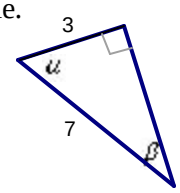
Chapter 10 - Trigonometry of Right Triangles
Trigonometric Ratios - Applications

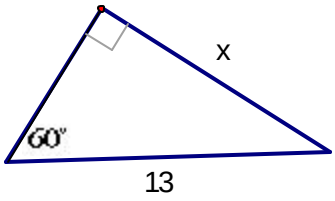
1. A giant redwood tree casts a shadow 532 ft long.
Find the height of the tree if the angle of elevation of the sun is 25.7°.

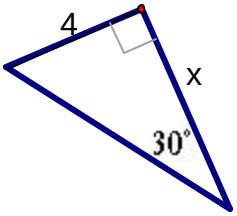
2. From a point on the ground 500 feet from the base of a building, it is observed that the angle of elevation to the top of the building is 24° and the angle of elevation to the top of a flagpole atop the building is 27°. Find the height of the building and the length of the flagpole.

3. Find $\sin a$, $\cos b$, $\tan a$, $\cot b$ if

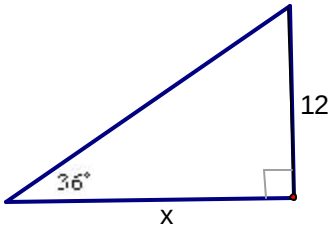


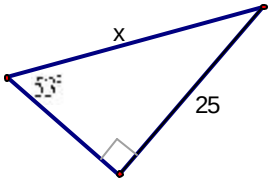
4. Find the side labeled *x*.





5. Find *x* correct to five decimal places.



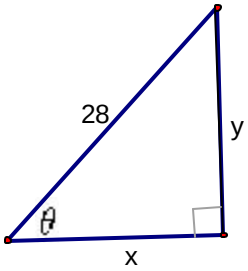


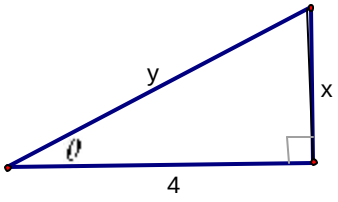
6. Sketch a right triangle that has one acute angle q , and find the other five trigonometric ratios of q .

a) $\sin q = \frac{3}{5}$

b) $\tan q = \sqrt{3}$

7. Express x and y in terms of trigonometric ratios of q .





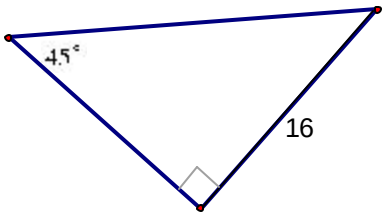
8. Evaluate the expressions:

a) $\sin 30^\circ + \cos 30^\circ$

b) $\sin 30^\circ \csc 30^\circ$

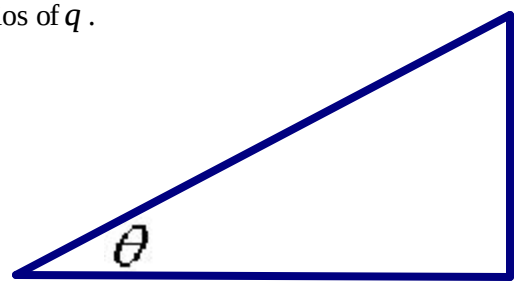
c) $\left(\sin 60^\circ\right)^2 + \left(\cos 60^\circ\right)^2$

9. Solve the right triangle.



10. Using a protractor, sketch a right triangle that has the acute angle 40°. Measure the sides carefully and use your results to estimate the six trigonometric ratios of 40°.

11. Use a ruler to carefully measure the sides of the triangle, and then use your measurements to estimate the six trigonometric ratios of q.



12. From the top of a 200-ft lighthouse, the angle of depression to a ship in the ocean is 23°. How far is the ship form the base of the lighthouse?

13. A 20-ft ladder leans against a building so that the angle between the ground and the ladder is 72°. How high does the ladder reach on the building?

14. A man is lying on the beach, flying a kite. He holds the end of the kite string at ground level, and estimates the angle of elevation of the kite to be 50°. If the string is 450 ft long, how high is the kite above the ground?

15. A water tower is located 325 ft from a building. From a window in the building, it is observed that the angle of elevation to the top of the tower is 39° and the angle of depression to the bottom of the tower is 25°. How tall is the tower? How high is the window?

16. An airplane flying at the rate of 350 feet per second begins to climb at an angle of 10°. What is the increase in altitude over the next 15 seconds if the speed remains the same?

17. At an altitude of 12,000 ft, a pilot sees two towns through angles of depression of 37° and 48°. To the nearest ten feet, how far apart are the towns?

18. To estimate the height of a mountain above a level plain, the angle of elevation to the top of the mountain is measured to be 32°. One thousand feet closer to the mountain along the plain, it is found that the angle of elevation is 35°. Estimate the height of the mountain.

19. When the moon is exactly half full, the earth, moon, and the sun form a right angle (moon at the right angle).At that time the angle formed by the sun, earth, and moon is measured to be 89.85°. If the distance from the earth to the moon is 240,000 mi, estimate the distance from the earth to the sun.

20. Find x correct to one decimal place.