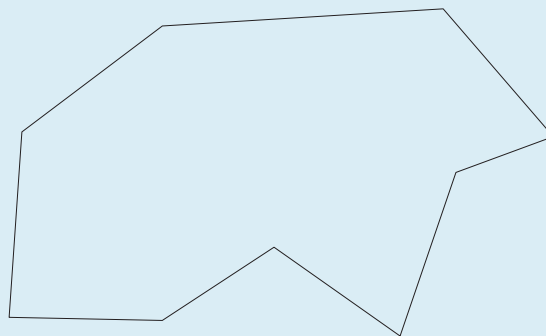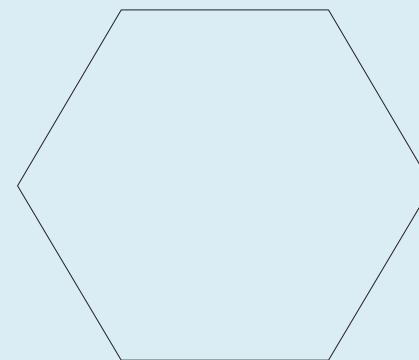# Polygon

Polygon is a plane figure bounded by many (usually five or more) straight lines. When all the sides and included angles are equal, it is called as a regular polygon.
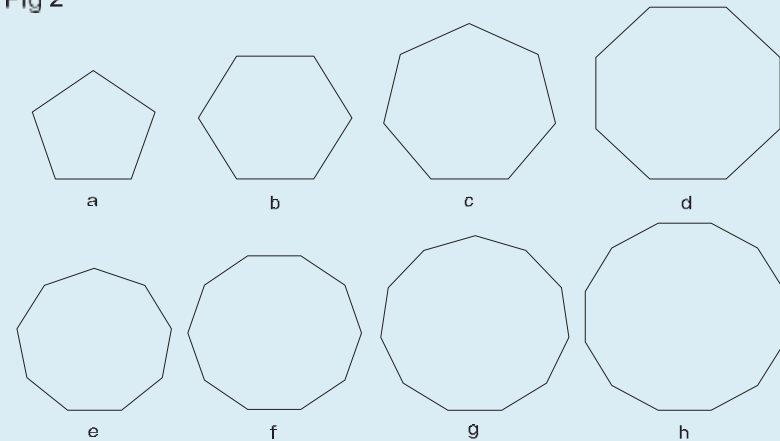
IRREGULAR POLYGON   REGULAR POLYGON

Names of polygons

Polygons are named in terms of their number of sides as given below: (Fig 2)

Name	No. of sides
Pentagon	Five sides
Hexagon	Six sides
Heptagon	Seven sides
Octagon	Eight sides
Nonagon	Nine sides
Decagon	Ten sides
Undecagon	Eleven sides
Duodecagon	Twelve sides

Fig 2

Properties of polygon

- All corners of a regular polygon lie on the circle. The sides of a regular polygon will be tangential to the circle drawn in side. (Fig 3)

- The sum of the interior angles of a polygon is equal to $(2 \times n - 4) \times$ rt angle, where n is the number of sides.

- The sum of exterior angles of a polygon is equal to 360°.

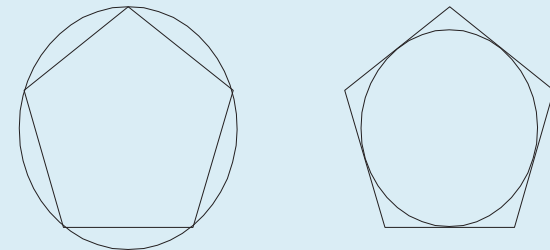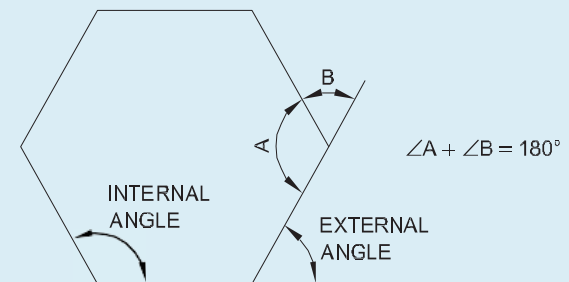- The sum of the interior angle and the corresponding external angle is 180°. (Fig 4)

