

Name: Answers

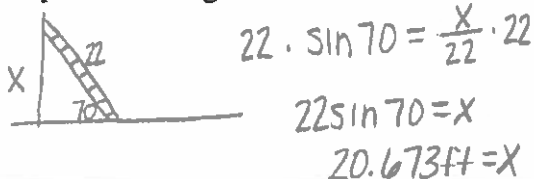
Block: _____

Class Examples: Angles of Elevation and Depression

Date: _____

Honors PreCalculus

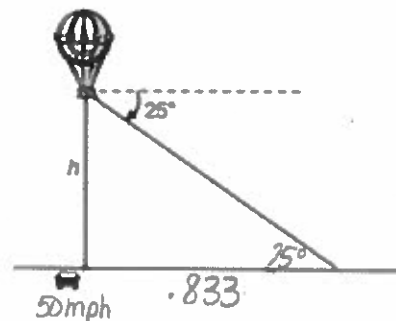
1. A 22-foot extension ladder leaning against a building makes a 70° angle with the ground. How far up the building does the ladder touch?



2. A sledding run is 300 yards long with a vertical drop of 27.6 yards. Find the angle of depression of the run.



3. A hot air balloon is floating above a straight stretch of highway. To estimate how high above the ground the balloon is floating, the passengers of the balloon take measurements of a car below them. They assume that the car is traveling at 50 miles per hour. One minute after the car passes directly below the balloon, they take a bearing on the car and find that the angle of depression to the car is 25° . Find the altitude of the balloon.

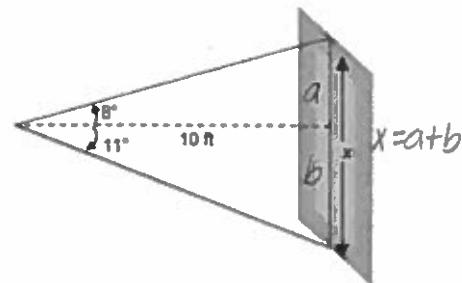


$\frac{50}{60} = .833 \text{ miles/minute}$
 $\tan 25 = \frac{h}{.833}$
 $.833 \tan 25 = h$
 $.388 \text{ miles} = h$
 $.388(5280) = 2048.64 \text{ ft}$

4. A security camera in a neighborhood bank is mounted on a wall 9 feet above the floor. What angle of depression should be used if the camera is to be directed to a spot 6 feet above the floor and 12 feet from the wall?

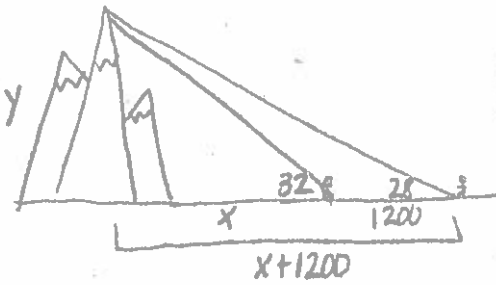


5. A man is standing 10 ft from a painting. He notices that the angle of elevation from his eyes to the top of the painting is 8° and the angle of depression to the bottom of the painting is 11° . Find the height of the painting to the nearest tenth of a foot.



$\tan 8 = \frac{a}{10}$
 $10 \tan 8 = a$
 $1.405 = a$
 $\tan 11 = \frac{b}{10}$
 $10 \tan 11 = b$
 $1.944 = b$
 $x = a + b$
 $1.405 + 1.944$
 $x = 3.3 \text{ ft}$

6. To estimate the height of a mountain, an observer measures the angle of elevation to the top of the mountain to be 28° . The observer moves 1200 ft closer to the mountain and measures the angle of elevation to be 32° . What is the height of the mountain to the nearest hundred feet?



$$\tan 32 = \frac{y}{x}$$

$$\tan 28 = \frac{y}{x+1200}$$

$$x \tan 32 = y$$

$$\tan 28 = \frac{x \tan 32}{x+1200}$$

$$6848.99 \tan 32 = y$$

$$(x+1200) \tan 28 = x \tan 32$$

$$4279.724 = y$$

$$x \tan 28 + 1200 \tan 28 = x \tan 32$$

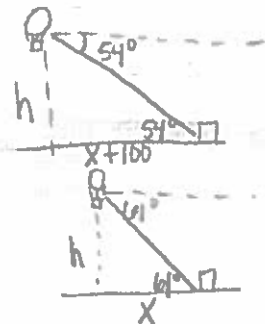
$$4300 \text{ ft} = y$$

$$1200 \tan 28 = x \tan 32 - x \tan 28$$

$$1200 \tan 28 = x (\tan 32 - \tan 28)$$

$$\frac{1200 \tan 28}{\tan 32 - \tan 28} = x \rightarrow 6848.990 = x$$

7. While taking a ride in a hot-air balloon in Napa Valley, Francisco wonders how high he is. To find out, he chooses a landmark that is to the east of the balloon and measures the angle of depression to be 54° . A few minutes later, after traveling 100 feet east, the angle of depression to the same landmark is determined to be 61° . Use this information to determine the height of the balloon.



$$\tan 54 = \frac{h}{x+100}$$

$$\tan 61 = \frac{h}{x}$$

$$321.836 \tan 61 = h$$

$$580.608 \text{ ft} = h$$

$$\tan 54 = \frac{x \tan 61}{x+100}$$

$$x \tan 61 = h$$

$$(x+100) \tan 54 = x \tan 61$$

$$x \tan 54 + 100 \tan 54 = x \tan 61$$

$$100 \tan 54 = x \tan 61 - x \tan 54$$

$$100 \tan 54 = x (\tan 61 - \tan 54)$$

$$\frac{100 \tan 54}{\tan 61 - \tan 54} = x$$

$$321.836 = x$$

8. One World Trade Center (1WTC) is to be the centerpiece of the rebuilding of the World Trade Center in New York City. The tower will be 1368 feet tall (not including a broadcast antenna). The angle of elevation from the base of an office building to the top of the tower is 34° . The angle of elevation from the helipad on the roof of the office building to the top of the tower is 20° .

- a) How far away is the office building from 1WTC?

(Assume the side of the tower is vertical. Round to nearest foot)

- b) How tall is the office building? Round to nearest foot.

$$a) \tan 34 = \frac{1368}{x} \cdot x$$

$$x \tan 34 = 1368$$

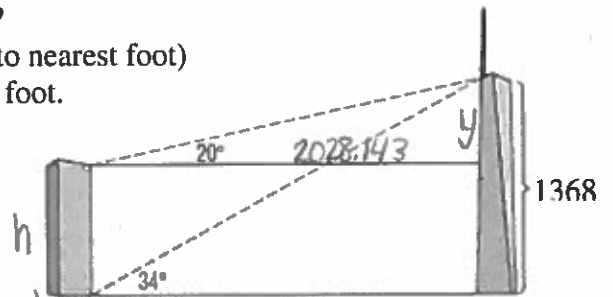
$$x = \frac{1368}{\tan 34}$$

$$x = 2028.143 \text{ ft}$$

$$b) \tan 20 = \frac{y}{2028.143}$$

$$2028.143 \tan 20 = y$$

$$738.184 = y$$



$$h = 1368 - y$$

$$h = 1368 - 738.184$$

$$h = 629.816 \text{ ft}$$

$$h = 630 \text{ ft}$$