DEPARTMENT OF EDUCATION (S)
Government of Manipur

CHAPTER 13
TRIGONOMETRY

NOTES

Trigonometry is the branch of Mathematics which originally dealt with the angles and sides of a triangle and relations between them.

➢ Branches of Trigonometry

Trigonometry is broadly divided into two branches. They are

(i) Plane Trigonometry and

(ii) Spherical Trigonometry

➢ Angle in Trigonometry

In Trigonometry, an angle is formed by the revolution of a line about a fixed point in it keeping itself always in the same plane.

The fixed point which is the centre of revolution is called the origin. The revolving line forms positive or negative angles according to the revolution is in the anti-clockwise or clockwise direction.

Note: In plane geometry an angle is said to be formed by two rays having a common origin or initial point. The measure of an angle is always between 0^0 and 360^0. Further the sign of an angle has no relevance. In Trigonometry the magnitude of an angle has no restriction.

➢ Measurement of Angles

Angles are measured in three systems.

They are (i) The Sexagesimal System

(ii) The centesimal system

(iii) The circular system.

- **The Sexagesimal System**

In this system a right angle is divided into 90 equal parts and each one of them is called one degree denoted by 1^0. Each degree is divided into 60 equal parts, each one is called a minute denoted by $1^{/}$ and again one minute is divided into 60 equal parts each one called one second denoted by $1^{//}$.

Thus, we write

1 right angle = 90^0

1^0 = $60^{/}$

$1^{/}$ = $60^{//}$

- **The Centesimal System**

In this system a right angle is divided into 100 equal parts and each one of them is called one grade denoted by 1^g. Each grade is divided into 100 equal parts, each one is called a centesimal minute denoted by $1^{\backslash}$ and again one centesimal minute is divided into 100 equal parts each one called one centesimal second denoted by $1^{\backslash\backslash}$.

Thus, we write

1 right angle = 100^g

1^g = $100^{\backslash}$

$1^{\backslash}$ = $60^{\backslash\backslash}$

- **The Circular System**

In this system, the measure of an angle is expressed in radians.

A radian is an angle subtended at the centre of any circle by an arc whose length is equal to the radius of the circle. It is denoted by 1^c.

Theorems

1. The circumference of a circle bears a constant ratio to its diameter.
2. A radian is a constant angle.

- **Relation among the three System of Measurement of Angles**

$$180^0 = 200^g = \pi^c = 2 \text{ right angles}$$

If x^0, y^g and z^c are the measures of an angle in the three systems, then

$$\frac{x}{180} = \frac{y}{200} = \frac{z}{\pi}.$$

Note: 1. When a straight angle is divided into 180 equal parts one part is one degree.
2. When a straight angle is divided into 200 equal parts one part is one grade.

- **If an arc of length (s) subtends an angle θ (in radian) at the centre of a circle with r as radius, then $s = r\theta$.**

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