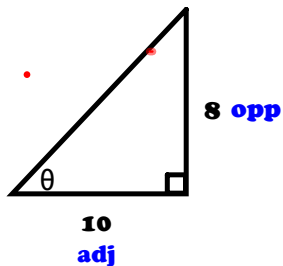


## Finding a Missing Side AND Angle in the SAME right triangle.

**Example 1: Find the measure of the indicated angle and missing side.**



**Solution:** Missing Angle

$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$\tan \theta = \frac{8}{10}$$

$$\tan \theta = 0.8000$$

$$\theta = \tan^{-1}(0.8000)$$

$$\theta = 39^\circ$$

Missing Side

$$c^2 = a^2 + b^2$$

$$c^2 = (10)^2 + (8)^2$$

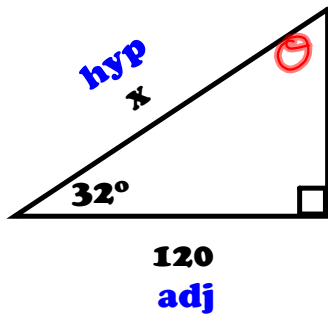
$$c^2 = 100 + 64$$

$$c^2 = 164$$

$$c = \sqrt{164}$$

$$c = 12.8$$

**Example 2: Find the length of the indicated side and measure of the missing angle.**



**Solution: Missing Angle**

$$\theta = 180^\circ - 90^\circ - 32^\circ = 58^\circ$$

**Missing Side**

$$\cos 32^\circ = \frac{\text{adj}}{\text{hyp}}$$

$$\cos 32^\circ = \frac{120}{x}$$

$$x \cos 32^\circ = 120$$

$$x = \frac{120}{\cos 32^\circ}$$

$$x = 141.5 \text{ or } 142$$

$$\cos 32^\circ = \frac{120}{x}$$

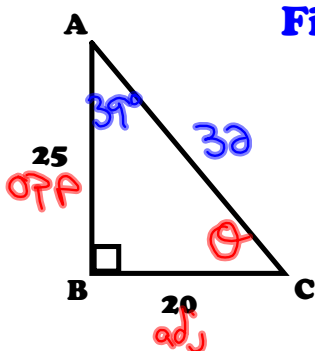
$$\frac{0.8480}{1} = \frac{120}{x}$$

$$0.8480x = 120$$

$$x = 141.5$$

## Solving a Triangle

**Example 3: Solve the following triangle.**  
**Find all missing sides and angles!**



**Solution: Missing Side**

$$c^2 = a^2 + b^2$$

$$c^2 = (20)^2 + (25)^2$$

$$c^2 = 400 + 625$$

$$c^2 = 1025$$

$$c = \sqrt{1025}$$

$$c = 32$$

**Side AC = 32**

**Angle "A"**

$$\tan A = \frac{\text{opp}}{\text{adj}}$$

$$\tan A = \frac{20}{25}$$

$$\tan A = 0.8000$$

$$A = \tan^{-1}(0.8000)$$

$$A = 39^\circ$$

**Angle "C"**

$$\tan C = \frac{\text{opp}}{\text{adj}}$$

$$\tan C = \frac{25}{20}$$

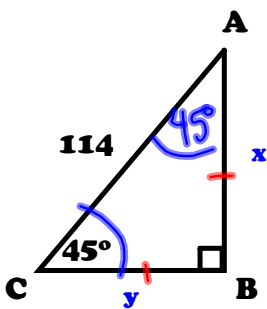
$$\tan C = 1.2500$$

$$C = \tan^{-1}(1.2500)$$

$$C = 51^\circ$$

**Example 4: Solve the following triangle.**

**Find all missing sides and angles!**



**Solution: Angle "A"**

$$180^\circ - 90^\circ - 45^\circ = 45^\circ$$

**Side "AB"**

$$\sin 45^\circ = \frac{\text{opp}}{\text{hyp}}$$

$$\frac{\sin 45^\circ}{1} = \frac{x}{114}$$

$$114 \sin 45^\circ = x$$

$$114 (0.7071) = x$$

$$80.6 = x$$

$$\text{Side AB} = \underline{\underline{80.6}}$$

**Side "CB"**

$$\cos 45^\circ = \frac{\text{adj}}{\text{hyp}}$$

$$\frac{\cos 45^\circ}{1} = \frac{y}{114}$$

$$114 \cos 45^\circ = y$$

$$114 (0.7071) = y$$

$$80.6 = y$$

$$\text{Side CB} = \underline{\underline{80.6}}$$

**Please Note: You may NOT use any side or angle that **you** find to find another missing side or angle.**