Trigonometry

Trigonometry is the study of triangles, specifically **right triangles.**

Trigonometric Functions
The six trigonometric functions are sine (sin) complementary sine (cos), tangent (tan), complementary secant (cosec or csc), secant (sec), and complementary tangent (cot).

Trigonometric Angle
An angle in trigonometry can be represented by θ, A, B, C or α, β, γ etc. (0 < θ < 90°)

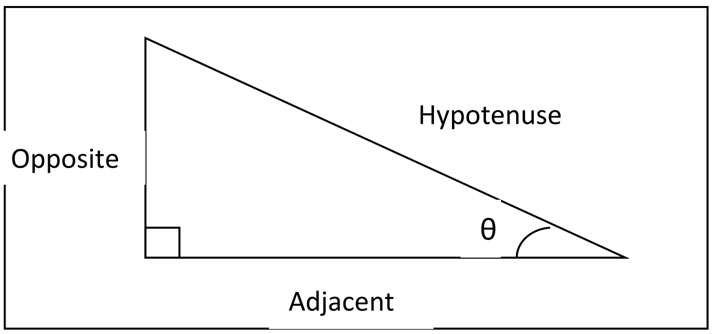


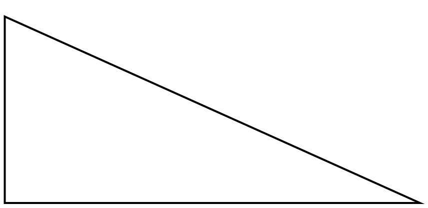
Figure 1

The memorization of this mnemonic can be useful for remembering the phrase:
"**S**ome **O**fficers **H**ave **C**urly **A**uburn **H**air **T**il **O**ld **A**ge"

sinθ = **o**pp/**h**yp = SOH   **c**os θ = **a**dj/**h**yp = CAH   **t**an θ = **o**pp/**a**dj = TOA

csc θ = hyp/opp   sec θ – hyp/adj   cot θ = adj/opp

Example 1: For 0 < θ < 90°, given sin θ = 4/5. Determine the other trigonometric functions.
Step 1: Draw a figure showing θ, hyp, adj, and opp.
Step 2: Determine one unknown using the Pythagorean Theorem $c^2 = a^2 + b^2$
Step 3: Determine each using the above ratios.



sin θ = _______   csc θ = _______
cos θ = _______   sec θ = _______
tan θ = _______   cot θ = _______

Trigonometry

Pythagorean Identities: Verify using example 1.

$\sin^2 \theta + \cos^2 \theta = 1$ ___________________________

$\tan^2 \theta + 1 = \sec^2 \theta$ ___________________________

$\cos^2 \theta + 1 = \csc^2 \theta$ ___________________________

Even/Odd Functions

cos θ and sec θ are even functions, i.e. cos (-θ) = cos θ and sec(-θ) = sec θ

sin θ, tan θ, csc θ, and cot θ are odd fuctions, i.e. sin(-θ) = -sin θ, etc.

Degrees to Radian Formula

If θ in an angle in degrees and r is an angle in radians, then

$\pi/180 = r/\theta$ $\Theta = 180r/\pi$ $r = \pi\theta/180$

Example 2: Convert the following:

a. 3 π/2 into degrees
b. 130° into radians
c. 270° into radians
d. 3π/4 into degrees

Table 1: Using the conversion from degree to radian, fill in the column of angle in radians.

Angle (r)	Angle (°)	sin	cos	tan	csc	sec	cot
	0°	0	1	0	n.d.	1	n.d.
	30°	1/2	$\sqrt{3/2}$	$1/\sqrt{3}$	2	$2/\sqrt{3}$	$\sqrt{3}$
	45°	$1/\sqrt{2}$	$1/\sqrt{2}$	1	$\sqrt{2}$	$\sqrt{2}$	1
	60°	$\sqrt{3}/2$	1/2	$\sqrt{3}$	$2/\sqrt{3}$	2	$1/\sqrt{3}$
	90°	1	0	n.d.	1	n.d.	0