

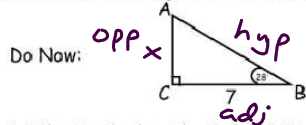
Geometry CC – Mr. Valentino

Unit 7 Lesson 7: Angle of Elevation and Depression

Name: _____

Date: _____ Period: _____

Aim: What is the angle of elevation and angle of depression?



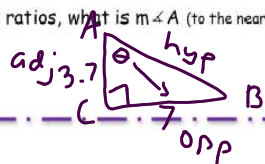
~~SOH~~ ~~CAH~~ TOA

$$\tan 28 = \frac{x}{7}$$

$$x = 7 \tan 28 = \mathbf{3.7}$$

1. What is the length of side AC? (to the nearest tenth)

2. Using trig ratios, what is $m\angle A$ (to the nearest degree)?



~~SOH~~ ~~CAH~~ TOA

$$\tan \theta = \frac{7}{3.7} = \mathbf{62^\circ}$$

Angle of Elevation



Angle of Depression



1. Matt stands at the tip of the shadow of the flagpole which is 34 feet away. Find, to the nearest foot, the height of a flagpole when the angle of elevation of the sun is 38° .

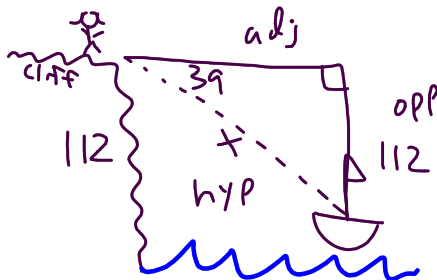


~~SOH~~ ~~CAH~~ TOA

$$\tan 38 = \frac{x}{34}$$

$$x = 34 \tan 38 = \mathbf{27 \text{ ft}}$$

2. Amanda stands 112 feet above sea level at the top of a cliff. The angle of depression from the top of the cliff to a boat at sea is 39° . How far is Amanda from the boat? Round to the nearest foot.



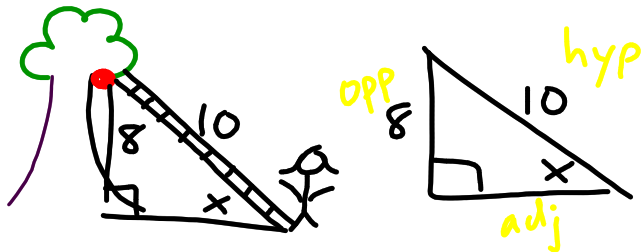
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$$\sin 39 = \frac{112}{x}$$

$$\frac{112}{\sin 39} = \frac{x \sin 39}{\sin 39}$$

$$\mathbf{178 \text{ ft} = x}$$

3. Sara is apple picking when she spots the perfect apple 8 feet from the ground. What angle of elevation should the ladder be placed at if she has a 10 foot ladder? (to the nearest degree)



SOH (CAH TOA)

$$\sin x = \frac{8}{10}$$

$$\sin^{-1}(8/10) = 53^\circ$$

4. Chris is flying a plane at an altitude of 20,000 ft. When he is 35,000 ft from the runway of JFK airport (measured along the ground), what angle of depression should Chris descend the plane at? (to the nearest tenth of a degree)

5. A dog, who is 8 meters from the base of a tree, spots a squirrel in the tree at an angle of elevation of 40° . What is the direct-line distance between the dog and the squirrel? (to the nearest tenth of a meter)

6. A great white shark swims 22 feet below sea level. If the shark is 67.7 feet from the sailboat, what is the angle of depression of the boat to the shark? (to the nearest tenth of a degree)

*****Challenge Problems*****

7. The angle of elevation of the top of a cliff from the point Q on the ground is 30° . On moving a distance of 20 m towards the foot of the cliff the angle of elevation increases to x° . If the height of the cliff is 17.3 m, then find x° to the nearest tenth of a degree.

8. From a plane flying due east at 265 m above sea level, the angles of depression of two ships sailing due east measure 35° and 25° . How far apart are the ships (to the nearest meter)?

Angle of Elevation and Depression Homework

1. A dog, who is 8 meters from the base of a tree, spots a squirrel in the tree at an angle of elevation of 40° . What is the direct-line distance between the dog and the squirrel? Round your answer to the nearest tenth.

2. A ship is on the surface of the water, and its radar detects a submarine at a distance of 238 feet, at an angle of depression of 23° . How deep underwater is the submarine? Round your answer to the nearest tenth.

3. Two observers on the ground are looking up at the top of the same tree from two different points on the horizontal ground. The first observer, who is 83 feet away from the base of the tree, looks up at an angle of elevation of 58° . The second observer is standing only 46 feet from the base of the tree. (Note: you may ignore the heights of the observers and assume their measurements are made directly from the ground.)

a) How tall is the tree, to the nearest foot?

b) At what angle of elevation must the second observer look up to see the top of the tree? (to the nearest tenth of a degree)

4. A person starts out 17 miles from the base of a tall mountain, and looks up at a 4° 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.