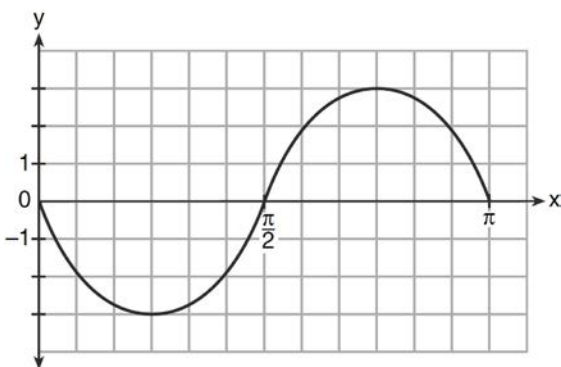
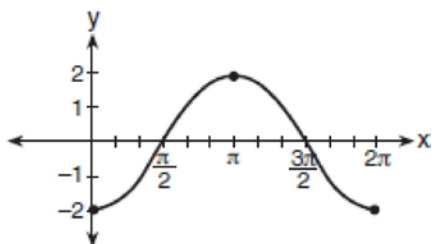


A2.A.72: Identifying the Equation of a Trigonometric Graph 3: Write the trigonometric function that is represented by a given periodic graph

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



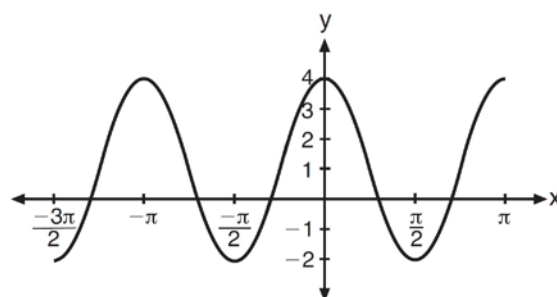
- 2 The accompanying graph shows a trigonometric function. State an equation of this function.



- 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.

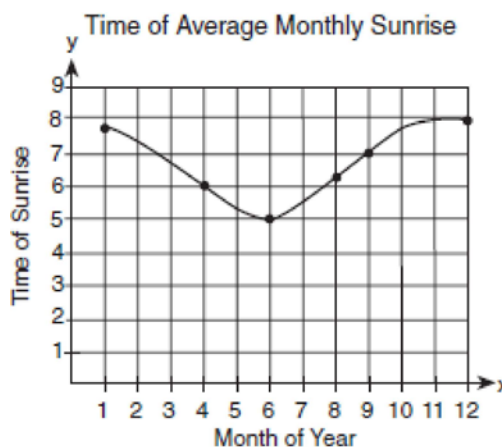


- 4 The periodic graph below can be represented by the trigonometric equation $y = a \cos bx + c$ where a , b , and c are real numbers.



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.



A2.A.72: Identifying the Equation of a Trigonometric Graph 3: Write the trigonometric function that is represented by a given periodic graph

Answer Section

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.

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

$a = |5 - 3| = |1 - 3| = 2$. The period of the function is 4π . To compute b ,

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

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

REF: 080330b

4 ANS:

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

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 ,

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

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

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

REF: 080127b