

TOC ← **8.5 Angles of Elevation and Depression**

EQ: Can you solve problems using angles of elevation and depression?

How are you doing? Write answer next to Essential Question

1. I don't understand the material
2. I understand a little.
3. I understand this material.
4. I could teach this to someone



Summary: At least 3 sentences...

8.5 Examples Geo done

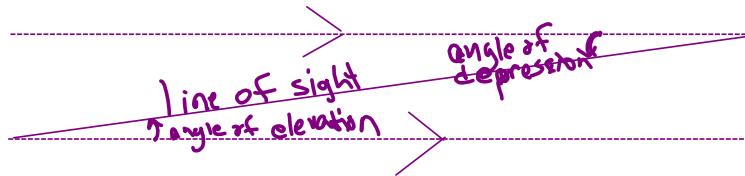
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KEY TERMS

Angle of Elevation - An angle formed by a **horizontal** line and an observer's line of sight to an object *above* the horizontal line.

Angle of Depression - An angle formed by a **horizontal** line and an observer's line of sight to an object *below* the horizontal line.

Angles of elevation and depression are ALWAYS formed with a horizontal line and never a vertical line.



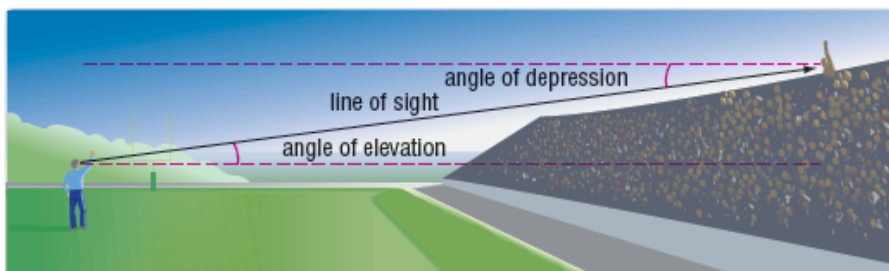
Horizontal lines are parallel, so the angle of elevation and angle of depression in the diagram are congruent by the Alternate Interior Angles Theorem.

Two Angles of Elevation or Depression Angles of elevation or depression to two different objects can be used to estimate the distance between those objects. Similarly, the angles from two different positions of observation to the same object can be used to estimate the object's height.

Study Tip

Indirect Measurement

When using the angles of depression to two different objects to calculate the distance between them, it is important to remember that the two objects must lie in the same horizontal plane. In other words, one object cannot be higher or lower than the other.



8.5 Examples Geo done

1. At the circus, a person in the audience at ground level watches the high-wire routine. A 5-foot-6-inch tall acrobat is standing on a platform that is 25 feet off the ground. How far is the audience member from the base of the platform, if the angle of elevation from the audience member's line of sight to the top of the acrobat's head is 27° ?

2. Maria is at the top of a cliff and sees a seal in the water. If the cliff is 40 feet above the water and the angle of depression is 52° , what is the horizontal distance from the seal to the cliff, to the nearest foot?

3. Vernon is on the top deck of a cruise ship and observes two dolphins following each other directly away from the ship in a straight line. Vernon's position is 154 meters above sea level, and the angles of depression to the two dolphins are 35° and 36° . Find the distance between the two dolphins to the nearest meter?

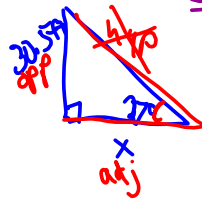
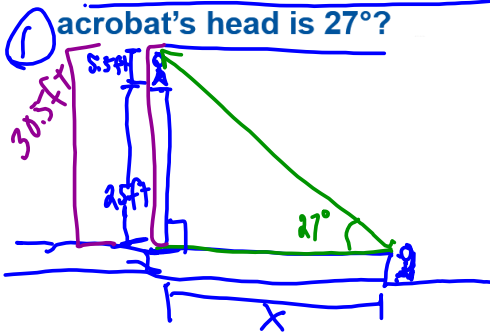
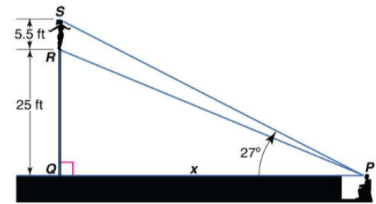
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8.5 Examples Geo done

Example 1 Angle of Elevation

CIRCUS ACTS At the circus, a person in the audience at ground level watches the high-wire routine. A 5-foot-6-inch tall acrobat is standing on a platform that is 25 feet off the ground. How far is the audience member from the base of the platform, if the angle of elevation from the audience member's line of sight to the top of the acrobat's head is 27° ?

