

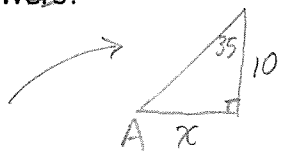
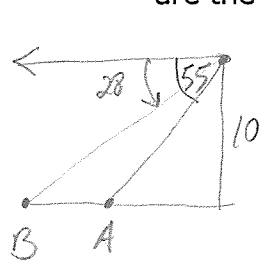
KEY

Geometry (H)  
Right Triangle Trig

Applications, Applications and More Applications

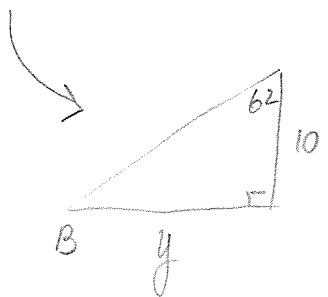
Solve each of the following. Draw or redraw a picture where necessary.

1. A passenger in an airplane flying at an altitude of 10 km sees two towns directly to the left of the plane. The angles of depression to the towns are  $28^\circ$  and  $55^\circ$ . How far apart are the towers?



$$\tan 35 = \frac{x}{10}$$

$$x \approx 7.0021$$



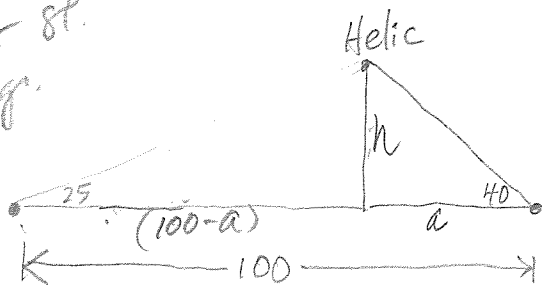
$$\tan 62 = \frac{y}{10}$$

$$y \approx 18.8073$$

11.8 Km apart

2. Two observers simultaneously measure the angle of elevation of a helicopter. One angle is measured as  $25^\circ$ , the other as  $40^\circ$ . If the observers are 100 feet apart and the helicopter lies over the line joining them, how high is the helicopter?

Need to show sp. diag.



$$(100-a) \tan 25 = a \tan 40$$

$$100 \tan 25 - a \tan 25 = a \tan 40$$

$$100 \tan 25 = a \tan 40 + a \tan 25$$

$$100 \tan 25 = a (\tan 40 + \tan 25)$$

$$\tan 25 = \frac{h}{(100-a)} \rightarrow (100-a) \tan 25 = h$$

$$\frac{100 \tan 25}{\tan 40 + \tan 25} = a$$

$$\tan 40 = \frac{h}{a} \rightarrow a \tan 40 = h$$

$$a \approx 35.7212$$

exact answer

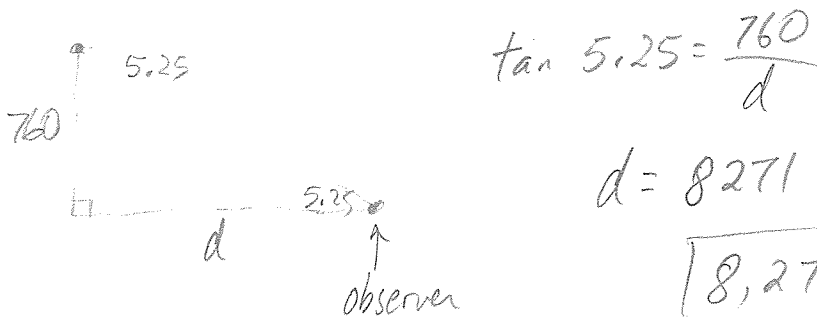
$$h = \frac{100(\tan 25)(\tan 40)}{(\tan 40 + \tan 25)}$$

$$a \tan 40 = h$$

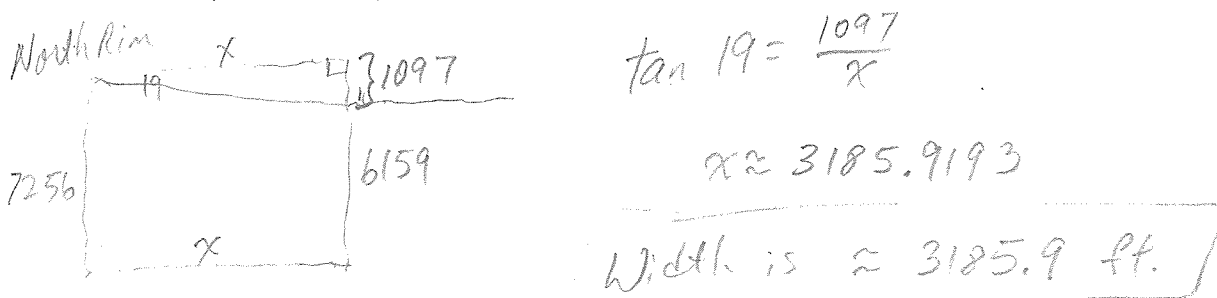
$$h \approx 29.97$$

≈ 30 feet

5. A hot air balloon over Park City, Utah is 760 ft. above the ground. The angle of depression from the balloon to an observer is  $5.25^\circ$ . Assuming the ground is relatively flat, how far is the observer from a point on the ground directly under the balloon?



