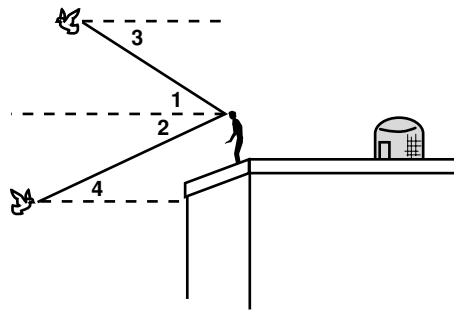


LESSON

Practice B

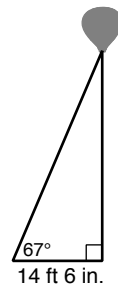
8-4 Angles of Elevation and Depression

Marco breeds and trains homing pigeons on the roof of his building. Classify each angle as an angle of elevation or an angle of depression.



1. $\angle 1$ _____
2. $\angle 2$ _____
3. $\angle 3$ _____
4. $\angle 4$ _____

To attract customers to his car dealership, Frank tethers a large red balloon to the ground. In Exercises 5–7, give answers in feet and inches to the nearest inch. (*Note: Assume the cord that attaches to the balloon makes a straight segment.*)



5. The sun is directly overhead. The shadow of the balloon falls 14 feet 6 inches from the tether. Frank sights an angle of elevation of 67° . Find the height of the balloon.

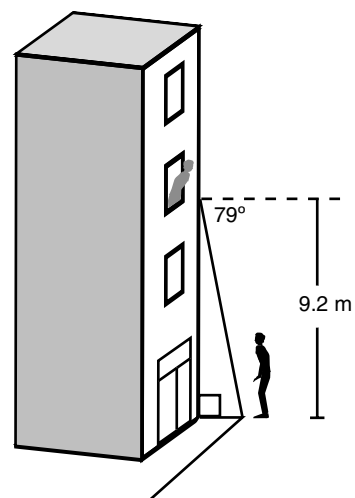
6. Find the length of the cord that tethers the balloon.

7. The wind picks up and the angle of elevation changes to 59° . Find the height of the balloon.

Lindsey shouts down to Pete from her third-story window.

8. Lindsey is 9.2 meters up, and the angle of depression from Lindsey to Pete is 79° . Find the distance from Pete to the base of the building to the nearest tenth of a meter.

9. To see Lindsey better, Pete walks out into the street so he is 4.3 meters from the base of the building. Find the angle of depression from Lindsey to Pete to the nearest degree.



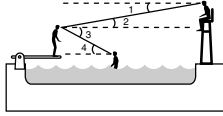
10. Mr. Shea lives in Lindsey's building. While Pete is still out in the street, Mr. Shea leans out his window to tell Lindsey and Pete to stop all the shouting. The angle of elevation from Pete to Mr. Shea is 72° . Tell whether Mr. Shea lives above or below Lindsey.

LESSON
8-4 Angles of Elevation and Depression

In Exercises 1 and 2, fill in the blanks to complete the definitions.

- An angle of elevation is the angle formed by a horizontal line and a line of sight to a point above the line.
- An angle of depression is the angle formed by a horizontal line and a line of sight to a point below the line.

Ben is on the diving board at the neighborhood pool. Jenna is in the pool, and a lifeguard sits at her station on the opposite end of the pool. Classify each angle as an angle of elevation or an angle of depression.

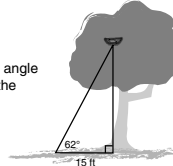


- $\angle 1$ angle of depression
- $\angle 2$ angle of elevation
- $\angle 3$ angle of depression
- $\angle 4$ angle of elevation

Lisa sees a bird's nest high in a tree. She decides to use trigonometry to estimate how high the nest is.

- Lisa walks 15 feet from the base of the tree. She measures an angle of elevation from the ground to the nest of 62° . Find how high the nest is above the ground, to the nearest foot.

28 feet



- Lisa spots the mother bird on a branch above the nest. She measures an angle of elevation to the bird of 67° . Find how high the mother bird is above the ground, to the nearest foot.

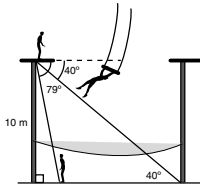
35 feet

Zelda, a trapeze artist, stands on a 10-meter-high platform.

- Zelda measures a 40° angle of depression to the base of the other platform. Find the distance between the bases of the platforms to the nearest tenth of a meter.
- Zelda's partner, Zev, is on the ground doing a safety check on the net. Zelda measures a 79° angle of depression to Zev. Find the distance to the nearest tenth of a meter from Zev to the base of Zelda's platform.

11.9 meters

1.9 meters



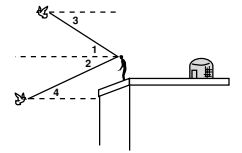
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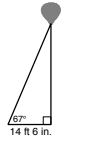
LESSON
8-4 Angles of Elevation and Depression

Marco breeds and trains homing pigeons on the roof of his building. Classify each angle as an angle of elevation or an angle of depression.



