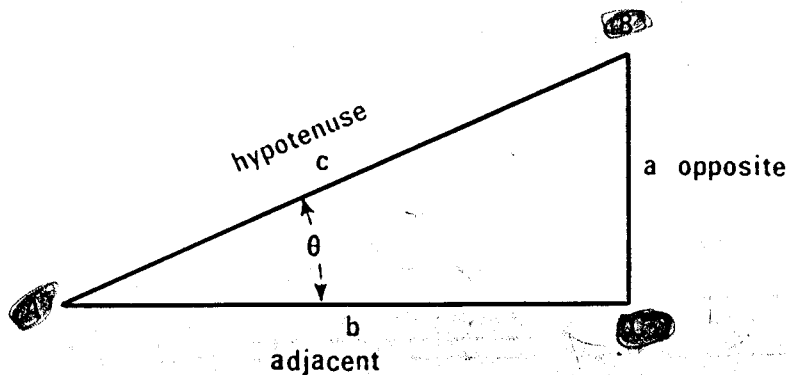


# TRIGONOMETRY

INTRODUCTION TO TRIGONOMETRY

Trigonometry is that branch of mathematics which deals with the relationships between the angles and sides of triangles. There are six such basic relationships which are called functions. They are: sine (sin), cosine (cos), tangent (tan), cotangent (cot), secant (sec), and cosecant (csc).



In a right triangle ABC, with a, b, and c being the sides opposite the corresponding angles, the trigonometric functions are expressed as the following ratios:

$$\text{sine } A = \sin A = \frac{a}{c} = \frac{\text{opp}}{\text{hyp}}$$

$$\text{cosine } A = \cos A = \frac{b}{c} = \frac{\text{adj}}{\text{hyp}}$$

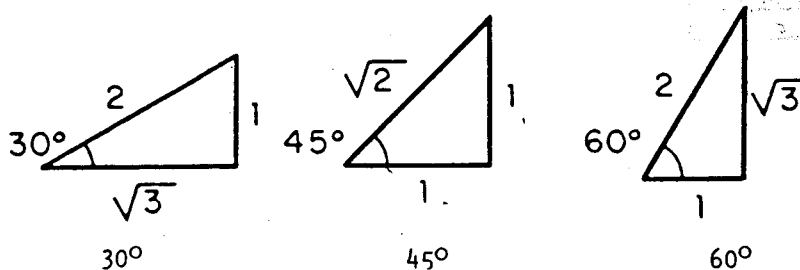
$$\text{tangent } A = \tan A = \frac{a}{b} = \frac{\text{opp}}{\text{adj}}$$

$$\text{cotangent } A = \cot A = \frac{b}{a} = \frac{\text{adj}}{\text{opp}}$$

$$\text{secant } A = \sec A = \frac{c}{b} = \frac{\text{hyp}}{\text{adj}}$$

$$\text{cosecant } A = \csc A = \frac{c}{a} = \frac{\text{hyp}}{\text{opp}}$$

The table below shows the values of the functions of some common angles.

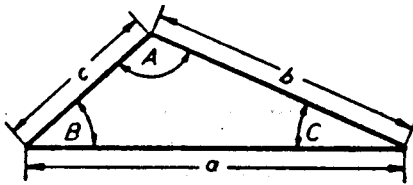


sin	1/2 (.5)	1/2 √2 (.707107)	1/2 √3 (.866025)
cos	1/2 √3 (.866025)	1/2 √2 (.707107)	1/2 (.5)
tan	1/3 √3 (.57735)	1.	√3 (1.73205)
cot	√3 (1.73205)	1.	1/3 √3 (.57735)
sec	2/√3 (1.15470)	√2/2 (1.414214)	2.
csc	2.	√2/2 (1.414214)	2/√3 (1.15470)

TRIGONOMETRIC CALCULATIONS

Arranged in this chart are the functional relationships and identities for oblique triangles. Use of this chart is best effected by drawing a sketch of the triangles approximately to scale, lettering them as shown in the chart and designating all known parts.

To find	Given	Formulas
A	B, C	$180^\circ - (B + C)$
Tan A	a, b, C	$\frac{a \times \sin C}{b - (a \times \cos C)}$
Cos A	a, b, c	$\frac{b^2 + c^2 - a^2}{2bc}$
Sin A	a, c, C	$\frac{a \times \sin C}{c}$
Sin A	a, b, B	$\frac{a \times \sin B}{b}$
Tan A	a, c, B	$\frac{a \times \sin B}{c - (a \times \cos B)}$
B	A, C	$180^\circ - (A + C)$
Sin B	a, b, A	$\frac{b \times \sin A}{a}$
Cos B	a, b, c	$\frac{c^2 + a^2 - b^2}{2ac}$
Tan B	b, c, A	$\frac{b \times \sin A}{c - (b \times \cos A)}$
Sin B	b, c, C	$\frac{b \times \sin C}{c}$



To find		Given		FORMULAS		Given		To find	
a	c, A, C	$\frac{c \times \sin A}{\sin C}$	$\frac{a \times \sin B}{\sin A}$	a, A, B	b	$\frac{c \times \sin B}{a - (c \times \cos B)}$	a, c, B	Tan C	
a	b, A, B	$\frac{b \times \sin A}{\sin B}$	$\frac{c \times \sin B}{\sin C}$	c, B, C	b	$\frac{a^2 + b^2 - c^2}{2ab}$	a, b, c	Cos C	
a	b, c, A	$\sqrt{b^2 + c^2 - (2bc \times \cos A)}$	$\sqrt{c^2 + a^2 - (2ac \times \cos B)}$	a, c, B	b	$\frac{a \times \sin C}{\sin A}$	a, A, C	c	

Formulas	Given	To find
$180^\circ - (A + B)$	A, B	C
$\frac{c \times \sin A}{a}$	a, c, A	Sin C
$\frac{c \times \sin A}{b - (c \times \cos A)}$	b, c, A	Tan C
$\frac{c \times \sin B}{b}$	b, c, B	Sin C
$\frac{c \times \sin B}{a - (c \times \cos B)}$	a, c, B	Tan C
$\frac{a^2 + b^2 - c^2}{2ab}$	a, b, c	Cos C
$\frac{a \times \sin C}{\sin A}$	a, A, C	c
$\sqrt{a^2 + b^2 - (2ab \times \cos C)}$	a, b, C	c
$\frac{b \times \sin C}{\sin B}$	b, B, C	c
$\frac{ab \times \sin C}{2}$	a, b, C	Area
$\frac{1}{2}(S - a)(S - b)(S - c)$	a, b, c	Area