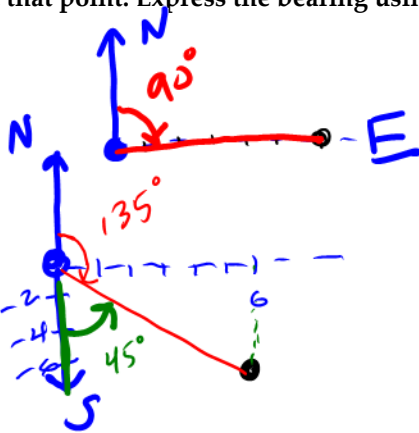


MATH 104/GRACEY
WORKSHEET/2.5

Name Key

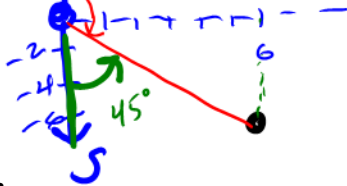
An observer for a radar station is located at the origin of a coordinate system. For the point given, find the bearing of an airplane located at that point. Express the bearing using both methods.

1) (6, 0)



① 90° ② N 90° E

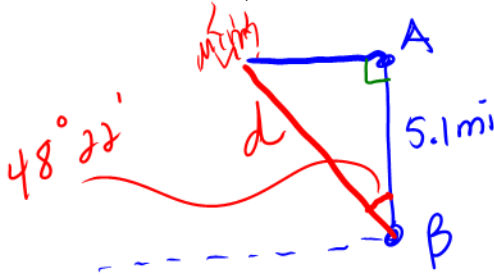
2) (6, -6)



① $90^\circ + 45^\circ = 135^\circ$
② S 45° E

Solve the problem.

3) A fire is sighted due west of lookout A. The bearing of the fire from lookout B, 5.1 miles due south of A, is N $48^\circ 22'$. How far is the fire from B (to the nearest tenth of a mile)?



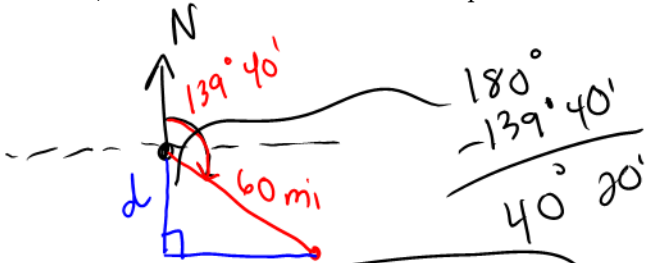
$$\cos 48^\circ 22' = \frac{5.1}{d}$$

$$d = \frac{5.1}{\cos 48^\circ 22'}$$

$$d \approx 7.7 \text{ mi}$$

The fire is approx. 7.7mi away from lookout B

4) A boat sails for 4 hours at 15 mph in a direction $139^\circ 40'$. How far south has it sailed (to the nearest mile)?



$$4(15) = 60 \text{ mi}$$

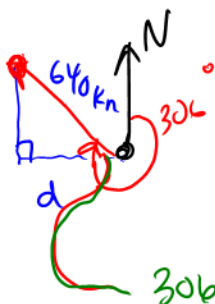
$$\cos 40^\circ 20' = \frac{d}{60}$$

$$d = 60 \cos 40^\circ 20'$$

$$d \approx 46 \text{ mi}$$

The boat has sailed approx. 46 miles south

5) An airplane travels at 160 km/h for 4 hr in a direction of 306° from St. Louis. At the end of this time, how far west of St. Louis is the plane (to the nearest kilometer)?



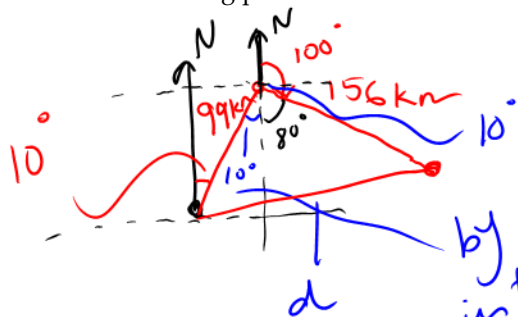
$$\cos 36^\circ = \frac{d}{640}$$

$$(160)(4) = 640 \text{ km}$$

$$d \approx 518 \text{ km}$$

$$306^\circ - 270^\circ = 36^\circ$$

6) A ship travels 99 km on a bearing of 10° , and then travels on a bearing of 100° for 156 km. Find the distance from the starting point to the end of the trip, to the nearest kilometer.



