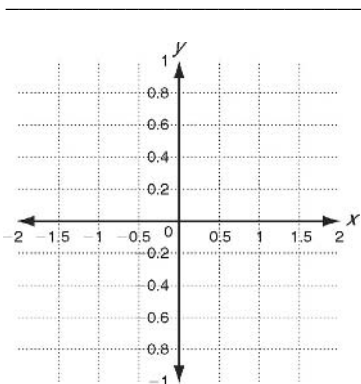


LESSON
11-1

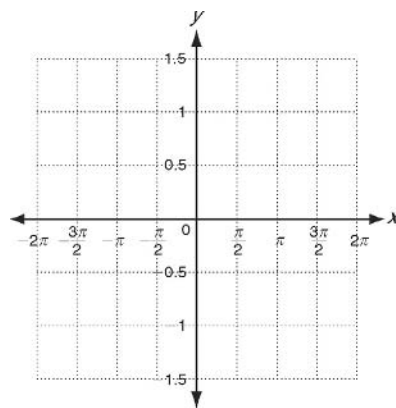
Practice C
Graphs of Sine and Cosine

Using $f(x) = \sin x$ or $f(x) = \cos x$ as a guide, graph each function. Identify the amplitude, period, x-intercepts, and phase shift.

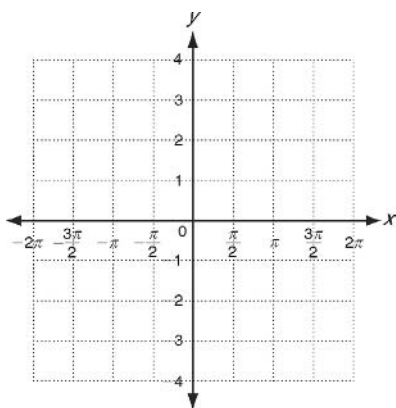
1. $h(x) = \frac{1}{2} \cos(-\pi x)$



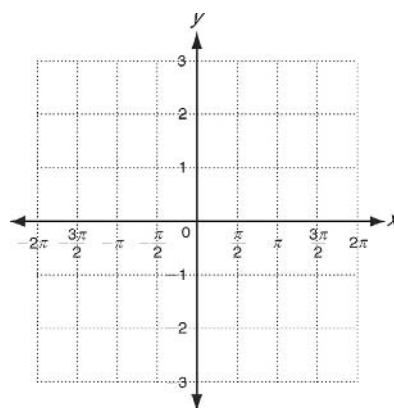
2. $q(x) = -\sin\left(\frac{\pi}{2}x\right)$



3. $c(x) = 3\cos(x + \pi)$



4. $h(x) = -2\sin\left(x - \frac{\pi}{2}\right)$

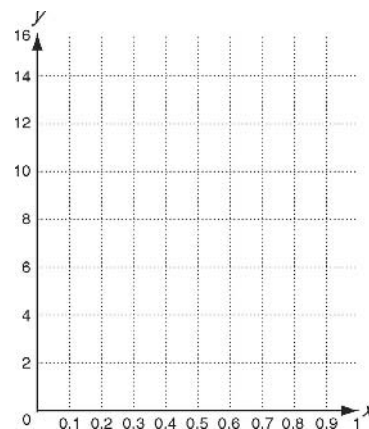


Solve.

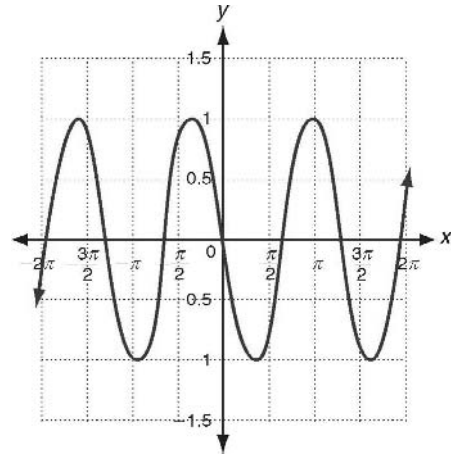
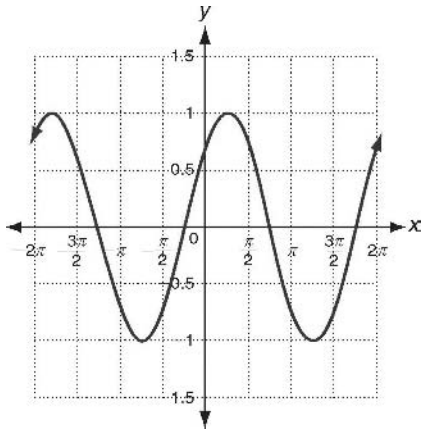
5. A manual metronome is an inverted pendulum that helps musicians play to the beat. The number of centimeters, C , that the tip of the pendulum is from a tabletop can be modeled by $C(t) = 2\cos 4\pi t + 12$, where t is the time in seconds.