6. The angle of depression is  $19^\circ$  from a point 7256 ft. above sea level on the north rim of the Grand Canyon level to a point 6159 ft. above sea level on the south rim. How wide is the canyon at that point?



7. A shoreline runs north-south and a boat is due east of the shoreline. The bearings of the boat from two points on the shore are  $110^\circ$  and  $100^\circ$ . Assume the two points are 550 ft. apart. How far is the boat from the shore?

$$\tan 80 = \frac{d}{x} \rightarrow d = x \tan 80$$

$$\tan 70 = \frac{d}{(550+x)} \rightarrow d = (550+x) \tan 70$$

$$x \tan 80 = 550 \tan 70 + x \tan 70$$

$$x \tan 80 - x \tan 70 = 550 \tan 70$$

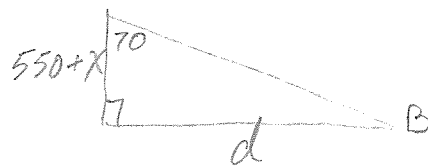
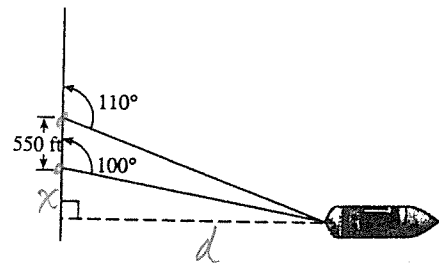
$$x (\tan 80 - \tan 70) = 550 \tan 70$$

$$x = \frac{550 \tan 70}{(\tan 80 - \tan 70)}$$

$$x \approx 516.8309$$

$$d = x \tan 80$$

$$d = 2931.1 \text{ ft.}$$



$$d = \frac{550 (\tan 70) (\tan 80)}{(\tan 80 - \tan 70)}$$

exact answer

8. The angle of elevation from an observer to the bottom edge of the Delaware River drawbridge observation deck located 200 ft. from the observer is  $30^\circ$ . The angle of elevation from the observer to the top of the observation deck is  $40^\circ$ . What is the height of the observation deck?

$$\tan 30 = \frac{x}{200}$$

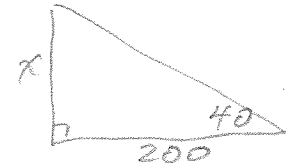
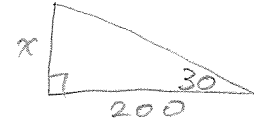
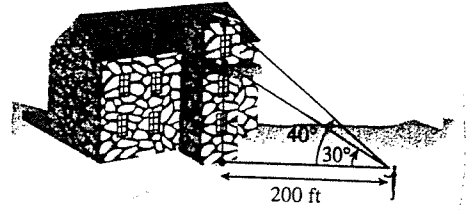
$$x \approx 115.470$$

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

$$x \approx 167.8199$$

$$\begin{array}{r} 167.8199 \\ -115.470 \\ \hline 52.3499 \end{array}$$

height  $\approx 52.3$  feet



9. A ramp leading to a freeway overpass is 470 ft. long and rises 32 ft. What is the angle of inclination of the ramp to the nearest tenth of a degree?

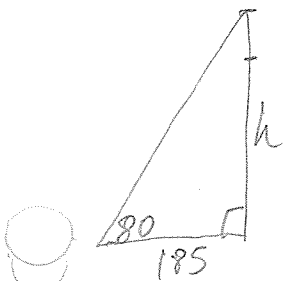


$$\sin x = \frac{32}{470}$$

$$x \approx 3.9040$$

Angle of inclination  $\approx 3.9^\circ$

10. The angle of elevation of the top of the TV antenna mounted on top of the Eiffel Tower in Paris is measured to be  $80^\circ$  at a point 185 ft. from the base of the tower. How tall is the tower plus TV antenna?



$$\tan 80 = \frac{h}{185}$$

$$h \approx 1049.1871$$

$\approx 1049.2$  feet

