

## Setting up Trig to Solve

Now that you know the three trig ratios—sine, cosine, and tangent—you can learn how to solve problems with them. We'll start with isolating the unknown that you want to find.

When you're solving trig problems, you're not going to use both angles and all three ratios. When you start solving, you have to get a little bit choosy. You must pick **one angle** to work with **one ratio**. But how do you pick?

**Rule 1:** You can work with any angle you want (unless it's the right angle), but if the problem is asking you to use a specific angle...use that angle.

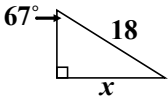
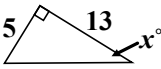
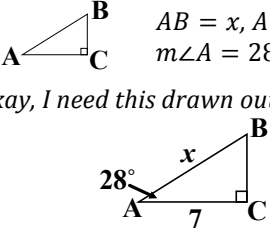
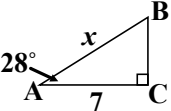
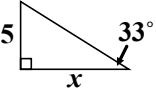
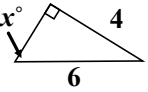
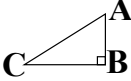
**Rule 2:** Work with the ratio that uses what you have and what you want. For example, if you're looking for the opposite and you know the hypotenuse, use sine (opposite over hypotenuse).

$$\text{SOH} \rightarrow \sin(\text{angle}) = \frac{\text{opp}}{\text{hyp}}$$

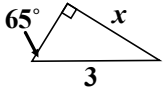
$$\text{CAH} \rightarrow \cos(\text{angle}) = \frac{\text{adj}}{\text{hyp}}$$

$$\text{TOA} \rightarrow \tan(\text{angle}) = \frac{\text{opp}}{\text{adj}}$$

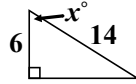
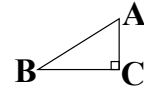
For each right triangle, write one of the three trigonometric equations using  $x$ . Then, isolate the  $x$ .

<p><b>EXAMPLE</b></p>  <p>First, I must pick an angle. The problem gave me <math>67^\circ</math>, so I'll use it.</p> <p>Hyp: 18    Opp: <math>x</math>    Adj: ???</p> <p>Since I've got <b>hyp</b> &amp; want <b>opp</b>, I'll use <b>sine</b>.</p> $\text{SOH} \rightarrow \sin(\text{angle}) = \frac{\text{opp}}{\text{hyp}}$ $\sin(67^\circ) = \frac{x}{18}$ <p>To get <math>x</math> alone, I'll use proportions.</p> $\frac{\sin(67^\circ)}{1} = \frac{x}{18}$ $18 \sin(67^\circ) = x$ <div style="border: 1px solid black; padding: 2px; display: inline-block;"><math>x = 18 \sin(67^\circ)</math></div> <p><b>WARNING: DO NOT MULTIPLY</b> outside numbers with the angle inside!</p>	<p><b>EXAMPLE</b></p>  <p>To pick an angle... I want to find <math>x^\circ</math>, so I should use that as my angle.</p> <p>Hyp: ???    Opp: 5    Adj: 13</p> <p>I've got <b>opp</b> &amp; adj, so I'll use <b>tangent</b>.</p> $\text{TOA} \rightarrow \tan(\text{angle}) = \frac{\text{opp}}{\text{adj}}$ $\tan(x^\circ) = \frac{5}{13}$ <p>We can't get <math>x</math> any more alone based on what we've done so far, so that's our answer.</p> <div style="border: 1px solid black; padding: 2px; display: inline-block;"><math>\tan(x^\circ) = \frac{5}{13}</math></div>	<p><b>EXAMPLE</b></p>  <p><math>AB = x</math>, <math>AC = 7</math>, and <math>m\angle A = 28^\circ</math></p> <p>Okay, I need this drawn out, so...</p>  <p>I have <math>28^\circ</math>, so I'll use it.</p> <p>Hyp: <math>x</math>    Opp: ???    Adj: 7</p> <p>I've got <b>adj</b> &amp; want <b>hyp</b>. That's <b>cosine</b>.</p> $\text{CAH} \rightarrow \cos(\text{angle}) = \frac{\text{adj}}{\text{hyp}}$ $\cos(28^\circ) = \frac{7}{x}$ <p>Use proportions.</p> $\frac{\cos(28^\circ)}{1} = \frac{7}{x}$ $x \cos(28^\circ) = 7$ $\frac{x \cos(28^\circ)}{\cos(28^\circ)} = \frac{7}{\cos(28^\circ)}$ <div style="border: 1px solid black; padding: 2px; display: inline-block;"><math>x = \frac{7}{\cos(28^\circ)}</math></div> <p><b>WARNING: DO NOT DIVIDE</b> the outside numbers with the angle inside!</p>
<p>1.</p> 	<p>2.</p> 	<p>3. <math>AB = 4</math>, <math>BC = x</math>, and <math>m\angle C = 62^\circ</math></p> 

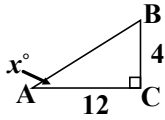
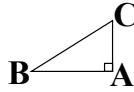
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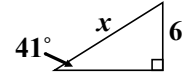
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6.  $AB = x$ ,  $AC = 8$ , and  $m\angle A = 71^\circ$ 

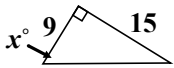
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8.  $BC = 11$ ,  $AC = x$ , and  $m\angle B = 40^\circ$ 

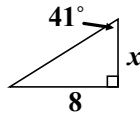
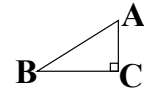
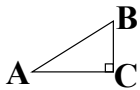
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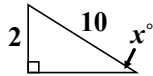
10.



11.

12.  $AB = 2$ ,  $BC = 3$ , and  $m\angle A = x^\circ$ 13.  $AC = 5$ ,  $BC = x$ , and  $m\angle A = 48^\circ$ 

14.



15.

