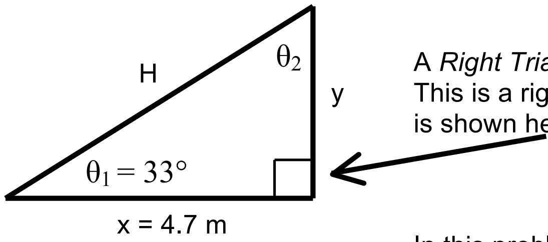
Flipping Physics Lecture Notes:
A Problem to Review SOH CAH TOA and the Pythagorean Theorem for use in Physics



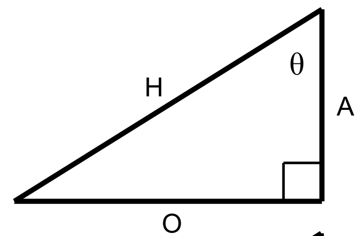
A *Right Triangle* is a triangle with a right angle or 90° angle. This is a right triangle and the symbol for the right angle is shown here.

In this problem we are trying to find y, H and θ_2 = ?

We could use the fact that the interior angles of a triangle add up to 180°, like this:

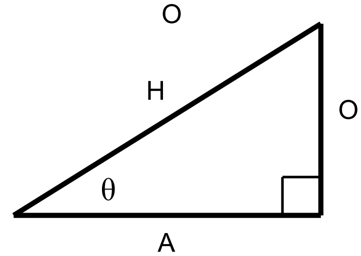
$$\theta_1 + \theta_2 + 90^\circ = 180^\circ \Rightarrow \theta_1 + \theta_2 = 90^\circ \Rightarrow \theta_2 = 90^\circ - \theta_1 = 90^\circ - 33^\circ = 57^\circ$$

However, because we are trying to review SOH CAH TOA and the Pythagorean Theorem, let's not do that this time. On a quiz or test, you certainly should, however not right now.



SOH means $\sin\theta = \frac{O}{H}$; CAH means $\cos\theta = \frac{A}{H}$ & TOA means $\tan\theta = \frac{O}{A}$

Where O means Opposite, A means Adjacent and H means Hypotenuse.
The Hypotenuse is always opposite the 90° angle.

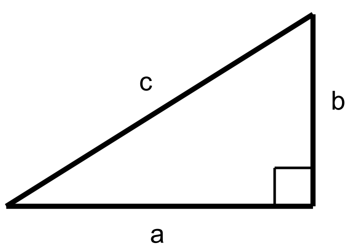


To find the Hypotenuse we can use CAH:

$$\cos\theta = \frac{A}{H} \Rightarrow \cos\theta_1 = \frac{x}{H} \Rightarrow \cos(33) = \frac{4.7}{H} \Rightarrow H\cos(33) = \frac{4.7H}{H}$$

$$\Rightarrow H\cos(33) = 4.7 \Rightarrow \frac{H\cos(33)}{\cos(33)} = \frac{4.7}{\cos(33)} \Rightarrow H = \frac{4.7}{\cos(33)}$$

$$H = 5.6041 \approx \boxed{5.6m}$$



To find y we can use the Pythagorean Theorem:

$$a^2 + b^2 = c^2 \Rightarrow x^2 + y^2 = H^2 \Rightarrow y^2 = H^2 - x^2 \Rightarrow y = \sqrt{H^2 - x^2}$$

$$\Rightarrow y = \sqrt{5.6^2 - 4.7^2} = 3.0447 \approx \boxed{3.0m}$$

To find θ_2 we can use TOA:

$$\tan\theta = \frac{O}{A} \Rightarrow \tan\theta_2 = \frac{x}{y} = \frac{4.7}{3.0522} \Rightarrow \tan^{-1}(\tan\theta_2) = \tan^{-1}\left(\frac{4.7}{3.0522}\right)$$

$$\theta_2 = \tan^{-1}\left(\frac{4.7}{3.0522}\right) = \boxed{57^\circ}$$

Remember, SOH CAH TOA and the Pythagorean Theorem only work on Right Triangles.