Name _____

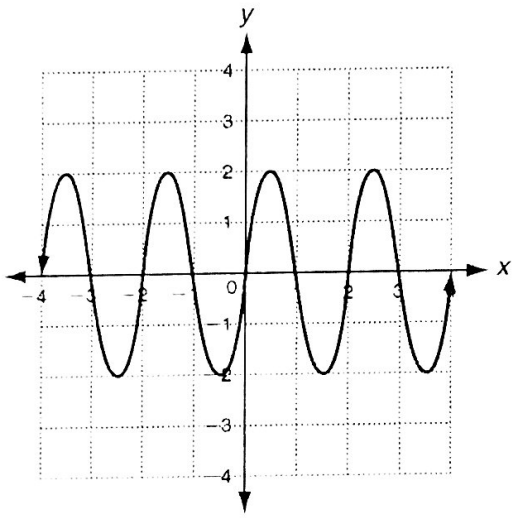
Secondary 3 Honors SAGE Review Teacher _____ Date _____ Period _____

F.TF.5

Multiple Choice

Identify the choice that best completes the statement or answers the question.

____ 1. Which is the equation of the graph shown below?



a. $f(x) = 2\sin \pi x$

b. $f(x) = 2\sin 2\pi x$

c. $f(x) = \frac{1}{2}\sin \pi x$

d. $f(x) = \frac{1}{2}\sin \frac{\pi}{2}x$

____ 2. The graph of which function has a period of π and an amplitude of π?

a. $y = \frac{1}{\pi}\sin 2x$

b. $y = \pi \sin 2x$

c. $y = \frac{1}{\pi}\sin \frac{1}{2}x$

d. $y = \pi \sin \frac{1}{2}x$

____ 3. Which function has an amplitude of 2 and a period of π?

a. $f(x) = 2\cos 2x$

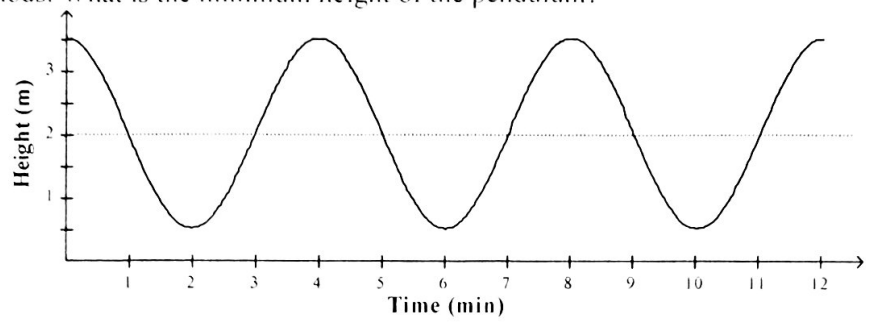
b. $f(x) = 2\cos \pi x$

c. $f(x) = \frac{1}{2}\cos 2x$

d. $f(x) = \frac{1}{2}\cos \pi x$

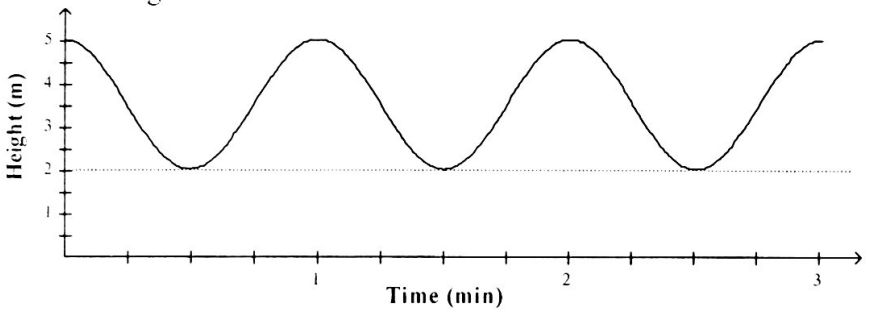
____ 4. The height of a giant pendulum in meters above the ground is given by the function $H(t) = 1.5\cos\frac{\pi}{2}t + 2$ where t is time in minutes. Graph the height of the pendulum for three complete periods. What is the minimum height of the pendulum?

a.



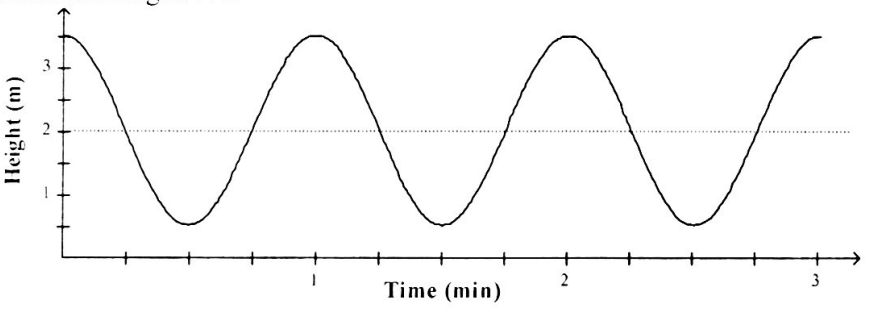
minimum height: 0.5 m

b.



