DSSSB TGT PART(A+B)

MATHS

TRIGNOMETRIC RATIO & IDENTITIES

LIVE 15/05/2024 04:00PM

Trignometry

त्रिकोणमिति

तीन कोण → त्रिभुज (समकोण △)

Measure of an Angle

There are three system for measuring angles.

(i) Sexagesimal System (~~English~~ System) In this system, angle is measured in degrees.

90°

$90^\circ = 100^g$

1 right angle = 90°, $1^\circ = 60'$ and $1' = 60''$

(ii) Centesimal System (French System) In this system, angle is measured in grades.

1 right angle = 1009^g, $1^g = 100'$ and $1' = 100''$

(iii) Circular Measure In this system, angle is measured in radians.

The angle subtended at the centre of a circle by an arc of length equal to its radius is 1 radian, as 1^c.

On comparing all the above three measuring systems, we have

$\pi^c = 180° = 200^g$ = 2 right angles

$\pi^c = 180° = 200^g$

Degree Grade

$$\frac{D}{90} = \frac{G}{100} = \frac{2R}{\pi}$$

Radian

$\pi^c = 180^\circ$

$\pi = 180$

$\pi^\circ = 180^\circ \alpha$

$\pi = 180^\circ$

Convert 180° into Radian?

$$\frac{D}{90} = \frac{2R}{\pi}$$

$$\frac{2 \cancel{180}}{\cancel{90}} = \frac{2R}{\pi}$$

$\pi = R$

$\pi = 180$

$\pi^c = 180^\circ$

Convert 200° into Radian?

$$\frac{D}{90} = \frac{2R}{\pi} \qquad \pi^\circ =$$

$$\frac{\overset{10}{\cancel{200}}}{90} = \frac{2R}{\pi}$$

$$\frac{10\pi}{9} = R$$

1 Right angle $\Rightarrow 90^\circ$

$1^\circ \Rightarrow 60 \text{ min} = 60'$

$1 \text{ min} \Rightarrow 60 \text{ sec} = 60''$

$1^c = 57^\circ\ 17'\ 45''$

$= 57.2958^\circ$

$\boxed{1^c \approx 57.3^\circ}$

Sin Cos tan

LAL / KKA = PBP / HHB

$\sin\theta = \frac{P}{H}$, $\text{Cosec}\,\theta = \frac{H}{P}$

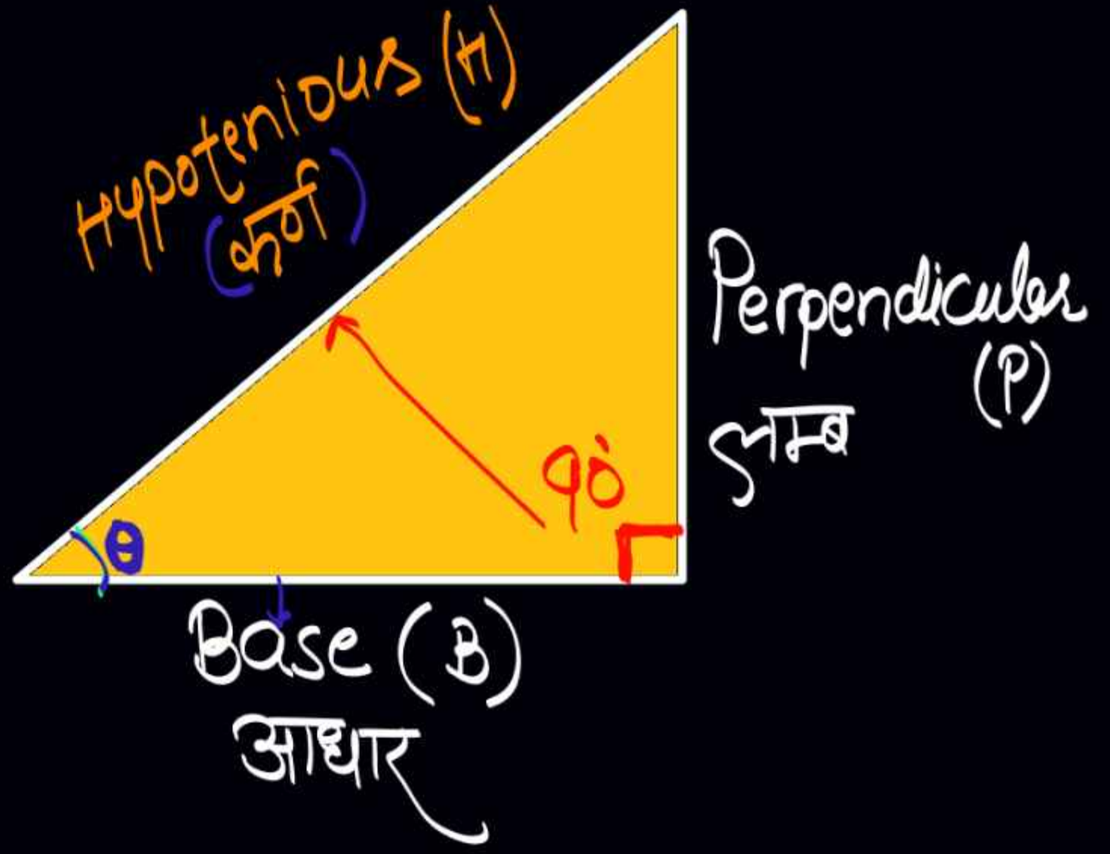
$\cos\theta = \frac{B}{H}$, $\sec\theta = \frac{H}{B}$

