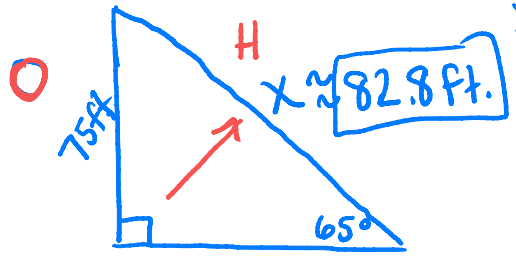
Angle of Elevation/Depression HW **Name:** Key

Honors Math 2

SOH - CAH - TOA

Word problems.

1) A wire is attached to the top of a 75 foot tower and meets the ground at a 65° angle. How long is the wire?

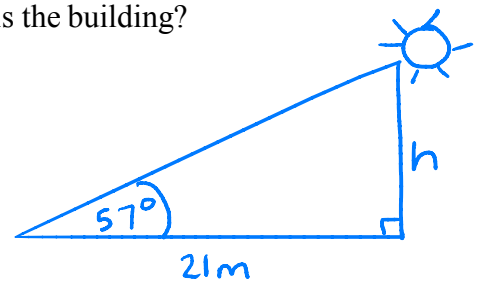


$x \sin 65° = \frac{75}{x} \cdot x$

$x = \frac{75}{\sin 65°}$

$x \approx 82.8$ ft.

2) When the suns angle of elevation is 57°, a building casts a shadow 21 meters long. How high is the building?

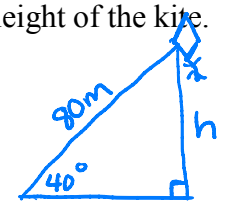


$\tan 57° = \frac{h}{21}$

$21 \tan 57° = h$

$h \approx 32.3$m

3) A kite is flying at an angle of elevation of about 40°. All 80 meters of string have been let out. Ignoring the sag in the string, find the height of the kite.



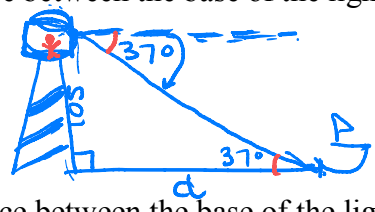
$\sin 40° = \frac{h}{80}$

$80 \sin 40° = h$

$h \approx 51.4$m

4) A man stands at the top of a 105 foot lighthouse and sees a boat. The angle of depression to sight the boat is 37°.

a) Approximate the distance between the base of the light house and the boat, disregarding the height of the man.



$\tan 37° = \frac{105}{d}$

$d = \frac{105}{\tan 37°}$

$d \approx 139.3$ft.

b) Approximate the distance between the base of the lighthouse and the boat is the man's eye level is 5.5ft from the top of the lighthouse.

$\tan 37° = \frac{99.5}{d}$

$d \tan 37° = 99.5$

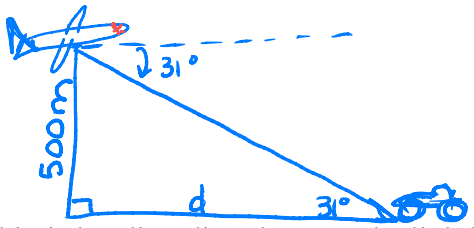
$d = \frac{99.5}{\tan 37°}$

$d = 132.0$ft.

c) Which should be more accurate?

The man's eye level is more accurate.

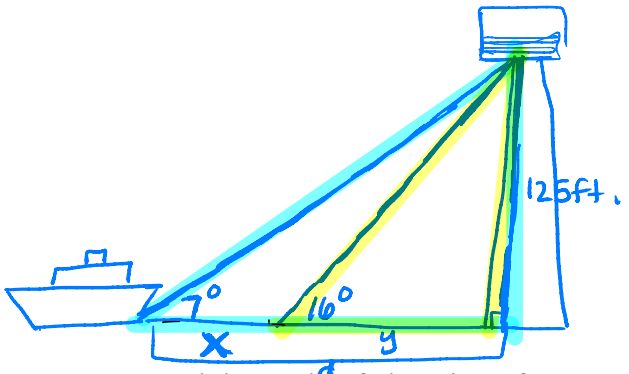
5) An observer in an airplane at a height of 500 meters sees a car at an angle of depression of 31°. If the plane is over a barn, how far is the car from the barn?



$\tan 31° = \frac{500}{d}$

$d = \frac{500}{\tan 31°} \approx \boxed{832.1\text{m}}$

6) A ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, the angles of elevation from the ship to the light was 7°. A short time later, the angle of elevation was 16°. To the nearest foot, determine and state how far the ship traveled from first sighting to second sighting.



$\tan 7° = \frac{125}{d}$

$d = \frac{125}{\tan 7°}$

$d = 1018.04$

$\tan 16° = \frac{125}{y}$

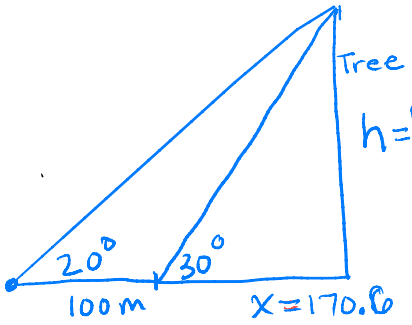
$y = \frac{125}{\tan 16°}$

$y = 435.9268$

$d - y = x$

$\boxed{582.1\text{ft}}$

7) Marcos measured the angle of elevation of a tree and found it to be 20°. He walked 100m closer. This time, the angle of elevation was 30°. How tall is the tree? (answer to 1 decimal place)



$h = \boxed{98.5\text{ft.}}$

$\tan 30° = \frac{h}{x}$

$x \tan 30° = h$

$\tan 20° = \frac{h}{x+100}$

$(x+100)\tan 20° = h$

$x \tan 30° = (x+100)\tan 20°$

$x \tan 30° = x \tan 20° + 100 \tan 20°$

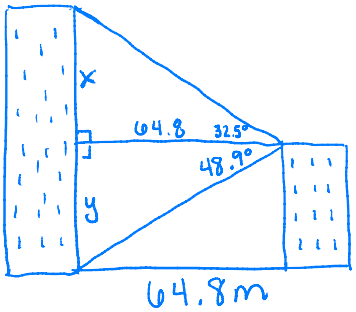
$x \tan 30° - x \tan 20° = 100 \tan 20°$

$x(\tan 30° - \tan 20°) = 100 \tan 20°$

$\frac{x(\tan 30° - \tan 20°)}{(\tan 30° - \tan 20°)} = \frac{100 \tan 20°}{\tan 30° - \tan 20°}$

$\approx \boxed{170.6\text{ft}}$

8) Two buildings are 64.8m apart. From the top of the shorter one, the angle of elevation to the top of the other is 32.5°, while the angle of depression to the base is 48.9°. Find the sum of the building heights to the nearest tenth of a meter.



$\tan 32.5° = \frac{x}{64.8}$

$64.8 \tan 32.5° = x$

$x \approx 41.282\text{m}$

$\tan 48.9° = \frac{y}{64.8}$

$64.8 \tan 48.9° = y$

$y \approx 74.2816\text{ft}$

Sum = height of tall building + height of short building

sum = $(x + y)$ + y

Sum = $x + 2y$

$(41.282) + 2(74.2816)$

Sum = $\boxed{189.8\text{ ft.}}$