The Sine and Cosine Ratios

In a right triangle, the ratios that relate each leg to the hypotenuse depend only on the measure of the acute angle and not on the size of the triangle!

If <A is an acute angle in a right triangle, then:

$$\sin B = \frac{length\ of\ the\ side\ opposite\ <B}{length\ of\ \ hypotenuse}$$

$$\cos B = \frac{length\ of\ the\ side\ adjacent\ to\ <B}{length\ of\ hypotenuse}$$

Q: What happens to sin B as <B approaches 0°? Why?

A: sin B will approach 0 because the opposite side (numerator in the trig ratio) approaches 0.

Q: What happens to cos B as <B approaches 0°? Why?

A: cos B will approach 1 because the hypotenuse (denominator in the trig ratio) approaches 0.

Example 1: Determining the Sine and Cosine of an Angle

Given ΔABC has sides AB = 24 cm, AC = 26 cm, and BC = 10 cm, and <B = 90°, find sin C and cos C to the nearest hundredth.

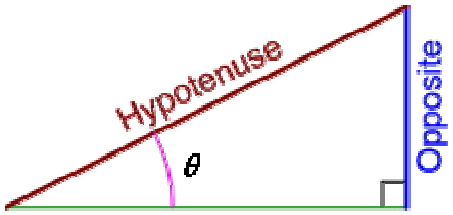
Example 2: Using Sine or Cosine to Determine the Measure of an Angle

Given ΔABC has sides AC = 8.7 cm and BC = 4.6 cm, and <B = 90°, find <A and <C to the nearest degree.

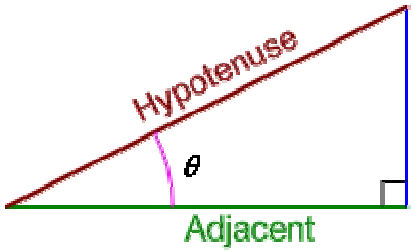
Example 3: Using Sine or Cosine to Solve a Problem

A storm caused a 15.3-m hydro pole to lean over. The top of the pole is now 12.0-m above the ground. What angle does the pole make with the ground? Give the answer to the nearest degree.

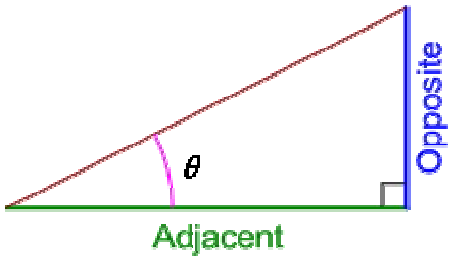
In summary,



$$\sin\theta = \frac{\text{Opposite}}{\text{Hypotenuse}} = \text{S O H}$$



$$\cos\theta = \frac{\text{Adjacent}}{\text{Hypotenuse}} = \text{C A H}$$



$$\tan\theta = \frac{\text{Opposite}}{\text{Adjacent}} = \text{T O A}$$