$\tan\theta = \frac{P}{B}$, $\cot\theta = \frac{B}{P}$

$\sin\theta = \frac{1}{\text{Cosec}\,\theta}$

$\cos\theta = \frac{1}{\sec\theta}$

$\tan\theta = \frac{\sin\theta}{\cos\theta}$



Most Imp Identity.

1. $\sin^2\theta+\cos^2\theta=1 \Rightarrow \begin{cases}\sin^2\theta=1-\cos^2\theta\\ \cos^2\theta=1-\sin^2\theta\end{cases}$

$$\frac{\sin^2\theta}{\cos^2\theta}+\frac{\cos^2\theta}{\cos^2\theta}=\frac{1}{\cos^2\theta}$$

2. $\tan^2\theta+1=\sec^2\theta$

या

$\sec^2\theta-\tan^2\theta=1$

$$\tan^2\theta+1=\sec^2\theta$$

$$\frac{\sin^2\theta}{\sin^2\theta}+\frac{\cos^2\theta}{\sin^2\theta}=\frac{1}{\sin^2\theta}$$

3. $1+\cot^2\theta=\operatorname{cosec}^2\theta$

या

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

θ	0°	30°	45°	60°	90°
Sin	$\sqrt{\frac{0}{4}} \Rightarrow 0$	$\sqrt{\frac{1}{4}} \Rightarrow \frac{1}{2}$	$\sqrt{\frac{2}{4}} \Rightarrow \frac{1}{\sqrt{2}}$	$\sqrt{\frac{3}{4}} \Rightarrow \frac{\sqrt{3}}{2}$	$\sqrt{\frac{4}{4}} \Rightarrow 1$
Cos	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
Tan	0	$\frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} \Rightarrow \frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	$\frac{1}{0} = \infty$
Cot	$\frac{1}{0} = \infty$	$\frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} \Rightarrow \sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	$\frac{1}{0} = 0$
Sec	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	$\frac{1}{0} = \infty$
Cosec	∞	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1

