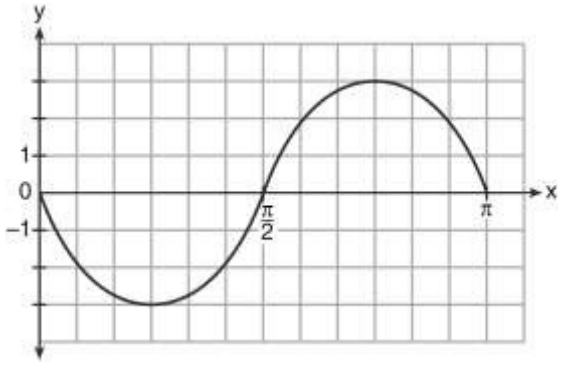
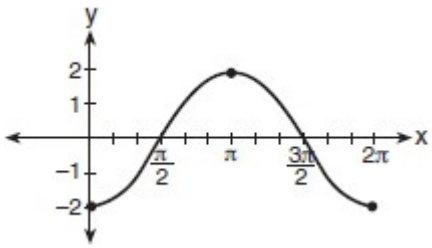
Name: _____

A2.A.72: Identifying the Equation of a Trigonometric Graph: Write the trigonometric function that is represented by a given periodic graph

1 Write an equation for the graph of the trigonometric function shown below.

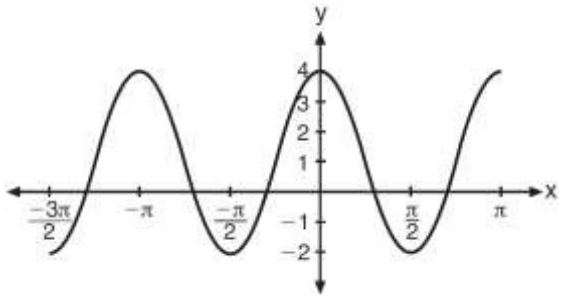


2 The accompanying graph shows a trigonometric function. State an equation of this function.



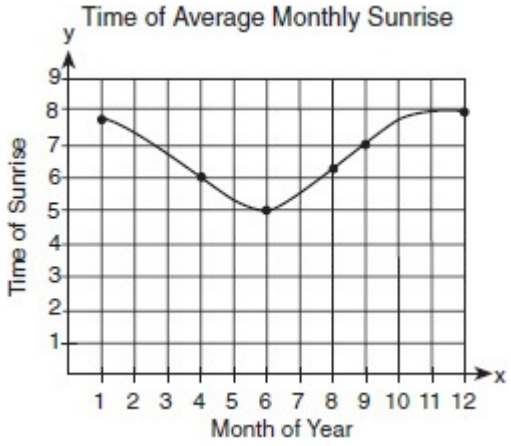
3 A student attaches one end of a rope to a wall at a fixed point 3 feet above the ground, as shown in the accompanying diagram, and moves the other end of the rope up and down, producing a wave described by the equation $y = a\sin bx + c$. The range of the rope's height above the ground is between 1 and 5 feet. The period of the wave is 4π. Write the equation that represents this wave.

4 The periodic graph below can be represented by the trigonometric equation $y = a\cos bx + c$ where *a*, *b*, and *c* are real numbers.



State the values of *a*, *b*, and *c*, and write an equation for the graph.

5 The times of average monthly sunrise, as shown in the accompanying diagram, over the course of a 12-month interval can be modeled by the equation $y = A\cos(Bx) + D$. Determine the values of *A, B,* and *D,* and explain how you arrived at your values.



1 ANS:

$y = -3\sin 2x$. The period of the function is π, the amplitude is 3 and it is reflected over the *x*-axis.

REF: 061235a2

2 ANS:

$y = -2\cos x$. The period of the function is 2π, the amplitude is 2 and it is reflected over the *x*-axis.

REF: 080926b

3 ANS:

$y = 2\sin\frac{1}{2}x + 3$. The range of the function is from a minimum of 1 to a maximum of 5. To compute *c*, average these values: $c = \frac{1+5}{2} = 3$. To compute *a*, the amplitude, find the distance from *c* to the minimum or maximum. $a = |5-3| = |1-3| = 2$. The period of the function is 4π. To compute *b*,

$$\text{period} = \frac{2\pi}{b}$$

$$4\pi = \frac{2\pi}{b}$$

$$b = \frac{2\pi}{4\pi} = \frac{1}{2}$$

REF: 080330b

4 ANS:

$a = 3, b = 2, c = 1 \quad y = 3\cos 2x + 1.$

REF: 011538a2

5 ANS:

1.5, $\frac{1}{2}$, 6.5. The range of the function is from a minimum of 5 to a maximum of 8. To compute *D*, the translation of the function, average these values: $D = \frac{5+8}{2} = 6.5$. To compute *A*, the amplitude, find the distance from *D* to the minimum or maximum. $A = |8-6.5| = |5-6.5| = 1.5$. The period of the function is 4π. To compute *B*,

$$\text{period} = \frac{2\pi}{b}$$

$$4\pi = \frac{2\pi}{B}$$

$$B = \frac{2\pi}{4\pi} = \frac{1}{2}$$