

F.TF.B.5: Modeling Trigonometric Functions 1

- 1 Which function's graph has a period of 8 and reaches a maximum height of 1 if at least one full period is graphed?

1) $y = -4 \cos\left(\frac{\pi}{4}x\right) - 3$

2) $y = -4 \cos\left(\frac{\pi}{4}x\right) + 5$

3) $y = -4 \cos(8x) - 3$

4) $y = -4 \cos(8x) + 5$

- 2 The voltage used by most households can be modeled by a sine function. The maximum voltage is 120 volts, and there are 60 cycles *every second*. Which equation best represents the value of the voltage as it flows through the electric wires, where t is time in seconds?

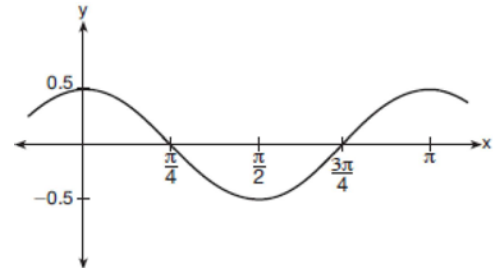
1) $V = 120 \sin(t)$

2) $V = 120 \sin(60t)$

3) $V = 120 \sin(60\pi t)$

4) $V = 120 \sin(120\pi t)$

- 3 Which equation is represented by the graph shown below?



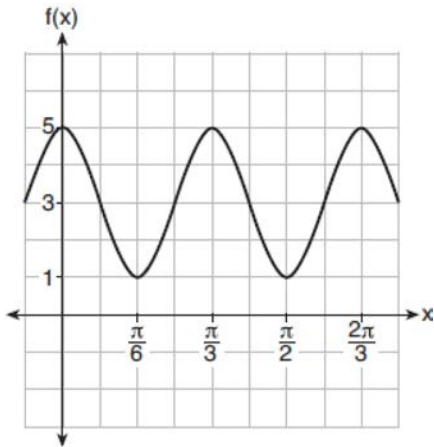
1) $y = \frac{1}{2} \cos 2x$

2) $y = \cos x$

3) $y = \frac{1}{2} \cos x$

4) $y = 2 \cos \frac{1}{2}x$

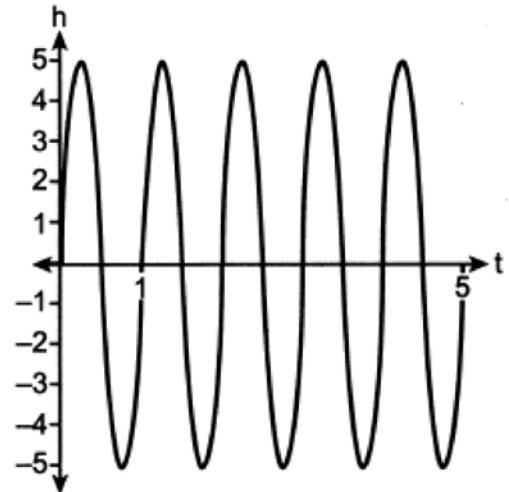
- 4 The function $f(x) = a \cos bx + c$ is plotted on the graph shown below.



What are the values of a , b , and c ?

- 1) $a = 2, b = 6, c = 3$
- 2) $a = 2, b = 3, c = 1$
- 3) $a = 4, b = 6, c = 5$
- 4) $a = 4, b = \frac{\pi}{3}, c = 3$

