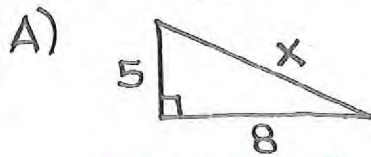


Using Trig Ratios to Find a Missing Side

When given the length of 2 sides of a right triangle, use the Pythagorean Theorem to find the length of the other side.

Example 1: Find the value of x .



$$\begin{aligned} 5^2 + 8^2 &= x^2 \\ 25 + 64 &= x^2 \\ 89 &= x^2 \end{aligned}$$

$$(9.43 = x)$$



$$x^2 + 10^2 = 30^2$$

$$x^2 + 100 = 900$$

$$x^2 = 800$$

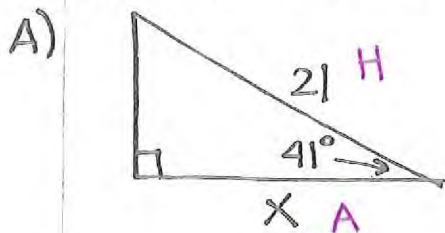
$$(x = 28.28)$$

When given the length of one side and the measure of one angle of a right triangle, use trig ratios to find a missing side.

* Steps for Finding a Missing Side: *

- 1) Label the sides you have been given, O, H or A (based on the angle given).
- 2) Decide on the trig ratio that you will use.
- 3) Set up an equation. (trig ratio(angle) = $\frac{\text{side}}{\text{side}}$)
- 4) Solve the equation. (Always begin by multiplying by the denominator!)

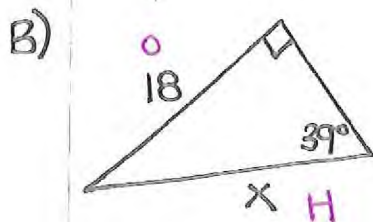
Example 2: Find the value of x . Round to the nearest tenth if needed.



$$21 \cdot \cos 41^\circ = \frac{x}{21} \cdot 21$$

$$21 \cdot \cos 41^\circ = x$$

$$\boxed{15.8 = x}$$

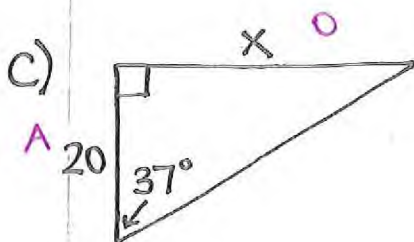


$$x \cdot \sin 39^\circ = \frac{18}{x} \cdot x$$

$$\frac{x \cdot \sin 39^\circ}{\sin 39^\circ} = \frac{18}{\sin 39^\circ}$$

$$x = \frac{18}{\sin 39^\circ}$$

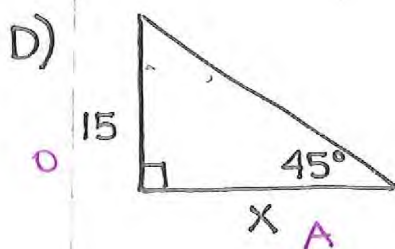
$$\boxed{x = 28.6}$$



$$20 \cdot \tan 37^\circ = \frac{x}{20} \cdot 20$$

$$20 \cdot \tan 37^\circ = x$$

$$\boxed{15.1 = x}$$



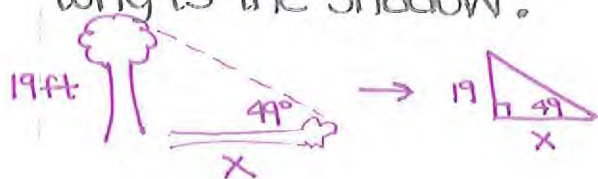
$$x \cdot \tan 45^\circ = \frac{15}{x} \cdot x$$

$$\frac{x \cdot \tan 45^\circ}{\tan 45^\circ} = \frac{15}{\tan 45^\circ}$$

$$x = \frac{15}{\tan 45^\circ}$$

$$\boxed{x = 15}$$

Example 3: A tree 19 ft tall casts a shadow which forms a 49° angle with the ground. How long is the shadow?



$$x \cdot \tan 49^\circ = \frac{19}{x} \cdot x$$

$$\frac{x \cdot \tan 49^\circ}{\tan 49^\circ} = \frac{19}{\tan 49^\circ}$$

$$\boxed{x = 16.5}$$