

5. [1.2] **Sum of Angles in a Triangle**

The measures of the three angles of a triangle are given as

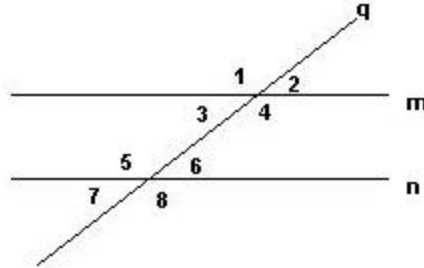
$(x + 10)^\circ$, $(5x - 20)^\circ$, and $(x + 50)^\circ$. Find the measures of all three angles.

6. [1.2] **Find Angle Measures**

Two parallel lines are cut by a transversal as shown below.

The alternate interior angles are given as $\angle 3 = (3x + 12)^\circ$ and $\angle 6 = (5x - 6)^\circ$.

Find the measures of $\angle 7$ and $\angle 8$.



7. [1.2] **Find side lengths using similar triangles**

A fire lookout tower casts a shadow 60 yds long at the same time that the shadow of a 9-ft truck is 15 ft long. Find the height of the tower.

Include correct units.

8. [1.2] **Find the function values of an angle given a point on the terminal side**

Find exact values for the six trigonometric functions, given the point

$(-6, -8)$ lies on the terminal side. Rationalize denominators and simplify.

9. [1.3] **Find the function values of an angle given a point on the terminal side**

Find exact values for the six trigonometric functions, given the point

$(-2\sqrt{3}, 4)$ lies on the terminal side. Rationalize denominators and simplify.

10. [1.3] **Find the function values of an angle given the equation of the terminal side**

Find exact values for the six trigonometric functions of the angle in standard position having its terminal side defined by $2x + y = 0$, $x \geq 0$.

Rationalize denominators and simplify.

11. [1.4] **Find the function values of an angle given one value and the quadrant**

Find the exact values of the remaining trigonometric functions for the angle q

if $\tan q = \frac{12}{5}$ and q is a quadrant III angle.

12. [1.4, ID] **Simplify trigonometric identities**

Use the fundamental identities to simplify the following trigonometric expressions to a single trigonometric function or number.

a. $\sin^2 q \tan^2 q + \sin^2 q$

b. $\sec^2 q - \sin^2 q \sec^2 q$

c. $\frac{\tan q}{\sec q - 1} + \frac{\sec q - 1}{\tan q}$

d. $(\cot q + \csc q)(\cot q - \csc q)$

13. [2.1] **Solve equations using cofunction identities**

Solve the following equation for q .

Assume that all angles in which q appears are acute angles.

a. $\cos(3q + 6^\circ) = \sin(q - 4^\circ)$

b. $\sec\left(\frac{7q}{6} - 10^\circ\right) = \csc\left(\frac{11q}{6} + 7^\circ\right)$

14. [2.2] **Find angle measures given an interval and a function value**

Find **all** values of q in the interval $[0^\circ, 360^\circ)$.

a. $\cos q = \frac{-\sqrt{2}}{2}$

b. $\cot q = -\sqrt{3}$

c. $\csc q = -1$

d. $\sin q = 0$

15. [2.2] **Evaluate an expression using function values of special angles**

Without using a grapher, evaluate exactly. Show supporting work and simplify results.

a. $\sec^2 300^\circ - 2\cos 150^\circ + \tan 45^\circ$

b. $\cot^2 90^\circ - \sec^2 180^\circ + \csc 225^\circ$

c. $\cot^2 135^\circ + \tan 60^\circ - \sin^4 180^\circ$

16. [GC#1, 2.3] **Approximate function values with a grapher**

Using a calculator, find all values of q in the interval $[0^\circ, 360^\circ)$ which satisfy the given information. Give your answer in decimal degrees to the nearest hundredth.

a. $\tan q = 0.0816$

b. $\sin q = 0.9467$

17. [GC#1, 2.3] Approximate reciprocal function values with a grapher

Using a calculator, evaluate to 4 SIGNIFICANT digits.

a. $\sec 37.8^\circ$

b. $\cot 63^\circ 37'$

When appropriate, answers in problems 18 - 24 should include correct units.

