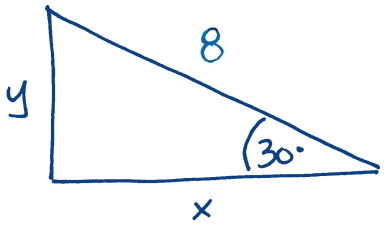
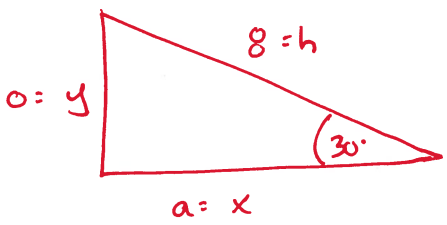
MATH 10C - TRIGONOMETRY PROBLEMS

Q1: A Physics 20 student needs to break a vector into components. To do this, they draw a triangle, and solve for the sides labelled "x" and "y".



The length of side x is a.b, and the length of side y is c.d, where a, b, c, and d are ___, ___, ___, and ___.

(Record your 4-digit answer in the numerical response boxes below).



$\sin\theta = \frac{o}{h}$ $\quad \cos\theta = \frac{a}{h}$

$\sin 30 = \frac{y}{8}$ $\quad \cos 30 = \frac{x}{8}$

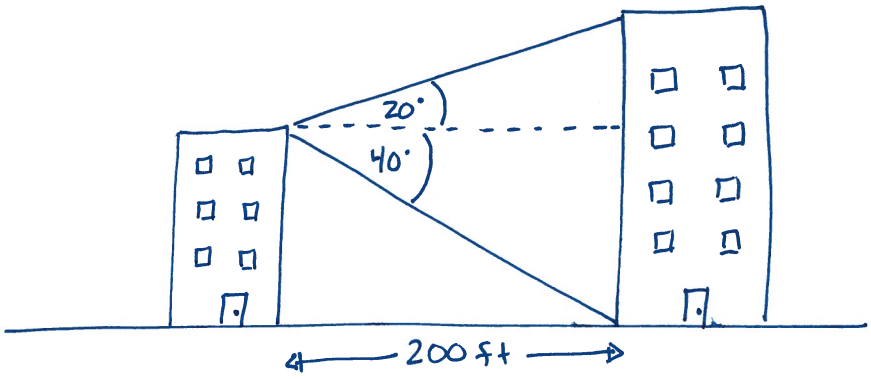
$0.5 = \frac{y}{8}$ $\quad 0.866 = \frac{x}{8}$

$4.0 = y$ $\quad 6.9 = x$

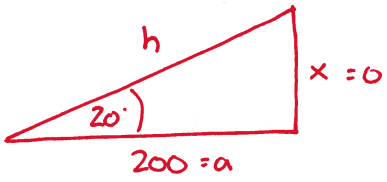
c.d $\quad$ a.b

6	9	4	0

Q2: A student standing on top of a small building looks across at a taller skyscraper.



How tall is each building?

