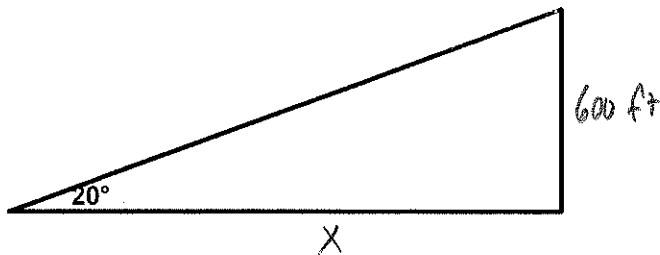


4.8 – Word Problems again!!

Review of Right Triangle Word Problems

- 1) The sun is 20° above the horizon. Find the **length of a shadow** cast by a building that is 600 feet tall.

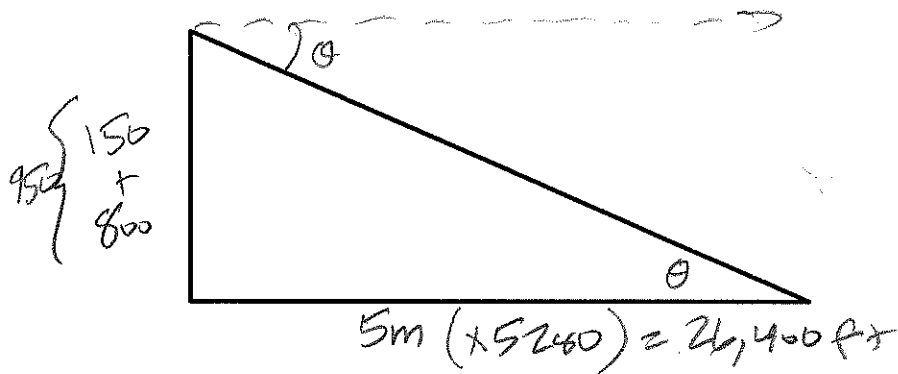


$$\tan 20^\circ = \frac{600}{x}$$

$$x = \frac{600}{\tan 20^\circ}$$

$$\approx 1648.49 \text{ ft}$$

- 2) A cellular telephone tower that is 150ft tall is placed on top of a mountain that is 1200ft above sea level. **What is the angle of depression** from the top of the tower to a cell phone user who is 5 horizontal miles away and 400 feet above sea level?



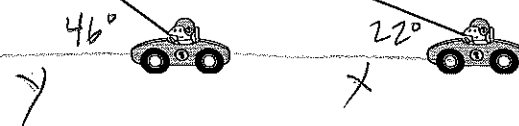
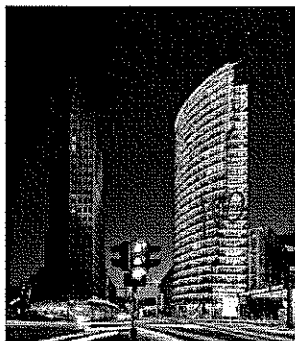
$$\tan \theta = \frac{950}{26,400}$$

$$\theta \approx \tan^{-1}\left(\frac{950}{26,400}\right)$$

$$\approx 2.06^\circ$$

Slightly more complex

- 3) From the top of a 100 foot building a man observes a car moving toward the building. If the angle of depression of the car changes from 22° to 46° during the period of observation, how far does the car travel?



