

The given point is on the terminal side of an angle  $\theta$ . Determine the exact values of the six trig functions of the angle. Be sure to simplify radicals and fractions.

1.  $(-10, 14)$   $r = \sqrt{296} = 2\sqrt{74}$

$\sin \theta = \frac{7\sqrt{74}}{296}$	$\csc \theta = \frac{\sqrt{74}}{7}$
$\cos \theta = \frac{-5\sqrt{74}}{296}$	$\sec \theta = \frac{\sqrt{74}}{-5}$
$\tan \theta = \frac{7}{-5}$	$\cot \theta = \frac{-5}{7}$

2.  $(-3, -1)$   $r = \sqrt{10}$

$\sin \theta = \frac{-1\sqrt{10}}{10}$	$\csc \theta = \frac{-\sqrt{10}}{10}$
$\cos \theta = \frac{-3\sqrt{10}}{10}$	$\sec \theta = \frac{-\sqrt{10}}{3}$
$\tan \theta = \frac{1}{3}$	$\cot \theta = 3$

With the given information, find the values of the six trig functions of  $\theta$ .

3.  $\cos \theta = -\frac{2}{7}$ ,  $\sin \theta > 0$   $y = \sqrt{45} = 3\sqrt{5}$

$\sin \theta = \frac{3\sqrt{5}}{7}$	$\csc \theta = \frac{7}{3\sqrt{5}}$
$\cos \theta = \frac{-2}{7}$	$\sec \theta = \frac{-7}{2}$
$\tan \theta = \frac{3\sqrt{5}}{-2}$	$\cot \theta = \frac{-2}{3\sqrt{5}}$

4.  $\tan \theta = \frac{8}{15}$ ,  $\cos \theta < 0$   $r = 17$

$\sin \theta = \frac{-8}{17}$	$\csc \theta = \frac{-17}{8}$
$\cos \theta = \frac{-15}{17}$	$\sec \theta = \frac{-17}{15}$
$\tan \theta = \frac{8}{15}$	$\cot \theta = \frac{15}{8}$

Express the following angles in degree measure. Round to three decimal places if necessary.

$\frac{25\pi}{9}$   $\approx 250^\circ$

$-\frac{7\pi}{4}$   $\approx -405^\circ$

5.  $\frac{7\pi}{5}$

7.  $-\frac{9\pi}{4}$

$\frac{990^\circ}{\pi} \approx 315.127^\circ$

6.  $5.5$

8.  $\frac{7\pi}{6}$

Find one positive and one negative coterminal angle for the following. Your answer should be an exact value in the same mode as the original angle.

8.  $810^\circ$   $90^\circ$

$-270^\circ$

9.  $450^\circ$

10.  $\frac{5\pi}{6}$

$-\frac{19\pi}{6}$

10.  $\frac{7\pi}{6}$

Express the following angles in exact radian measure (leave in terms of  $\pi$  -- no decimals!).

11.  $-\frac{13\pi}{9}$

11.  $-260^\circ \cdot \frac{\pi}{180}$

12.  $\frac{25\pi}{6}$

12.  $750^\circ \cdot \frac{\pi}{180}$

Express each angle measure in degrees:

$123^\circ 25' 12''$

13. Express  $123.42^\circ$  in terms of degrees-minutes-seconds.

Determine the complement and supplement for the following angles. Your answer should be in the same mode as the original angle.

14.  $\frac{2\pi}{7}$  complement  $\frac{3\pi}{14}$

supplement  $\frac{5\pi}{7}$

15.  $122^\circ$  complement  $\text{none}$

supplement  $58^\circ$

Arc length and area of a sector. Round your answers to three decimal places.

$$\frac{43}{11} \approx 3.909 \quad 16.$$

$$\theta = \frac{s}{r} \qquad A = \frac{1}{2} r^2 \theta$$

Determine the radian measure of the central angle of a circle of radius 55 miles that intercepts an arc length of 215 miles.

$$\theta = \frac{215}{55} = \frac{43}{11} \approx 3.909$$

$$\frac{31\pi}{9} \text{ cm} \approx 10.821 \text{ cm} \quad 17.$$

Determine the arc length of a circle with radius 4 cm and central angle intercepting the arc of  $155^\circ$ .

$$l = 4 \cdot \frac{155 \cdot \pi}{180} = \frac{31\pi}{9} \approx 10.821$$

$$551.023 \text{ in}^2 \quad 18.$$

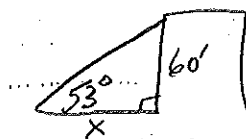
Determine the area of the sector of a circle with radius of 22.75 inches and a central angle of  $122^\circ$ .

$$A = \frac{1}{2} (22.75)^2 \cdot \frac{122 \cdot \pi}{180} \approx 551.023$$

Right triangle Trigonometry.

$$45.213 \text{ ft} \quad 19.$$

The angle of elevation from a point on the street to the top of a building is  $53^\circ$ . The building is 60 feet high. How far is the point on the street to the foot of the building?



$$\tan 53^\circ = \frac{60}{x}$$

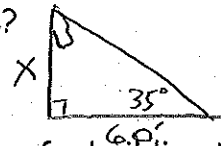
$$x = 60 / \tan 53^\circ = 45.213$$

$$42.012 \text{ ft} \quad 20.$$

A flagpole casts a 60 foot shadow when the angle of elevation of the sun is  $35^\circ$ . How tall is the flagpole?

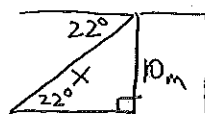
$$\tan 35^\circ = \frac{x}{60}$$

$$x = 60 \cdot \tan 35^\circ$$



$$26.695 \text{ m} \quad 21.$$

A wire needs to reach from the top of a building to a point on the ground. The building is 10 m tall, and the angle of depression from the top of the building to the point on the ground is  $22^\circ$ . How long should the wire be?

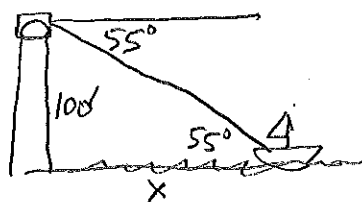


$$\sin 22^\circ = \frac{10}{x}$$

$$x = 10 / \sin 22^\circ = 26.695$$

$$70.021 \text{ ft} \quad 22.$$

From the top of a lighthouse at a height of 100 feet above sea level, the angle of depression to a sailboat adrift on the water is  $55^\circ$ . How far from the foot of the lighthouse is the sailboat?



$$\tan 55^\circ = \frac{100}{x}$$

$$x = \frac{100}{\tan 55^\circ} = 70.021$$