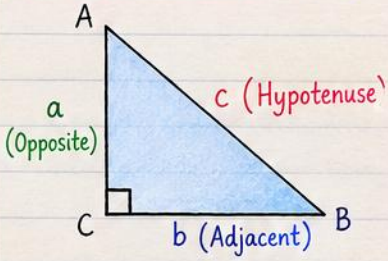
Pragyan

# TRIGONOMETRY

## Class 10 - Important Formulas & Concepts

## 1. BASIC RATIOS (Right Angled Triangle)




In $\Delta ABC$, $\angle C = 90°$
- c = Hypotenuse
- a = Opposite to $\angle B$
- b = Adjacent to $\angle B$

- $\sin\theta = \frac{\text{Opposite}}{\text{Hypotenuse}} = \frac{a}{c}$
- $\cos\theta = \frac{\text{Adjacent}}{\text{Hypotenuse}} = \frac{b}{c}$
- $\tan\theta = \frac{\text{Opposite}}{\text{Adjacent}} = \frac{a}{b}$

## 2. TRIGONOMETRIC IDENTITIES

- $\sin^2\theta + \cos^2\theta = 1$
- $1 + \tan^2\theta = \sec^2\theta$
- $1 + \cot^2\theta = \text{cosec}^2\theta$
- $\tan\theta = \frac{\sin\theta}{\cos\theta}$
- $\cot\theta = \frac{\cos\theta}{\sin\theta}$
- $\sec\theta = \frac{1}{\cos\theta}$
- $\text{cosec}\,\theta = \frac{1}{\sin\theta}$

**Quotient Identities**

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

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

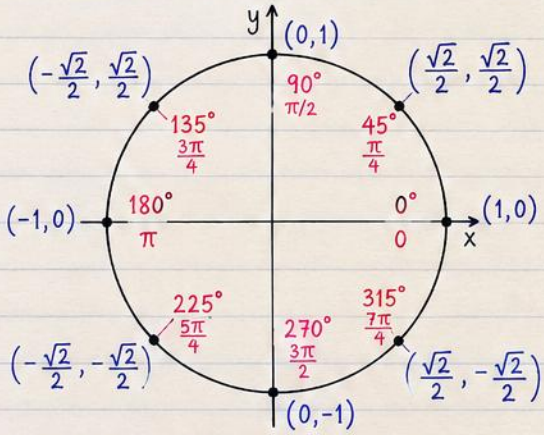
**Reciprocal Identities**

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

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

$\tan\theta = \frac{1}{\cot\theta}$

## 3. UNIT CIRCLE VALUES




## 4. SUM & DIFFERENCE FORMULAS

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

## 5. MULTIPLE & HALF ANGLE FORMULAS

- $\sin 2A = 2\sin A\cos A$
- $\cos 2A = \cos^2 A - \sin^2 A = 2\cos^2 A - 1 = 1 - 2\sin^2 A$
- $\tan 2A = \frac{2\tan A}{1 - \tan^2 A}$

- $\sin\frac{A}{2} = \pm\sqrt{\frac{1-\cos A}{2}}$
- $\cos\frac{A}{2} = \pm\sqrt{\frac{1+\cos A}{2}}$
- $\tan\frac{A}{2} = \pm\sqrt{\frac{1-\cos A}{1+\cos A}}$

## 6. IMPORTANT VALUES (0°, 30°, 45°, 60°, 90°)

| $\theta$ | 0° | 30° ($\pi/6$) | 45° ($\pi/4$) | 60° ($\pi/3$) | 90° ($\pi/2$) |
|---|---|---|---|---|---|
| $\sin\theta$ | 0 | $\frac{1}{2}$ | $\frac{1}{\sqrt{2}}$ | $\frac{\sqrt{3}}{2}$ | 1 |
| $\cos\theta$ | 1 | $\frac{\sqrt{3}}{2}$ | $\frac{1}{\sqrt{2}}$ | $\frac{1}{2}$ | 0 |
| $\tan\theta$ | 0 | $\frac{1}{\sqrt{3}}$ | 1 | $\sqrt{3}$ | Not defined |
| $\text{cosec}\,\theta$ | Not defined | 2 | $\sqrt{2}$ | $\frac{2}{\sqrt{3}}$ | 1 |
| $\sec\theta$ | 1 | $\frac{2}{\sqrt{3}}$ | $\sqrt{2}$ | 2 | Not defined |
| $\cot\theta$ | Not defined | $\sqrt{3}$ | 1 | $\frac{1}{\sqrt{3}}$ | 0 |

## 7. EXAMPLE

If $\sin\theta = \frac{3}{5}$ and $\theta$ is acute, find $\cos\theta$ and $\tan\theta$.

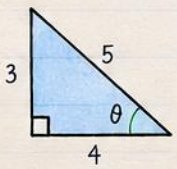
**Solution:**

$\sin\theta = \frac{3}{5} = \frac{\text{Opposite}}{\text{Hypotenuse}}$

Let opposite = 3, hypotenuse = 5

Adjacent $= \sqrt{5^2 - 3^2} = \sqrt{25-9} = \sqrt{16} = 4$

$\cos\theta = \frac{4}{5}$, $\tan\theta = \frac{3}{4}$




## 8. TIPS

1. Learn values of 0°, 30°, 45°, 60°, 90°.
2. Use identities to simplify expressions.
3. Draw a right triangle for problems.
4. Convert between ratios using reciprocal and quotient identities.
5. Practice sum-difference and double angle formulas.