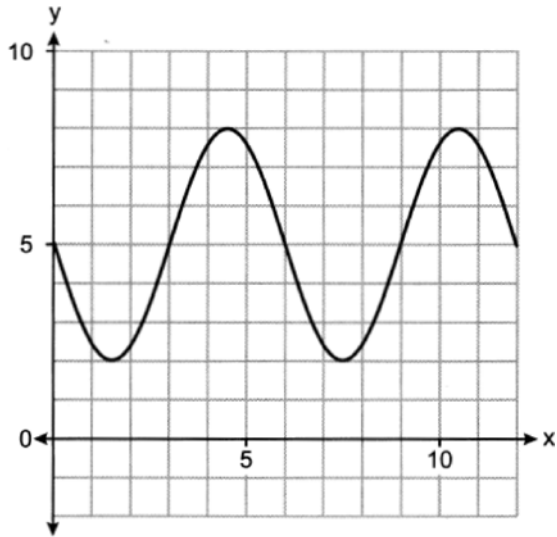
- 5 A cyclist pedals a bike at a rate of 60 revolutions per minute. The height, h , of a pedal at time t , in seconds, is plotted below.



The graph can be modeled by the function $h(t) = 5 \sin(kt)$, where k is equal to

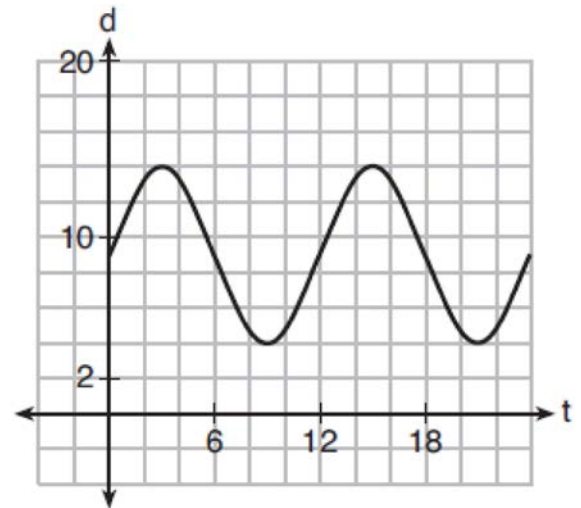
- 1) 1
- 2) 2π
- 3) 60
- 4) $\frac{\pi}{30}$

6 Which equation is graphed in the diagram below?



- 1) $y = -3 \sin\left(\frac{\pi}{3}x\right) + 5$
- 2) $y = -3 \cos\left(\frac{\pi}{3}x\right) + 5$
- 3) $y = -5 \sin\left(\frac{\pi}{3}x\right) + 3$
- 4) $y = -5 \cos\left(\frac{\pi}{3}x\right) + 3$

7 The depth of the water at a marker 20 feet from the shore in a bay is depicted in the graph below.



If the depth, d , is measured in feet and time, t , is measured in hours since midnight, what is an equation for the depth of the water at the marker?

- 1) $d = 5 \cos\left(\frac{\pi}{6}t\right) + 9$
- 2) $d = 9 \cos\left(\frac{\pi}{6}t\right) + 5$
- 3) $d = 9 \sin\left(\frac{\pi}{6}t\right) + 5$
- 4) $d = 5 \sin\left(\frac{\pi}{6}t\right) + 9$

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Answer Section

1 ANS: 1

$$-4(-1) - 3 = 1 \quad 8 = \frac{2\pi}{b}$$

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

REF: 081820aai

2 ANS: 4

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

$$\frac{1}{60} = \frac{2\pi}{B}$$

$$B = 120\pi$$

REF: 061624aai

3 ANS: 1

REF: 061708aai

4 ANS: 1

The cosine function has been translated +3. Since the maximum is 5 and the minimum is 1, the amplitude is 2.

$$\frac{\pi}{3} = \frac{2\pi}{b}$$

$$b = 6$$

REF: 011913aai

5 ANS: 2

$$1 = \frac{2\pi}{k}$$

$$k = 2\pi$$

REF: 012313aai

6 ANS: 1

$$\text{amplitude} = \frac{8-2}{2} = 3, b = \frac{2\pi}{6} = \frac{\pi}{3}, c = \frac{8+2}{2} = 5$$

REF: 062403aai

7 ANS: 4

$$a = \frac{14-4}{2} = 5, d = \frac{14+4}{2} = 9$$

REF: 061810aai