

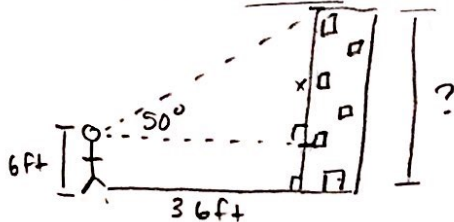
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## Unit 6 Segment 2 Lesson 3

For each problem below (when appropriate):

- Draw a diagram.
- Setup and solve a proportion.
- Interpret your answer.

1. Michael, whose eyes are six feet off the ground, is standing 36 feet away from the base of a building, and he looks up at a  $50^\circ$  angle of elevation to a point on the edge of building's roof. To the nearest foot, how tall is the building?



$$\tan 50 = \frac{x}{36}$$

$$x = 36 \cdot \tan 50$$

$$x \approx 36 \cdot (1.1918)$$

$$x \approx 42.9031$$

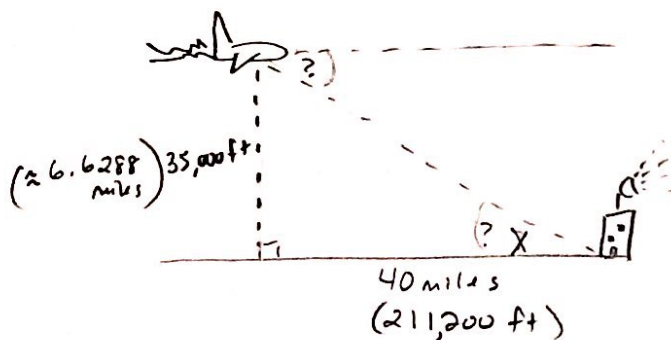
$$x \approx 43 \text{ ft.}$$

the height of the building is  $x + 6$   
 $43 + 6 = 49$

The building is approximately 49 feet tall.

2. A pilot is traveling at a height of 35,000 feet above level ground. According to her GPS, she is 40 miles away from the airport runway, as measured along the ground. At what angle of depression will she need to look down to spot the runway ahead?

$$5,280 \text{ ft} = 1 \text{ mile}$$



$$\tan x = \frac{35,000}{211,200}$$

$$\tan^{-1}\left(\frac{35,000}{211,200}\right) = x$$

$$x \approx \tan^{-1}(0.1657197)$$

$$x \approx 9.409523$$

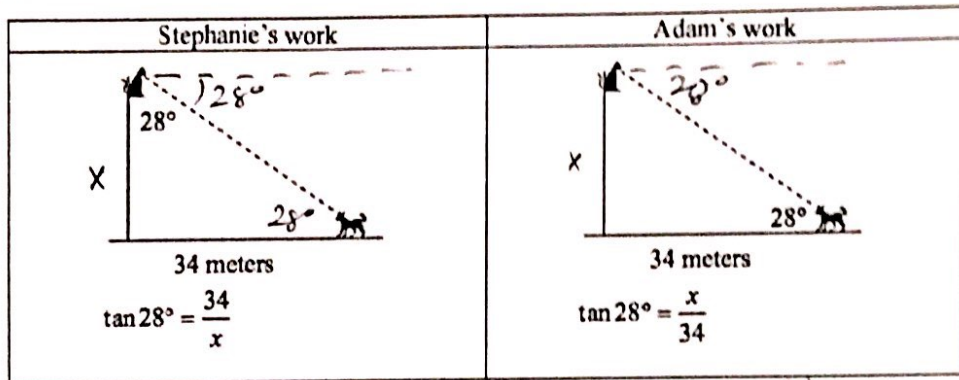
$$x \approx 9^\circ$$

The pilot will need to look down approximately  $9^\circ$  to spot the runway ahead.

3. **Error Analysis:** Consider the following problem, which Stephanie and Adam are both trying to solve:

"A cat, who has climbed a tree, looks down at a dog at a  $28^\circ$  angle of depression. If the dog is 34 meters from the base of the tree, how high up is the cat?"

The first steps of their work are shown below. Analyze their work and determine who, if anyone, has set it up correctly. Finally, answer the question: "How high up in the tree is the cat?"



Stephanie put the angle of depression in the wrong place, however her proportion is setup correctly. Adam has the correct diagram and proportion.

$$\tan 28^\circ = \frac{x}{34}$$

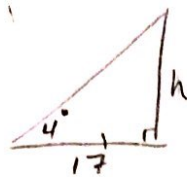
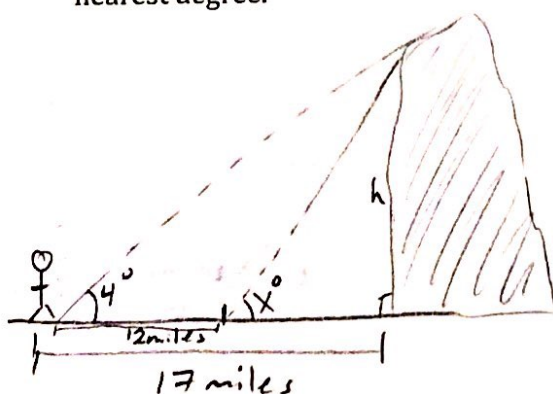
$$x = 34 \cdot \tan 28^\circ$$

$$x \approx 34 \cdot (0.5317)$$

$$x \approx 18.0781$$

The cat is approximately 18.1 meters high.

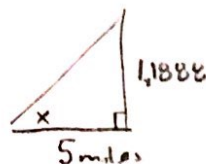
4. A person starts out 17 miles from the base of a tall mountain, and looks up at a  $4^\circ$  angle of elevation to the top of the mountain. When they move 12 miles closer to the base of the mountain, what will be their angle of elevation when they look to the top? Answer to the nearest degree.



$$\tan 4^\circ = \frac{h}{17}$$

$$17 \cdot \tan 4^\circ = h$$

$$h \approx 1.1888$$



$$\tan x = \frac{1.1888}{5}$$

$$\tan^{-1}\left(\frac{1.1888}{5}\right) = x$$

$$x \approx 13.3743$$

The person's angle of elevation when they look to the top is about  $13^\circ$ .