

# Honors Trigonometry Test 2 Study Guide

## Unit Circle and Coordinate Trigonometry, Solving Right Triangles, Real World Problems

### Part One – Evaluating Trig Functions without a Calculator

#### What you need to know:

1. Finding the value for all six trig functions for any angle by placing the  $30^\circ$ ,  $60^\circ$ ,  $90^\circ$  and  $45^\circ$ ,  $45^\circ$ ,  $90^\circ$  triangle on the coordinate plane, as well as understanding the coordinates on the unit circle for solving for trig functions on the x and y axis.
2. Finding the value of all six trig functions of an angle defined by any coordinate point on the (x,y)-plane.

Fill in the following blanks with the correct coordinates or combinations of coordinates (x and y):

$$\text{Sin} = \frac{y}{r}$$

$$\text{Cos} = \frac{x}{r}$$

$$\text{Tan} = \frac{y}{x}$$

$$\text{Csc} = \frac{r}{y}$$

$$\text{Sec} = \frac{r}{x}$$

$$\text{Cot} = \frac{x}{y}$$

Evaluate each of the following trig functions; draw a unit circle and label the appropriate triangle or coordinates as needed:

$$\sin \frac{-5\pi}{6} = -\frac{1}{2}$$

$$\sec \frac{7\pi}{4} = \sqrt{2}$$

$$\cot(-3\pi) = \text{Undefined}$$

$$\cos \frac{3\pi}{2} = 0$$

Find the exact value of each trigonometric function. Draw a unit circle as needed.

$$1) \cot \frac{10\pi}{3} = \frac{\sqrt{3}}{3}$$

$$2) \tan 5\pi = 0$$

$$3) \csc \frac{\pi}{6} = 2$$

$$4) \sin \frac{9\pi}{2} = 1$$

Use the given point on the terminal side of angle  $\theta$  to find the value of the trigonometric function indicated.

$$5) \tan \theta; (-3, 4) = -\frac{4}{3}$$

$$6) \csc \theta; (\sqrt{5}, -2) = -\frac{3}{2}$$

$$7) \cos \theta; (-\sqrt{15}, -7) = -\frac{\sqrt{15}}{8}$$

$$8) \cos \theta; (9, 18) = \frac{\sqrt{5}}{5}$$

# Part Two – Solving Right Triangles and Understanding Real World Problems

## Calculator Needed

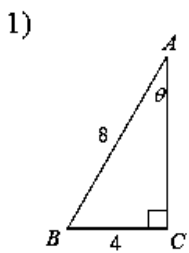
### What you need to know:

- Using a calculator in both degree and radian mode to evaluate trig functions of any angle. This includes understanding minute and second notation for degrees less than 1 (converting these to decimals).
- Using a calculator in both degree and radian mode to evaluate inverse trigonometric functions to determine an angle measure based on given ratios or side lengths of a triangle.
- Being able to model real-world trigonometric problems and solve for missing lengths or angles.
- Using multiple equations to solve for multiple variables (systems of equations) by elimination of a common variable.

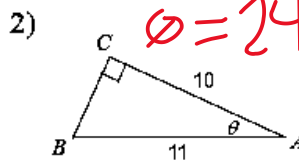
Use a calculator to evaluate the following trig functions; state what quadrant the angle lies in:

$\tan \frac{-2\pi}{9}$  *-0.839*    
  $\csc \frac{15\pi}{13}$  *-2.152*    
  $\sin 71^\circ 23' 40''$  *0.948*    
  $\cot -3^\circ 10'$  *-20.205*

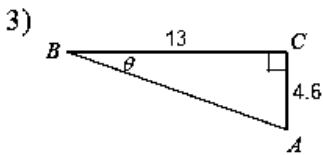
Find the measure of each angle indicated. Round to the nearest tenth.



