Trig

Assignment: Draw a picture & show all work--round answers to the nearest tenth.

1. A tree 40 feet high casts a shadow 58 feet long. Find the measure of the angle of elevation of the sun.

2. 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.

3. A 50-meter vertical tower is braced with a cable secured at the top of the tower and tied 30 meters from the base. What angle does the cable form with the vertical tower?

4. A ladder leaning against a hose makes an angle of 60° with the ground. The foot of the ladder is 7 feet from the foot of the house. How long is the ladder?

5. 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.

6. A balloon on a 40-foot string makes an angle of 50° with the ground. How high above the ground is the balloon if the hand of the person holding the balloon is 6 feet above the ground?

7. After flying at an altitude of 9 kilometers, an airplane starts to descend when its ground distance from the landing field is 175 kilometers. What is the angle of depression for this portion of the flight?

8. A ski slope is 550 yards long with a vertical drop of 130 yards. Find the angle of depression of the slope.

Example 2

Find, to the nearest meter, the **line-of-sight distance,** AB, from the person to the top of the building referred to in Example 1.

Solution: $\sec 75° = \frac{AB}{5}$

$AB = 5 \sec 75°$ ← You can also use $\cos 75° = \frac{5}{AB}$.

$= 5(3.864)$ ← From the table or calculator

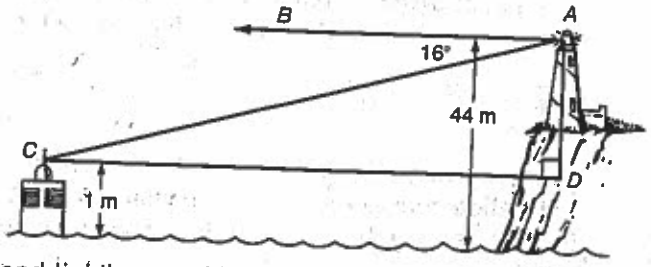
$= 19.32$, or about 19 meters

Written Exercises

In Exercises 1–21, find lengths to the nearest unit and angle measures to the nearest ten minutes.

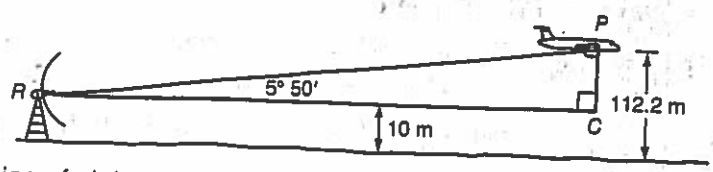
a

1. In the figure below, the angle of depression from the top of the lighthouse to the top of the buoy is 16°. Find the distance, DC, from the cliff to the buoy.



2. For the buoy and lighthouse of Exercise 1 find the line-of-sight distance, AC, from the top of the lighthouse to the buoy.

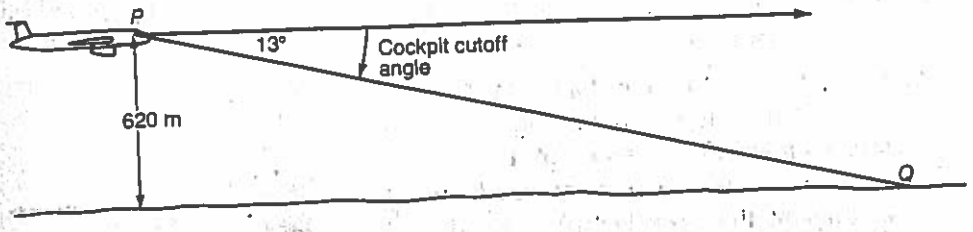
The angle of elevation from a radar antenna to an airplane is 5°50′. The antenna is 10 meters above the ground. The altitude of the plane is 112.2 m.



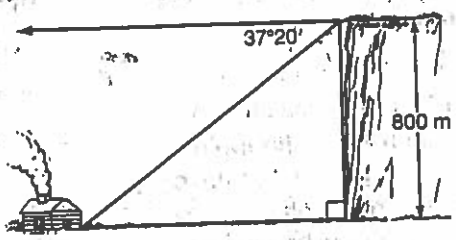
3. Find the line of sight distance, RP, from the antenna to the plane.

4. Find the distance, RC, from the antenna to C directly below the plane.

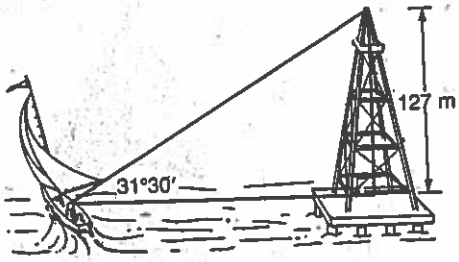
5. The angle of depression of the closest point on the ground that is visible over the nose of an airplane is called the **cockpit cutoff angle.** For a certain plane flying level at an altitude of 620 meters, the cockpit cutoff angle is 13°. Find the line-of-sight distance from the pilot to the closest visible point on the ground. Refer to the figure below.

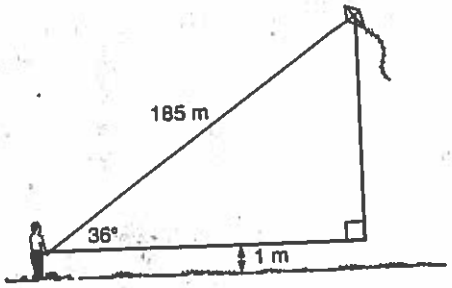


6. The angle of depression from the top of a cliff 800 meters high to the base of a log cabin is 37°20′. How far is the cabin from the foot of the cliff?



7. From the deck of a boat, the angle of elevation of the top of an offshore oil rig is found to be 31°30′. The top of the oil rig is 127 meters above the level of the platform on which it stands. Assume that the head of the person doing the sighting is level with the base of the oil rig. What is the distance between the base of the oil rig and the boat? See the figure at the left below.





8. A kite string is 185 meters long and makes an angle of 36° with the horizontal as shown in the figure at the right above. What is the altitude of the kite? (Assume that the string is straight and that it is held one meter above the ground.)