Fig 3

Fig 4

$\angle A + \angle B = 180°$

INTERNAL ANGLE

EXTERNAL ANGLE

Types of Polygons

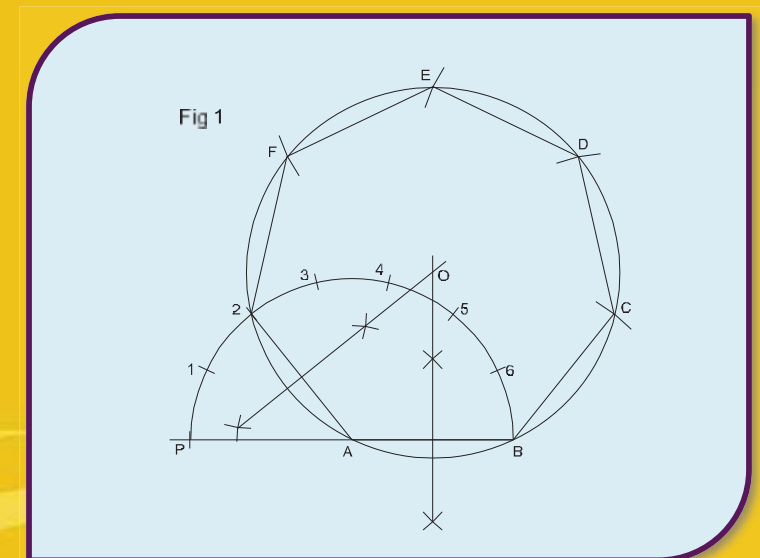Follow the procedure and construct polygons :

Procedure

1 Regular heptagon of side 25 mm.

Semi-circular method - Type A (Fig 1)

- Draw a line AB equal to 25 mm.

- Extend BA to a convenient length.

- `A' as centre and radius AB describe a semi-circle.

- Divide the semi-circle into seven equal parts (number of sides) using divider.

- Number the points as 1,2,3,4,5,6 starting from `P'.

- Join A2

- Draw the perpendicular bisectors from 2A and AB intersecting at 0.

- `0' as centre and OA or OB as radius describe a circle.

- Mark the points C,D,E,F and 2 on the circle such that BC = CD = DE = EF = F2 = AB.

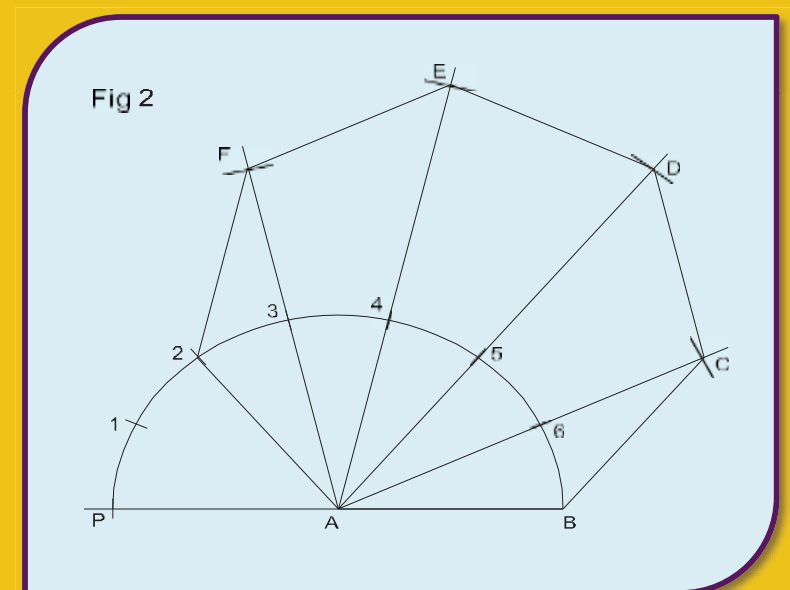- Join the line BC, CD, DE, EF and F2.

- ABCDEF2 is required heptagon.

