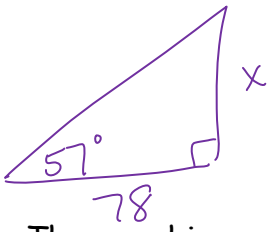
Geometry Honors
Trig Unit – Section 9.10 Word Problems Angles of Elevation and Depression

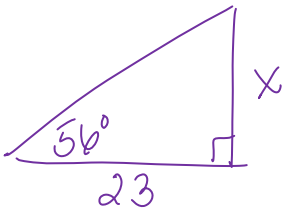
1) From a point 78ft from the base of a building, the angle of elevation to the top of the building is 57°. To the nearest foot, how high is the building?



$\tan 57^\circ = \frac{x}{78}$

$x = 120$ feet

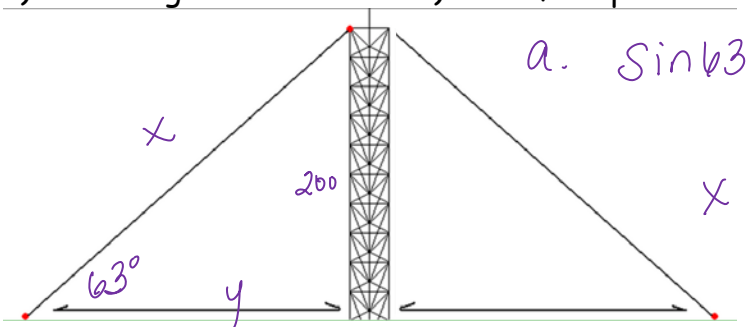
2) The sun shines on a flagpole, causing a shadow to be cast on the ground. The distance from the base of the pole to the tip of the shadow is 23 feet. At that time of day, the sun's rays make an angle of 56° with the ground. How tall is the flagpole?



$\tan 56^\circ = \frac{x}{23}$

$x = 34.10$ feet

3) A 200 ft high television transmitting tower is to be supported by guy wires running from the ground to the top of the tower. The wires make an angle of 63° with the ground.
a) How long is each wire? b) How far apart are the wires placed in the ground?



a. $\sin 63^\circ = \frac{200}{x}$

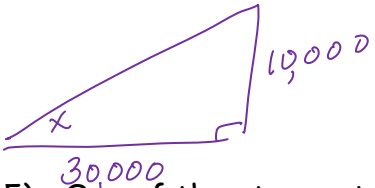
$x = 224.47$ feet

b. $\tan 63^\circ = \frac{200}{y}$

$y = 101.91$ feet

$2y = 203.81$ feet

4) Haleakela is a 10,000 foot high dormant volcano on Maui, Hawaii. The peak is a horizontal distance of 30,000 feet from the ocean. Neglecting a person's height, at what angle would you have to look up to see the peak if you were standing at the edge of the ocean?



$\tan x = \frac{10,000}{30,000}$

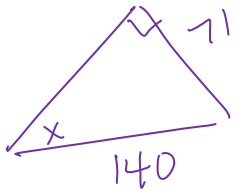
$x = 18.43^\circ$

5) One of the steepest streets in the United States is the 500 block of Highland Drive on Queen Ann Hill in Seattle. If you measure horizontally 70 centimeters from a point on the road surface, you must go down 14.2 centimeters to get back to the surface. What angle does Highland Drive make with the horizontal?

$\tan x = \frac{14.2}{70}$

$x = 11.47^\circ$

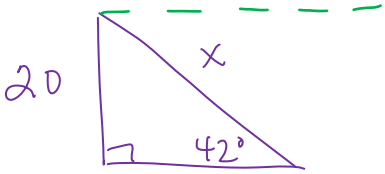
6) The lid of a grand piano is held open by a prop, and the prop makes a right angle with the lid. The prop is 71 cm long, and its base is 140 cm from the lid hinge. What angle does the lid make with the piano?



$\sin x = \frac{71}{140}$

$x = 30.47^\circ$

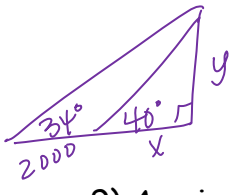
7) An eagle spotted a mouse 20 feet below at an angle of 42° with the horizon. If the eagle flies along its line of sight, how far will it have to fly to reach its prey?



$\frac{\sin 42^\circ}{1} = \frac{20}{x}$

$x = 29.89$ feet

8) Sailors on a ship observe a lighthouse at an angle of 34° to the path of the ship. After the ship has sailed 2000 yards more, the lighthouse is at 40° to the ship's path. How far is the ship from the lighthouse at the first sighting and at the second sighting?



$\tan 40^\circ = \frac{y}{x}$

$\tan 34^\circ = \frac{y}{2000+x}$

Set y's equal

$x\tan 40^\circ = 2000\tan 34^\circ + x\tan 34^\circ$

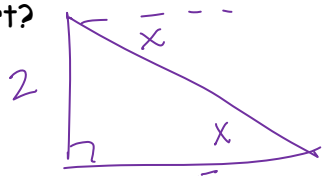
$x(\tan 40^\circ - \tan 34^\circ) = 2000\tan 34^\circ$

$x = \frac{2000\tan 34^\circ}{\tan 40^\circ - \tan 34^\circ}$

$= 8196.17$ yds

10,196.17 yds

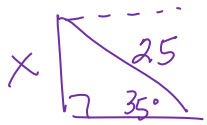
9) An airplane is flying at a height of 2 miles above the ground. The distance along the ground from the airplane to the airport is 5 miles. What is the angle of depression from the airplane to the airport?



$\tan x = \frac{2}{5}$

$x = 21.81^\circ$

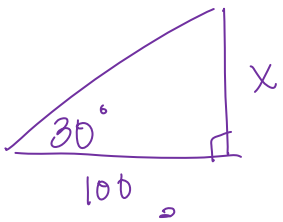
10) A bird sits on top of a lamppost. The angle of depression from the bird to the feet of an observer standing away from the lamppost is 35°. The distance from the bird to the observer is 25 meters. How tall is the lamppost?



$\sin 35^\circ = \frac{x}{25}$

$x = 14.34$ feet

11) How tall is a bridge if a 6 foot person standing 100 feet away can see the top of the bridge at an angle of 30° to the horizon?



$\tan 30^\circ = \frac{x}{100}$

$x = 57.74$ feet

Building is 63.74 feet tall