer is A (2kg)

2. A rectangular plot measures 12m by 10m.The length of the plot is increased in the ratio 3:2 , while the width is decreased in the ratio 4;5.By what ratio is the area of the plot decreased?

A. 4:3 B. 5:4 C 6:5 D 3:2

Working

New length after increase

$\frac{3}{2}$ x 12 = 18m

New width after decrease

$\frac{4}{5}$ x 10 = 8m

Original area before the increase/decrease

= (12 x 10) m^2

= 120m^2

New area = (18 x 8) m^2

= 144 m^2

New ratio = 144: 120

= 6 : 5

The correct answer is C (6: 5).

3. Gladys keeps hens, ducks, and turkeys. The ratio of hens to ducks is 5:2. The number of turkeys is 35 less than the number of hens. How many turkeys are there if there are 30 ducks?

A. 105 B. 40 C. 75 D. 65

Working

Hens : ducks = 5 : 2

Total ratio = 7

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

Hens = $\frac{5}{7}$ of x

Therefore $\frac{2}{7}$ of x = 30

x = 30 $x \frac{7}{2}$

x = 105 (Total hens and ducks)

Hens = $\frac{5}{7}$ x 105

= 75

Turkeys = (75 – 35)

The correct answer is B (40)

4. Elijah and Paul shared some money in the ratio 5:8.Elijah got sh120 less than Paul. How much money did Paul get?

A. Sh520 B. Sh320 C. Sh200 D. Sh192

Working

Let the amount Paul got be t

Therefore Elijah got (t-120)

Therefore t -120 : t = 5 : 8

$\frac{t - 120}{t} = \frac{5}{8}$

$8t - 960 = 5t$

$8t - 5t = 960$

$3t = 960$

t = sh320

Therefore Paul got = sh 320

The correct answer is B (sh320)

5. A contractor employed 60 men to complete a piece of work in 150 days. How many more days would 50 men take to complete the same work?

A.180 B.30 C. 40 D. 50

Working

60 men take 150 days

1 man take (150x60) days

Therefore 50 men will take ($\frac{150 \times 60}{50}$) days

= 180 days

How many more? (180 – 150) days

= 30 days

The correct answer is B (30 days)

6. Eighteen men can finish to dig a piece of land in 45 days. How many days would 15 men take to finish the same piece of land?

A.54 B.25 C.7 $\frac{1}{2}$ D.9

Working

18 men take 45 days

1 man takes (45 x 18) days

Therefore 15 men will take $\frac{(45 \times 18)}{15}$

= 54 days

The correct answer is A (54 days)