Fig 1

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Procedure

2 Semi – Circle Method – Type B (Fig 1)

Follow the procedure upto dividing the semi-circle into number of equal parts. (Ex.5.1)

- Join A2
- Join A3, A4, A5 and A6 and extend to a convenient length.
- With centre `B' and radius AB draw an arc cutting A6  extended line at `C'.
- `C' as centre adn same radius, draw an arc cutting the  line A5 at `D'.
- Locate the points E & F in the same manner.
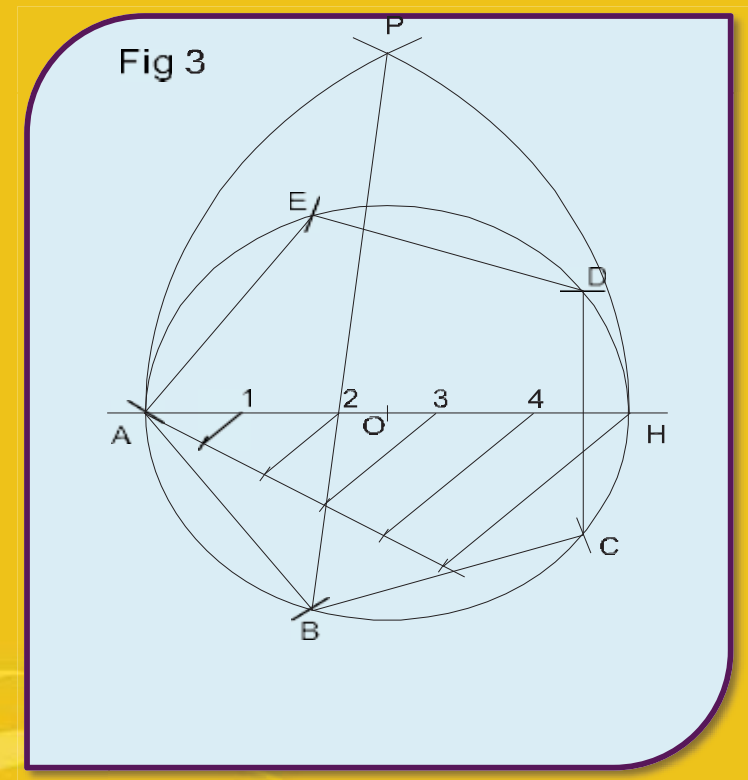- Join BC, CD, DE, EF and F2.
- ABCDEF2 is the required heptagon.

Fig 2

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Procedure

3 Pentagon inside a Circle of Diameter 60 mm. (Fig 3)

- Draw the line AH equals to 60 mm. (Diameter of circle)

- `O' as centre OA as radius describe a circle.
- Divide AH into 5 equal parts (as many equal parts as the sides).

- A and H as centers, AH as radius describe arcs intersecting at `P'.

- Join P2 and extend it to meet the circle at `B'.

- Set off BC, CD, DE, EF equals to AB on the circle.

- Join the points.

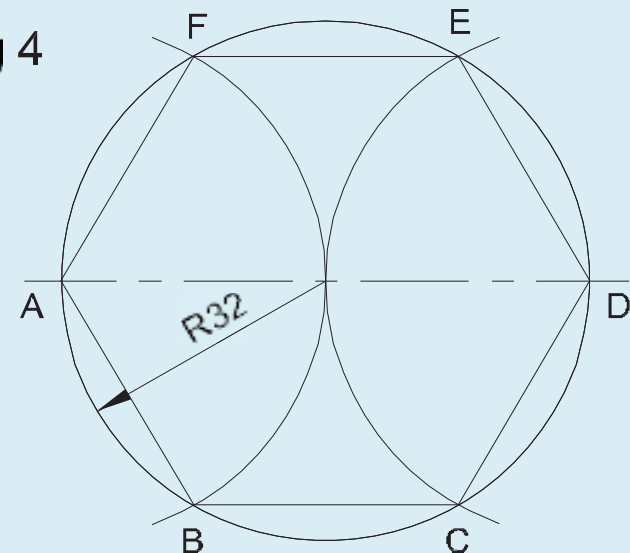- ABCDEF is the required pentagon.