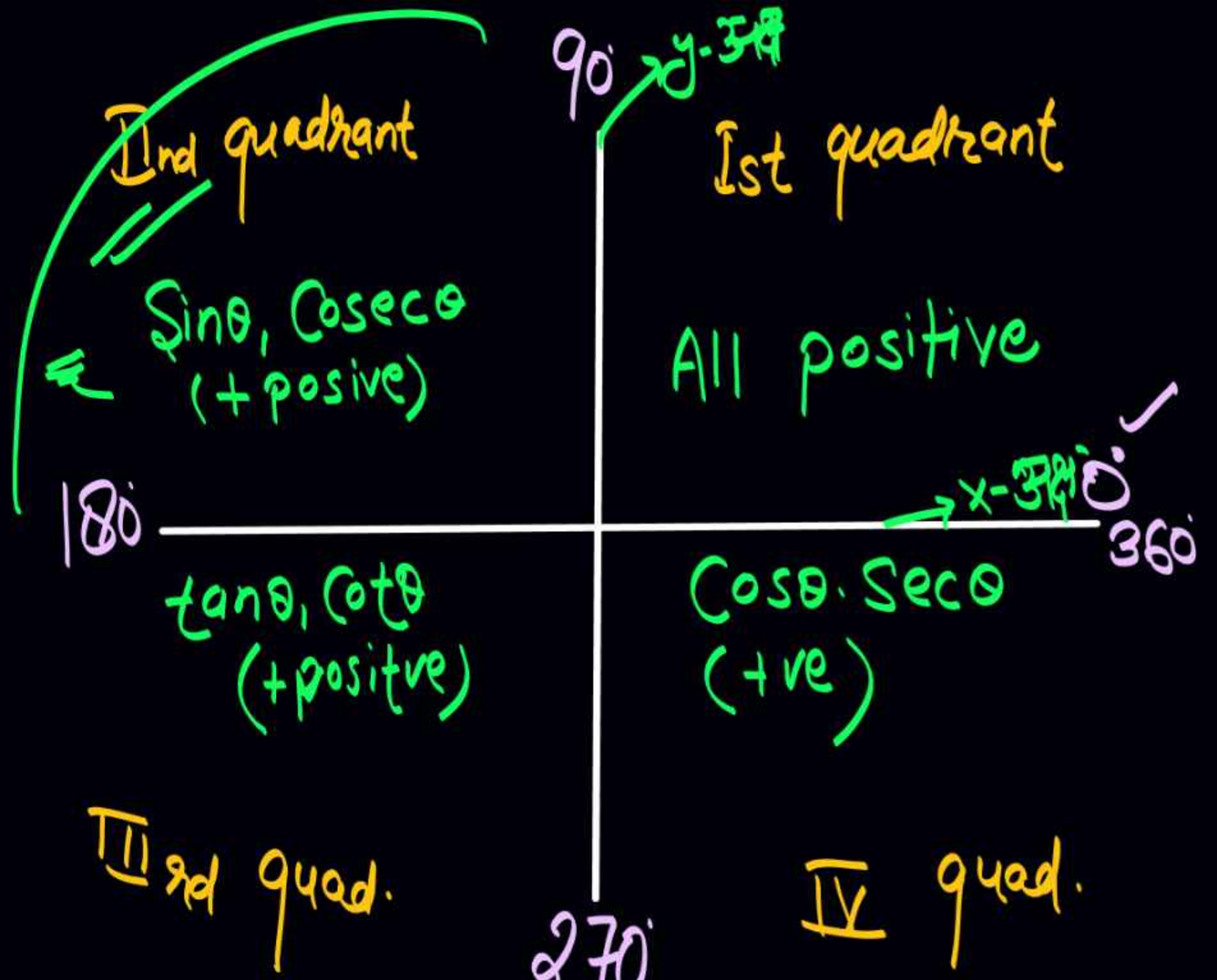
$\frac{\sin\theta}{\cos\theta}$ ⇐

$\frac{1}{\infty} = 0$

θ →	0°	30°	45°	60°	90°
Sinθ	$\sqrt{\frac{0}{4}} \Rightarrow 0$	$\sqrt{\frac{1}{4}} \Rightarrow \frac{1}{2}$	$\sqrt{\frac{2}{4}} \Rightarrow \frac{1}{\sqrt{2}}$	$\sqrt{\frac{3}{4}} \Rightarrow \frac{\sqrt{3}}{2}$	$\sqrt{\frac{4}{4}} \Rightarrow 1$
Cosθ	1 ←	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
tanθ	$\frac{0}{1} = 0$ ✓	$\frac{\frac{1}{2}}{\sqrt{3}/2} \Rightarrow \frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	$\frac{1}{0} = \infty \Rightarrow \frac{1}{\infty} = 0$
Cotθ	$\frac{1}{0} = \infty$	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0
Secθ	1	$\frac{2}{\sqrt{3}}$ ✓	$\sqrt{2}$ ✓	2 ✓	$\frac{1}{0} = \infty$ ✓
Cosecθ	∞	2	$\sqrt{2}$	$2/\sqrt{3}$	1

X-अक्ष पर Ratio Change नहीं होगा।
केवल चिन्ह Change हो सकते हैं

y-अक्ष पर Ratio Change होगा ($90° \pm$, $270° \pm$)
व Sign भी Change हो सकता है



$(90 \pm \theta)$ or $(270 \pm \theta)$

$\sin \rightleftharpoons \cos$

$\tan \rightleftharpoons \cot$

$\sec \rightleftharpoons \operatorname{cosec}$

$\sin(315^\circ) = ?$

$\sin(270 + 45) = -\cos 45^\circ$

$$\tan\theta = \frac{\sin\theta}{\cos\theta}$$

- दो कोणों के योग एवं अन्तर से सम्बन्धित कुछ महत्त्वपूर्ण सर्वसमिकाएँ
- **Some Important Identities Related to Sum and Difference of Two Angles**

- $\sin(A + B) = \sin A \cos B + \cos A \sin B$
- $\sin(A - B) = \sin A \cos B - \cos A \sin B$
- $\cos(A + B) = \cos A \cos B - \sin A \sin B$
- $\cos(A - B) = \cos A \cos B + \sin A \sin B$

- $\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$
- $\tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$
- $\cot(A+B) = \frac{\cot A \cot B - 1}{\cot A + \cot B}$
- $\cot(A - B) = \frac{\cot A \cot B + 1}{\cot B - \cot A}$

- $\sin(A+B)\sin(A - B) = \sin^2 A - \sin^2 B = \cos^2 B - \cos^2 A$
- $\cos(A + B)\cos(A-B) = \cos^2 A - \sin^2 B = \cos^2 B - \sin^2 A$

Function	Domain	Range
$\sin\theta$	$\theta \in R$	[-1,1]
$\cos\theta$	$\theta \in R$	[-1,1]
$\tan\theta$	$\theta \in R - [(2n+1)x90^\circ]$	R
$\cot\theta$	$\theta \in R - [n\pi]$	R
$\sec\theta$	$\theta \in R - [(2n+1)x90^\circ]$	R-(-1,1)
$\operatorname{cosec}\theta$	$\theta \in R - [n\pi]$	R-(-1,1)