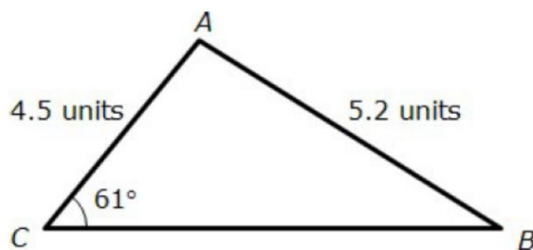


You will be allowed a calculator for the entire test.

1. Triangle ABC is shown below.



Find  $m\angle A$ ,  $m\angle B$ , and  $CB$ . Round answers to the nearest degree and the nearest tenth of a unit.

2. Dusty is flying two kites at the same time. He has 380 feet of line out to one kite and 420 feet to the other. He estimates the angle between the two lines to be  $30^\circ$ . Approximate the distance between the kites.

3. Find the exact value of the following trigonometric expression.:  $\sin \frac{\pi}{6}$

4. If an angle,  $\theta$ , terminates in quadrant III and  $\cos \theta = -\frac{3}{5}$ , find  $\tan \theta$ .

5. Convert the radian measure  $\frac{7\pi}{3}$  to degrees.

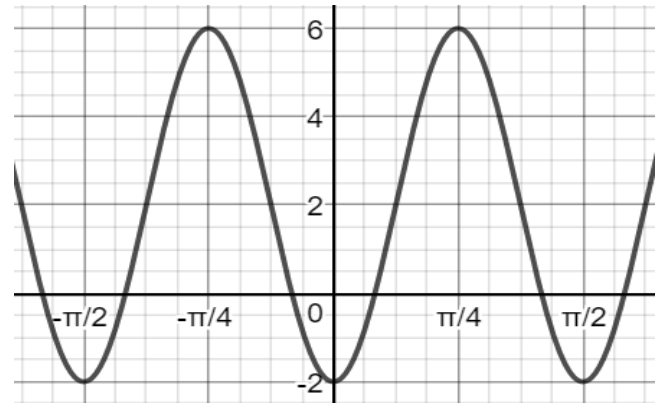
6. A statue is 50 feet high and casts a shadow that is 61 feet long. Find the angle of elevation that the sun makes with the ground.

7. Find three angles, in both radians and degrees, where the reference angle for all the angles equivalent to  $60^\circ$

8. The average monthly temperature in Dallas, Texas can be modeled using the sinusoidal function  $y = 51.2 - 11.67 \cos(0.524x)$ , where  $x$  represents the month of the year. What is the period of this function in radians?

9. The graph of a sinusoidal function is shown below.

Write a function that could be used to represent the sinusoidal function.



10. A trigonometric function is shown below.

$$f(x) = 4 \sin\left(x + \frac{\pi}{4}\right) - 2$$

Which transformations best describe the function?

Amplitude:

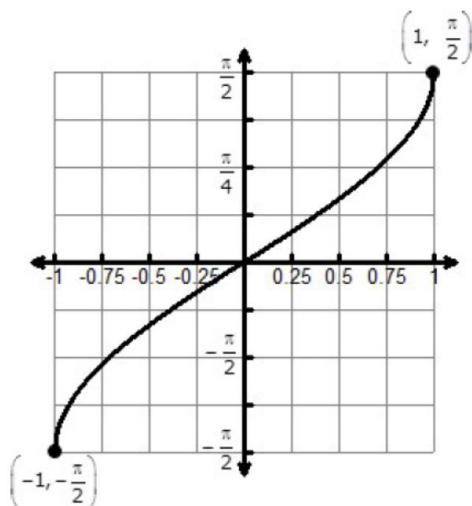
Phase Shift:

Vertical Shift:

Period:

11. Find the solutions of  $2 \sin x + 1 = 0$  when  $-\pi < x < 3\pi$

12. Which parent function is represented in the graph below?



13. A trigonometric equation is shown below.

$$4\sin^2 x = 3 \text{ where } 0 \leq x < 2\pi$$

What is the solution to the trigonometric equation over the given interval?

14. Which expression(s) is equivalent to  $\tan \theta$ ?

I.  $\frac{\sin \theta}{\cos \theta}$

II.  $\frac{\cos \theta}{\sin \theta}$

III.  $\frac{1}{\cot \theta}$

IV.  $\cot \theta$

15. A trigonometric expression is shown below.

$$\frac{\csc A}{\cos A} - \frac{\cos A}{\sin A}$$

Write an expression that represents the given trigonometric expression in simplified form.

16. Vector  $\mathbf{v}$  has components of  $\langle 6, 9 \rangle$ . Determine the angle,  $\theta$ , in degrees, that vector  $\mathbf{v}$  makes with the x-axis.

17. If  $\mathbf{u} = 3\mathbf{i} + 2\mathbf{j}$  and  $\mathbf{v} = 2\mathbf{i} + 7\mathbf{j}$ , draw a diagram to represent the vector  $\mathbf{u} + \mathbf{v}$

18. Eliminate the parameter and convert into rectangular form for the following parametric equation

$$\begin{cases} x(t) = 10 - t \\ y(t) = 8 - t \end{cases}$$

19. The position of a moving particle after  $t$  seconds, where  $0 \leq t \leq 4$ , is represented by the equation below.

$$\begin{cases} x(t) = 3t - 2 \\ y(t) = t^2 + 1 \end{cases}$$

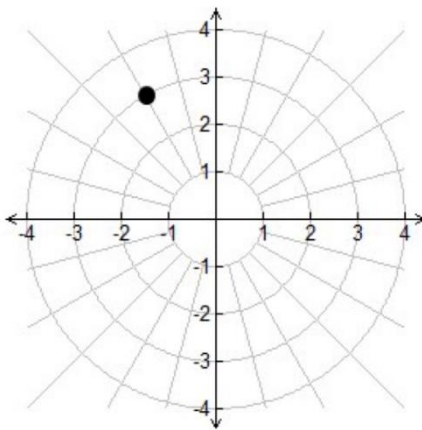
Sketch a graph of the motion.

20. William hit a golf ball with an initial velocity of 150 feet per second at an angle of  $40^\circ$  above the horizontal. What is the maximum height reached by the golf ball?

21. Convert the polar coordinates  $\left(2, \frac{\pi}{3}\right)$  into rectangular form.

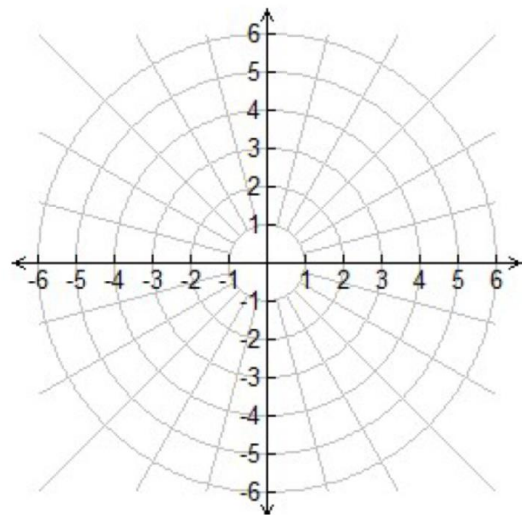
22. Convert the following rectangular coordinates (5,-12) to polar coordinates, using radians rounded to the nearest hundredth.

23. A polar coordinate system with a single point is shown below. Write the coordinate in two ways.



24. Graph the polar equation shown

$$r = 3 \cos(2\theta)$$



25. Write the limit definition of a derivative.