

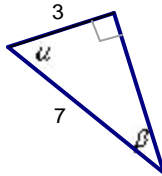
2.1, 2.3 & 2.4 Trigonometry of Right Triangles

Trigonometric Ratios - Applications

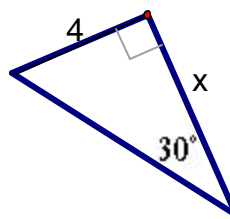
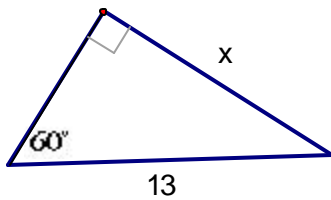
1. A giant redwood tree casts a shadow 532 ft long. Find the height of the tree if the angle of elevation of the sun is 25.7° (A: 256 ft)

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. (A: 32 ft)

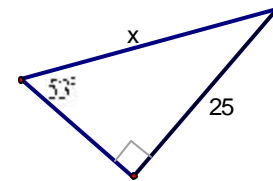
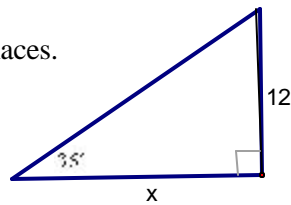
3. Find $\sin a$, $\cos b$, $\tan a$, $\cot b$ if



4. Find the side labeled x .



5. Find x correct to five decimal places.

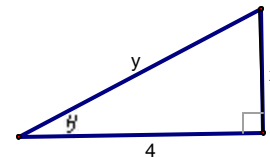
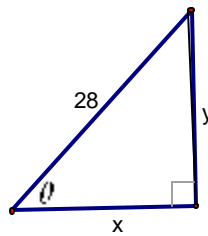


6. Sketch a right triangle that has one acute angle q , and find the other five trigonometric ratios of q .

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

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

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



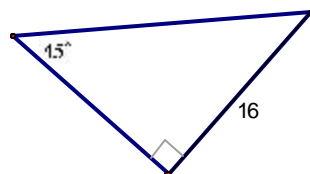
8. Evaluate the expressions:

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

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

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

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. 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 from the base of the lighthouse? (A: approx. 471 ft)

12. 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?
13. 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?
14. 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? (A: 414 ft)

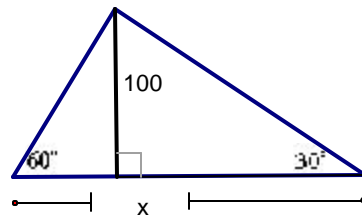
15. An airplane flying at the rate of 350 feet per second begins to climb at an angle of 10° . What is the increase in altitude over the next 15 seconds if the speed remains the same? (A: 912 ft)

16. 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? (A: 5121 ft)

17. 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. (A: 4200 ft)

18. 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. (A: 91,673,351 mi)

19. Find x correct to one decimal place. (A: 230.9)



20. (2.4 - #3) The height of a right circular cone is 25.3 cm. if the diameter of the base is 10.4 cm, what angle does the side of the cone make with the base? (A: 78.4 degrees)

21. (2.4 - #10) If the angle of elevation of the sun is 63.4° when a building casts a shadow of 37.5 feet, what is the height of the building? (A: 74.9 feet)

22. (2.4 - #12) A person standing on top of a 15-foot high sand pile wishes to estimate the width of the pile. He visually locates two rocks on the ground below at the base of the sand pile. The rocks are on opposite sides of the sand pile, and he and the two rocks are in the same vertical plane. If the angles of depression from the top of the sand pile to each of the rocks are 27° and 19° , how far apart are the rocks? (A: 73 feet)

23. (2.4 - #16) A man standing on the roof of a building 60 feet high looks down to the building next door. He finds that the angle of depression to the roof of that building from the roof of his building to be 34.5° , while the angle of depression from the roof of his building to the bottom of the building next door is 63.2° . How tall is the building next door? (A: 39.2 ft)

24. (2.4 - #18) A man wondering in the desert walks 2.3 miles in the direction $S 31^\circ W$. He then turns 90° and walks 3.5 miles in the direction $N 59^\circ W$. At that time, how far is he from his starting point, and what is his bearing from the starting point? (A: 4.2 mi, S 88 degrees W)

25. (2.4 - #22) A boat travels on a course bearing $S 63^\circ 50' E$ FOR 100 MILES. How many miles south and how many miles east has the boat traveled? (A: 44.1 mi south and 89.8 mi east)