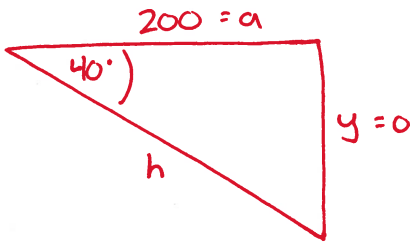


$\tan\theta = \frac{o}{a}$

$\tan 20 = \frac{x}{200}$

$0.36397 = \frac{x}{200}$

$72.79 = x$



$\tan\theta = \frac{o}{a}$

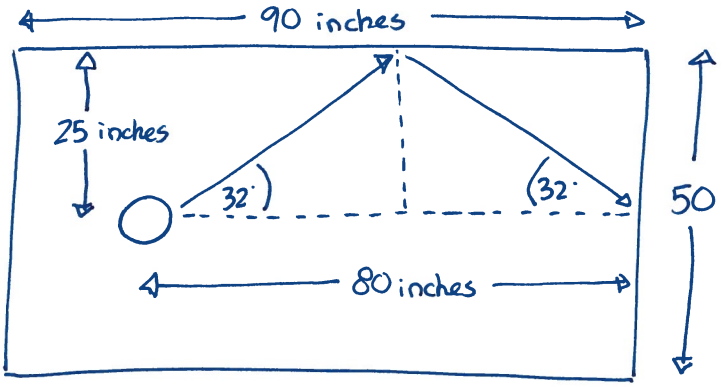
$\tan 40 = \frac{y}{200}$

$0.83910 = \frac{y}{200}$

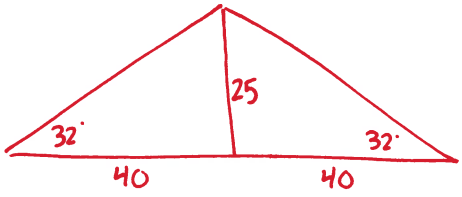
$169.82 = y$

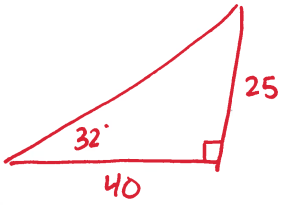
TOTAL HEIGHT = 240.61 ft

Q3: An air hockey table is usually 90 inches by 50 inches.



How much additional distance does the puck travel if its banked off the side?





Option #1

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

$25^2+40^2=c^2$

$c=47.17$

Option # 2

$\sin\theta=\frac{o}{h}$

$\sin 32=\frac{25}{h}$

$0.5299=\frac{25}{h}$

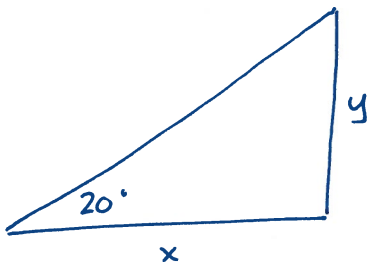
$h(0.5299)=25$

$h=47.18$

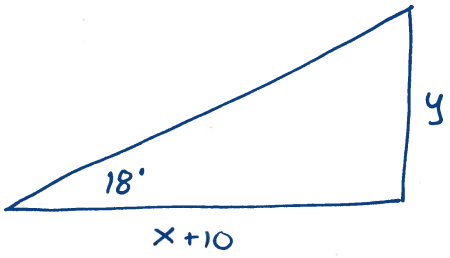
So total diagonal distance is 47.2 inch + 47.2 inch, or 94.4 inches.
Straight path was 80 inches.
So extra 14 inches.

1	4	1

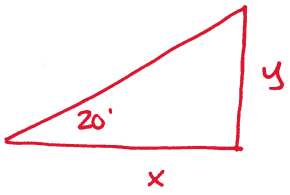
Q4: A student is an unknown distance, x, from a tree, and looks up at an angle of elevation of 20° to the top of the tree.



The student then backs up 10m and looks up again, this time at an angle of inclination of 18°:



How tall is the tree?

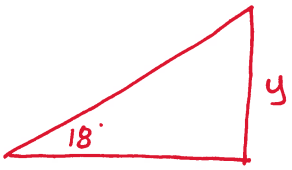


$\text{Tan}\theta = \frac{o}{a}$

$\text{Tan}\,20 = \frac{y}{x}$

$0.364 = \frac{y}{x}$

$y = 0.364x$



$\text{Tan}\,18 = \frac{y}{x+10}$

$0.325 = \frac{y}{x+10}$

$0.325(x+10) = y$

$0.325x + 3.25 = y$

Set y's equal to each other

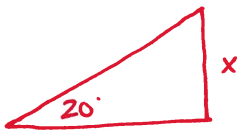
$0.364x = 0.325x + 3.25$

$0.364x = 0.325x + 3.25$

$-0.325x \quad -0.325x$

$0.039x = 3.25$

$x = 83.\overline{3}$



$\text{Tan}\theta = \frac{o}{a}$

$\text{Tan}\,20 = \frac{x}{83.\overline{3}}$

$x = 30.3\text{ m tall}$