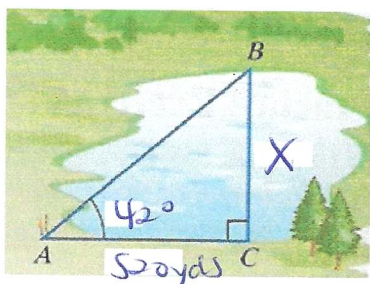


- I. For the following – a.) For each given picture, label it appropriately based on the problem.  
 b.) Setup an equation that will be needed to use to complete the problem.  
 c.) Show the work you used to obtain the correct answer (including units).

- 1.) A surveyor is standing at pt A near a lake and is observing two other points that are across the lake. The angle formed at the surveyor is  $42^\circ$  and the distance from the surveyor to pt C is 520 yards. What is the length of the lake?

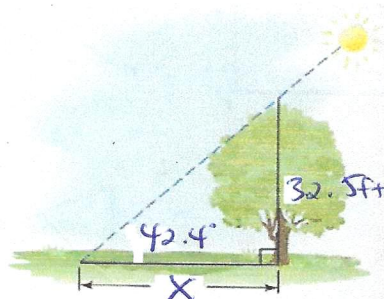


$$\tan 42^\circ = \frac{X}{520}$$

$$X = 520 \tan 42^\circ$$

$$X = 468.2 \text{ yd}$$

- 2.) The angle of elevation of the sun during a certain time of day is  $42.4^\circ$ . At this specific time day a 32.5-foot tree casts a shadow on the ground. How long is the tree's shadow?

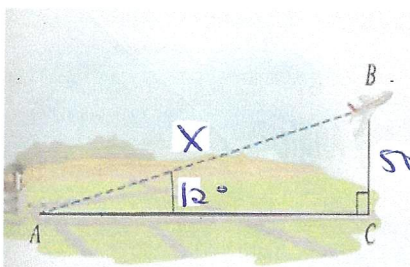


$$\tan 42.4^\circ = \frac{32.5}{X}$$

$$X = \frac{32.5}{\tan 42.4^\circ}$$

$$X = 35.6 \text{ ft}$$

- 3.) A plane rises from take-off and flies at an angle of  $12^\circ$  with the horizontal runway. The plane eventually gains an altitude of 500 ft. What is the distance that the plane flown from its take-off?

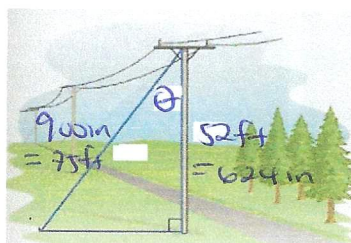


$$\sin 12^\circ = \frac{500}{X}$$

$$X = \frac{500}{\sin 12^\circ}$$

$$X = 2404.9 \text{ ft}$$

- 4.) A telephone pole is 52 feet tall. A guy wire that is 900 inches long is attached from the ground to the top of the pole. What is the measure of the angle formed between the wire and the pole?



$$\cos \theta = \frac{52}{75}$$

$$\theta = \cos^{-1}\left(\frac{52}{75}\right)$$

$$\theta = 46.1^\circ$$

or

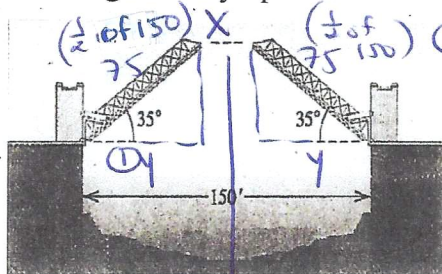
$$\cos \theta = \frac{624}{900}$$

$$\theta = \cos^{-1}\left(\frac{624}{900}\right)$$

$$\theta = 46.1^\circ$$

Keep dimensions same...!!

