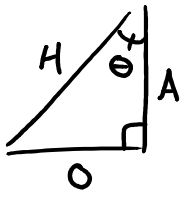
3.3 Solving the whole Triangle

March 1, 2017 7:49 AM

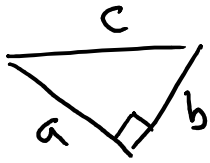
We now have the following formulas that we can use to solve triangles

$\sin\theta = \frac{O}{H}$ $\cos\theta = \frac{A}{H}$ $\tan\theta = \frac{O}{A}$

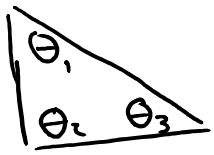


From last year, you will also remember these formulas for solving triangles

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

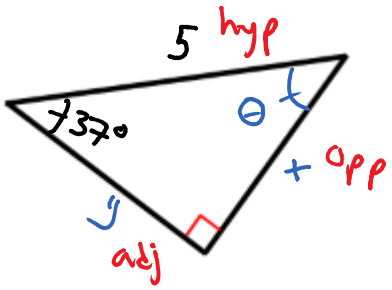


$\theta_1 + \theta_2 + \theta_3 = 180$



Solving a whole triangle means, finding all the angles of the triangle and all the side lengths.

Examples: Solve the Triangles



Solve for y

$\cos\theta = \frac{A}{H}$

$5[\cos 37] = \left[\frac{y}{5}\right]5$

$5\cos 37 = y$

$4 = y$

Solve for θ

$\theta_1 + \theta_2 + \theta_3 = 180$

$90 + 37 + \theta = 180$

$-90 \quad -90$

$37 + \theta = 90$

$-37 \quad -37$

$\theta = 53°$

Solve for x

$\sin\theta = \frac{O}{H}$

$5[\sin 37] = \left[\frac{x}{5}\right]5$

or

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

$4^2 + x^2 = 5^2$

$x^2 = 9$

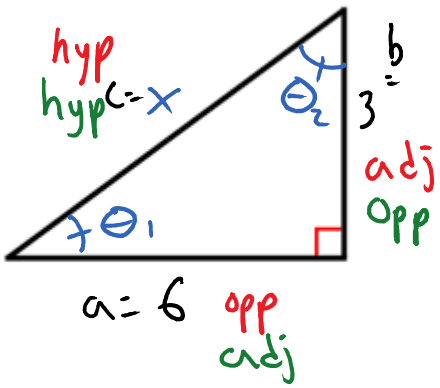
$\sin 37 = \frac{x}{5}$

$5\sin 37 = x$

$3 = x$

$x^2 = 9$

$x = 3$



For θ_2

$\text{Tan}\theta = \frac{O}{A}$

$\text{Tan}\,\theta_2 = \frac{6}{3}$

$\theta_2 = \text{Tan}^{-1}\left[\frac{6}{3}\right]$

$\theta_2 = 63°$

For θ_1

$\theta_1 + \theta_2 + \theta_3 = 180$

$\theta_1 + 63 + 90 = 180$

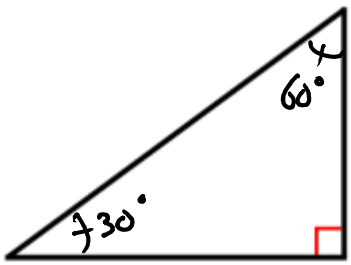
$-90 \quad -90$

$\theta_1 + 63 = 90$

$-63 \quad -63$

$\theta_1 = 27°$

Can you solve this triangle?



Solve for x

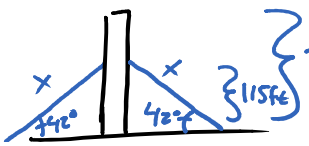
$a^2 + b^2 = c^2$

$6^2 + 3^2 = c^2$

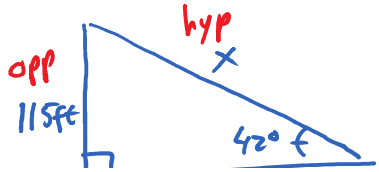
$\sqrt{45} = \sqrt{c^2}$

$6.7 = c$

Word Problems: A tower is supported by two steel guide wires that are attached half way up the tower. The wires have an angle of elevation of 42°. The tower is 230ft. How much wire is used to support the tower?

