

Name _____

Angular / Linear Velocity Worksheet.

1. The second hand on a clock makes one revolution in one minute. What is the linear velocity, in centimeters per second, of a point on the tip of the second hand, if the second hand is 9 cm from center to the tip?

2. A Merry-Go-Round travels at an angular velocity of 6 revolutions per minute. What is the linear velocity, in feet per minute, of a person that is sitting 5 feet from the center of the Merry-Go-Round?

3. The earth makes one rotation every 24 hours. What is the linear velocity, in miles per hour, of a person standing on the equator, if the radius of the earth at the equator is approximately 4000 miles?

4. A bicycle wheel is 24 inches in diameter. If the bicycle is traveling at 10 miles per hour, what is the angular velocity, in revolutions per minute, of the wheel?

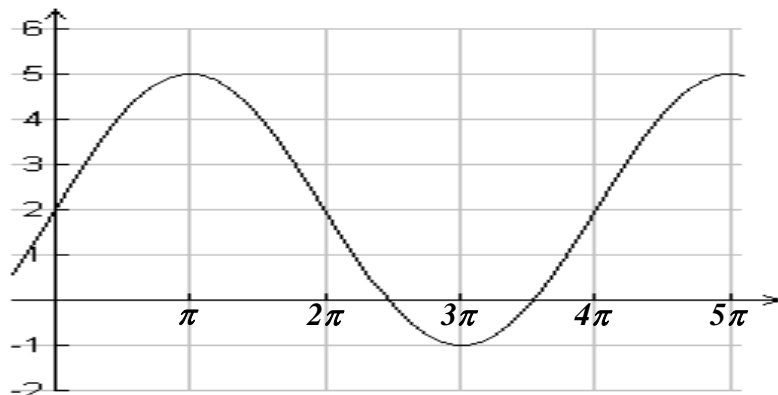
5. A figure skater is spinning with his arms outstretched at an angular velocity of 8 radians per second.
 - a. What is the angular velocity of the spin, in revolutions per minute?

 - b. His fingertip travels in a circular motion with a radius of 90 centimeters. What is the linear velocity of the fingertip, in meters per second?

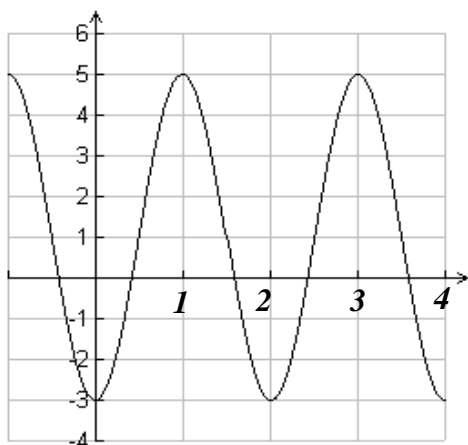
Sinusoid Graph Problems

Write the equation for each of the following graphs. There may be more than one correct answer.

