MIND MAP

CIRCLE: The set of points which are at a constant distance of units from a fixed point O is called a circle with centre O and radius = r units. The circle is denoted by $C(O, r)$.

The fixed point O is called the centre and the constant distance r units is called its radius.

Circumference and area of a circle

For a circle of radius r, we have

(i) Circumference of the circle = $2\pi r$

(ii) Area of the circle = πr^2

(iii) Area of the semicircle = $\frac{1}{2}\pi r^2$

(iv) Perimeter of the semicircle = $(\pi r + 2r)$

Rotating wheels

(i) Distance moved by a wheel in 1 rotation = circumference of the wheel

(ii) Number of rotations in 1 minute = $\frac{\text{distance moved in 1 minute}}{\text{circumference}}$

Rotation of the hands of a clock

(i) Angle described by the minute hand of a clock in 60 minutes = 360º.

(ii) Angle described by the hour hand of a clock in 12 hours = 360º.

Length of arc, area of sector

Let an arc AB make an angle $\theta^\circ < 180^\circ$ at the centre of a circle of radius r. Then, we have

(i) Length of the arc $\overset{\frown}{PQ} = \frac{2\pi r\,\theta}{360} = \ell$

(ii) Area of the sector $= \frac{\pi r^2 \theta}{360}$

$$= \left(\frac{1}{2} \times \frac{2\pi r\,\theta}{360} \times r\right) = \left(\frac{1}{2} \times l \times r\right)$$

(iii) Perimeter of the sector

$$= \left(2r + \frac{2\pi r\,\theta}{360}\right)$$

Area of a ring

Let R and r be the outer and inner radii of a ring.

Then, area of the ring = $\pi(R^2 - r^2)$.

Area of segment

(a) Area of the minor segment $PRQP$ = (area of the sector $OPRQO$) – (area of ΔOPQ)

$$= \left(\frac{\pi r^2 \theta}{360} - \frac{1}{2} r^2 \sin\theta\right)$$

(b) Area of the major segment $QSPQ$ = (area of the circle) – (area of the minor segment $PRQP$)