Trig 5.4

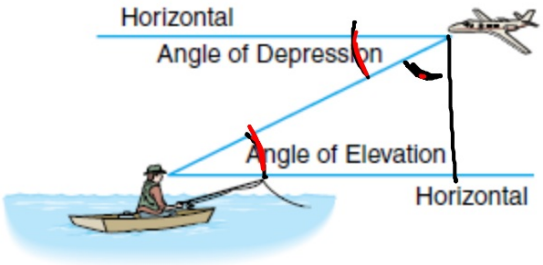
Use trigonometry to find the measures of the sides of right triangles

apothem

angle of elevation

angle of depression

indirect measurement



Quiz today (Handy angles)
Quiz Tues. 5.3-5.4

activity: whiteboards (if time)

8. **Geometry** Each base angle of an isosceles triangle measures 55° 30′. Each of the congruent sides is 10 centimeters long.

a. Find the altitude of the triangle.

b. What is the length of the base?

c. Find the area of the triangle.

$\frac{\sin 55.5}{1} = \frac{x}{10}$

$x = 8.24$

$\frac{\cos 55.5}{1} = \frac{n}{10}$

$n = 5.66$

$A = \frac{1}{2} b h$

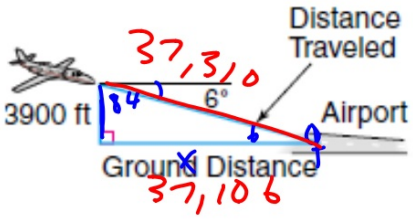
$= \frac{1}{2}(11.33)(8.24)$

$= 46.68\ cm^2$

26. Aviation When a 757 passenger jet begins its descent to the Ronald Reagan International Airport in Washington, D.C., it is 3900 feet from the ground. Its angle of descent is 6°.

a. What is the plane's ground distance to the airport?

b. How far must the plane fly to reach the runway?



$\sin 6 = \frac{3900}{h}$

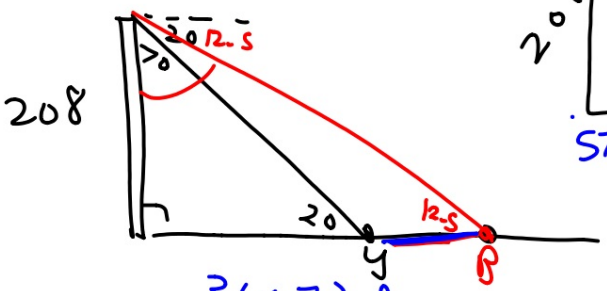
$h \sin 6 = 3900$

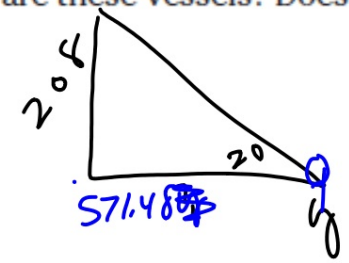
$\tan 6 = \frac{3900}{x}$

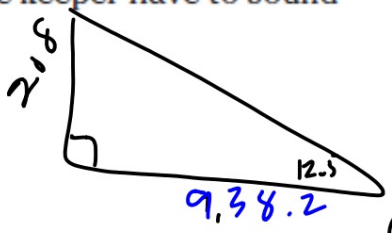
$x \tan 6 = 3900$

$x = 37{,}106$

27. **Boat Safety** The Cape Hatteras lighthouse on the North Carolina coast was built in 1870 and rises 208 feet above sea level. From the top of the lighthouse, the lighthouse keeper observes a yacht and a barge along the same line of sight. The angle of depression for the yacht is 20°, and the angle of depression for the barge is 12° 30′. For safety purposes, the keeper thinks that the two sea vessels should be at least 300 feet apart. If they are less than 300 feet, she plans to sound the horn. How far apart are these vessels? Does the keeper have to sound the horn?