$$\tan 22^\circ = \frac{100}{x+y}$$

$$x+y = \frac{100}{\tan 22^\circ}$$

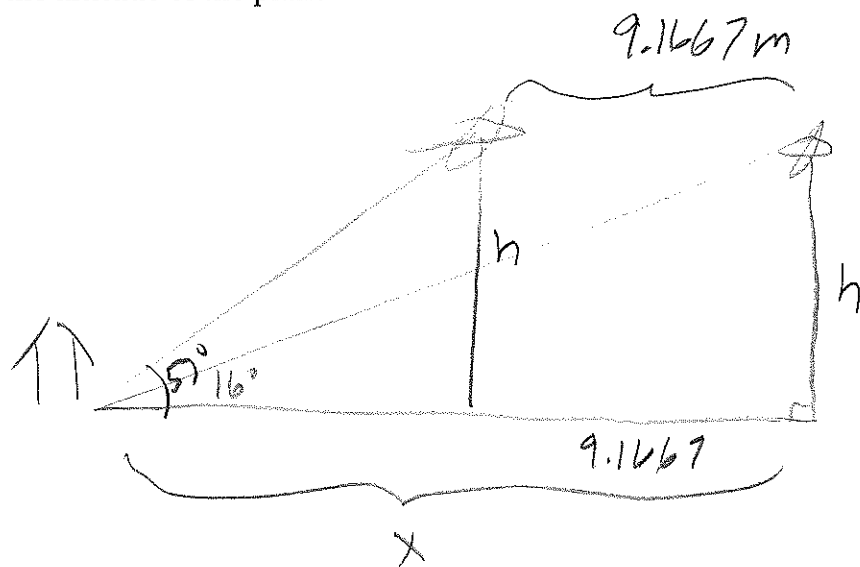
$$\tan 46^\circ = \frac{100}{y}$$

$$y = \frac{100}{\tan 46^\circ}$$

$$x = \frac{100}{\tan 22^\circ} - \frac{100}{\tan 46^\circ} \approx 150.94 \text{ ft}$$

4.8 – Word Problems again!!

- 4) A plane is observed approaching your home and you assume that its speed is 550 miles per hour. The angle of elevation of the plane is 16° right now and 57° one minute later. Approximate the altitude of the plane.



$$\frac{550 \text{ m}}{1 \text{ hr}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} = 9.1667 \text{ m/min}$$

$$\tan 16^\circ = \frac{h}{x}$$

$$h = x \tan 16^\circ$$

$$\tan 57^\circ = \frac{h}{x - 9.1667}$$

$$h = x \tan 57^\circ - 9.1667 (\tan 57^\circ)$$

$$x \tan 16^\circ = x \tan 57^\circ - 9.1667 (\tan 57^\circ)$$

$$x \tan 16^\circ - x \tan 57^\circ = -9.1667 (\tan 57^\circ)$$

$$x (\tan 16^\circ - \tan 57^\circ) = -9.1667 (\tan 57^\circ)$$

$$x = \frac{-9.1667 (\tan 57^\circ)}{(\tan 16^\circ - \tan 57^\circ)} \approx +11.26$$

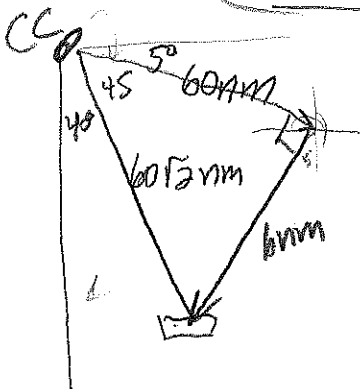
$$h = x \tan 16^\circ$$

$$\approx 3.23 \text{ mi}$$

4.8 – Word Problems again!!

Course and Bearing: The biggest thing to know is that NORTH is degree 0 (instead of east, like it normally is on the x-axis)

- 6) The Coast Guard Cutter travels at 30 knots (nautical miles) from its home port of Corpus Christi on a course of 95° for 2 hours, and then changes to a course of 185° for 2 hours. Find the **distance** and **bearing** from the Corpus Christi port to the boat.



$$\begin{array}{r} 185 \\ -95 \\ \hline 90^\circ \end{array}$$

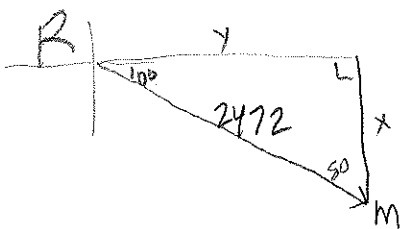
$$\begin{array}{r} 90 \\ +90 \\ \hline 180 \end{array}$$

$$\text{Distance} = 60\sqrt{2} \text{ nm}$$

$$\text{Bearing} = 140^\circ \text{ or } S40^\circ E$$

- 7) A jet leaves Reno, Nevada and is headed toward Miami, Florida at a bearing of 100° . The distance between the two cities is approximately 2472 miles.

a) How far north and how far west is Reno relative to Miami?



$$\sin 10^\circ = \frac{x}{2472}$$

$$x(\text{north}) = 2472 \sin 10^\circ \approx 429.26 \text{ m}$$

$$\cos 10^\circ = \frac{y}{2472}$$

$$y(\text{west}) = 2472 \cos 10^\circ \approx 2424.41 \text{ m}$$

b) If the jet is to return directly to Reno from Miami, at what bearing should it travel?

$$\begin{array}{r} 360 \\ -80 \\ \hline 280 \end{array}$$

$$280^\circ \text{ or } N80^\circ W$$