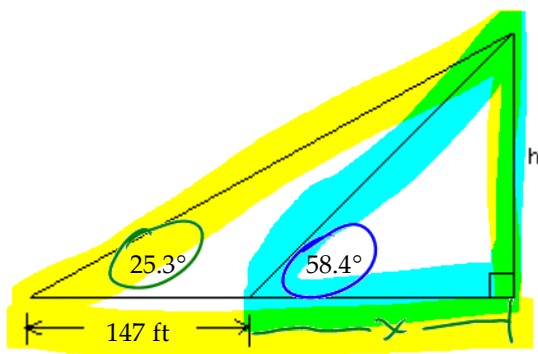
by alternate interior \angle 's of a parallel line cut by another line

$$99^2 + 156^2 = d^2$$

$$d = \sqrt{99^2 + 156^2}$$

$$d \approx 185 \text{ km}$$

7) Find h as indicated in the figure. Round your answer to the hundredths place.



The trick is to use trig stuff to isolate h twice. Then set the 2 expressions equal to each other.

$$\tan 25.3^\circ = \frac{h}{147+x} \rightarrow h = (147+x) \tan 25.3^\circ$$

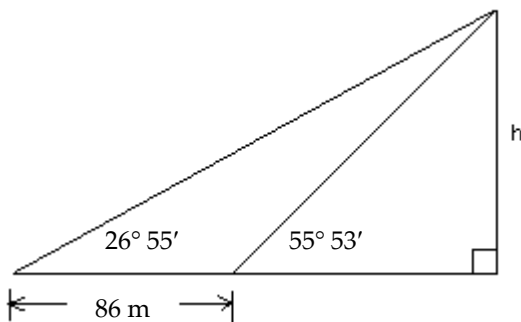
$$\tan 58.4^\circ = \frac{h}{x} \rightarrow h = x \tan 58.4^\circ$$

$$147 + x$$

$$(147+x) \tan 25.3^\circ = x \tan 58.4^\circ$$

$$(147+x)(.4727) = 1.6255x \rightarrow 69.487 + .4727x = 1.6255x$$

8) Find h as indicated in the figure. Round your answer to the hundredths place.



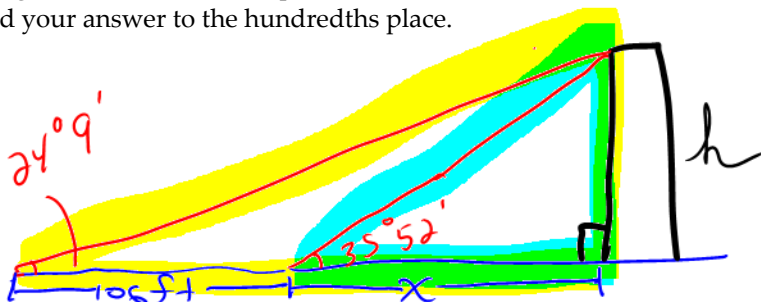
$$69.487 = 1.1528x$$

$$x \approx 60.28 \text{ ft}$$

$$h \approx 60.28 \tan 58.4^\circ$$

$$h \approx 97.98 \text{ ft}$$

- 9) The angle of elevation from a point on the ground to the top of a tower is $37^\circ 52'$. The angle of elevation from a point 106 feet farther back from the tower is $24^\circ 9'$. Find the height of the tower. Round your answer to the hundredths place.



