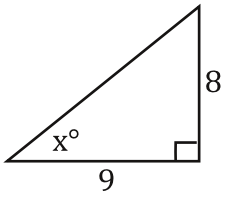
Solving for Missing Angles

Where did my angles go?

Using Trig to solve for missing angles is pretty much like using trig to find missing sides with one critical difference... In order to see that difference, let's do an example...

Solve for the angle labeled x.



This is of course a set up for the Tangent ratio. So... set it up and plug in what you have...

$\tan x° = \frac{O}{A}$ $\tan x° = \frac{8}{9}$

This looks weird. What do you do now?.... Just divide 8 by 9 and keep going. This gives you....

$\tan x° = 0.8889$

The logical thing now would be to divide by "Tan" to get x alone... hmm. That's not a bad idea, but it's a bit more complicated than that. The problem is that "Tan" is not a number or a variable. It is a ratio. Dividing by a ratio is a bit weird... Look at this....

$\frac{2}{3}x = 6$ How do you solve this? Multiply 2/3 by its reciprocal 3/2...

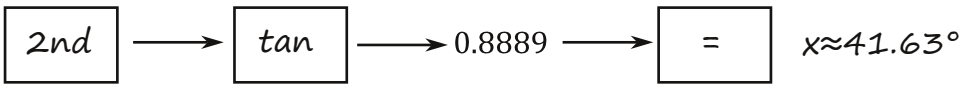
$\frac{3}{2} * \frac{2}{3}x = 6 * \frac{3}{2}$ $x = 9$

So how do you multiply by the reciprocal of Tan? Well, the reciprocal of Tan is actually called arctan, but you won't need that for a couple of years. Fortunately, your calculator can take the inverse (a fancy name of reciprocal) tan functions. These are usually written above the SIN, COS, and TAN buttons. To use them press "shift" or "2nd" and then the button. On paper it looks like this...

$\tan^{-1} * \tan x° = 0.8889 * \tan^{-1}$

$x = \tan^{-1} 0.8889$

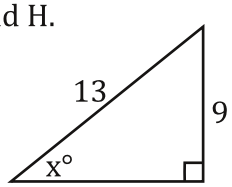
Then press these buttons on your calculator...



$x \approx 41.63°$

Here is another example...

Step 1: Label A, O, and H.



Step 2: Write out the ratio.

$\sin x° = \frac{O}{H}$

Step 3: Plug in and solve.

$\sin x° = \frac{9}{13}$

$\sin^{-1} * \sin x° = 0.6923 * \sin^{-1}$ $x \approx 43.81°$

$x = \sin^{-1} 0.6923$