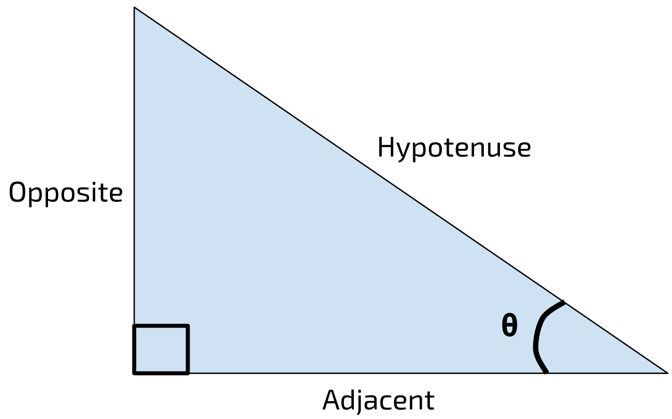
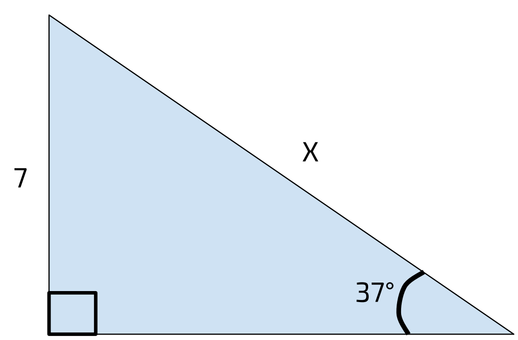
Using Trig Functions to Solve for Missing Side



Sine	Cosine	Tangent
$sin(\theta) = \frac{Opposite}{Hypotenuse}$	$cos(\theta) = \frac{Adjacent}{Hypotenuse}$	$tan(\theta) = \frac{Opposite}{Adjacent}$

We can use trig functions to solve for the missing side of a right triangle when we have a known angle and a known side.
To do so, use the appropriate trig function to set up then solve an equation.
You will need a calculator to approximate the trig function to solve the equation.

Examples



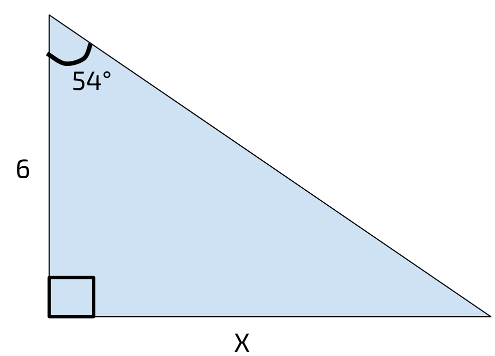
The two sides that we use here are the opposite and hypotenuse sides, so use sine.

$$sin(\theta) = \frac{Opposite}{Hypotenuse}$$

$$sin(37°) = \frac{7}{x}$$

$$x = \frac{7}{sin(37°)}$$

$$x \approx 11.63$$



In this case, with the opposite and adjacent sides, we use the tangent function.

$$tan(\theta) = \frac{Opposite}{Adjacent}$$

$$tan(37°) = \frac{x}{6}$$

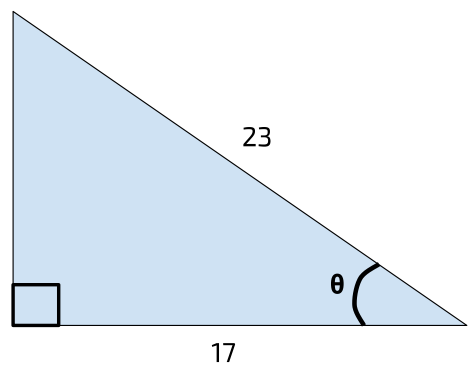
$$6 \bullet tan(37°) = x$$

$$4.52 \approx x$$

Using Trig Functions to Solve for Missing Angle

We can also use trig functions to solve for the missing angle of a right triangle when we have two known sides
To do so, use the appropriate trig function to set up then solve an equation.
You will also need a calculator for these problems.

Examples



The two sides that we use here are the adjacent and hypotenuse sides, so use cosine.

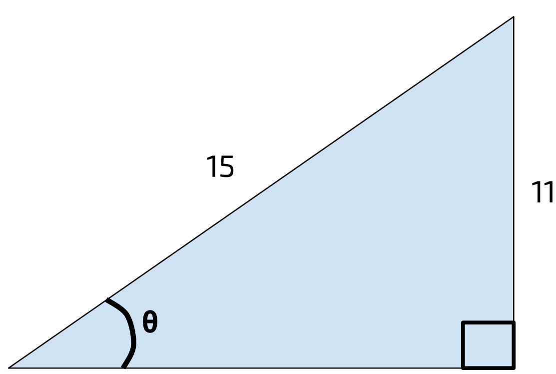
$$cos(\theta) = \frac{Adjacent}{Hypotenuse}$$

$$cos(\theta) = \frac{17}{23}$$

$$\theta = cos^{-1}(\frac{17}{23})*$$

$$\theta \approx 42.34°$$

*For this step, you will need to use the special inverse trig function on your calculator. Note that this is not the same as doing $cos(\frac{17}{23})$ and raising it to the power of -1. If needed, ask your instructor for more guidance.



$$sin(\theta) = \frac{Opposite}{Hypotenuse}$$

$$sin(\theta) = \frac{11}{15}$$

$$\theta = sin^{-1}(\frac{11}{15})$$

$$x \approx 47.17°$$