$$\tan 24^\circ 9' = \frac{h}{x+106}$$

$$h = (x+106) \tan 24^\circ 9'$$

$$\text{and } \tan 35^\circ 52' = \frac{h}{x}$$

$$h = x \tan 35^\circ 52'$$

$$h = (179.70) \tan 35^\circ 52'$$

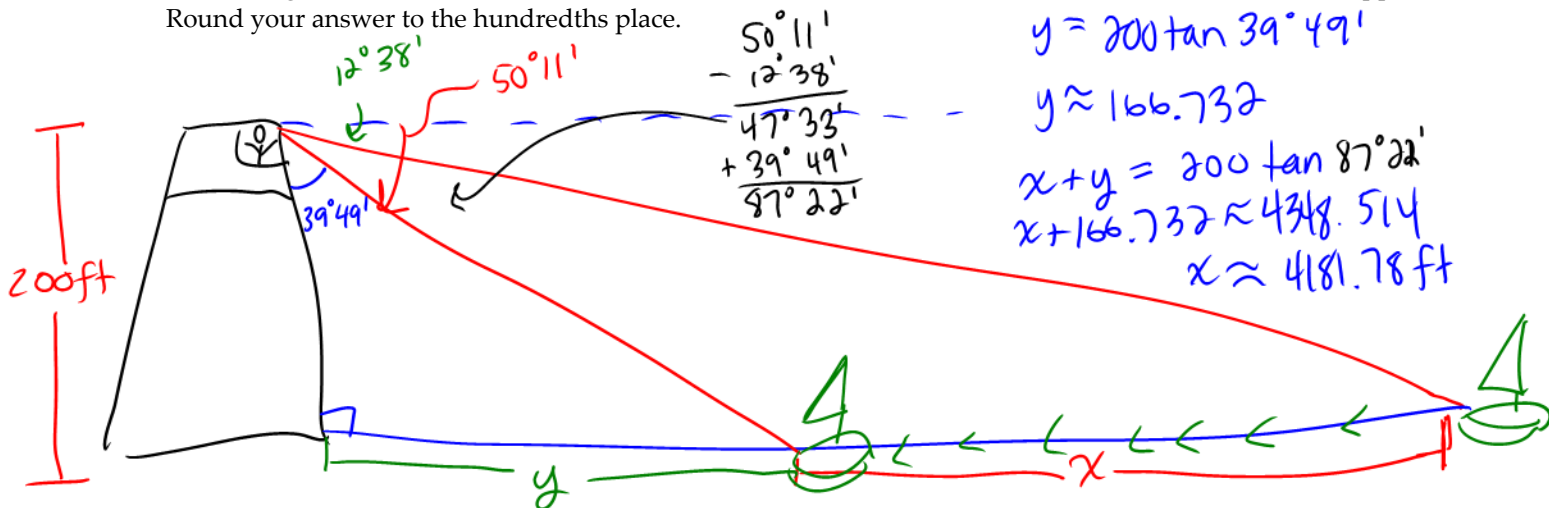
$$h \approx 128.10 \text{ ft}$$

$$(x+106) \tan 24^\circ 9' = x \tan 35^\circ 52'$$

$$(x+106)(0.4483693) = 0.71285427x$$

$$47.52715 = 0.26448497x \rightarrow x \approx 179.70$$

- 10) A person is watching a boat from the top of a lighthouse. The boat is approaching the lighthouse directly. When first noticed the angle of depression to the boat is $12^\circ 38'$. When the boat stops, the angle of depression is $50^\circ 11'$. The lighthouse is 200 feet tall. How far did the boat travel from when it was first noticed until it stopped? Round your answer to the hundredths place.



$$y = 200 \tan 39^\circ 49'$$

$$y \approx 166.732$$

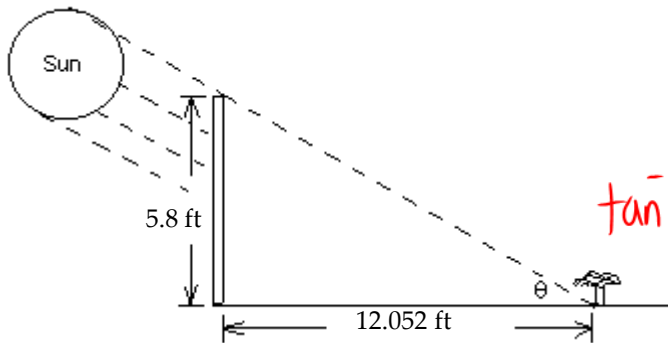
$$x + y = 200 \tan 87^\circ 22'$$

$$x + 166.732 \approx 4348.514$$

$$x \approx 4181.78 \text{ ft}$$

$$\begin{array}{r} 50^\circ 11' \\ - 12^\circ 38' \\ \hline 37^\circ 33' \\ + 39^\circ 49' \\ \hline 77^\circ 22' \end{array}$$

- 11) A 5.8-ft fence is 12.052 ft away from a plant in the direction of the sun. It is observed that the shadow of the fence extends exactly to the bottom of the plant. (See drawing) Find θ , the angle of elevation of the sun at that time. Round the measure of the angle to the nearest tenth of a degree.



$$\tan \theta = \frac{5.8}{12.052}$$

$$\tan^{-1}(\tan \theta) = \tan^{-1}\left(\frac{5.8}{12.052}\right)$$

$$\theta \approx 25.7^\circ$$

Answer Key

Testname: WS2.5TST

- 1) 90° ; N 90° E or S 90° E
- 2) 135° ; S 45° E
- 3) 7.7 mi
- 4) 46 mi
- 5) 518 km
- 6) 185 km
- 7) 97.98 ft
- 8) 66.55 m
- 9) 112.26 ft
- 10) 725.58 ft
- 11) $\theta = 25.7^\circ$