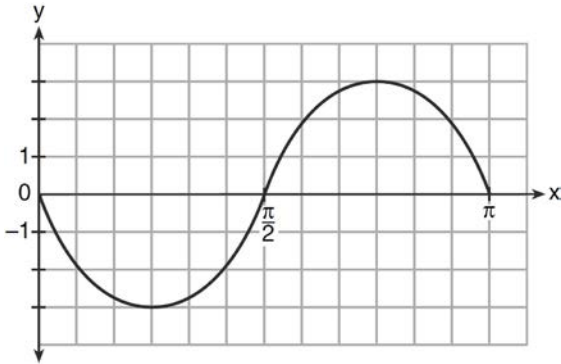
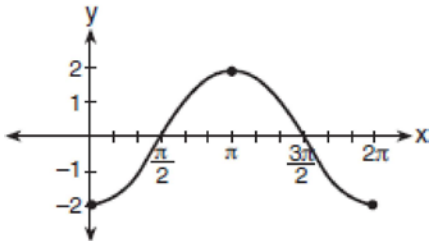


**F.IF.C.7: Graphing Trigonometric Functions 7**

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



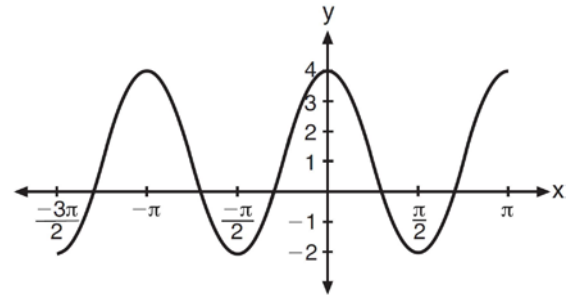
- 2 The accompanying graph shows a trigonometric function. State an equation of this function.



- 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  $4\pi$ . Write the equation that represents this wave.

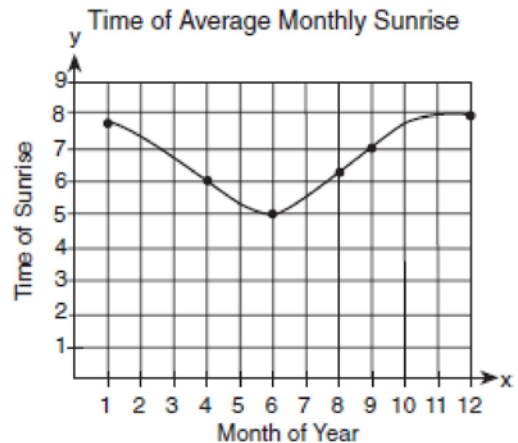


- 4 The periodic graph below can be represented by the trigonometric equation  $y = a \cos bx + c$  where  $a$ ,  $b$ , and  $c$  are real numbers.



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.



### F.IF.C.7: Graphing Trigonometric Functions 7 Answer Section

1 ANS:

$y = -3 \sin 2x$ . The period of the function is  $\pi$ , 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  $2\pi$ , 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  $4\pi$ . 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  $4\pi$ . 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