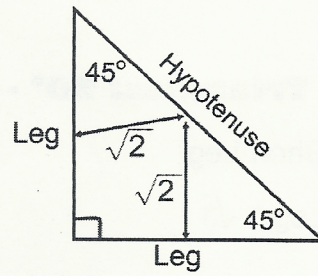


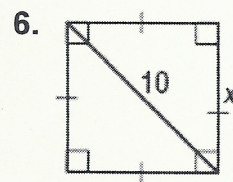
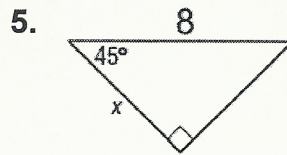
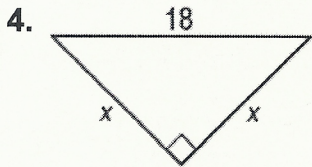
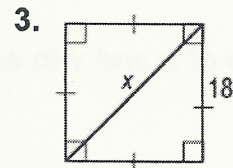
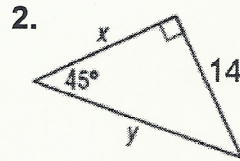
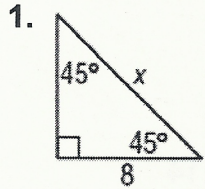
Special Right Triangles: 45° - 45° - 90°

Hypotenuse = Leg * $\sqrt{2}$ $\sqrt{2}$

Leg = $\frac{\text{hypotenuse}}{\sqrt{2}}$



Find the value of x in each triangle.

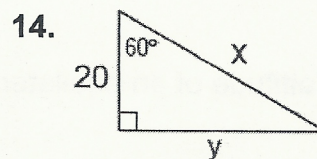
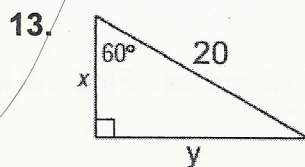
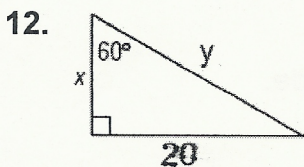
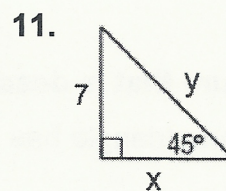
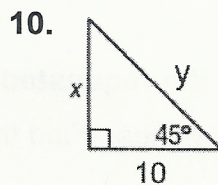
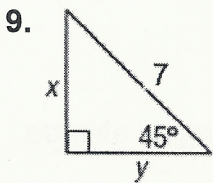


Sketch the figure that is described. Find the requested measure.

7. The perimeter of a square is 48 meters. Find the length of a diagonal.

8. The perimeter of a square is 20 cm. Find the length of a diagonal.

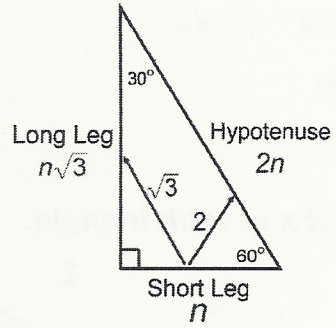
Find the value of x and y in each figure.



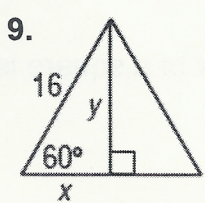
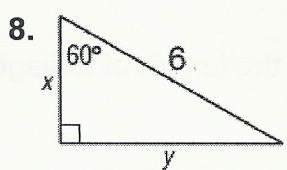
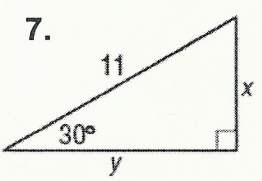
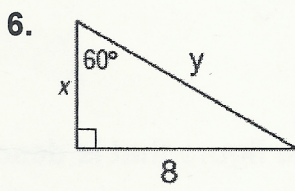
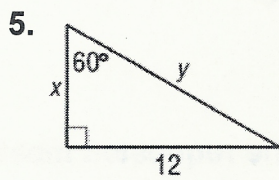
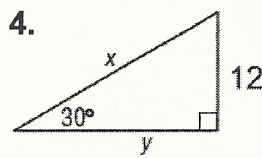
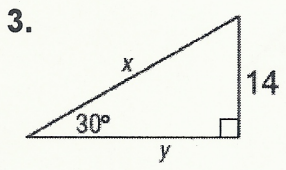
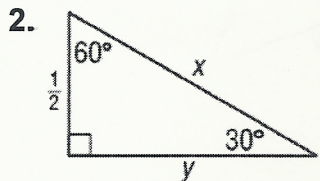
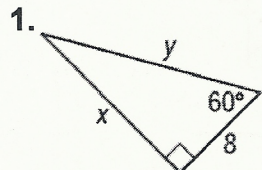
Special Right Triangles: 30° - 60° - 90°