a. Graph the height of the pendulum tip for 2 periods.

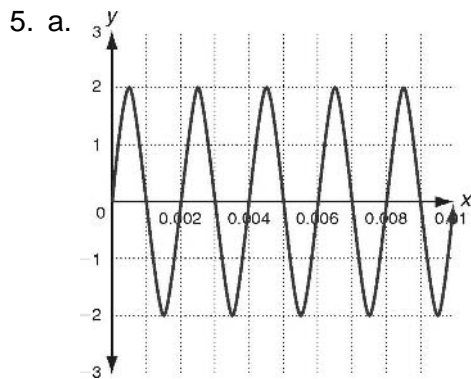
b. How high is the pendulum when $t = \frac{1}{4}$ second?



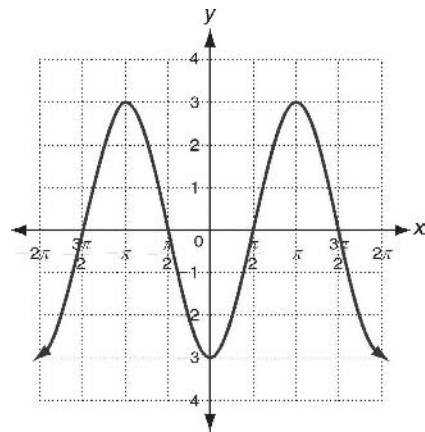
4. x-intercepts: $\frac{3\pi}{4}, \frac{7\pi}{4}$; phase shift: $\frac{\pi}{4}$ radians to the right



3. Amplitude: 3; period: 2π , x-intercepts: $\frac{\pi}{2}, \frac{3\pi}{2}$; phase shift: π radians to the left

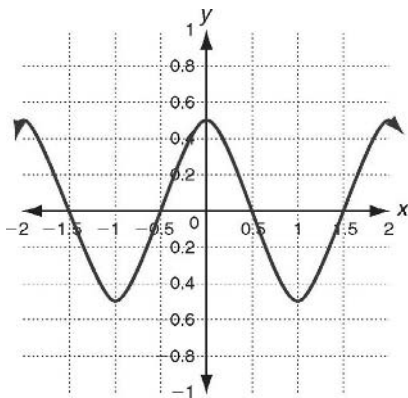


b. 500 Hz



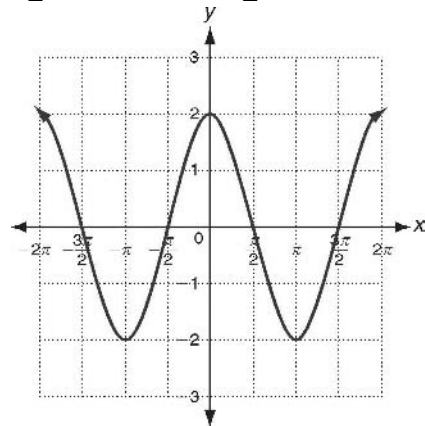
Practice C

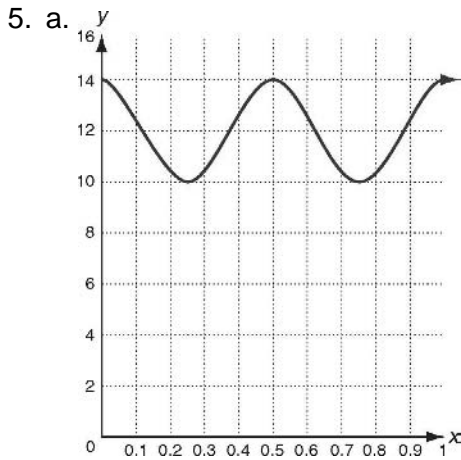
1. Amplitude: 0.5; period: 2; x-intercepts: 0.5, 1.5; phase shift: 0



