

Assignment

Write

Write the word(s) that best completes each statement.

1. The _____ of a periodic function is the reciprocal of the period and specifies the number of repetitions of the graph of a periodic function per unit.
2. For periodic functions, a horizontal translation is called a _____.

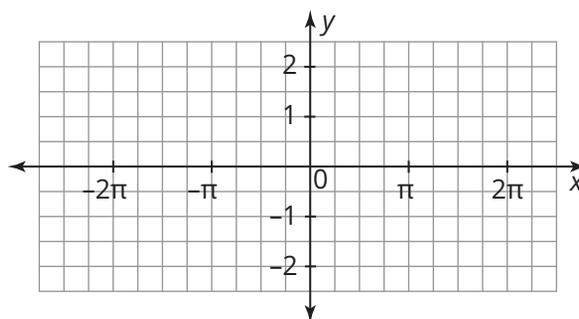
Remember

Given the transformed functions $y = A \sin(B(x - C)) + D$ and $y = A \cos(B(x - C)) + D$, the A -value affects the range, minimum and maximum output values, and the amplitude of the basic function, the B -value affects the period and frequency of the basic function, the C -value is interpreted as the phase shift, and the D -value affects the midline.

Practice

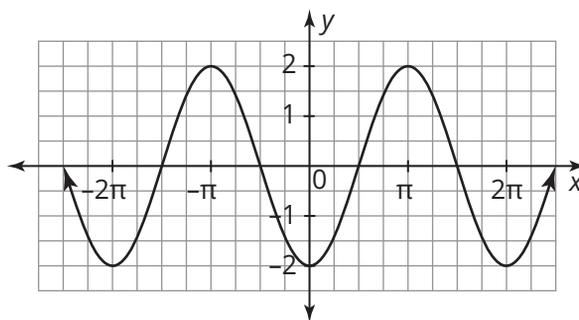
1. To create the function $m(x)$, the function $f(x) = \sin x$ is first reflected across the x -axis. Then, the amplitude is increased to 1.5 and the period was changed to π radians.

- a. Graph the function $m(x)$.
- b. Write the function $m(x)$.



2. Consider the given graph of a trigonometric function.

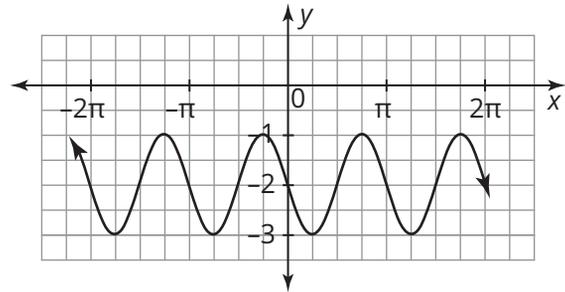
- a. Write the function $g(x)$ that matches the given graph if the function $g(x)$ is a transformation of the function $f(x) = \sin x$.
- b. Determine the amplitude, period, frequency, and phase shift of $g(x)$.
- c. Write the function $h(x)$ that matches the given graph if the function $h(x)$ is a transformation of the function $f(x) = \cos x$.
- d. Determine the amplitude, period, frequency, and phase shift of $h(x)$.



3. The function $f(x) = \sin x$ has been horizontally stretched by a factor of 2 and shifted up 3 units to create the function $t(x)$. Write the function $t(x)$.
4. The function $f(x) = \cos x$ has been vertically compressed by a factor of $\frac{1}{4}$ and shifted $\frac{3\pi}{2}$ radians to the right to create the function $p(x)$. Write the function $p(x)$.

Stretch

- Consider the given graph of a trigonometric function.
 - Write the function $g(x)$ if $g(x)$ is a transformation of $f(x) = \sin x$.
 - Determine the amplitude, period, frequency, and phase shift of $g(x)$.
 - Write the function $h(x)$ if $h(x)$ is a transformation of $f(x) = \cos x$.
 - Determine the amplitude, period, frequency, and phase shift of $h(x)$.



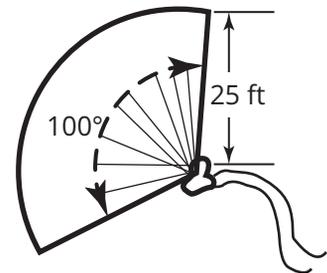
- The tangent of θ is the ratio of $\sin \theta$ to $\cos \theta$. Use your knowledge of the unit circle and the sine and cosine functions to determine $\tan \theta$ for each value of θ .

a. 0 radians	c. $\frac{2\pi}{3}$ radians	e. $\frac{3\pi}{2}$ radians
b. $\frac{\pi}{6}$ radians	d. $\frac{5\pi}{4}$ radians	f. $\frac{11\pi}{6}$ radians

Review

- A satellite in a low Earth orbit completes one orbit every 90 minutes. The satellite follows a circular path with its center at the center of the earth. The satellite is at an altitude of 160 kilometers. The radius of the earth is 6371 kilometers.
 - Determine the angle of rotation, in radians, that corresponds to a 15-minute time period.
 - Determine the distance traveled by the satellite in a 15-minute time period.

- Archie is watering his lawn with a sprinkler attached to a hose. The outer path of the spray is an arc with the center at the sprinkler and a central angle of 100° . The distance from the sprinkler to any point on the outer path is 25 feet. Determine the central angle of the outer path in radians and the length of the outer path of the spray.



- An owner of two large commercial buildings is trying to make the buildings more environmentally friendly. She has the building's bathroom facilities revamped with more modern energy saving equipment. She also places signs in the buildings encouraging the occupants to conserve water. On the first day after the building reconstruction is complete, Building A used 21,150 gallons of water and Building B used 24,325 gallons of water. For the remaining 29 days of the first month, Building A's water usage decreased by 0.5% each day while Building B's water usage decreased by 0.75% each day.
 - Determine the total amount of water used by each building during the first month. Round decimals to the nearest hundredth.
 - The cost of water for the state Building A is located in is \$.00785 per gallon. After day 15 of the first month after reconstruction, the state raised its rates to \$.00795. Determine how much the owner paid for water for the first month after reconstruction was done at the building.