Hypotenuse = 2 * Short Leg

Long Leg = Short Leg * $\sqrt{3}$



Find the value of x and y in each triangle.



Sketch the figure that is described. Then, find the requested measure.

10. An equilateral triangle has a side length of 10 inches. Find the length of the triangles altitude.

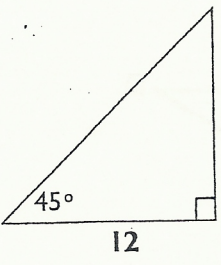
11. The altitude of an equilateral triangle is 18 inches. Find the length of a side.

Name _____

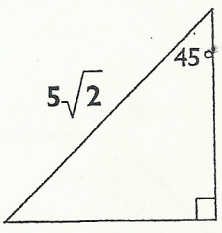
Pre-Quiz: Special Right Triangles

Find the values for each missing side

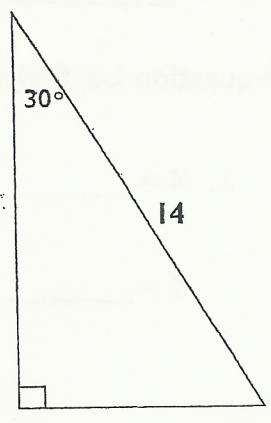
1.)



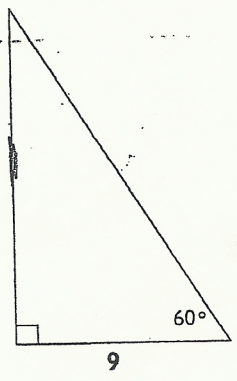
2.)



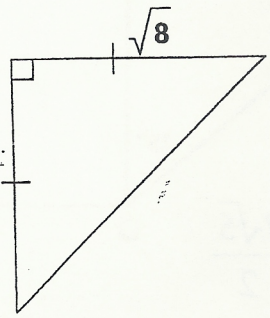
3.)



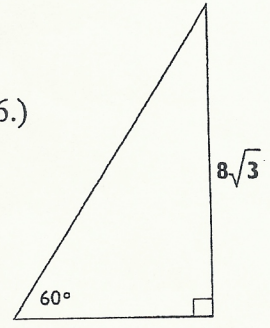
4.)



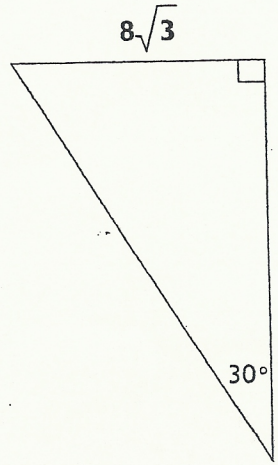
5.)



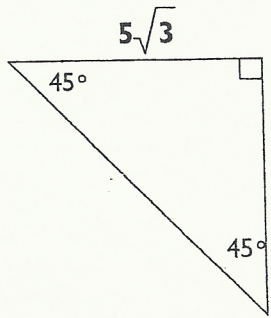
6.)



9.)



10.)



4

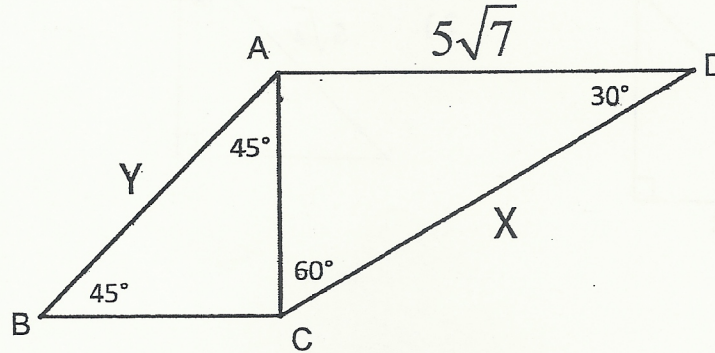
Name: _____

Date: _____

In question 1-3, find x and y.