- 5.) A drawbridge is 150 feet long when stretched across a river. As shown in the figure, the two sections of the bridge can be rotated upward through an angle of  $35^\circ$ . How far are the ends of the two sections when the bridge is fully opened?



$$\cos 35^\circ = \frac{y}{75}$$

$$y = 75 \cos 35^\circ$$

$$y = 61.4$$

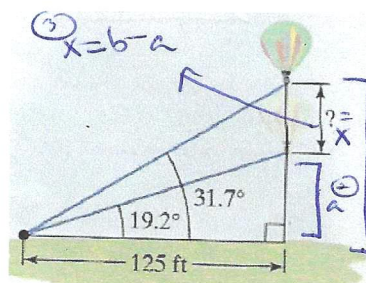
$$X = 150 - 2y$$

$$X = 150 - 2(61.4)$$

$$X = 27.2 \text{ ft}$$

$$X = 150 - 2y$$

- 6.) A hot-air balloon is rising vertically. The angle of elevation from a point on level ground 125 feet from the balloon to a point directly under the passenger compartment changes from  $19.2^\circ$  to  $31.7^\circ$ . How far does the balloon rise during this period?



$$X = b - a$$

$$\tan 31.7^\circ = \frac{b}{125}$$

$$b = 125 \tan 31.7^\circ$$

$$b = 77.2$$

$$\tan 19.2^\circ = \frac{a}{125}$$

$$a = 125 \tan 19.2^\circ$$

$$a = 43.5$$

$$X = b - a$$

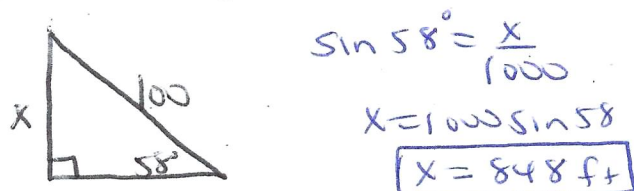
$$X = 77.2 - 43.5$$

$$X = 33.7 \text{ ft}$$

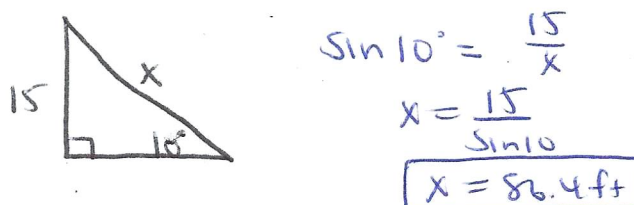


- II. For the following – a.) Draw a representation of each given problem appropriately.  
 b.) Setup an equation that will be needed to use to complete the problem.  
 c.) Show the work you used to obtain the correct answer (including units).

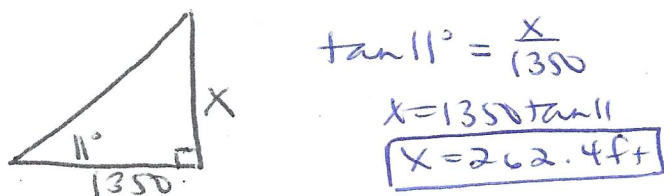
7.) A captive balloon fastened by a cable 1000 feet long, was blown by a wind so that the cable made an angle of  $58^\circ$  with the ground. Find the height of the balloon.



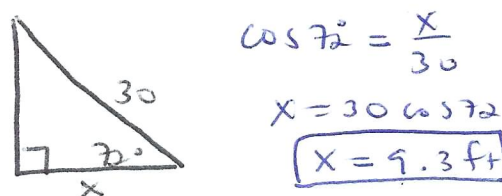
8.) A road is inclined at an angle of  $10^\circ$  with the horizontal. Find the distance which must be driven on this road in order to be elevated 15 feet above the horizontal.



