MATHEMATICS

AREA OF PLANE FIGURES

Triangle, Parallelogram and Trapezium.

Area of Triangle

Examples: (1) A triangle has a height of 45cm and its base 55cm. Calculate its area.

Solution

Area (A) $= \frac{1}{2} \times b \times h$

b = 55cm, h = 45cm,

$A = \frac{1}{2} \times 55 \times 45 = 1237.5cm^2$

Parallelogram

E.g. The area of a Parallelogram is 20sq.cm. The base is 6cm. Find its height.
Solution: Area=base × height
Given: Area= 20sq.cm
base= 16cm
height=?
Area=6×h, 20=6h
20/6=6h/6
h=3.3cm

Trapezium:
E.g, the area of a Trapezium is 67.965sq.cm. Find its height if the parallel sides are 5cm and 8.8cm, respectively.
Solution: Area=1/2(a+b)h
given, area=67.965sq.cm
height=?
Parallel sides= 5cm and 8.8cm
1. 67.965=1/2×(5+8.8)h
67.965=1/2×5h×8.8h
67.965=1/2×13.8h/1
67.965/1=13.8h/2
cross multiply: 1×13.8h=67.965×2
13.8h=135.93
13.8h/13.8=135.93/13.8
h=9.85cm.

Area of plane Figure

(I) Area of circle,

i. word problems involving area
. Area of a circle.

Area = πr^2 given π = 22/7 or 3.14,

Example; (1) the area of a circle is 157cm^2. Find the radius of circle.

Area = 157cm^2, π = 3.14, r =?

157= 3.14 × r^2, 157 = 3.14r^2, 157 /3.14=

3.14r^2/3.14 50 = r^2, √50 =√ r^2, r = 7.07cm, r=7cm

(ii) Word Problems involving Area:

Examples: 1) The area of a triangle is 30cm^2.Find the height if its base is 13cm.

Solution:

Area = 1/2 × b × h, given: Area = 30cm^2, base = 13cm, height =?

30 = 1/2 × 13 × h, 30/1 = 13h/2, cross multiply,

1 × 13h = 30×2, 13h/13 = 60/13, h = 4.6cm.

3. A trapezium of area 140cm^2, has parallel sides 10cm apart. One of these sides is 16cm long **Calculate the length of the other parallel side.**

Solution: Area = 1/2(a+b)h, area = 14cm^2, height= 10cm.

Solution: given, area= 140, a = 16, h = 10,

140 = 1/2(16+b)10, 140= 1/2(160+10b), cross multiply, 140/1 = 160 + 10b /2, 1(169+10b) = 140 × 2

160 + 10b = 280,10b = 280 - 160

10b/10 = 120/10, b= 12cm.

CONSTRUCTION

Bisection of a given line segment.

steps 1: Open a pair of compasses to a little more than half the length of line AB. Using "A" as the centre, draw an arc to Intersect line segment AB and at point B, draw an arc to intersect line segment "AB". The point where the two arcs meet, call them points P and Q.

Step 2: Draw a line through P and Q such that it meets line segment AB at M,

M is the midpoint of line AB. PQ is the perpendicular bisector of the line segment AB.

Construction of angle 90-degree

step 1: Construct the perpendicular line bisector of line segment AB. Angle XYB is equal to 90 degrees.

Bisection of a Given Angle

To bisect a given angle ABC, we use the following steps:

Step 1: Open the compasses to a radius less than the length AB and BC with B as the centre, draw an arc to cut AB and BC at points X and Y respectively.

Step 2: Using the same radius. as in step (I), with X as the centre first and then Y, draw two arcs to meet at R.

step 3: Draw a line from B through R. The line BR is the bisector of angle B.

Construction Of Special Angles 45^o, 60^o. And 30^o

Construction of angle 45^0

To construct an angle of 45^o, we bisect the angle 90^o as follows:

Step (I) 45^{O} = ½ of 90^{O}. Therefore, with Y as the centre, draw an arc to cut XY and YB at M and N. With M and N as centres and the same radius, draw two arcs to meet at Z. Draw YZ, each angle is 45^{O}.

Construction of angles 60^{O} and 30^{O}.

Step (I) draw any line AB with A as the centre and a convenient radius, draw an arc to cut AB at P.

Step (ii) with P as centre and the same radius as in step 1, draw an arc to cut the first arc at C.

Step (iii) Join A to C.

Angle CAB = 60^{O}, is the required angle.

To construct an angle of 30^{O}, we bisect the 60^{O} angle as follows:

Step (iv) with P as centre first and then C, draw two arcs to meet at D. Draw AD, the bisector

of CAB. That is CAD= DAB = 30^{O},

(30^{O} = ½ of 60^{O}).