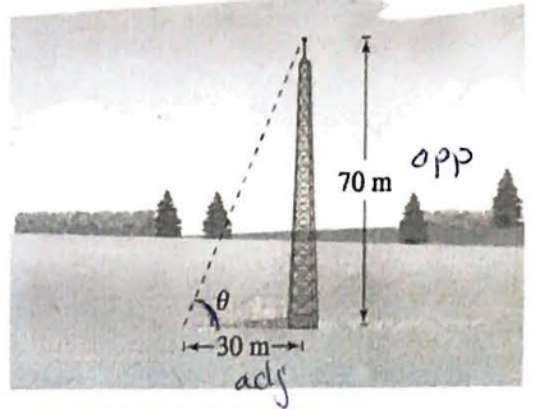


- 1) The height of a radio transmission tower is 70 meters, and it casts a shadow of length 30 meters. Find the angle of elevation of the sun.

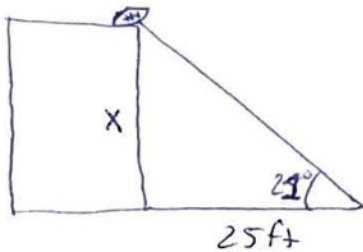
$$\tan \theta = \frac{70}{30}$$

$$\theta = \tan^{-1} \frac{70}{30}$$

$$\theta = 66.8^\circ$$



- 2) Your football has landed at the edge of the roof of your school. The base of the building, the angle of elevation to your football is your football?



$$\tan 21 = \frac{x}{25}$$

$$25 \tan 21 = x$$

$$9.6 \text{ ft} \approx x$$

$$\tan 28^\circ = \frac{10}{z}$$

$$z = \frac{10}{\tan 28} = 18.8 \text{ km}$$

$$\tan 55^\circ = \frac{10}{x}$$

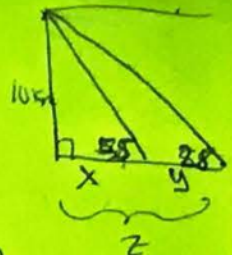
$$x = \frac{10}{\tan 55}$$

$$x = 7.0 \text{ km}$$

$$x = z - y$$

$$x = 18.8 - 7$$

$$= 11.81 \text{ km}$$



OR #3

- 3) A passenger in an airplane at an altitude of 10 kilometers see plane. The angles of depression to the towns are 28° and 55°

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

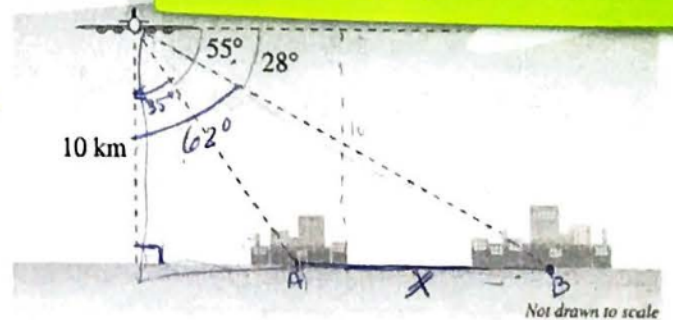
$$10 \tan 35 = d$$

$$\tan 62 = \frac{d+x}{10}$$

$$10 \tan 62 = 10 \tan 35 + x$$

$$10 \tan 62 - 10 \tan 35 = x$$

$$11.81 \text{ km} \approx x$$



- 4) In traveling across flat land, you notice a mountain directly in front of you. Its angle of elevation (to the peak) is 3.5°. After you drive 13 miles closer to the mountain, the angle of elevation is 9°. Approximate the height of the mountain.