36672 ft.

no

$\tan 20 = \frac{208}{y}$

$y \tan 20 = 208$

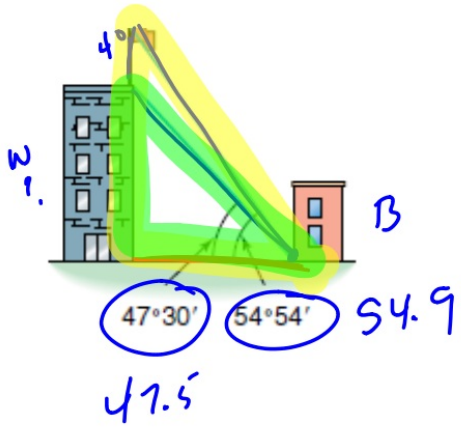
571.48

$\tan 12.5 = \frac{208}{b}$

$b \cdot \tan 12.5 = 208$

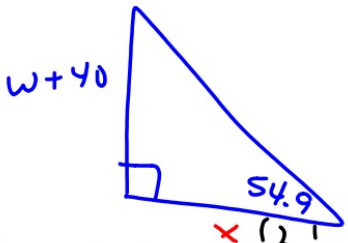
938.2

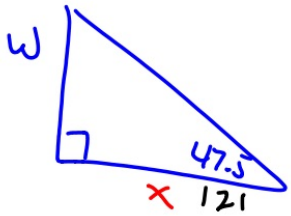
30. Architecture A flagpole 40 feet high stands on top of the Wentworth Building. From a point in front of Bailey's Drugstore, the angle of elevation for the top of the pole is 54° 54′, and the angle of elevation for the bottom of the pole is 47° 30′. How high is the building?



54.9

47.5





$\frac{\tan 54.9}{1} = \frac{w+40}{x}$

$1.42x = w+40$

$\frac{\tan 47.5}{1} = \frac{w}{x}$

$w = 1.09x$

$1.42x = 1.09x + 40$

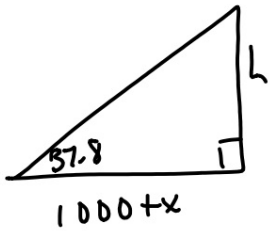
$\frac{0.33x}{0.33} = \frac{40}{0.33}$

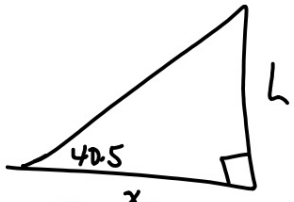
$x = 121$

$\frac{\tan 47.5}{1} = \frac{w}{121}$

$w = 132$ ft

4 **SURVEYING** On May 18, 1980, Mount Saint Helens, a volcano in Washington, erupted with such force that the top of the mountain was blown off. To determine the new height at the summit of Mount Saint Helens, a surveyor measured the angle of elevation to the top of the volcano to be 37° 46′. The surveyor then moved 1000 feet closer to the volcano and measured the angle of elevation to be 40° 30′. Determine the new height of Mount Saint Helens.

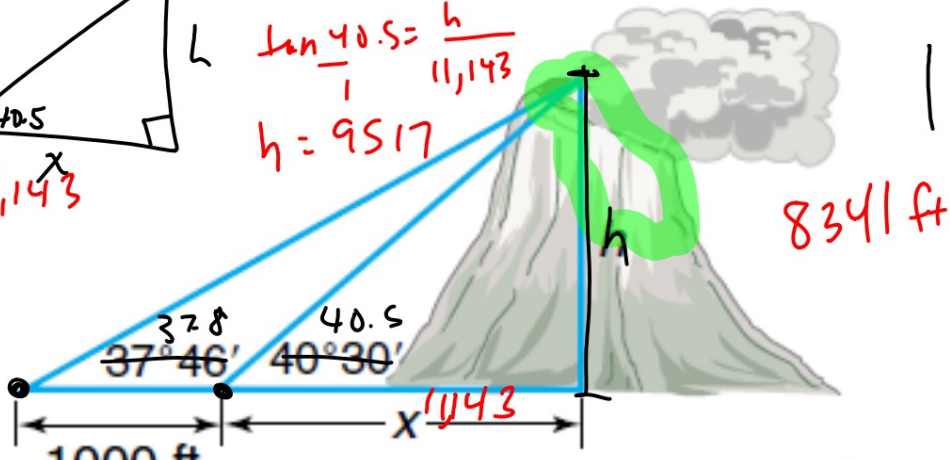




11,143

$\tan 40.5 = \frac{h}{11{,}143}$

$h = 9517$



8341 ft

1. Use 2 triangles
2. Solve for x
3. Answer the question

$\tan 37.8 = \frac{h}{1000+x}$

$h = \tan 37.8(1000+x)$

$h = 0.78(1000+x)$

$h = 780 + 0.78x$

$\tan 40.5 = \frac{h}{x}$

$x \tan 40.5 = h$

$h = 0.85x$

$0.85x = 780 + 0.78x$

$0.07x = 780$

$x = 11{,}142.9$