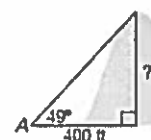


Advanced Algebra with Trigonometry
Section 13-1: Angles of Elevation & Depression

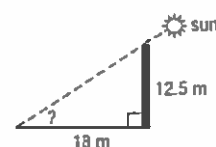
Name _____ # _____
Date _____ Class _____

Solve each problem given below. Round measures of lengths to the nearest whole number and angles to the nearest whole degree. Answers are provided. Show your process to earn credit.

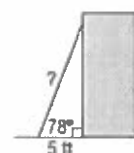
- 1.) The angle of elevation from point A to the top of a hill is 49° . If point A is 400 feet from the base of the hill, how high is the hill?



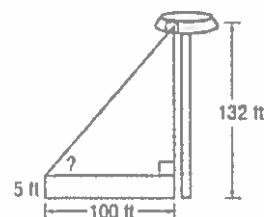
- 2.) Find the angle of elevation of the sun when a 12.5-meter-tall telephone pole casts a 18-meter-long shadow.



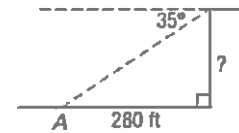
- 3.) A ladder leaning against a building makes an angle of 78° with the ground. The foot of the ladder is 5 feet from the building. How long is the ladder?



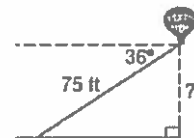
- 4.) A person whose eyes are 5 feet above the ground is standing on the runway of an airport 100 feet from the control tower. That person observes an air traffic controller at the window of the 132-foot tower. What is the angle of elevation?



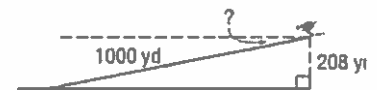
- 5.) The angle of depression from the top of a sheer cliff to point A on the ground is 35° . If point A is 280 feet from the base of the cliff, how tall is the cliff?



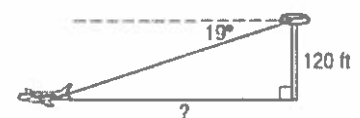
- 6.) The angle of depression from a balloon on a 75-foot string to a person on the ground is 36° . How high is the balloon?



- 7.) A ski run is 1000 yards long with a vertical drop of 208 yards. Find the angle of depression from the top of the ski run to the bottom.

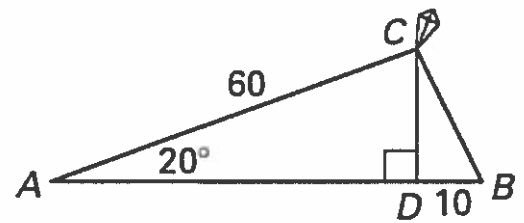


- 8.) From the top of a 120-foot-high tower, an air traffic controller observes an airplane on the runway at an angle of depression of 19° . How far from the base of the tower is the airplane?



1. Suppose θ is an acute angle, and $\sin \theta = \frac{a}{c}$.
- Use a right triangle containing an angle θ and two sides of lengths a and c to find the length of the third side in terms of a and c .
 - Express $\cos \theta$ and $\tan \theta$ in terms of a and c .

2. In the diagram at the right, a kite at point C is being held by a string from point A that is 60 ft long. The angle of elevation of the kite from point A is 20° . An observer at point B is 10 ft from the point on the ground D directly below the kite. What is the angle of elevation of the kite from point B ?



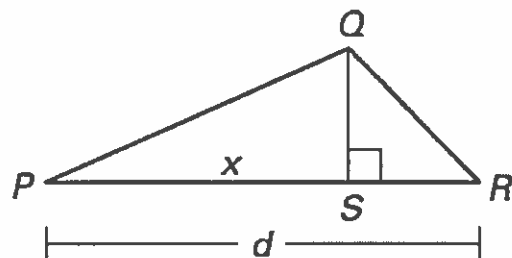
3. Let \overline{QS} be the altitude to \overline{PR} in triangle PQR , and let $d = PR$. Let $x = PS$.

a. Express SR in terms of x and d .

b. Write the expression $\frac{\tan R}{\tan P}$ in terms of x and d .

c. Use your answer to part (b) to solve for x in terms of d and the tangents of angles P and R .

d. Find QS in terms of d and the tangents of angles P and R .



A support cable from a radio tower makes an angle of 56° with the ground. If the cable is 250 feet long, how far above the ground does it meet the tower?

You are standing at the end of the shadow of a giant sequoia, 150 feet from its base. The angle of elevation to the sun is 63° . How tall is the tree?



A gangplank is a narrow ramp used for boarding or leaving a ship. The maximum safe angle of elevation for a gangplank is 20° . Suppose a gangplank is 10 feet long. What is the closest a ship can come to the dock for the gangplank to be used?

You are standing 75 meters from the base of Jin Mao Building in Shanghai, China. You estimate that the angle of elevation to the top of the building is 80° . What is the approximate height of the building? Suppose one of your friends is at the top of the building. What is the distance between you and your friend?

Homework Problems

1. A ski slope at a mountain has an angle of elevation of 25.2° . The vertical height of the slope is 1808 feet. How long is the ski slope?
2. To measure the width of a river you plant a stake on one side of the river, directly across from a boulder. You then walk 100 meters to the right of the stake and measure a 79° angle between the stake and the boulder. What is the width w of the river?
3. Mt. Fuji in Japan is approximately 12,400 feet high. Standing several miles away, you estimate the angle of elevation to the top of the mountain is 30° . Approximately how far away are you from the base of the mountain?

