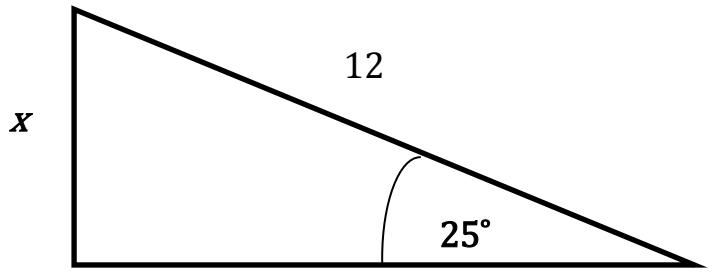
Trigonometry Problems Summary - Finding Unknown Sides

Main Problem Type 1: Unknown side 'x' ends up in the numerator *(top)* part of the fraction / ratio.

Example



Since the sides under consideration are the Opposite and Hypotenuse, we are dealing with the sine ratio: $[\sin\theta = \frac{O}{H}]$

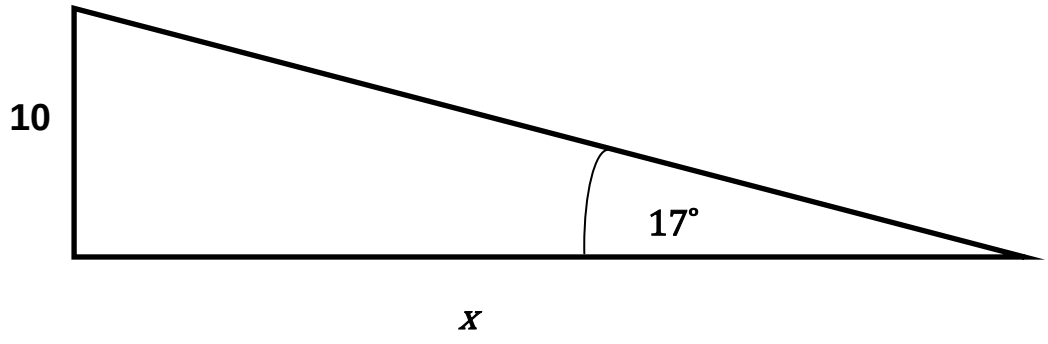
So $\sin 25° = \frac{x}{12}$

$x = 12 \times \sin 25°$ (by ordinary algebraic equation manipulation)

$x = 5.07$ (using calculator and rounding to 2 decimal places)

Main Problem Type 2: Unknown side 'x' ends up in the denominator *(bottom)* part of the fraction / ratio.

Example



This time, since the sides under consideration are the Opposite and Adjacent, we are dealing with the tangent ratio: $[\tan\theta = \frac{O}{A}]$

So $\tan 17° = \frac{10}{x}$

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Key point: In this type, the algebra is slightly "trickier" as we need to handle the unknown "*x*" being in a different place in the equation.

However, all you need to remember is that $\tan 17°$ is just a number – so this equation is little different from something like:

$1.82 = \frac{15}{x}$ which can be solved in the following steps:

$1.82\,x = 15$ (multiplying both sides by "*x*")

$x = \frac{15}{1.82}$ (dividing both sides by 1.82)

$x = 8.24$ (using calculator and rounding to 2 decimal places)

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Now going back to the trigonometry problem:

$\tan 17° = \frac{10}{x}$

$\tan 17°\ x = 10$

$x = \frac{10}{\tan(17°)}$

} See how these steps are just the same as the ones above

$x = 32.71$ (using calculator and rounding to 2 decimal places)

Conclusion and Practice

These are the two main types of problems when given an angle and one side of a right-angled triangle. The first step in both cases is to express the known and unknown sides in terms of the relevant trigonometric ratio. The resulting equation is then solved for the unknown side. Most text books will give many examples of both types to practice.