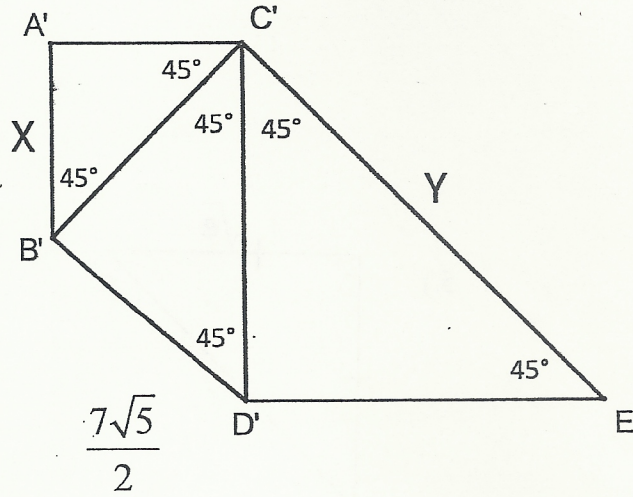
1. X = _____

Y = _____



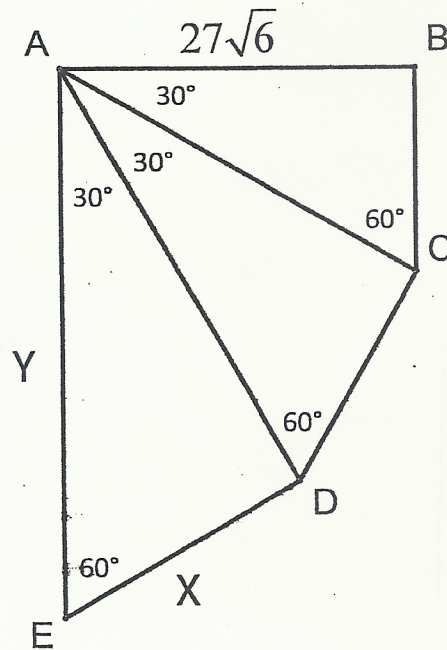
2. X = _____

Y = _____



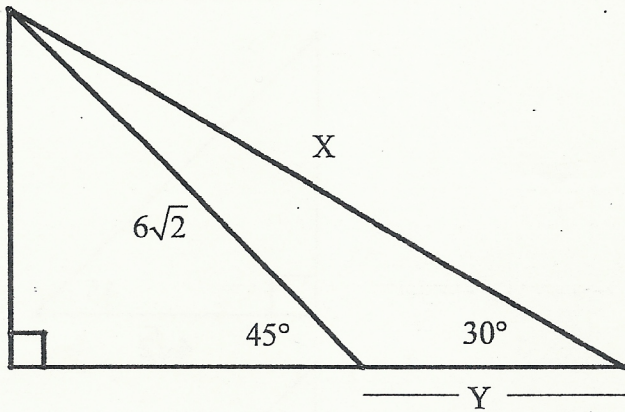
3. X = _____

Y = _____



In questions 4 & 5, find the missing sides with an exact value.

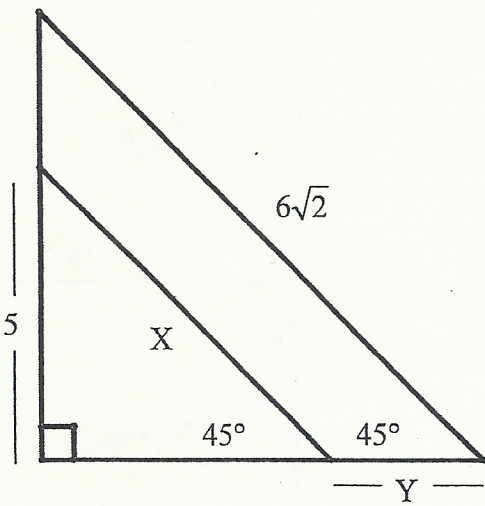
4.



