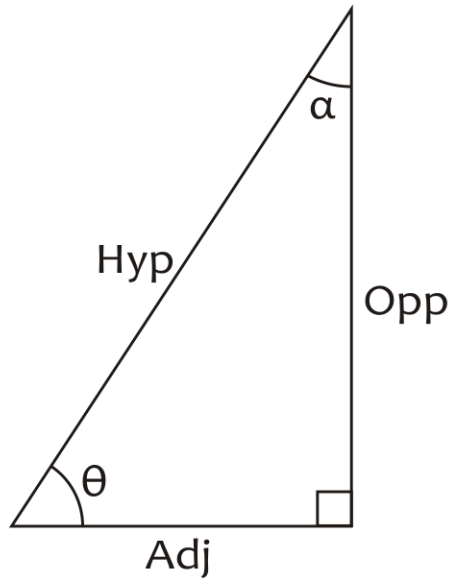
TRIGONOMETRIC EQUATIONS

If one of the angles of a triangle is 90^{o} (a right angle), the triangle is called a right angled triangle. We indicate the 90^{o} angle by placing a box (⌞) in its corner. Because the three (internal) angles of a triangle add up to 180^{o}, the other two angles are less than 90^{o}; that is they are acute.



In the above triangle, the side H opposite the right angle is called the hypotenuse. Relative to the angle Θ, the side O opposite the angle Θ is called the opposite side. The remaining side A is called the adjacent side.

NOTE: This assignment of the opposite and adjacent sides is relative to Θ. If the angle of interest is the α then the O side would become adjacent side and the A side would become the opposite side.

Pythagoras Theorem

Pythagoras equation is one important equation that relates all the three sides of a right-angled triangle. It states that a triangle is right angled if and only if

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

This means that given any two sides of a right angled triangle, the third side is completely determined.

For example, if O=1, A = 2, the $H = \sqrt{A^2 + O^2} = \sqrt{2^2 + 1^2} = \sqrt{4 + 1} = \sqrt{5}$.

Trigonometric Ratios

Trigonometric ratios provide relationships between the sides and angles of a right angled triangle. The three most commonly used ratios are:

Sine: $sin\theta = \frac{O}{H}$ (SOH)

Cosine: $cos\theta = \frac{A}{H}$ (CAH)

Tangent: $tan\theta = \frac{O}{A} = \frac{sin\theta}{cos\theta}$ (TOA)

Other ratios are defined below

Cosecant: $csc\theta = \frac{1}{sin\theta} = \frac{H}{O}$ (CosHO)

Secant: $sec\theta = \frac{1}{cos\theta} = \frac{H}{A}$ (SecHA)

Cotangent: $cot\theta = \frac{1}{tan\theta} = \frac{A}{O} = \frac{cos\theta}{sin\theta}$ (CotOA)