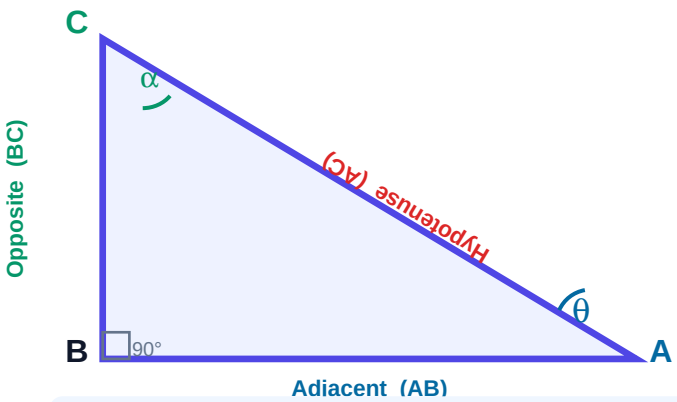
Grade 10 Mathematics · Chapter 8

Trigonometry – Formula Reference Sheet

Right Triangle – Parts & Labels



★ Trig ratios depend ONLY on the angle θ, not on the size of the triangle (AA Similarity).

The Six Trigonometric Ratios

Ratio	= Sides	Reciprocal of
sin θ	Opp / Hyp	—
cos θ	Adj / Hyp	—
tan θ	Opp / Adj	—
cosec θ	Hyp / Opp	1/sin θ
sec θ	Hyp / Adj	1/cos θ
cot θ	Adj / Opp	1/tan θ

Also: tan θ = sin θ / cos θ cot θ = cos θ / sin θ

SOH – CAH – TOA Memory Trick

SOH	Sin =	Opposite / Hypotenuse
CAH	Cos =	Adjacent / Hypotenuse
TOA	Tan =	Opposite / Adjacent

SOH CAH TOA

"Some Old Hens Can Always Hide Their Old Age" — mnemonic

If One Ratio is Given — Find the Rest

Step 1	Draw a right triangle and label the angle θ.
Step 2	Mark the two known sides from the given ratio.
Step 3	Find the 3rd side using Pythagoras: $a^2+b^2=c^2$
Step 4	Write all 6 trig ratios using definitions.

Example: tan A = 4/3 → Find all ratios

BC = 4k, AB = 3k → AC = √(16+9)k = 5k (Pythagoras)
sin A = 4/5 cos A = 3/5 tan A = 4/3
cosec A = 5/4 sec A = 5/3 cot A = 3/4

Standard Angle Values — Complete Table

Ratio ↓ Angle →	0°	30°	45°	60°	90°
sin	0	1/2	1/√2	√3/2	1
cos	1	√3/2	1/√2	1/2	0
tan	0	1/√3	1	√3	Undef.
cosec	Undef.	2	√2	2/√3	1
sec	1	2/√3	√2	2	Undef.
cot	Undef.	√3	1	1/√3	0

★ **Memory trick: sin values 0°→90° = √0/2, √1/2, √2/2, √3/2, √4/2 = 0, ½, 1/√2, √3/2, 1 ★ cos = sin read BACKWARDS**

Trigonometry – Identities, Relationships & Exam Tips

The Three Pythagorean Identities — All Derived from $a^2 + b^2 = c^2$

Identity 1

$\sin^2A + \cos^2A = 1$

Divide $a^2+b^2=c^2$ by c^2

Valid: $0° \le A \le 90°$

Identity 2

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

Divide $a^2+b^2=c^2$ by b^2

Valid: $0° \le A < 90°$

Identity 3

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

Divide $a^2+b^2=c^2$ by a^2

Valid: $0° < A \le 90°$

Useful Rearrangements — Know These for Proofs

From Identity 1	From Identity 2	From Identity 3
$\sin^2A = 1 - \cos^2A$	$\sec^2A - \tan^2A = 1$	$\operatorname{cosec}^2A - \cot^2A = 1$
$\cos^2A = 1 - \sin^2A$	$\tan^2A = \sec^2A - 1$	$\cot^2A = \operatorname{cosec}^2A - 1$
$\sin A = \sqrt{(1 - \cos^2A)}$	$(\sec+\tan)(\sec-\tan) = 1$	$(\operatorname{cosec}+\cot)(\operatorname{cosec}-\cot) = 1$
$\cos A = \sqrt{(1 - \sin^2A)}$	$\tan A = \sin A / \cos A$	$\cot A = \cos A / \sin A$

Compound Angle Trick

If $\sin(A-B) = 1/2 \rightarrow$ compare with table: $\sin 30° = 1/2 \rightarrow A-B = 30°$

Set up two equations, then add/subtract to solve for A and B individually.

8 Exam Quick-Check Tips

1	sin A and cos A are always between 0 and 1 (inclusive). Getting sin A > 1 means an error.
2	tan 90°, cot 0°, cosec 0° and sec 90° are ALL undefined — never write a number for these.
3	Know all 3 identities by heart. $\sin^2A + \cos^2A = 1$ is used most often.
4	Given ONE ratio? Draw triangle → mark sides → Pythagoras for 3rd side → find all 6.
5	Proof questions: work on ONE side only. NEVER move terms across the = sign.
6	As angle 0°→90°: sin increases (0→1), cos decreases (1→0), tan increases (0→∞).
7	Trig ratios depend ONLY on the angle — triangles of any size with same angle give same ratios.
8	To simplify proofs: convert everything to sin and cos, then use identities to match the other side.

$\sin^2A+\cos^2A=1$
Always true

$\sin 30°=½, \cos 60°=½$
Most-tested values

$\tan A = \sin A / \cos A$
Never forget this