NCERT – Class 10 Cheat Sheet

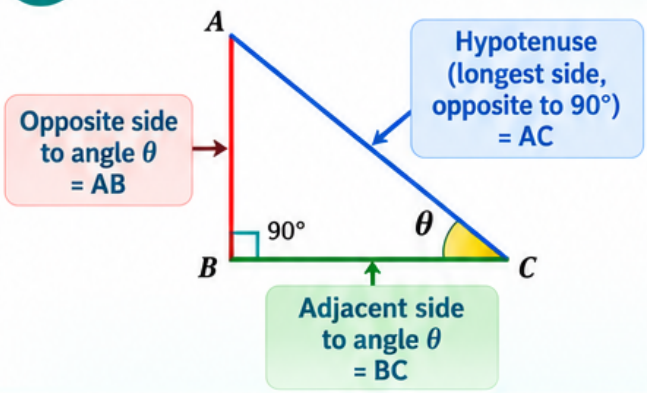
TRIGONOMETRIC RATIOS

Chapter: Some Applications of Trigonometry

Pumpa



1 RIGHT-ANGLED TRIANGLE AND IDENTIFICATION OF SIDES



How to identify the sides for a given angle θ?

- The side **opposite** to the given angle θ is the side which does not touch the angle θ.
- The side **adjacent** to the given angle θ is the side which touches the angle θ other than the hypotenuse.
- The **hypotenuse** is the side opposite to the right angle (90°) and is the longest side.

2 TRIGONOMETRIC RATIOS

$\sin\theta = \frac{\text{opposite side}}{\text{hypotenuse}}$	$\text{cosec}\theta = \frac{\text{hypotenuse}}{\text{opposite side}}$
$\cos\theta = \frac{\text{adjacent side}}{\text{hypotenuse}}$	$\sec\theta = \frac{\text{hypotenuse}}{\text{adjacent side}}$
$\tan\theta = \frac{\text{opposite side}}{\text{adjacent side}}$	$\cot\theta = \frac{\text{adjacent side}}{\text{opposite side}}$

3 RECIPROCAL OF TRIGONOMETRIC RATIOS

$\sin\theta = \frac{1}{\text{cosec}\theta}$	$\text{cosec}\theta = \frac{1}{\sin\theta}$
$\cos\theta = \frac{1}{\sec\theta}$	$\sec\theta = \frac{1}{\cos\theta}$
$\tan\theta = \frac{1}{\cot\theta}$	$\cot\theta = \frac{1}{\tan\theta}$
$\tan\theta = \frac{\sin\theta}{\cos\theta}$	$\cot\theta = \frac{\cos\theta}{\sin\theta}$
$\tan\theta = \frac{\sec\theta}{\text{cosec}\theta}$	$\cot\theta = \frac{\text{cosec}\theta}{\sec\theta}$

4 VALUES OF TRIGONOMETRIC RATIOS

Trigonometric ratio	0°	30°	45°	60°	90°
$\sin\theta$	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

5 TIPS FOR BOARD EXAM

- First, draw a neat right-angled triangle and mark the given angle.
- Identify opposite, adjacent and hypotenuse correctly.
- Use the standard values from the table (0°, 30°, 45°, 60°, 90°) directly.
- Simplify expressions using reciprocal relations when needed.
- Rationalise the denominator (remove $\sqrt{}$ from denominator).
- Check if the ratio is defined for the given angle.
- Keep 2–3 decimal approximations only if asked, otherwise use exact values ($\sqrt{}$ terms).

6 COMMON MISTAKES

- Confusing opposite and adjacent sides for the given angle.
- Taking hypotenuse as the adjacent side.
- Using the values from the table for the wrong angle.
- Writing undefined values (e.g., tan 90°, sec 90°) incorrectly.
- Forgetting reciprocal relations (e.g., $\sin\theta = \frac{1}{n}$ / $\text{cosec}\theta$).
- Not rationalising the denominator.
- Using approximate decimal values instead of exact values.
- Changing the reference angle in the middle of the question.

7 KEY TAKEAWAYS

- Trigonometric ratios are defined only for acute angles in a right triangle.
- Hypotenuse is always the longest side and opposite to 90°.
- Use the standard table values for quick solutions.
- $\text{cosec}\theta$, $\sec\theta$, $\tan\theta$, $\cot\theta$ may be "not defined" for certain angles.
- Reciprocal identities help in simplifying expressions.
- Accurate identification of sides and angle is the key to solving trigonometry questions.