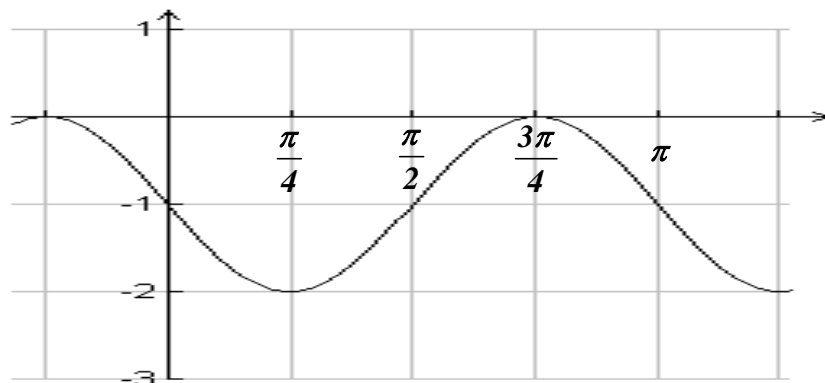
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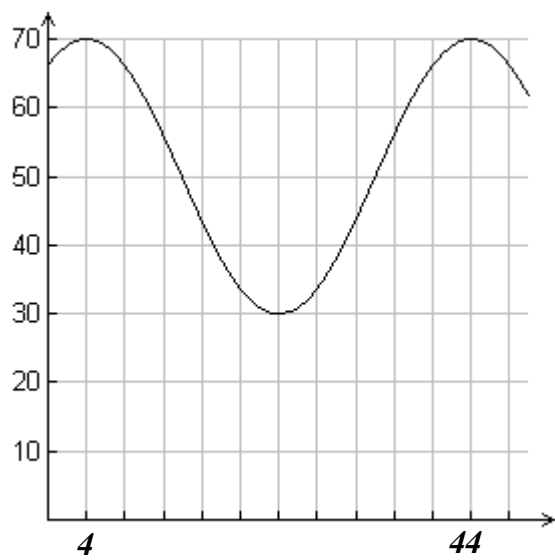
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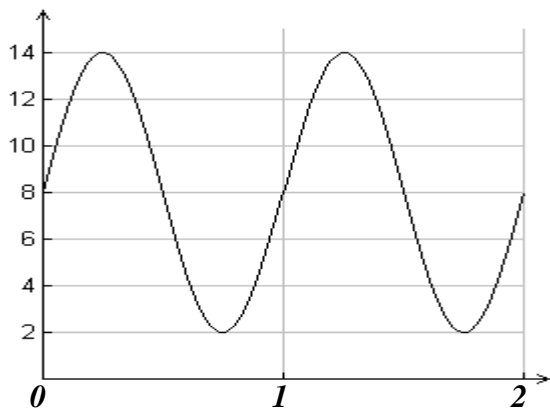
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Sinusoid Problems

1. At midnight, at high tide, the depth of water on a beach is 7 feet. Six and one-half hours later, the depth of the water at low tide is 3 feet. Assume that the depth of the water varies sinusoidally with time. Let t represent the number of hours since midnight.
 - a. Write an equation that models the depth of the water at any time t .

 - b. What is the depth of the water at $t = 4$ hours?

 - c. What is the *first* value of t for which the depth of the water is 3.5 feet?

2. The number of sunspots on the surface of the sun varies sinusoidally with time. Over a period of 18 years, the number of sunspots range from a minimum of 10 sunspots to a maximum of 110 sunspots. The last maximum occurred in the year 2002.
 - a. Write an equation that models the number of sunspots in the year t .

 - b. How many sunspots will there be in the year 2009?

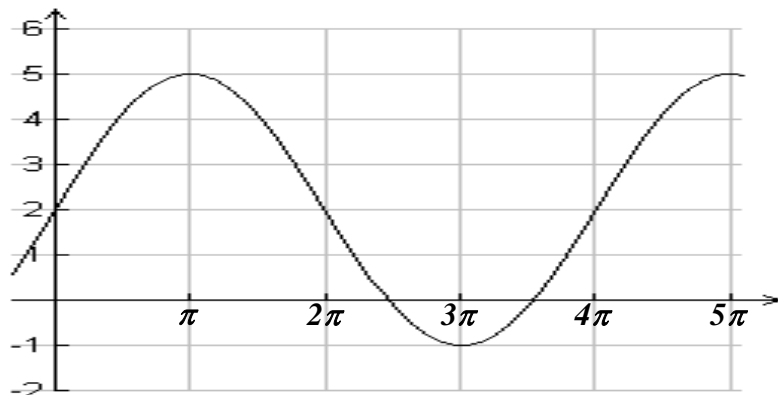
 - c. What is the first year after 2020 that there will be about 35 sunspots?

