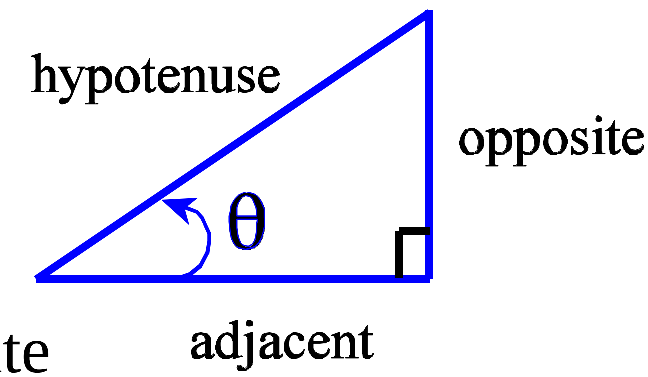
Trigonometry Review

Given a right (angle) triangle:



sine of angle $\theta =$

$$\sin\theta = \frac{\text{opposite}}{\text{hypoteneuse}}$$

cosine of angle $\theta =$

$$\cos\theta = \frac{\text{adjacent}}{\text{hypoteneuse}}$$

tangent of angle $\theta =$

$$\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$$

Mnemonic:

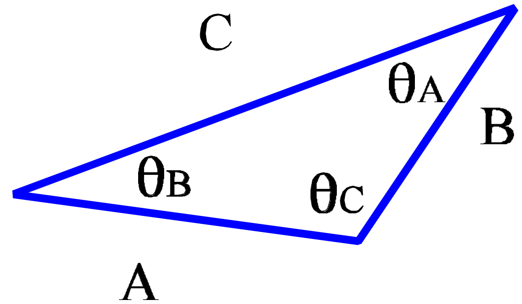
SOH - CAH - TOA

S=sine (sin), C=cosine (cos), T=tangent (tan)
O=opposite side, A=adjacent side, H=hypotenuse

Pythagorean theorem:

$$H^2 = A^2 + O^2$$

Given any triangle
right-angled or not:



Sine Laws:

$$\frac{A}{\sin\theta_A} = \frac{B}{\sin\theta_B} = \frac{C}{\sin\theta_C}$$

Cosine Laws:

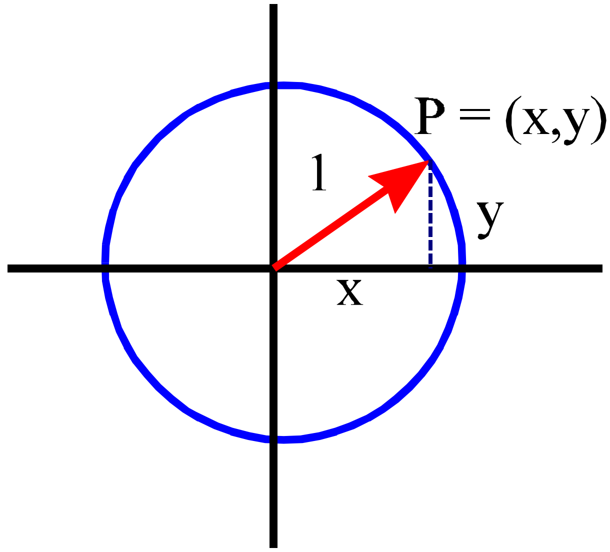
$$A^2 = B^2 + C^2 - 2BC\cos\theta_A$$

$$B^2 = A^2 + C^2 - 2AC\cos\theta_B$$

$$C^2 = A^2 + B^2 - 2AB\cos\theta_C$$

Note, with these equations if the length of at least one side is known plus two of (a) other sides or (b) the angles are known, all of the lengths of the sides and three interior angles can be determined.

Given a circle of radius 1 and a point P on the circumference:



$$\underline{P} = (\cos\theta, \sin\theta)$$

$$P_x = x = \cos\theta$$

$$P_y = y = \sin\theta$$

By Pythagorean theorem:

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

Range of functions:

$$-1 \le \sin\theta \le 1$$

$$-1 \le \cos\theta \le 1$$

$$-\infty < \tan\theta < \infty$$

Inverse functions:

$$\text{If} \quad \sin\theta = a$$

$$\text{then} \quad \theta = \sin^{-1}a$$

$$= \arcsin(a)$$

Similarly for **cos** and **tan** functions.