$X =$ _____

$Y =$ _____

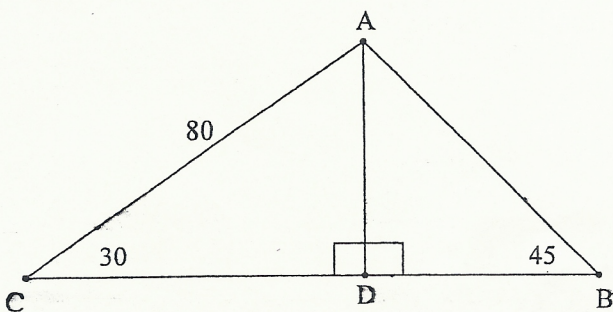
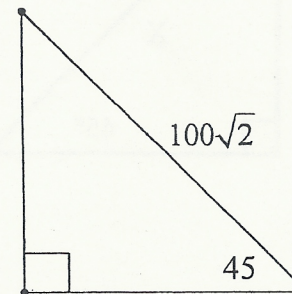
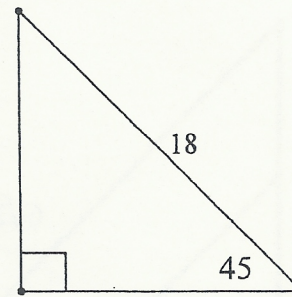
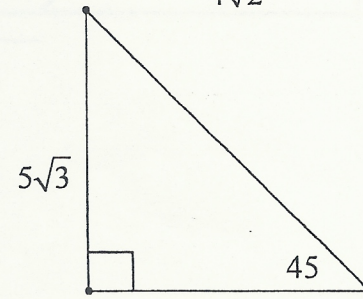
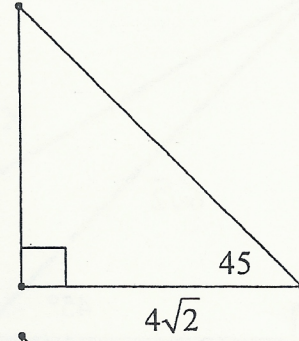
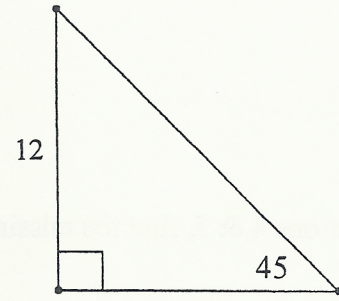
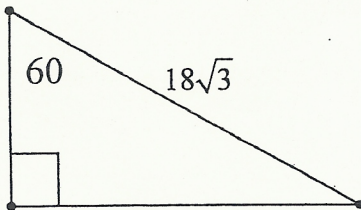
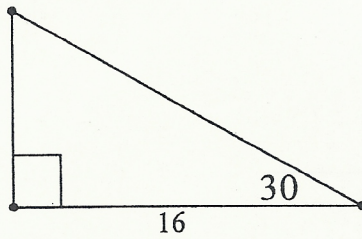
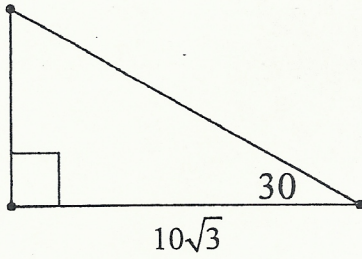
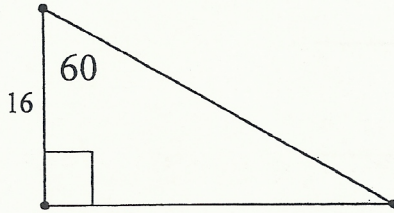
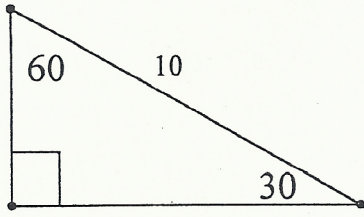
5.