$$\tan 3.5 = \frac{h}{d}$$

$$\tan 9 = \frac{h}{d-13}$$

$$h = (d-13) \tan 9$$

$$d \tan 3.5 = (d-13) \tan 9$$

$$d \tan 3.5 = d \tan 9 - 13 \tan 9$$

$$d \tan 3.5 - d \tan 9 = -13 \tan 9$$

$$d(\tan 3.5 - \tan 9) = -13 \tan 9$$

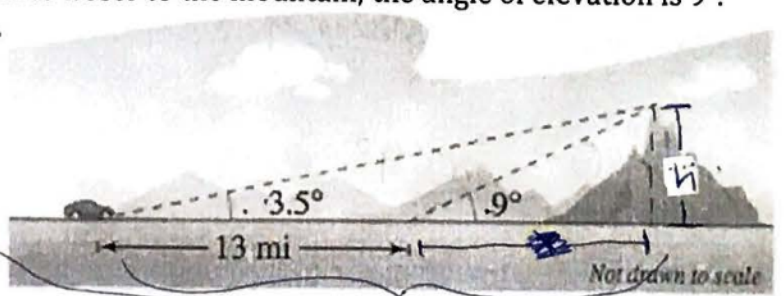
$$d = \frac{-13 \tan 9}{\tan 3.5 - \tan 9}$$

$$d \approx \frac{-2059}{-0.097}$$

$$d \approx 21.23$$

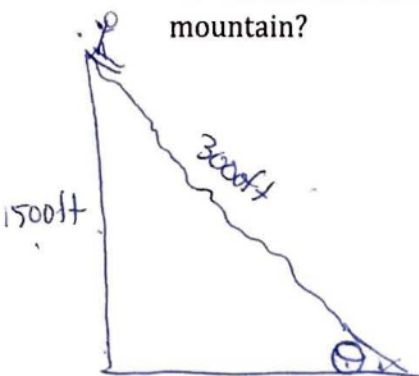
$$21.23 \tan 3.5 \approx h$$

$$1.3 \text{ miles}$$



# Sohcah-teea

- 5) You are skiing down a mountain with a vertical height of 1500 feet. The distance from the top of the mountain to the base is 3000 feet. What is the angle of elevation from the base to the top of the mountain?



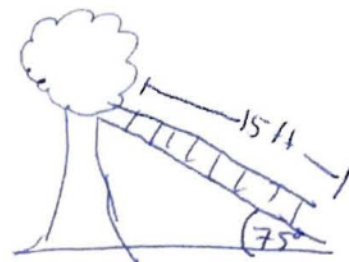
$$\sin \theta = \frac{1500}{3000}$$

$$\theta = \sin^{-1} \frac{1500}{3000}$$

$$\theta \approx 30^\circ$$

- 6) Multiple-Choice: A 15 foot ladder rests against a tree on level ground and forms a  $75^\circ$  angle of elevation. Where is the correct location of the  $75^\circ$  angle?

- A) Between the ladder and the ground  
 B) Between the ladder and the tree  
 C) Between the tree and the ground  
 D) It is not possible to place a  $75^\circ$  angle on such a figure.



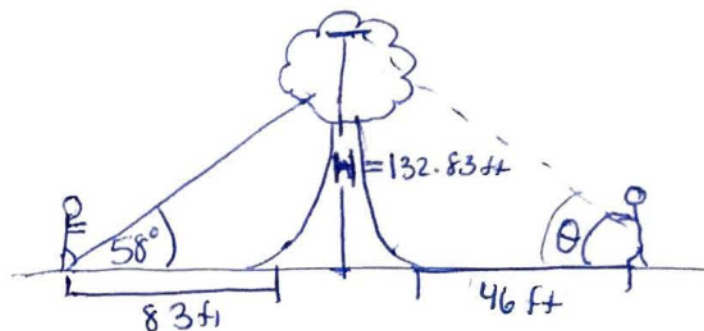
- 7) Two observers on the ground are looking up at the top of the same tree from two different points on the horizontal ground. The first observer, who is 83 feet away from the base of the tree, looks up at an angle of elevation of  $58^\circ$ . The second observer is standing only 46 feet from the base of the tree. (Note: you may ignore the heights of the observers and assume their measurements are made directly from the ground.)

- a) How tall is the tree, to the nearest foot?

$$\tan 58 = \frac{H}{83}$$

$$83 \tan 58 = H$$

$$132.83 \text{ ft} = H$$



- b) At what angle of elevation must the second observer look up to see the top of the tree?

$$\tan \theta = \frac{132.83}{46}$$

$$\theta = \tan^{-1} \left( \frac{132.83}{46} \right)$$

$$\theta \approx 70.9^\circ$$