

Introduction to Trigonometry

CBSE Class 10 Maths · Knowledge organiser

KEY DEFINITIONS

Trigonometric ratio

A ratio of two sides of a right-angled triangle for an acute angle, such as $\sin A$ = opposite/hypotenuse.

Trigonometric identity

An equation true for all angles where it is defined, such as $\sin^2 A + \cos^2 A = 1$.

Complementary angle ratios

$\sin(90^\circ - A) = \cos A$ and $\tan(90^\circ - A) = \cot A$.

KEY FORMULAS

Ratios (right $\triangle$) $\sin A = \frac{P}{H}$, $\cos A = \frac{B}{H}$,
 $\tan A = \frac{P}{B} = \frac{\sin A}{\cos A}$

Reciprocals $\operatorname{cosec} A = \frac{1}{\sin A}$, $\sec A = \frac{1}{\cos A}$,
 $\cot A = \frac{1}{\tan A}$

Identities $\sin^2 A + \cos^2 A = 1$, $1 + \tan^2 A = \sec^2 A$,
 $1 + \cot^2 A = \operatorname{cosec}^2 A$

$0^\circ, 30^\circ, 45^\circ, 60^\circ, 90^\circ$ $\sin : 0, \frac{1}{2}, \frac{1}{\sqrt{2}}, \frac{\sqrt{3}}{2}, 1$; $\cos : 1, \frac{\sqrt{3}}{2}, \frac{1}{\sqrt{2}}, \frac{1}{2}, 0$

$\tan$ at the same angles $0, \frac{1}{\sqrt{3}}, 1, \sqrt{3}$, not defined

YOU SHOULD BE ABLE TO...

- Find all six trigonometric ratios from one given ratio and know the values for $0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90° .
- Evaluate expressions with standard angles and prove the common identities by working from one side.
- Write long answers that combine ratios, standard values and identities, with every substitution shown.
- Prove the tougher identities and solve problems where the ratio is given in terms of letters such as a and b .

WORKED EXAMPLE

If $4 \tan \theta = 3$, find $\frac{\sin \theta + \cos \theta}{\sin \theta - \cos \theta}$.

$\tan \theta = \frac{3}{4}$. Take opposite = $3k$, adjacent = $4k$,
hypotenuse = $5k$. Then $\sin \theta = \frac{3}{5}$, $\cos \theta = \frac{4}{5}$, and the
expression = $\frac{7/5}{-1/5} = -7$. (Quicker: divide numerator
and denominator by $\cos \theta$ to get $\frac{\tan \theta + 1}{\tan \theta - 1} = \frac{7/4}{-1/4} = -7$
.)

COMMON MISTAKES

- ✗ Writing $\sin A$ as $\sin \times A$, or $\sin^2 A$ as $\sin A^2$.
- ✗ Assuming $\sin(A + B) = \sin A + \sin B$ – check with $A = B = 30^\circ$: $\sin 60^\circ \neq 1$.
- ✗ Mixing up opposite and adjacent sides when the angle is at a different vertex.
- ✗ Working on both sides of an identity at once as if it were an equation. Start from one side (usually the more complicated one) and reach the other.