3. A weight is attached to a spring that is bouncing up and down. You start a stopwatch. When $t = 4$ seconds, the weight is at a minimum distance of 2 feet above the floor. When $t = 9$ seconds, the weight is at a maximum distance of 8 feet above the floor. Assume that the height of the weight varies sinusoidally with time.
- Write an equation that models the height that the weight is above the floor at any time t .
 - What will be the height at $t = 11$ seconds?
 - What are the first two positive times t that the weight is 6 feet above the floor?
4. A Ferris wheel has a diameter of 100 feet. The center of the wheel is 52 feet above the ground. The wheel makes 1 complete revolution every 16 seconds. You get on the Ferris wheel at its lowest level at $t = 0$ seconds.
- Write an equation that models your height above the ground at any time t .
 - What is your height above the ground when $t = 4$ seconds?
 - What is the first time you will be 80 feet off the ground?
5. A person's blood pressure B , in millimeters of mercury is given for time t , in seconds, by the formula
- $$P = 110 - 20 \cos\left(\frac{8\pi}{3}t\right)$$
- What are the maximum and minimum blood pressures?
 - What is the period for this function?

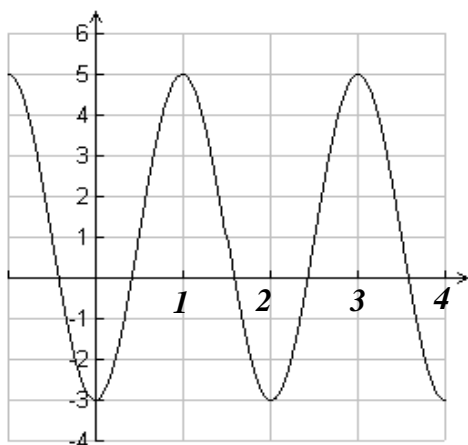
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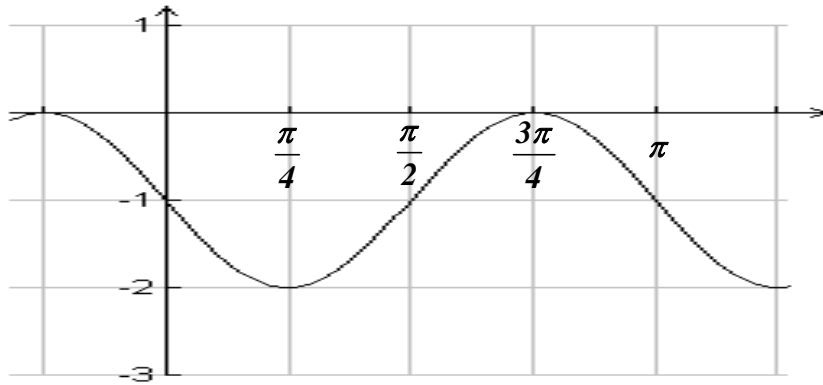
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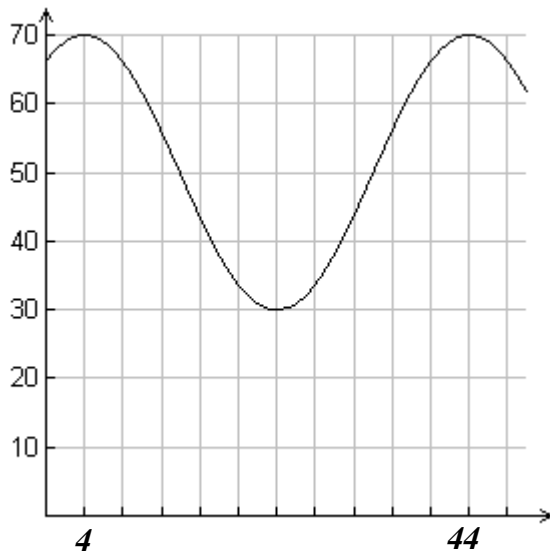
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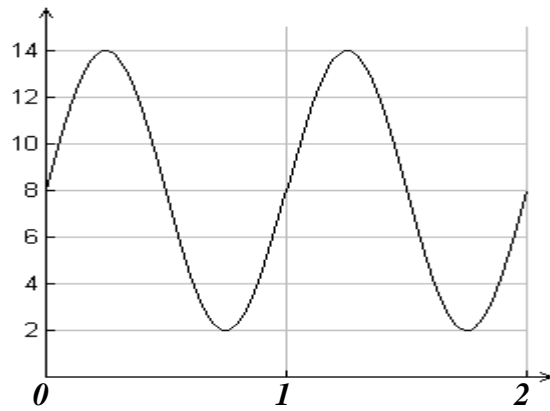
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