Trigonometry

- If in a circle of radius r, an arc of length l subtends and angle of θ radians, then $l = r\,\theta$

- Radian measure $=(\pi/180)\times$ Degree measure

- Degree measure $=(180/\pi)\times$ Radian measure

- $\cos^2 x + \sin^2 x = 1$

- $1 + \tan^2 x = \sec^2 x$

- $1 + \cot^2 x = \operatorname{cosec}^2 x$

- $\cos(2n\pi + x) = \cos x$

- $\sin(2n\pi + x) = \sin x$

- $\sin(-x) = -\sin x$

- $\cos(-x) = \cos x$

- $\cos(x + y) = \cos x \cos y - \sin x \sin y$

- $\cos(x - y) = \cos x \cos y + \sin x \sin y$

- $\cos(\eth/2 - x) = \sin x$

- $\sin(\eth/2 - x) = \cos x$

- $\sin(x + y) = \sin x \cos y + \cos x \sin y$

- $\sin(x - y) = \sin x \cos y - \cos x \sin y$

- $\cos(\pi - x) = -\cos x \quad \sin(\pi - x) = \sin x$

- $\cos(\pi + x) = -\cos x \quad \sin(\pi + x) = -\sin x$

- cos $(2\pi - x)$ = cos x sin $(2\pi - x)$ = $-$ sin x
- cos $(\pi/2 + x)$ = -sin x
- sin $(\pi/2 + x)$ = cos x
- cos 2x = $\cos^2 x - \sin^2 x$ = $2\cos^2 x - 1$ = $1 - 2\sin2x$ = $(1 - \tan^2 x)/(1 + \tan^2 x)$
- tan(x + y) = (tan x + tan y)/(1 $-$ tan x tan y)
- cot(x + y) = (cot x cot y $-$ 1)/(cot x + cot y)

Sample Examples

- Find the value of cos (–1710°).

  Solution:-

  We know that values of cos x repeats after an interval of 2π or 360°. Therefore, cos (–1710°) = cos (–1710° + 5 × 360°)= cos (–1710° + 1800°) = cos 90° = 0.

- Show that tan 3 x tan 2 x tan x = tan 3x – tan 2 x – tan x

  Solution:-

  We know that 3x = 2x + x Therefore, tan 3x = tan (2x + x)

  tan 3x = (tan 2x +tan x)/(1 – tan x tan 2x)

  tan 3x – tan 3x tan 2x tan x = tan 2x + tan x

  tan 3x – tan 2x – tan x = tan 3x tan 2x tan x

  tan 3x tan 2x tan x = tan 3x – tan 2x – tan x.

- Solve sin 2x – sin4 x + sin 6x = 0.

  Solution:- The equation can be written as

  sin 6x + sin 2x − sin 4x = 0

   2 sin 4x cos2x − sin 4x = 0

  i.e. sin 4x(2 cos2x − 1) = 0

  sin 4x = 0 or cos 2x = 1/2

  sin4x = 0 or cos 2x = cos π/3

  4x = nπ or 2nπ ± π/3