

Lesson 8-5

Angles of Elevation and Depression

Lesson Objectives

- Solve problems involving angles of elevation and depression
- Use angles of elevation and depression to find the distance between two objects

CCSS Addressed: G.SRT.8

Dec 24-11:25 AM

Angle of Elevation

from the boat to the top of the lighthouse

Angle of Elevation: the angle formed by a horizontal line and a person's line of sight when they look up.

Mar 2-8:33 PM

Angle of Depression

from the top of the lighthouse to the boat

Angle of Depression: the angle formed by a horizontal line and a person's line of sight when they look down.

Mar 2-8:33 PM

What do you notice about the angle of depression & angle of elevation?

congruent

Mar 2-8:33 PM

A monkey hanging in a tree 68 ft tall spots a banana at a 23° angle of depression. What is the direct distance from the monkey to the banana?

$\sin(23) = \frac{68}{x}$
 $x = \frac{68}{\sin(23)}$
hyp
opp

Mar 2-8:59 PM

A forest ranger in a 90-foot observation tower sees a fire. The angle of depression to the fire is 7°. What is the horizontal distance between the tower and the fire?

$\tan(7) = \frac{90}{x}$
 $x = \frac{90}{\tan(7)} \approx 733.0 \text{ ft}$
adj

Feb 11-9:29 AM

A 20-foot ladder leans against a wall so that the base of the ladder is 8 feet from the base of the building. What angle does the ladder make with the ground?

$\cos(x) = \frac{8}{20}$
 $x = \cos^{-1}\left(\frac{8}{20}\right)$
 $x \approx 66.4^\circ$

May 1-8:22 PM

A surveyor is 130 feet from a tower. The tower is 86 feet high. The surveyor's instrument is 4.75 feet above the ground. Find the angle of elevation.

$\tan(x) = \frac{81.25}{130}$
 $x = \tan^{-1}\left(\frac{81.25}{130}\right)$

Mar 3-9:25 AM

The 4-foot ground crew for a hot-air balloon can see the balloon in the sky at an angle of elevation of 37° . If the hot-air balloon is 930 feet above the ground, how far would the ground crew have to walk to be directly under the hot-air balloon?

$\tan(37) = \frac{926}{x}$
 $x = \frac{926}{\tan(37)}$

Feb 11-9:25 AM

YOUR TURN!

1. At a point on the ground 50 feet from the foot of a tree, the angle of elevation to the top of the tree is 53° . Find the height of the tree.

$\tan(53) = \frac{x}{50}$
 $x \approx 66.4 \text{ ft}$

May 1-8:29 PM

2. From the top of a lighthouse 210 feet high, the angle of depression to a boat is 27° . Find the distance from the boat to the foot of the lighthouse. The lighthouse was built at sea level.

$\tan(27) = \frac{210}{x}$
 $x \approx 412.1 \text{ ft}$

Nov 19-11:30 AM

3. A golfer is standing on a tee with the green in the valley below. If the tee is 43 yards higher than the green and the angle of depression from the tee to the hole is 14° , find the distance from the tee to the hole.

$\sin(14) = \frac{43}{x}$
 $x \approx 177.7 \text{ ft}$

Nov 19-11:30 AM

4. A 50-meter vertical tower is braced with a cable secured at the top of the tower and tied 20 meters from the base. What angle does the cable form with the vertical tower?

$$\tan(x) = \frac{20}{50}$$

$$x \approx 22^\circ$$



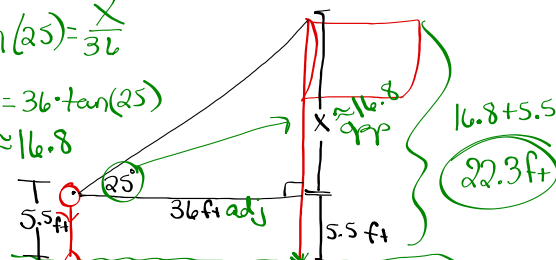
Nov 19-11:31 AM

5. The town of Belmont restricts the height of flagpoles to 25 feet on any property. Lindsay wants to determine whether her school is in compliance with the regulation. Her eye level is 5.5 feet from the ground and she stands 36 feet from the flagpole. If the angle of elevation is about 25° , what is the height of the flagpole to the nearest tenth?

$$\tan(25) = \frac{x}{36}$$

$$x = 36 \cdot \tan(25)$$

$$x \approx 16.8$$



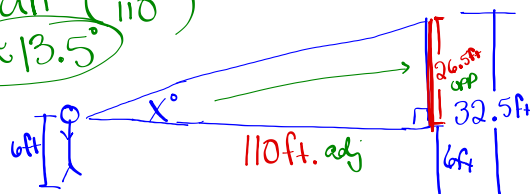
Nov 19-11:31 AM

6. A student can see a water tower from the closest point of the soccer field at San Lobos High School. The edge of the soccer field is about 110 feet from the water tower and the water tower stands at a height of 32.5 feet. What is the angle of elevation if the eye level of the student viewing the tower from the edge of the soccer field is 6 feet above the ground? Round to the nearest tenth.

$$\tan(x) = \frac{26.5}{110}$$

$$x = \tan^{-1}\left(\frac{26.5}{110}\right)$$

$$x \approx 13.5^\circ$$



Nov 19-11:31 AM