# **TRIGONOMETRIC FUNCTIONS**

## INTRODUCTION OF TRIGONOMETRY FUNCTIONS

### ANGLES AND THEIR MEASURES

#### Angle

A figure traced by rotating a given ray about its end point. The measure of angle is the amount of rotation performed from the initial side to the terminal side. Angle performed by anticlockwise rotation are taken as positive whereas angles formed by clockwise rotation are considered as negative.



#### **Radian or Circular Measure**

The angle subtended at the centre of a circle by an arc of the same circle whose length is

equal to the radius of the circle is called 1 radian and is denoted by 1<sup>c</sup>.

When no unit is mentioned with an angle, it is always understood to be in radian.

Radian measure and real numbers are same.

The ratio of circumference and diameter of a circle is always constant and denoted by Greek letter 'p'.

p is an irrational number,  $\pi = \frac{\text{Circumfere nce of Circle}}{\text{Diameter of circle}}$ 

Circumference =  $2pr = p \times diameter$ 

 $\pi = \frac{22}{7}$  (approx) = 3.1415.....

## Arc-angle relation

Angle = 
$$\frac{\text{arc}}{\text{radius}}$$
; Here angle is always in radian.  $\theta = \frac{1}{r}$ 

Angle subtended by a very small arc is approximately calculated by  $\theta = \frac{\text{Chord } AB}{2}$ 

Arc AB » chord AB for small angle q

Relation between degree and radian.

$$\pi^{\rm c}=\!180^{\rm o}$$

$$1^{\rm c} = \left(\frac{180}{\pi}\right)^{\rm c}$$

$$1^{\circ} = \left(\frac{\pi}{180}\right)^{\circ}$$

## Relation between the sides and interior angles of a polygon

(a) Sum of interior angle of polygon of n sides =  $(2n - 4) \times 90^\circ = (n - 2)p^c$ 

(b) Each interior angle of a regular polygon of *n* sides =  $\frac{(2n-4)90^{\circ}}{n} = \frac{(n-2)}{n}\pi^{c}$ 

- **Ex.1** Find the angle between the hour-hand and the minute-hand in degrees at half past 3.
- **Sol.** At half past three minute's hand will be at 6 that is its makes an angle of 180° from the position 12. While in one hour the hour-hand revolves by  $\frac{360^{\circ}}{12} = 30$ . So at half past 3, hour-hand will be making angle of  $3.5 \times 30 = 105^{\circ}$  from the position of 12. Hence the required angle =  $180^{\circ} 105^{\circ} = 75^{\circ}$ .