2. Amplitude: 1; period: 4; x-intercepts: 0, 2, 4; phase shift: 0

4. Amplitude: 2; period: 2π , x-intercepts: $\frac{\pi}{2}, \frac{3\pi}{2}$; phase shift: $\frac{\pi}{2}$ radians to the right

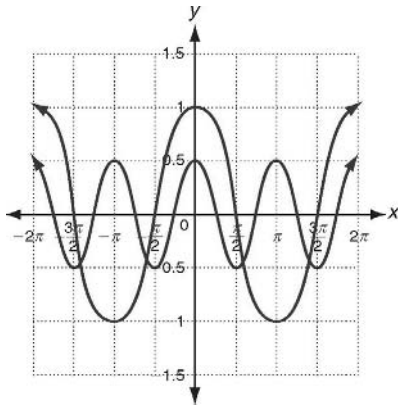




b. 10 cm

Review for Mastery

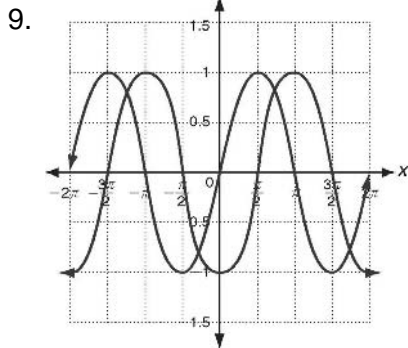
1. 0.5
2. π
3. 0.5, -0.5
4. 1 cycle
- 5.



6. $h = \frac{\pi}{2}$; phase shift: $\frac{\pi}{2}$ radians to the right

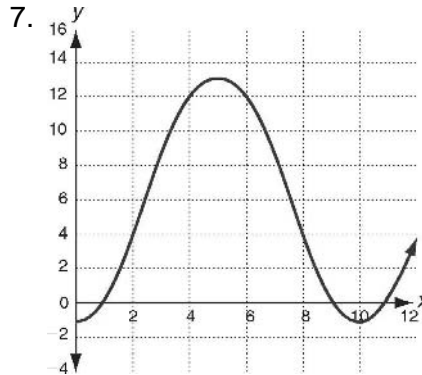
7. $\frac{\pi}{2}, \frac{3\pi}{2}$

8. Maximum of 1 at π , minimum of -1 at 0 and 2π



Challenge

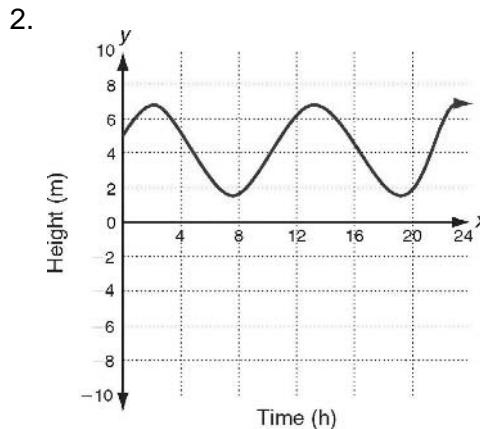
1. a, b, h, k
2. $k = 6$
3. $a = 7$
4. $b = \frac{\pi}{5}$
5. $h = \frac{5}{2}$
6. $y = 7 \sin \frac{\pi}{5} \left(x - \frac{5}{2} \right) + 6$



8. about 8.2 ft

Problem Solving

1. a. 2.5
- b. 12
- c. 2 units to the right
- d. 4 units up
- e. 6.5 m at 2:00 A.M.
- f. 1.5 m at 8:00 A.M.



3. 2
4. a. $d(t) = 4 \cos \left(\frac{\pi}{6} \right) (t - 2) + 2.5$

b. Possible answer: The maximum depth of the water would still be 6.5 m, but the minimum depth would be -1.5 m.