

Problem Solving with the Pythagorean Theorem and Trigonometry (5.9.3)

June 1st, 2020

Recall:

- 1) Given two side lengths of a right triangle, the third can be found using the Pythagorean Theorem.
- 2) Given two side lengths of a right triangle, the acute angle measures can be found using an inverse trigonometric function.
- 3) Given one side length and one acute angle measure of a right triangle, the missing side lengths can be found using a trigonometric function.

Def: An angle of elevation is the angle going up from a horizontal line to the line of sight of an object (often the acute angle coming up from the ground).

An angle of depression is the angle going down from a horizontal line to the line of sight of an object.

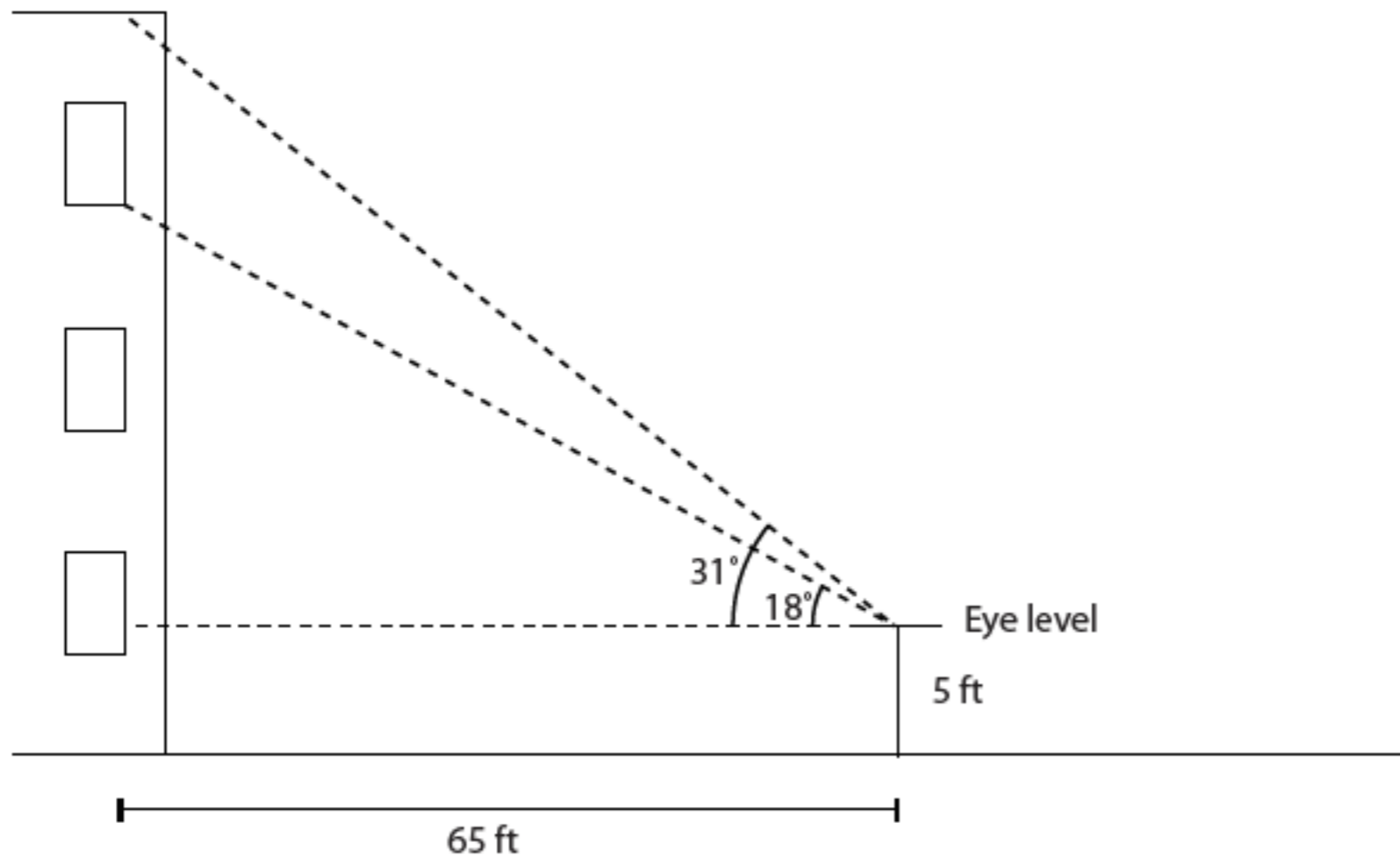
Ex. 1: Ashley's kite gets stuck in a tree and she must find out how high it is off the ground in order to get a stick that can retrieve it. Ashley is 5 feet tall, and when she is standing 23 feet from the base of the tree and looks up at the kite, the angle of elevation is 55° . How many feet above the ground is the kite?

Ex. 2: Gus is looking out the window of a building that is 85 feet off the ground and is amazed to see Tony Stark standing on the ground, approximately 50 feet from the base of the building. What is the angle of depression from Gus' line of sight to Tony Stark?

Problem-Based Task 5.9.3: Fighting Flames from a Distance

You are a firefighter on call at a burning building. Your colleagues are on the roof preparing to help put out the blaze by entering the building through the third-floor window. They need you to find the distance from the roof to the windowsill and then determine if the firefighters on the ground are close enough to the building for the water to reach the flames through the window on the third floor.

You observe from below. The angle of elevation to the windowsill is 18° and the angle of elevation to the top of the building is 31° . You are standing 65 feet away from the building and your eyes are 5 feet above the ground, as shown in the diagram. You hold the hose at eye level in order to take aim at the third-floor window.



To the nearest foot, what is the distance from the roof to the windowsill that the firefighters will need to descend by rope to enter the building? If the hoses can spray water at a distance of 100 feet, are the firefighters standing close enough to the building to put the flames out at the third-floor window?