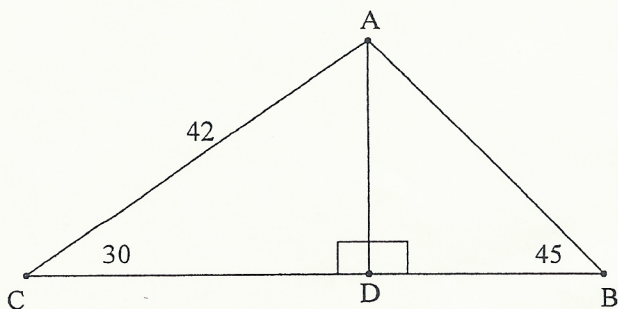
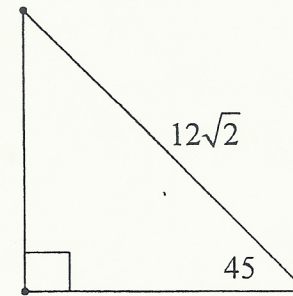
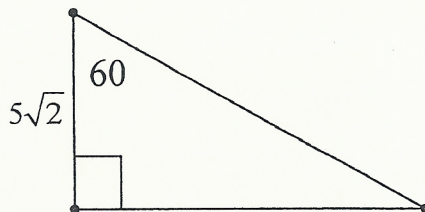
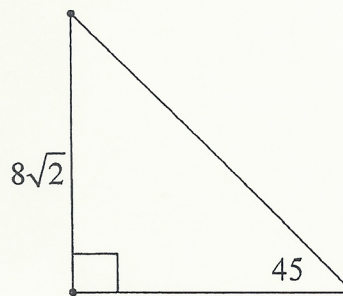
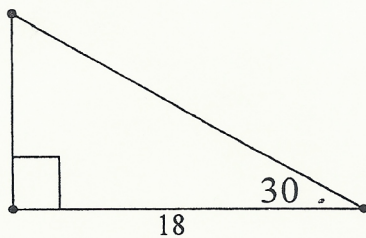
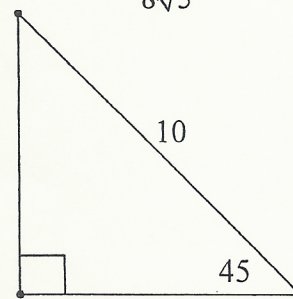
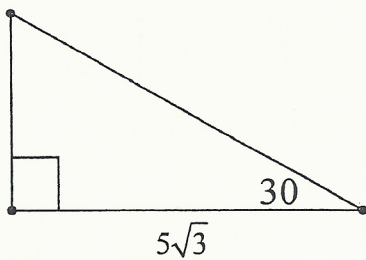
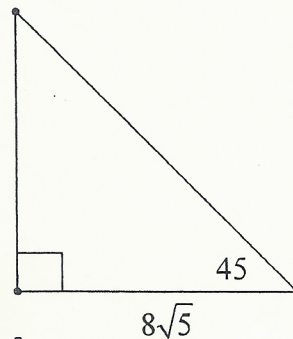
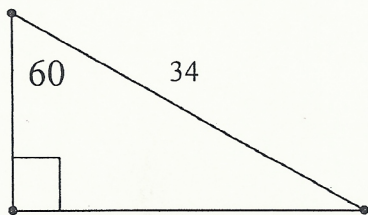
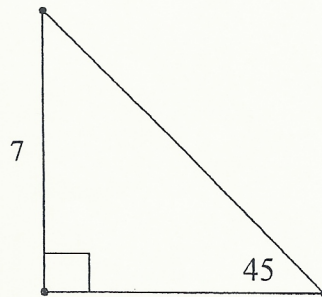
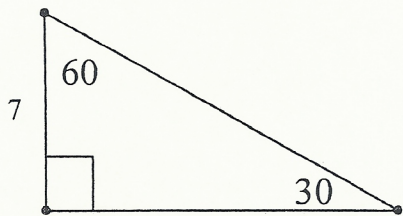
$X =$ _____

$Y =$ _____

(6)



- AD =
- CD =
- DB =
- AB =

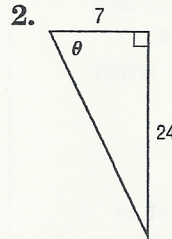
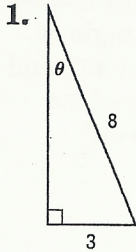


- AD =
- CD =
- DB =
- AB =

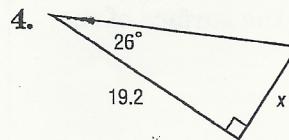
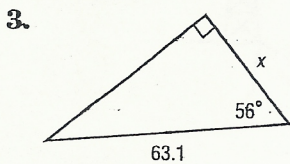
4-1 Practice

Right Triangle Trigonometry

Find the exact values of the six trigonometric functions of θ .

