Solving for the Entire Triangle

To solve a triangle, means to determine the value of each unknown side length and each unknown angle. We can use any of the following to help determine the unknown values:

$a^2 + b^2 = c^2$

opp/adj Hyp

- Pythagorean Theorem
  (if two side lengths are known)

- Sum of interior angles in a triangle
  (if one of the acute angles is known)

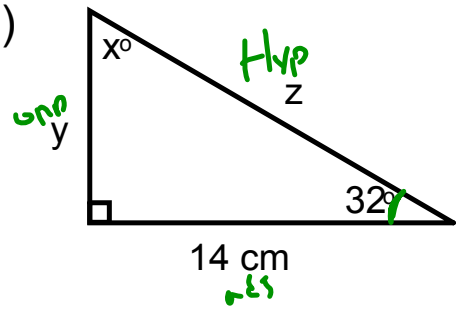
All add to 180°

$180 - 90 - 33 = x$

- SOH CAH TOA
  (if an acute angle and side length are known
  OR two side lengths are known)

Ex. 1 Solve each triangle. Round all side lengths to the nearest tenth and angles to the nearest degree.

a)



$180 - 32 - 90 = x$

$58° = x$

$14^2 + 8.7^2 = z^2$

$196 + 75.69 = z^2$

$\sqrt{271.69} = \sqrt{z^2}$

$16.5 = z$

$x = 58°$

$y = 8.7\text{ cm}$

$z = 16.5\text{ cm}$

SOH CAH TOA

Have: angle 32°, Adj 14

Need: opp

use: $\tan x = \frac{O}{A}$

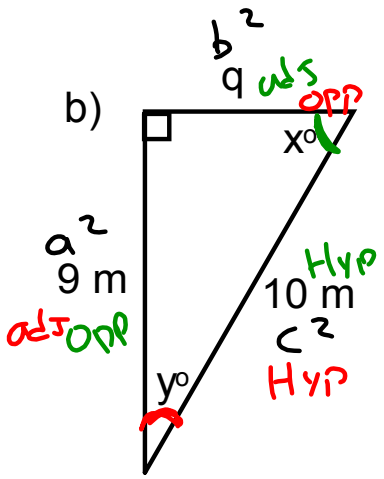
$\frac{\tan 32°}{1} = \frac{O}{14}$

$opp = 14 \tan 32°$

$opp = 8.7$

$\therefore y = 8.7$

b)



$x = 64°$

$y = 26°$

$q = 4.4\ m$

$q^2 + b^2 = 10^2$

$81 + b^2 = 100$

$b^2 = 100 - 81$

$\sqrt{b^2} = \sqrt{19}$

$b = 4.4$

$\therefore q = 4.4$

Have: opp = 9, Hyp = 10

Need: angle x

use: $\sin x = \frac{O}{H}$

$\sin x = \frac{9}{10}$

$\sin x = 0.9$

$x = \sin^{-1} 0.9$

$x = 64°$

Have: ADJ = 9, Hyp = 10

Need: Angle y

use: $\cos y = \frac{A}{H}$

$\cos y = \frac{9}{10}$

$\cos y = 0.9$

$y = \cos^{-1} 0.9$

$y = 26°$