- $\angle 1$ angle of elevation
- $\angle 2$ angle of depression
- $\angle 3$ angle of depression
- $\angle 4$ angle of elevation

To attract customers to his car dealership, Frank tethers a large red balloon to the ground. In Exercises 5–7, give answers in feet and inches to the nearest inch. (Note: Assume the cord that attaches to the balloon makes a straight segment.)



- The sun is directly overhead. The shadow of the balloon falls 14 feet 6 inches from the tether. Frank sights an angle of elevation of 67° . Find the height of the balloon.

34 ft 2 in.

- Find the length of the cord that tethers the balloon.

37 ft 1 in.

- The wind picks up and the angle of elevation changes to 59° . Find the height of the balloon.

31 ft 10 in.

Lindsey shouts down to Pete from her third-story window.

- Lindsey is 9.2 meters up, and the angle of depression from Lindsey to Pete is 79° . Find the distance from Pete to the base of the building to the nearest tenth of a meter.

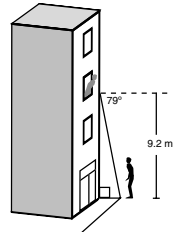
1.8 m

- To see Lindsey better, Pete walks out into the street so he is 4.3 meters from the base of the building. Find the angle of depression from Lindsey to Pete to the nearest degree.

65°

- Mr. Shea lives in Lindsey's building. While Pete is still out in the street, Mr. Shea leans out his window to tell Lindsey and Pete to stop all the shouting. The angle of elevation from Pete to Mr. Shea is 72° . Tell whether Mr. Shea lives above or below Lindsey.

Mr. Shea lives above Lindsey.



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LESSON
8-4 Angles of Elevation and Depression

Light moves through air at a constant speed. Laser range finders use this fact to gauge distance. The range finder shoots laser light at a distant object and records the time it takes for the reflection of the light to return. One half the time divided by the speed of light gives the distance to the object. If the angle of elevation or depression is also known, the vertical and horizontal distances can be found. In Exercises 1–3, give answers in feet and inches to the nearest inch.

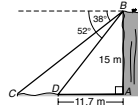
- A surveyor sights the top of a building with a handheld range finder. The top of the building is 148 feet 2 inches away. The angle of elevation is 56° . Find the distance from the surveyor to the building.
- The angle of depression to the bottom of the building is 4° . Find the height of the surveyor.
- Find the height of the building.

82 ft 10 in.

5 ft 10 in.

128 ft 8 in.

Lamar is on top of a 15-meter cliff. He knows that it is 11.7 meters from the bottom of the cliff to the near bank of a river and that the angle of depression is 52° . The angle of depression to the far bank is 38° . Lamar's calculator does not have trigonometric function keys.



- Describe how Lamar can find the width of the river. (Hint: What is special about the angles of depression?)

Possible answer: $m\angle C = 38^\circ$ and $m\angle ADB = 52^\circ$. These angles are complementary. So $\triangle ABD \sim \triangle ACB$. Lamar can use similarity ratios to find the distance AC : $\frac{AC}{AB} = \frac{AB}{AD}$ or $AC = \frac{AB^2}{AD}$. Subtracting AD from AC leaves CD , the width of the river.

- Find the width of the river to the nearest tenth of a meter.

7.5 m

Charlie is late for the hot-air balloon rally. He stops his car 65 meters from a hot-air balloon already taking flight.

- While Charlie watches the balloon ascend, he tilts his eyes up by 28° until he is watching at an angle of elevation of 66° . Find the vertical distance to the nearest tenth of a meter that the balloon ascended while Charlie watched.

95.2 m

- Charlie watched the balloon ascend for 2 minutes in Exercise 6. The balloon continues to rise at that same rate, but it is now also caught by a 17.7 km/h horizontal breeze coming from directly behind Charlie. Find the balloon's angle of ascent to the nearest degree and speed to the nearest tenth of a km/h.

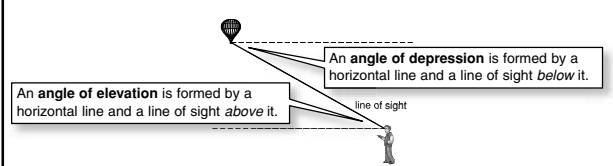
9° or $N 81^\circ E$; 17.9 km/h

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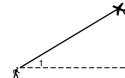
Holt Geometry

LESSON
8-4 Angles of Elevation and Depression



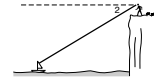
Classify each angle as an angle of elevation or an angle of depression.

- $\angle 1$



elevation

- $\angle 2$



depression

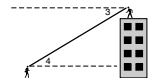
Use the figure for Exercises 3 and 4. Classify each angle as an angle of elevation or an angle of depression.

- $\angle 3$

depression

- $\angle 4$

elevation



Use the figure for Exercises 5–8. Classify each angle as an angle of elevation or an angle of depression.

- $\angle 1$

elevation

- $\angle 2$

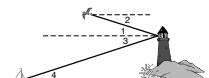
depression

- $\angle 3$

depression

- $\angle 4$

elevation



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