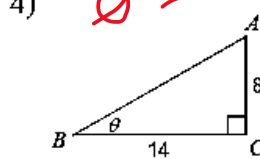
*$\theta = 30^\circ$*



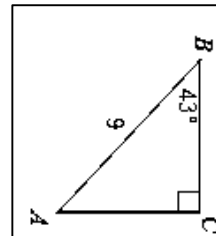
*$\theta = 24.6^\circ$*



*$\theta = 19.5^\circ$*

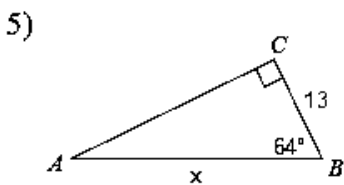


*$\theta = 29.7^\circ$*

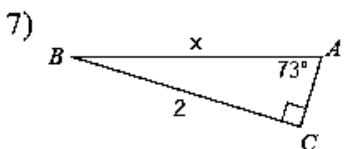
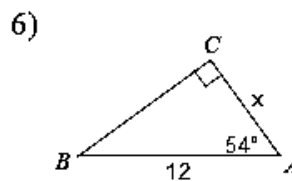


Solve each triangle. Round answers to the nearest tenth.

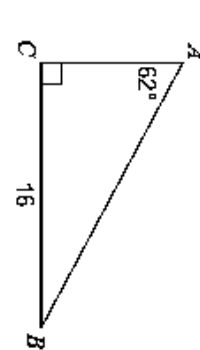
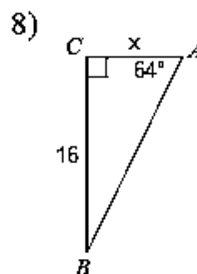
Find the measure of each side indicated. Round to the nearest tenth.



*$x = 29.7$*



*$x = 2.1$*



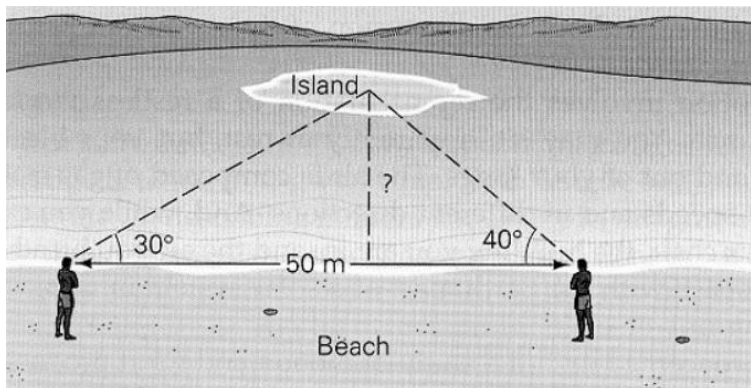
**Draw a picture representing the following problem, then solve:**

A marine scientist is standing atop a lighthouse looking out to sea. Through her binoculars, she sees two sperm whales swimming directly away from the lighthouse, one (the black whale) directly in front of the other (the white one). The scientist's knowledge of sperm whale behaviors tells her that the lead whale is typically 25 meters in front of the following whale. Using her sextant, she then determines that the angle of depression between her and the black whale is  $15^\circ$ , while the angle of depression between her and the white whale is  $19^\circ$ . How far is the white whale from the base of the lighthouse? Round your answer to the 10<sup>th</sup> place.

**Draw a picture representing the following problem, then solve:**

A mountain climber clings to the wall of a vertical cliff he is scaling. Breaking for a Power Bar, he looks out across the chasm behind him, and sees the sheer cliff face of the mountain he is planning on climbing on his next outing. He knows that the cliff he is on, and the one he wishes to climb are 1450 meters apart. He sights the angle of depression between himself and the foot of the other cliff to be  $18^\circ$ , then sights the angle of elevation between himself and the top of the cliff to be  $27^\circ$ . How tall is the cliff he wishes to scale?

**Use the information given in the picture to solve the following problem:**



How far away is the island from the beach?