Fig 3

Procedure

4 Arc method

Hexagon of side 32 mm (Fig 4)

- Draw a circle of radius 32 mm.

- Mark the diameter AD

- With same radius, A and D as centres. draw two arcs cutting the circle at points B,F,E & C respectively.

- Join AB, BC, CD, DE, EF and FA.

ABCDE is the required hexagon.

Fig 4

Procedure

5 Arc method

Hexagon inside a circele of diameter 60 mm (Fig 5)

- Draw a line FC equal to 60 mm (Diameter of circle).
- 'O' as centre describe a circle on the diameter FC.
- F as centre FO as radius draw an arc at A.
- 'A' as centre, same radius draw an arc at B.
- In the same manner set the points C,D & E.
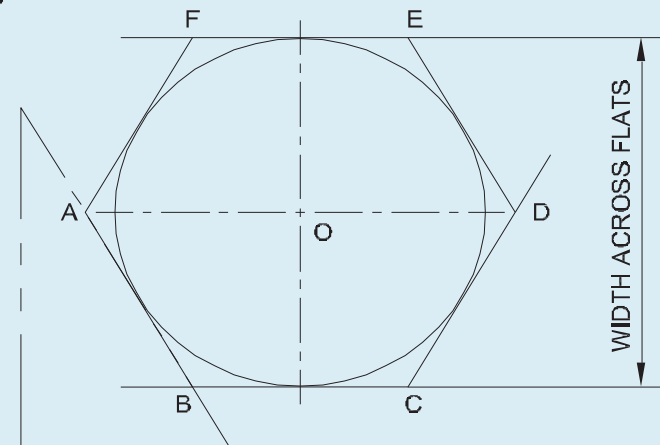- Join AB, BC, CD, DE, EF and FA.

ABCDEF is the required hexagon.

Fig 5
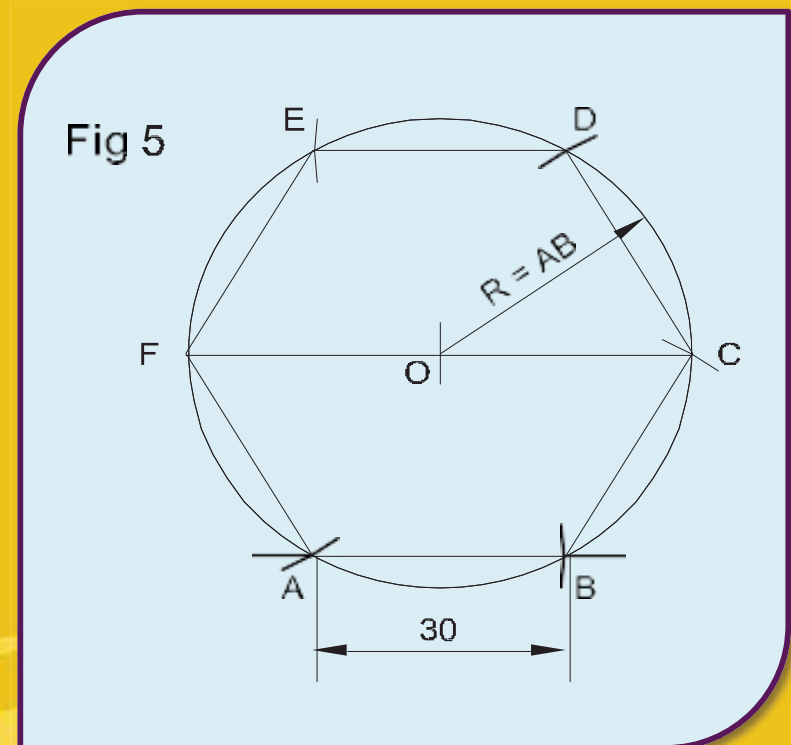
Procedure

6 Across Flats method

Hexagon istance across flat of 45 mm (Fig 6)

- Draw a circle of ϕ 45.

  (45 mm is the size across flat)

- Draw two horizontal tangents BC and FE.

- With 60° setsquare draw four tangents, touching the horizontal tangents.

- Mark the corners A,B,C,D,E and F.

ABCDEF is the required hexagon.

Fig 6

The End

Thanks