

Basic Trigonometry:

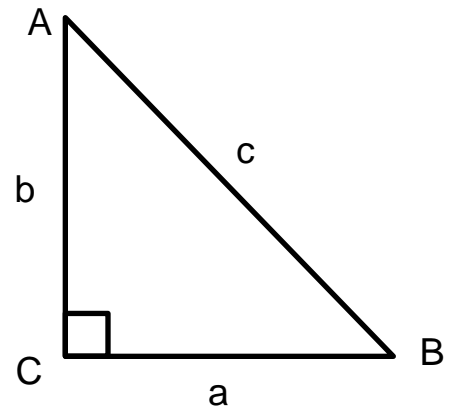
Given a right triangle, you can relate the sides and angles.

To Relate:

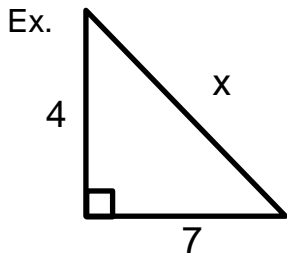
1. The three angles
2. The three sides
3. Two sides and an angle

Use:

- Simple Geometry
- Pythagorean Theorem
- Trigonometry



Pythagorean Theorem:  $a^2 + b^2 = c^2$

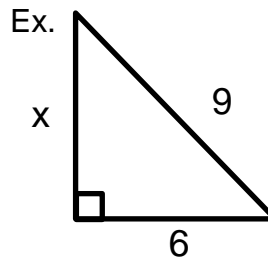


$$4^2 + 7^2 = x^2$$

$$16 + 49 = x^2$$

$$x^2 = 65$$

$$x = \sqrt{65}$$

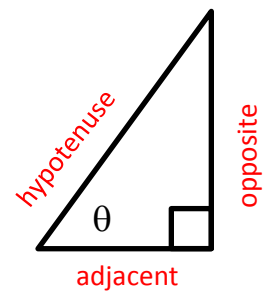


$$x^2 + 6^2 = 9^2$$

$$x^2 + 36 = 81$$

$$x^2 = 45$$

$$x = \sqrt{45} = 3\sqrt{5}$$



The angles in ANY triangle add up to 180 degrees.

Trigonometry: Given the angle,  $\theta$ , in a right triangle –

The side on the opposite side of the triangle is called the **opposite** side.

The side next to the angle is called the **adjacent** side.

The long side (opposite to the right angle) is called the **hypotenuse**.

The **six trig functions** relate an angle of the triangle to the ratios of these sides. They are:

Sine  $\theta = \sin \theta = \frac{\textit{opposite}}{\textit{hypotenuse}}$

Cosecant  $\theta = \csc \theta = \frac{\textit{hypotenuse}}{\textit{opposite}}$

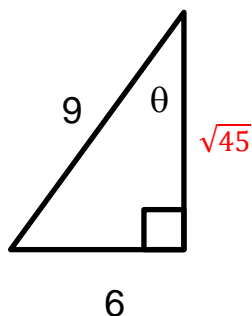
Cosine  $\theta = \cos \theta = \frac{\textit{adjacent}}{\textit{hypotenuse}}$

Secant  $\theta = \sec \theta = \frac{\textit{hypotenuse}}{\textit{adjacent}}$

Tangent  $\theta = \tan \theta = \frac{\textit{opposite}}{\textit{adjacent}}$

Cotangent  $\theta = \cot \theta = \frac{\textit{adjacent}}{\textit{opposite}}$

Ex: Find the 6 trig functions for the triangle



$$x^2 + 6^2 = 9^2$$

$$x^2 + 36 = 81$$

$$x^2 = 45$$

$$x = \sqrt{45}$$

$$\sin \theta = \frac{6}{\sqrt{45}}$$

$$\cos \theta = \frac{9}{\sqrt{45}}$$

$$\tan \theta = \frac{6}{9}$$

$$\csc \theta = \frac{\sqrt{45}}{6}$$

$$\sec \theta = \frac{\sqrt{45}}{9}$$

$$\cot \theta = \frac{9}{6}$$

In the calculator:  $\sin 42^\circ = 0.6691$  ,  $\cos 42^\circ = 0.7431$  ,  $\tan 42^\circ = 0.9004$