Draw a sketch of the problems below and label the given information.

Label the quantity(ies) to be found with a variable(s). Use the sketch to write an equation, solve the equation, and check that your answer makes sense.

18. [2.4] Solve a right triangle with given information

Solve the following right triangle, with legs a and b, hypotenuse c, and angle B between sides a and c. (Give answers to 3 SIGNIFICANT digits.)

a. $a = 68.0$ ft and $b = 104$ ft

b. $b = 305$ m and $B = 24.9^\circ$

19. [2.4] Solve a problem involving angle of elevation and depression

The angle of elevation from the top of a small building to the top of a nearby taller building is 46.1° , while the angle of depression to the bottom is 14.4° . If the shorter building is 62.3 feet tall, what is the height of the taller building to three significant digits?

20. [2.4] Solve a problem involving an angle of elevation and depression

A person standing 130 inches from a door notices that the angle of depression to the bottom of the door is 18° , while the angle of elevation to the top of the door is 11° . Find the height of the door to two significant digits.

21. [2.5] Solve a problem involving bearing (First Method)

Radar station A and B are on an east-west line, 5.43 km apart. Station A (west) detects a plane at C, on a bearing of 55.2° . Simultaneously Station B (east) detects the same plane, on a bearing of 325.2° . Find the distance from A to C to three significant digits.

22. [2.5] Solve a problem involving bearing (Second Method)

A ship leaves its home port and sails on a bearing of $N 33.7^\circ E$ for 56.7 knots (nautical miles). It then turns on a bearing of $S 56.3^\circ E$ for 42.3 knots. How far is the ship from its home port to three significant digits.

11. If $y = -12$ and $x = -5$, then $r = 13$.

a. $\sin \mathbf{q} = \frac{-12}{13}$

d. $\csc \mathbf{q} = \frac{-13}{12}$

b. $\cos \mathbf{q} = \frac{-5}{13}$

e. $\sec \mathbf{q} = \frac{-13}{5}$

c. $\tan \mathbf{q} = \frac{12}{5}$

f. $\cot \mathbf{q} = \frac{5}{12}$

12. a. $\tan^2 \mathbf{q}$

b. 1

c. $2\csc \mathbf{q}$ or $\frac{2}{\sin \mathbf{q}}$

d. -1

13. a. $\mathbf{q} = 22^\circ$

b. $\mathbf{q} = 31^\circ$

14. a. $135^\circ, 225^\circ$

b. $150^\circ, 330^\circ$

c. 270°

d. $0^\circ, 180^\circ$

15. a. $5 + \sqrt{3}$

b. $-1 - \sqrt{2}$

c. $1 + \sqrt{3}$

16. a. $\mathbf{q} = 466^\circ, 18466^\circ$

b. $\mathbf{q} = 71.21^\circ, 108.79^\circ$

17. a. $\sec 37.8^\circ = 1.266$

b. $\cot 63^\circ 37' = 0.4960$

18. a. $A = 33.2^\circ, B = 56.8^\circ, c = 124 \text{ ft}$

b. $A = 65.1^\circ, a = 657 \text{ m}, c = 724 \text{ m}$

19. Setup. $\tan 14.4^\circ = \frac{62.3}{x}; \tan 46.1^\circ = \frac{y}{x}; 62.3 + y = 314 \text{ ft} (314.44284 \dots)$

20. Setup. $\tan 11^\circ = \frac{x}{130}; \tan 18^\circ = \frac{y}{130}; x + y = 68 \text{ inches} (67.50906 \dots)$

21. Setup. $\sin 55.2^\circ = \frac{x}{5.43}; x = 4.46 \text{ km} (4.45884 \dots)$

22. Setup. $x^2 = 56.7^2 + 42.3^2; x = 70.7 \text{ knots} (70.740222 \dots)$