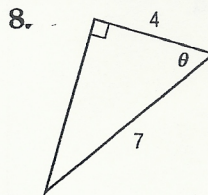
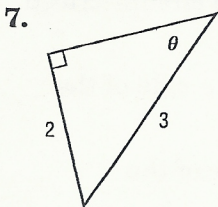


Find the value of x . Round to the nearest tenth, if necessary.

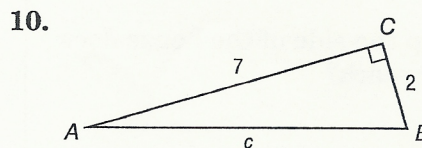
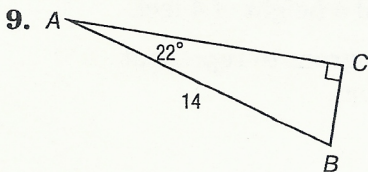


5. On a college campus, the library is 80 yards due east of the dormitory and the recreation center is due north of the library. The college is constructing a sidewalk from the dormitory to the recreation center. The sidewalk will be at a 56° angle with the current sidewalk between the dormitory and the library. To the nearest yard, how long will the new sidewalk be?
6. If $\cot A = 8$, find the exact values of the remaining trigonometric functions for the acute angle A .

Find the measure of angle θ . Round to the nearest degree, if necessary.



Solve each triangle. Round side measures to the nearest tenth and angle measures to the nearest degree.



11. **SWIMMING** The swimming pool at Perris Hill Plunge is 50 feet long and 25 feet wide. If the bottom of the pool is slanted so that the water depth is 3 feet at the shallow end and 15 feet at the deep end, what is the angle of elevation at the bottom of the pool?

Lesson 4-1

4-1 Word Problem Practice

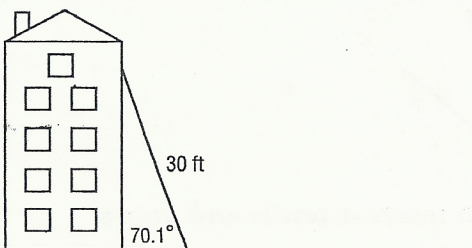
Right Triangle Trigonometry

1. MONUMENTS The Leaning Tower of Pisa in Italy is about 55.9 meters tall and is leaning so it is only about 55 meters above the ground. At what angle is the tower leaning?

2. SUBMARINES A submarine that is 250 meters below the surface of the ocean begins to ascend at an angle of 22° from vertical. How far will the submarine travel before it breaks the surface of the water?

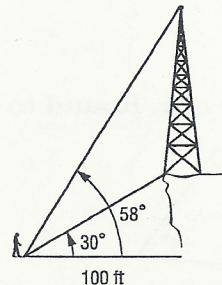
3. PHYSICS Suppose you are traveling in a car when a beam of light passes from the air to the windshield. The measure of the angle of incidence θ_i is 55° , and the measure of the angle of refraction θ_r is 35.25° . Use Snell's Law, $\frac{\sin \theta_i}{\sin \theta_r} = n$, to find the index of refraction n of the windshield to the nearest thousandth.

4. CONSTRUCTION A 30-foot ladder leaning against the side of a house makes a 70.1° angle with the ground.

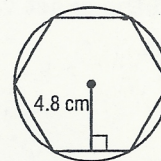


- How far up the side of the house does the ladder reach?
- What is the horizontal distance between the bottom of the ladder and the house?

5. OBSERVATION A person standing 100 feet from the bottom of a cliff notices a tower on top of the cliff. The angle of elevation to the top of the cliff is 30° , and the angle of elevation to the top of the tower is 58° . How tall is the tower?

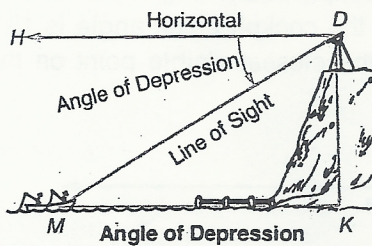
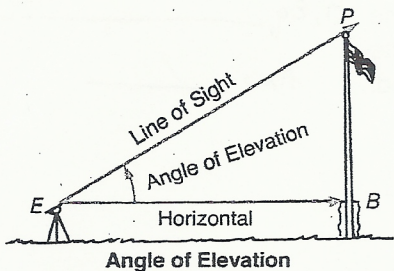


6. GEOMETRY The apothem of a regular polygon is the measure of the line segment from the center of the polygon to the midpoint of one of its sides. A circle is circumscribed about a regular hexagon with an apothem of 4.8 centimeters.



