STARTER 5.3

1) Find the values of the six trigonometric functions for angle θ in standard position if a point with coordinates **(6, - 5)** lies on its terminal side. Leave answers to simplest fraction or radical form.

2) Suppose θ is an angle in standard position whose terminal side lies in **Quadrant II**.

If $\csc \theta = \dfrac{\sqrt{85}}{9}$, find the values of the remaining five trigonometric functions for θ.
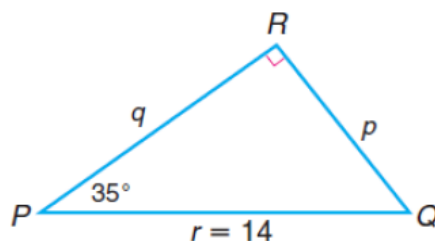
Leave answers to simplest fraction or radical form.

5.4: Applying Trigonometric Functions

Objective:

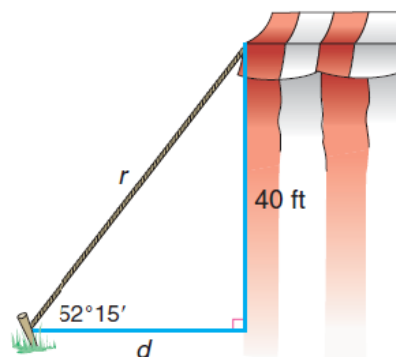* **Use trigonometry to find the measures of the sides or angles of right triangles.**

*Example* **1:** If $P = 35°$ and $r = 14$, find **q**.

Example **2:** The circus has arrived and the roustabouts must put up the main tent in a field near town. A tab is located on the side of the tent 40 feet above the ground. A rope is tied to the tent at this point and then the rope is placed around a stake on the ground. If the angle that the rope makes with the level ground is 50° 15',
(a) how long is the rope?
(b) what is the distance between the bottom of the tent and the stake?

***Example* 3:** A regular pentagon is inscribed in a circle with diameter 8.34 centimeters. The **apothem** of a regular polygon is the measure of a line segment from the center of the polygon to the midpoint of one of its sides. Find the apothem of the pentagon.
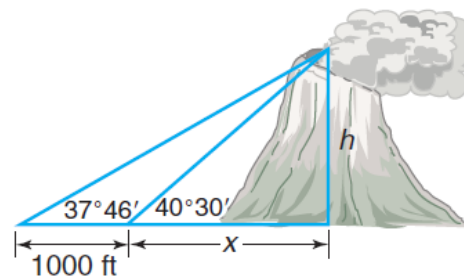
4.17 cm

a

α
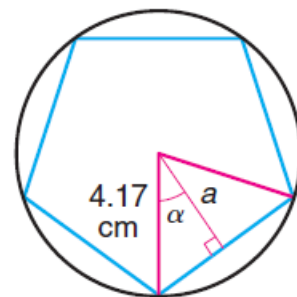
Angle of elevation – the angle between a horizontal line and the line of sight from an observer to an object at a higher level

Horizontal

Angle of Depression

Angle of Elevation

Horizontal

Angle of depression – the angle between a horizontal line and the line of sight from the observer to an object at a lower level
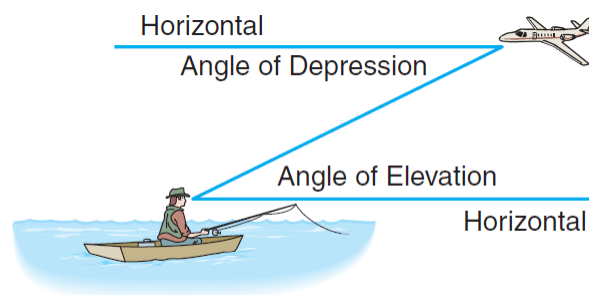
The angle of elevation and the angle of depression are **equal** in measure because they are **alternate interior angles.**

***Example* 4:** On May 18, 1980, Mount Saint Helens, a volcano in Washington, erupted with such force that the top of the mountain was blown off. To determine the new height at the summit of Mount Saint Helens, a surveyor measured the angle of elevation to the top of the volcano to be 37° 46'. The surveyor then moved 1,000 feet closer to the volcano and measured the angle of elevation to be 40° 30'. Determine the new height of Mount Saint Helens.

h

37° 46'   40° 30'

1000 ft x

Practice 5.4

1) If $B = 42°$ and $a = 12$, find c.
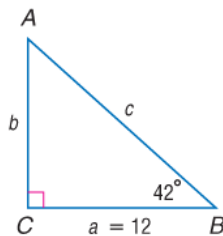
2) Each base angle of an isosceles triangle measures 55° 30'. Each of the congruent sides is 10 centimeters long.
    a) Find the altitude of the triangle.

    b) What is the length of the base?


    c) Find the area of the triangle.

3) A child holding on to the string of a kite gets tired and decides to put the string on the ground and secure it with a brick. The length of the string from the brick to the kite is 240 feet.
    a) If the angle formed by the string and the ground is 50.275°, how high is the kite?
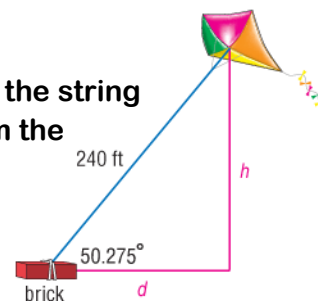
    b) What is the horizontal distance between the kite and the brick?

3) In Washington, D.C., the Washington Monument is situated between the Capitol and the Lincoln Memorial. A tourist standing at the Lincoln Memorial tilts her head at an angle of 7.491° in order to look up to the top of the Washington Monument. At the same time, another tourist standing at the Capitol steps tilts his head at a 5.463° to also look at the top of the Washington Monument.
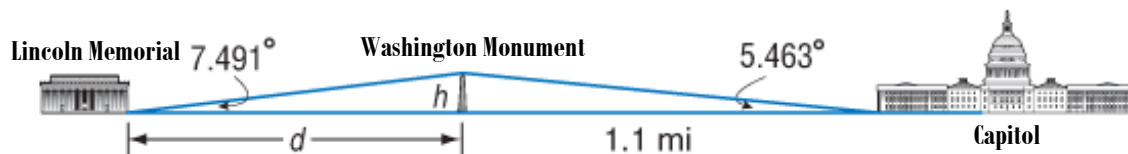
    a) About how high is the Washington Monument?

    b) What is the distance between the Lincoln Memorial and the Washington Monument?