

10/22/20

SHOW ALL WORK!!! DO YOUR OWN WORK!!! DO NOT USE THE MAC TO DO THE WORK!!

(1) **Verify** the **identities** by working down one side of the identity or the other, or both sides of the identity.

(a) $\sin^4(\beta) + 2\cos^2(\beta) = \cos^4(\beta) + 1$

(b) $\frac{\sec(x) - 1}{\tan^2(x)} = \frac{1}{\sec(x) + 1}$

(2) Find the **amplitude**, **period**, and **phase shift** and the **graph** of each equation.

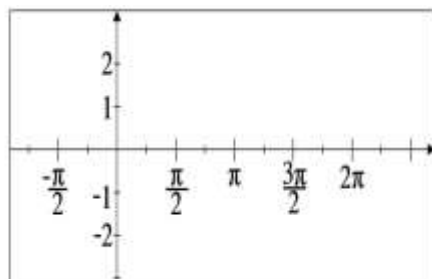
(a) $y = 2\cos\left(\frac{2}{3}x + \frac{\pi}{3}\right)$

(b) $y = -2\sin(2x - \pi)$

Amplitude _____

Period _____

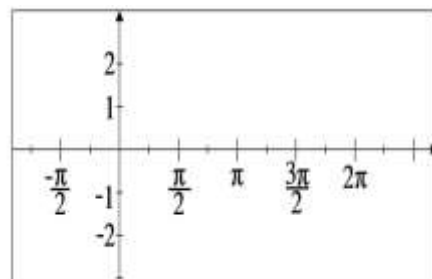
Phase Shift _____



Amplitude _____

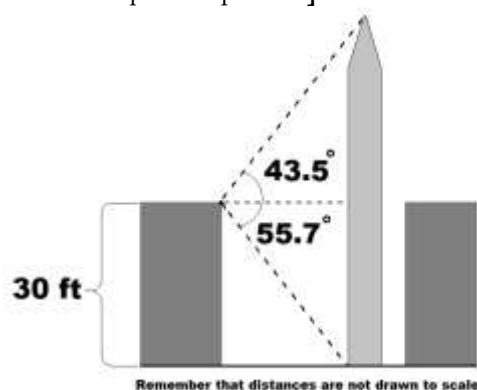
Period _____

Phase Shift _____



(3) **Height of a buried Monument.** Archeologists find a partially buried monument and decided to dig down 30 feet to the base of the monument. From a point that is 30 feet above the base of the buried monument an archeologist makes two angle measurements. The angle of elevation (or inclination) to the top of the monument is 43.5° and the angle of depression to the base of the monument is 55.7° . From this information **approximate** the **height** of the monument.

[Hint: Set up a triangle and equation with each angle. Label all the unknown sides needed for the separate equations]



- (4) **Spotting a Forest Fire.** A forest Ranger from observation point A spots a fire (F) in a direction of $N 69^{\circ}50'E$. From observation point B , 8 miles due east, another forest ranger spots the same fire in the direction $N 20^{\circ}10'W$. **Approximate**, to two decimal place, the **distance** of the fire (F) to the observation point A after following the instructions below.

- (a) **Label** the vertices with the letters A , B , and F and “box” them in using the diagram provided on the right.

- (b) **Indicate** in the diagram all angles formed after drawing the box.

- (c) **Find the approximate distance** from Observation point A to the Fire (F). [Remember to set up an equation to find this distance.]

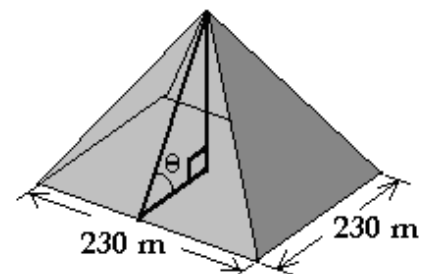


- (5) **Find all exact radian solutions** of the equation that are **in the interval** $[0, 2\pi)$
- $$\sqrt{2}\sin(\theta)\tan(\theta) = \tan(\theta)$$

- (6) **Approximate solutions** for the equation in the interval $[0^{\circ}, 360^{\circ})$ to two decimal places.
- $$9\cos^2(t) + 12\cos(t) - 1 = 0$$

- (7) **The Great Pyramid.** The Great Pyramid of Egypt is 147 meters high, with a square base of side 230 meters (see figure below). **Approximate**, to the nearest degree the **angle of elevation** θ formed from the ground at the midpoint of one of the sides to the apex (highest point) of the pyramid.

[Remember to set up an equation to solve]



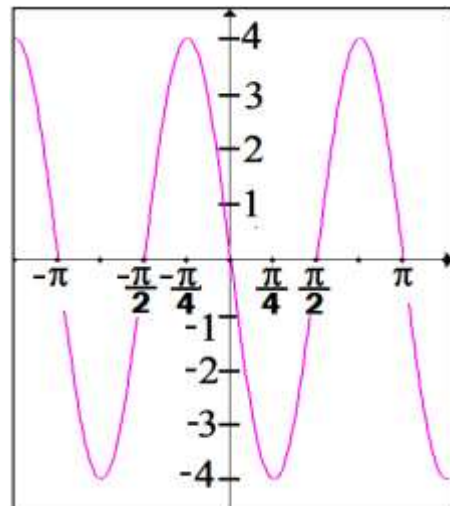
[Figures in diagram are not drawn to scale]

(8) **Trigonometric Equation.** The graph of an equation is shown in the figure on the right.

(a) Find the **amplitude**, **period**, and **phase shift** of the graph shown on the right.

Amplitude = _____, Period = _____, Phase Shift = _____

(b) Solve for a , b , and c with the conditions of $a > 0$, $b > 0$ and c is the least positive real number. Then write the equation for the graph in the form $y = a\sin(bx + c)$



$a =$ _____ $b =$ _____ $c =$ _____

$y =$

Write out the full equation using the values of a , b , and c .

(9) **Verify the identity** by working down one side of the identity or the other, or both sides of the identity.
 $[\tan(x) - \sin(x)][\csc(x) + \cot(x)] = \tan(x) \sin(x)$

(10) **Find the exact solutions** of the equation that are **in the interval** $[0, 2\pi)$

$$\sin\left(3x - \frac{\pi}{2}\right) = 1$$

Extra Credit:

(1) Solve the equations and find the exact solutions in the interval $[0, 2\pi)$

(a) $\cos(\theta) - \sin(\theta) = 1$

(b) $\tan(\omega) = \frac{1}{\cot(\omega)}$

(2) Verify the identity

$$\frac{\cos^2(x)}{1 + \sin(x)} = 1 - \sin(x)$$

(3) Is it now possible for somebody to record your dreams (in a thematic way) and play them back?