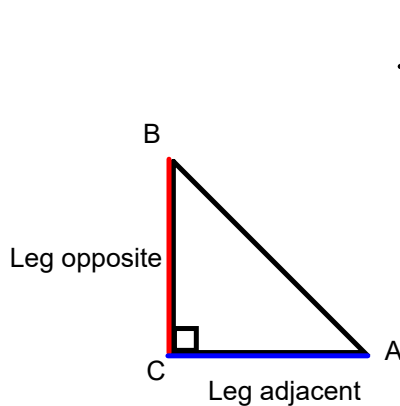


8.4 Trigonometry

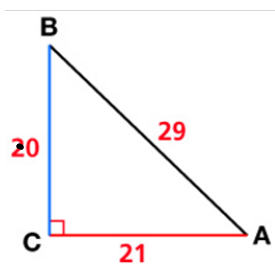
Objective: To use Sine Cosine and Tangent ratios to determine side lengths and angle measures in right triangles

In a right Triangle the ratio of the length of the leg opposite of $\angle A$ to the length of the leg adjacent to $\angle A$ is constant. No matter what the sides of the triangle are. This is called the **tangent** ratio.



$$\tan B = \frac{AC}{BC}$$

$$\tan A = \frac{\text{opposite}}{\text{adjacent}} = \frac{BC}{AC}$$

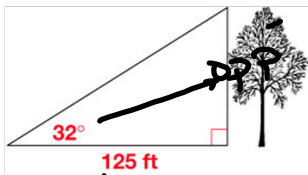
1 EXAMPLEWrite the tangent ratios for $\angle A$ and $\angle B$.

$$\tan A = \frac{\textit{opposite}}{\textit{adjacent}} = \frac{BC}{AC} = \frac{20}{21}$$

$$\tan B = \frac{\textit{opposite}}{\textit{adjacent}} = \frac{AC}{BC} = \frac{21}{20}$$

2 EXAMPLE

To measure the height of a tree, Alma walked 125 ft from the tree and measured a 32° angle from the ground to the top of the tree. Estimate the height of the tree.



The tree forms a right angle with the ground, so you can use the tangent ratio to estimate the height of the tree.

$$\text{adj } 125 \cdot \tan 32^\circ = \frac{\text{height}}{125} \cdot 125 \quad \text{Use the tangent ratio.}$$

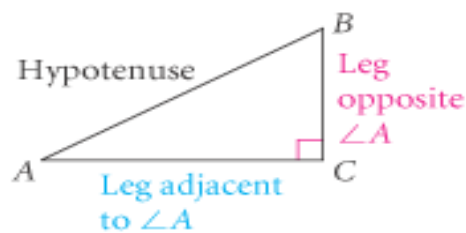
$$\text{height} = 125 (\tan 32^\circ) \quad \text{Solve for height.}$$

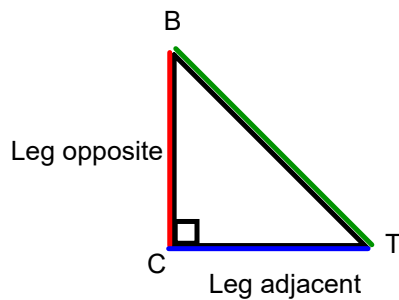
$$125 \text{ [TAN] } 32 \text{ [ENTER] } 78.108669 \quad \text{Use a calculator.}$$

$$\text{sine } \angle A = \frac{\text{length of leg opposite } \angle A}{\text{hypotenuse}}$$

$$\text{cosine } \angle A = \frac{\text{length of leg adjacent } \angle A}{\text{hypotenuse}}$$

$$\sin \angle A = \frac{\text{opposite}}{\text{hypotenuse}} \quad \cos \angle A = \frac{\text{adjacent}}{\text{hypotenuse}}$$





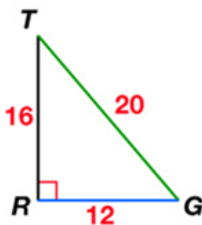
$$\sin T = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos T = \frac{\text{adjacent}}{\text{hypotenuse}}$$

USE THIS

SOH CAH TOA

1 EXAMPLE Use the triangle to find $\sin T$, $\cos T$, $\sin G$, and $\cos G$. Write your answer in simplest terms.



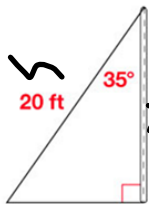
$$\sin T = \frac{12}{20} = \frac{3}{5}$$

$$\cos T = \frac{16}{20} = \frac{4}{5}$$

$$\sin G = \frac{16}{20} = \frac{4}{5}$$

$$\cos G = \frac{12}{20} = \frac{3}{5}$$

- 2 EXAMPLE** A 20-ft. wire supporting a flagpole forms a 35° angle with the flagpole. To the nearest foot, how high is the flagpole?



$$x = 20 \cdot \cos 35 = \frac{x}{20} \cdot 20$$

$$x = 20 \cdot \cos 35 = 16.38$$

16 ft

- 3 EXAMPLE** A right triangle has a leg 1.5 units long and hypotenuse 4.0 units long. Find the measures of its acute angles to the nearest degree. Draw a diagram using the information given.