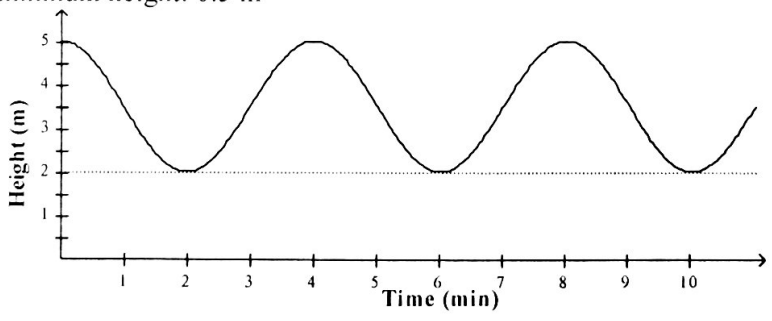
minimum height: 2 m

c.



minimum height: 0.5 m

d.



minimum height: 2 m

____ 5. A sinusoid reaches a maximum value of $\left(\frac{\pi}{2}, 28\right)$ and a minimum value of $(\pi, 12)$ during a single cycle. What is its amplitude?

a. $\frac{\pi}{2}$

b. 8

c. 2π

d. 20

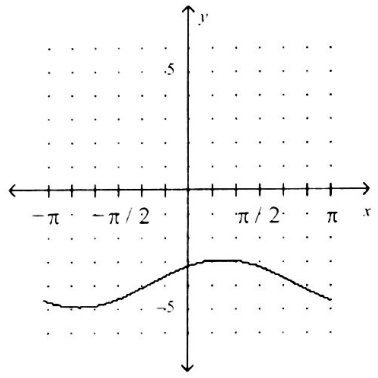
____ 6. A mass is suspended from a spring. When the mass is displaced vertically from its resting position and released, the displacement of the mass relative to its resting position is periodic. If the mass is raised 2 inches from its resting position and released, which function could model the displacement d, in inches, of the mass t seconds after being released? (Assume that the displacement above the resting position is positive and the displacement below the resting position is negative.)

a. $d(t) = 2 \sin t$
b. $d(t) = 2 \cos t$
c. $d(t) = -2 \sin t$
d. $d(t) = -2 \cos t$

Short Answer

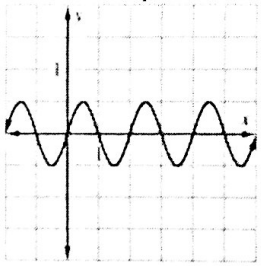
7. Write an equation of the form $y = a \cos bx$, where $a > 0$ and $b > 0$, with amplitude 0.6 and period $\frac{\pi}{2}$.

8. Write the equation for the sine function. (The period is 2π.)

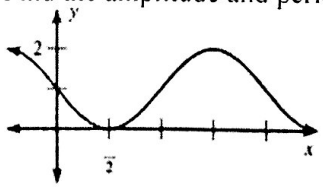


9. A Ferris wheel with a radius of 25 feet is rotating at a rate of 3 revolutions per minute. When $t = 0$, a chair starts at the lowest point on the wheel, which is 5 feet above the ground. Write a model for the height h (in feet) of the chair as a function of the time t (in seconds).

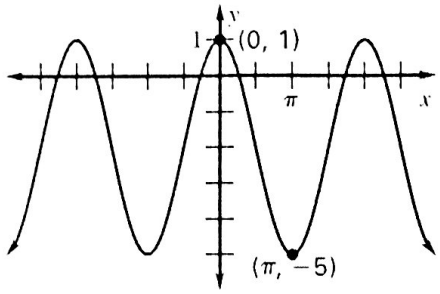
10. Find the amplitude and period of the graph. Then write a trigonometric function for the graph.



11. Find the amplitude and period of the graph. Then write a trigonometric function for the graph.



12. Write a function for the sinusoid.



13. High tide at the ocean shore begins at 12 A.M. (midnight), and is measured to be 4.82 feet. The low tide occurs at 6:15 A.M., and is measured to be 0.92 foot. Model the tide as a cosine function of the hours h with $h = 0$ representing midnight.

14. A boat is tied to a stationary dock. As the boat rises and falls with the waves at high tide, the deck of the boat varies between 1 foot below and 2 feet below the top of the dock. If a wave passes under the boat every 4 seconds, write a function to model the distance d, in feet, between the top of the dock and the deck of the boat t seconds after the peak of a wave passes under the boat.

Problem

15. One of the world's tallest Ferris wheels sits on a building 15 meters high and has a radius of 75 meters. It completes 1 revolution every 30 minutes. Mike wrote the function $h_1(t) = 75 \sin \frac{\pi}{15}(t - 7.5) + 90$ to model the height h of a passenger t minutes after getting on the Ferris wheel. Lupe thinks the height is described by the function $h_2(t) = 75 \cos \frac{\pi}{15}(t - 15) + 90$.

    a. Explain why both Mike and Lupe are correct.

    b. What does this say about using sine and cosine to model periodic phenomena? Explain. (Hint: Think about transformations.)