5 ft 6 in
6.5 ft



SOH CAH TOA

$$\tan 27^\circ = \frac{30.5}{x}$$

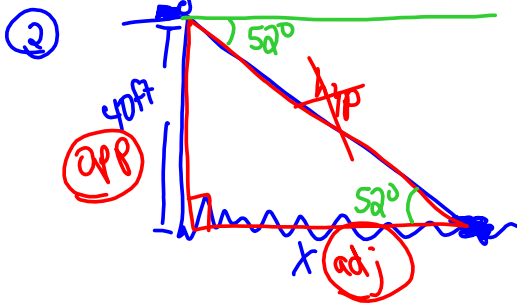
$$x \tan 27^\circ = \frac{30.5}{\tan 27^\circ}$$

$$x = \frac{30.5}{\tan 27^\circ} \approx \underline{\underline{60 \text{ ft}}}$$

8.5 Examples Geo done

Example 2 Angle of Depression

DISTANCE Maria is at the top of a cliff and sees a seal in the water. If the cliff is 40 feet above the water and the angle of depression is 52° , what is the horizontal distance from the seal to the cliff, to the nearest foot?

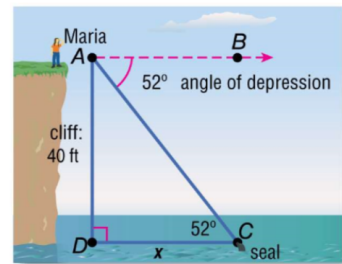


SOH CAH TOA

$$\tan 52^\circ = \frac{40}{x}$$

$$x \frac{\tan 52^\circ}{\tan 52^\circ} = \frac{40}{\tan 52^\circ}$$

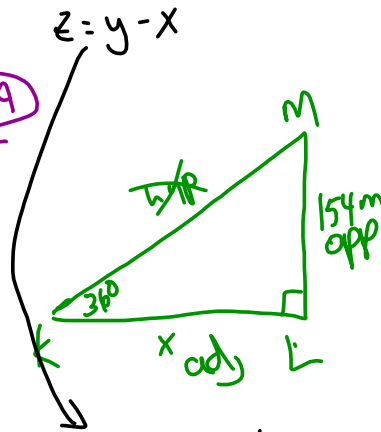
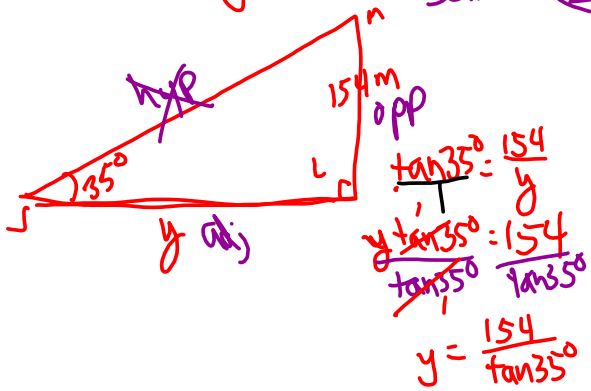
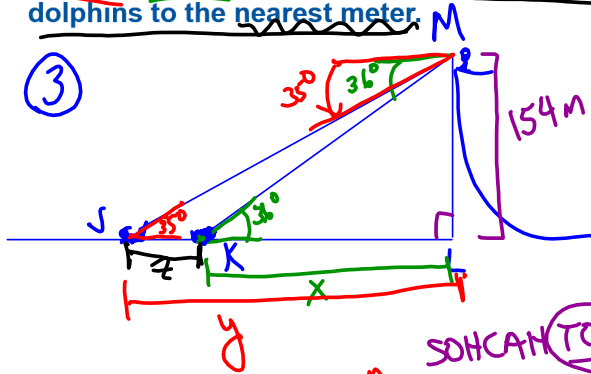
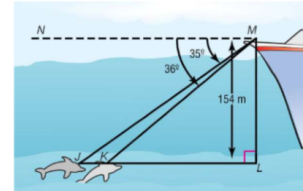
$$x = \frac{40}{\tan 52^\circ} \approx \underline{31 \text{ ft}}$$



8.5 Examples Geo done

Example 3 Use Two Angles of Elevation or Depression

DISTANCE Vernon is on the top deck of a cruise ship and observes two dolphins following each other directly away from the ship in a straight line. Vernon's position is 154 meters above sea level, and the angles of depression to the two dolphins are 35° and 36° . Find the distance between the two dolphins to the nearest meter.



$$\tan 36^\circ = \frac{154}{x}$$

$$\frac{x \tan 36^\circ}{\cancel{\tan 36^\circ}} = \frac{154}{\cancel{\tan 36^\circ}}$$

$$x = \frac{154}{\tan 36^\circ}$$

$z = y - x$

$$z = \frac{154}{\tan 35^\circ} - \frac{154}{\tan 36^\circ}$$

$$z \approx \underline{\underline{8 \text{ meters}}}$$

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Write 3 Questions for this section on the left page

1. How are you doing?

Write answer next to the Summary

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- 2: I understand a little.
- 3: I understand this material.
- 4: I could teach this to someone.

Summary: At least 3 sentences...

Write this now.