- Find the radius of the circumscribed circle.
 - What is the length of a side of the hexagon?
 - What is the perimeter of the hexagon?
- 7. SKATEBOARD** Suppose you want to construct a ramp for skateboarding with a 19° incline and a height of 4 feet.
- Draw a diagram to represent the situation.
 - Determine the length of the ramp.

The trigonometric functions are often used in calculating distances that are difficult to measure directly. In many of these instances, an angle is determined by a horizontal line and a line of sight.

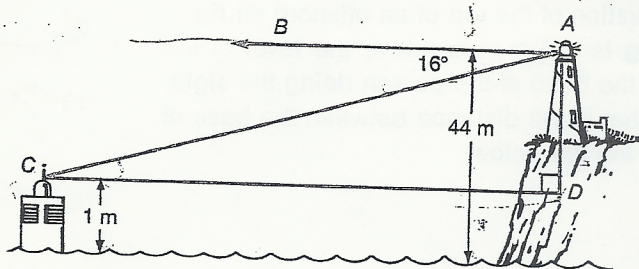


In the figure at the right above, lines HD and MK are parallel. Therefore, the measure of angle HDM , the **angle of depression**, equals the measure of angle KMD .

It is important to remember that the height of the person doing the sighting is a factor in determining the sides of the triangle used.

In Exercises 1-4, find lengths to the nearest unit and angle measures to the nearest ten minutes.

- 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.



1. eq _____

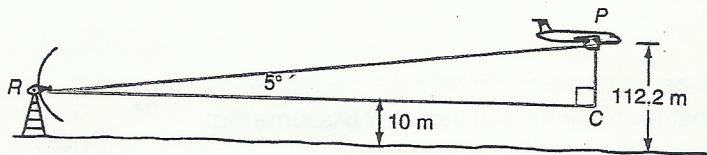
ANS _____

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

2. eq _____

ANS _____

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



3. eq _____

ans _____

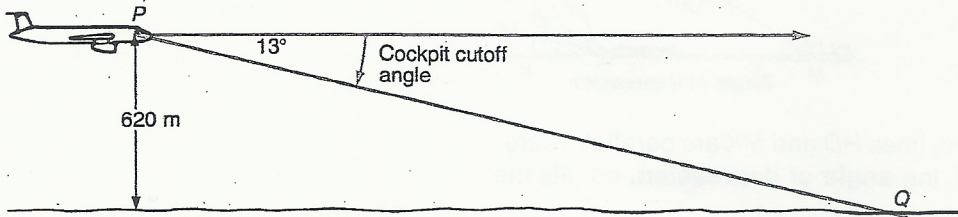
- Find the line of sight distance, RP , from the antenna to the plane.
- Find the distance, RC , from the antenna to C directly below the plane.

4. eq _____

ans _____

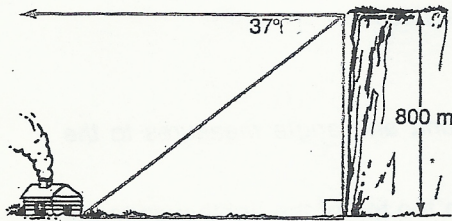
5. The angle of depression of the closest point on the ground that is visible over the nose of an airplane is called the **cockpit cutoff angle**. For a certain plane flying level at an altitude of 620 meters, the cockpit cutoff angle is 13° . Find the line-of-sight distance from the pilot to the closest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

5. Eq _____
ANS _____



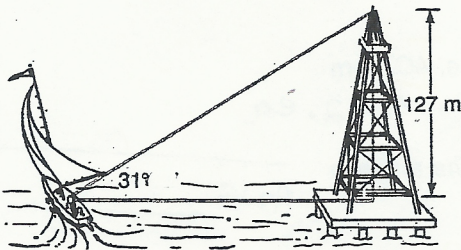
6. The angle of depression from the top of a cliff 800 meters high to the base of a log cabin is 37° . How far is the cabin from the foot of the cliff?

6. Eq _____
ANS _____



7. From the deck of a boat, the angle of elevation of the top of an offshore oil rig is found to be 31° . 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.

7. Eq _____
ANS _____



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.)

8. Eq _____
ANS _____