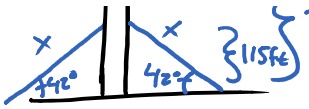


$\Rightarrow$

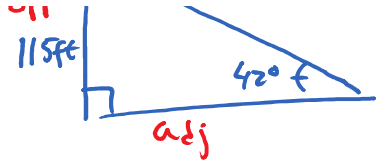


$\sin\theta = \frac{O}{H}$

$x\left[\sin 42\right] = \left[\frac{115}{x}\right]x$



$\Rightarrow$



$x[\sin 42] = \left[\frac{115}{x}\right]x$

$x \sin 42 = 115$

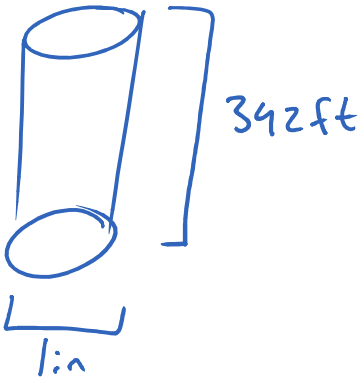
$x = \frac{115}{\sin 42}$

$x = 172\text{ ft}$

Two guide wires

$2 \times 172 = 344\text{ ft}$

If the wire has a diameter of 1in, then how much steel is used to make the wires?



$r = 0.5\text{in}$

$342\text{ ft} \times \frac{12\text{in}}{1\text{ft}} = 4104\text{in}$

$V = \pi r^2 h$

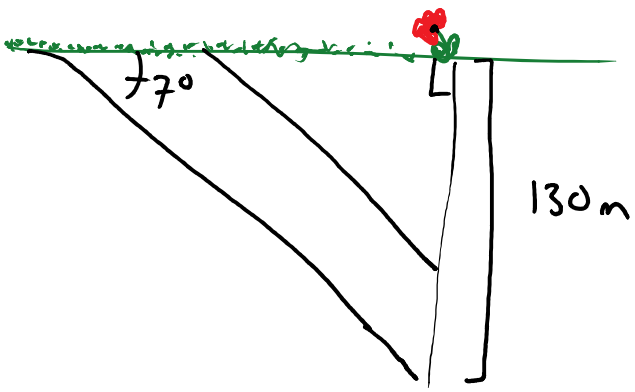
$= \pi (0.5)^2 (4104)$

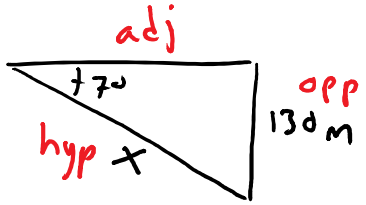
$= 3223\text{ in}^3$

in feet

$3223\text{in}^3 \times \frac{1\text{ft}}{12\text{in}} \times \frac{1\text{ft}}{12\text{in}} \times \frac{1\text{ft}}{12\text{in}} = 1.87\text{ft}^3$

The boring company wants to create a tunnel to help alleviate traffic. The tunnel must be 130m deep and must have an angle of depression of 7°. If you were drive down this tunnel, how far would you have to drive before reaching the bottom? Answer in Kilometers.





$x[\sin 7^\circ] = \left[\frac{130}{x}\right]x$

$\frac{x \sin 7}{\sin 7} = \frac{130}{\sin 7}$

$x = 130\text{ (m)}$

$x = \frac{\text{[illegible]}}{\sin 7}$

$x = 1067\text{m}$

$1067\text{m} \times \frac{1\text{km}}{1000\text{m}} = 1.067\text{ km}$

HW: Pg 131 CH3.3 Q: 1-13 odd

S + UP

TEST Wednesday next week