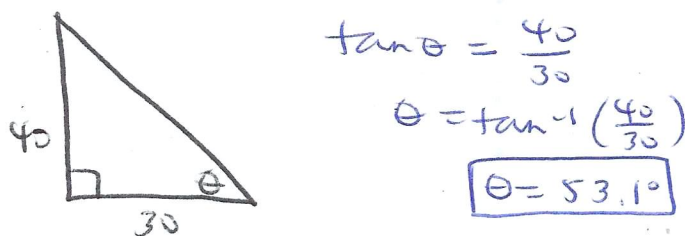
9.) A plane takes off from a field and rises at an angle of  $11^\circ$  with the horizontal. Find the height of the plane after it has traveled a horizontal distance of 1350 feet.



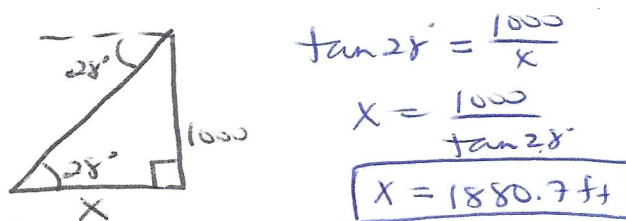
10.) A ladder is 30 feet long leans against a building and makes an angle of  $72^\circ$  with the ground. Find the distance the base of the ladder is from the bottom of the building.



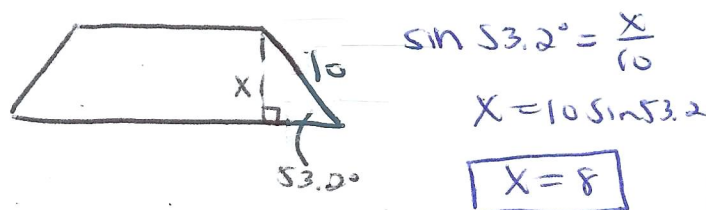
11.) A tree is 40 feet tall and point A is 30 feet from the base of a tree. Find the angle of elevation from point A to the top of the tree.



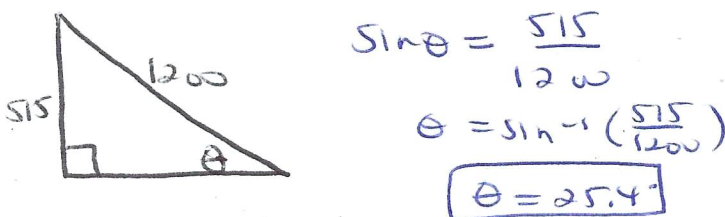
12.) An artillery spotter in a plane at an altitude of 1000 feet observes the angle of depression of an enemy tank measures to be  $28^\circ$ . How far is the enemy tank from the point on the ground directly below the spotter?



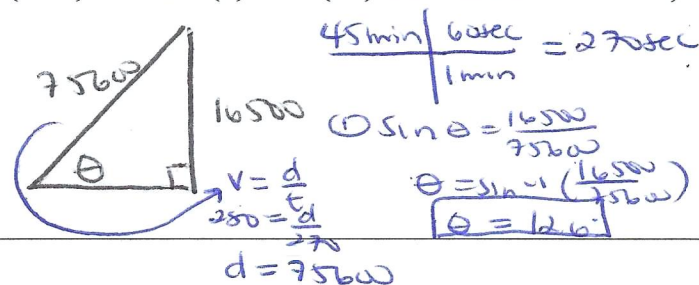
13.) One leg of a trapezoid is 10 and makes an angle of  $53.2^\circ$  with the longer base. Find the altitude of the trapezoid.



14.) A kite is 515 feet above the ground. If you have a 1200 foot roll of string and it is all out, what is the angle of elevation? Assume that the string of the kite follows a linear path.



15.) A jet took off at a rate of 280 feet/sec and climbed in a straight path for 4.5 minutes. What was the angle of elevation of its path if its final altitude was 16,500 feet? (NOTE: velocity (ft/sec) = distance (ft) / time (sec) and 1 minute = 60 seconds)



16.) The pilot of your tour helicopter has just announced that you are flying at a specific altitude and the launch pad is 8874 feet long. If the launch pad where you are to land is 9000 feet away from the helicopter, at what angle of depression should you fly to reach the pad in the shortest time?

