

HOMework 8-6

1. c

2. d

3. $f(x) = 3 \sin\left(\frac{\pi}{4}x\right) - 4$

4. $f(x) = 5 \cos\left(\frac{\pi}{4}x\right) + 4$

5. $f(x) = 2 \cos\left(\frac{\pi}{6}x\right) - 5$

6. $f(x) = -3 \sin\left(\frac{\pi}{4}x\right) + 3$

7. $f(x) = -50 \sin\left(\frac{\pi}{4}x\right) + 20$

8. $f(x) = 20 \cos\left(\frac{\pi}{6}x\right) + 5$

9. $h(t) = -20 \cos\left(\frac{\pi}{4}t\right) + 20$

Feb 6-6:59 PM

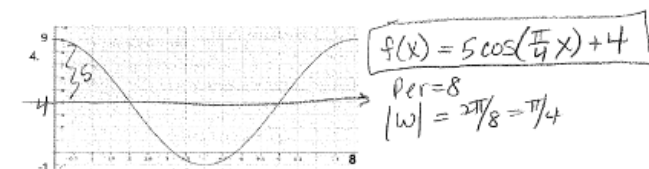
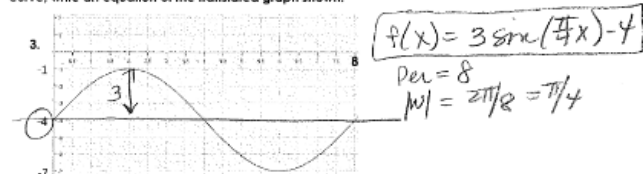
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Algebra 2 Homework 11.5

Period: _____

1. If $f(x) = 3 \sin(2x) + 4$, what is the maximum value of y ? $3+4=7$
 a. 3 b. 24 c. d. 10
2. If $f(x) = 2 \cos\left(\frac{1}{2}x\right) - 3$, what is the minimum value of y ?
D a. -3 b. 2 c. -1 d. 5
 $-2-3 = -5$

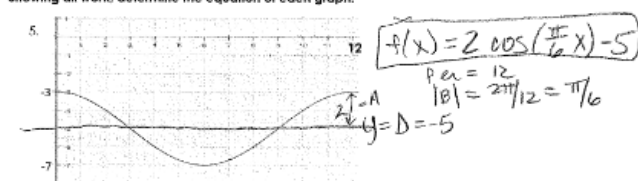
In 3 and 4, if each of the following graphs represents a vertical translation of a basic sine or cosine curve, write an equation of the translated graph shown.



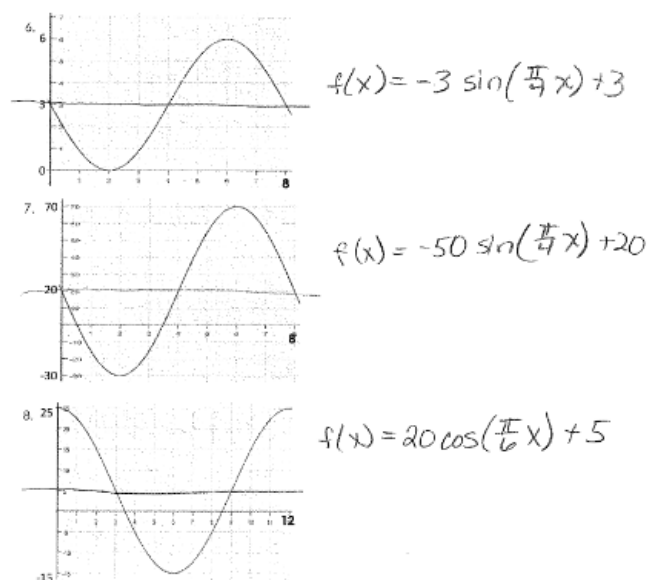
For 5-8, each of the following graphs can be modeled by the equation:

$$f(x) = A \sin(Bx) + D \text{ or } f(x) = A \cos(Bx) + D$$

Showing all work, determine the equation of each graph.



Feb 6-7:00 PM



9. A person gets on a Ferris wheel at its lowest point, with a radius of 20 meters. The ride took 4 minutes and made 30 complete revolutions. Write the equation that represents the height, $h(t)$ as a function of time in seconds.

Hint: Period = length of one cycle (in seconds)

$\text{amp} = 20 \text{ m}$ (rider goes 20m above and below center)
 $a = -20$ start at bottom
 $\text{Per} = \frac{4 \text{ min} \times 60 \text{ sec}}{30 \text{ rev.}} = 8 \text{ sec/cycle}$
 $|w| = \frac{2\pi}{8} = \frac{\pi}{4}$ $R = 20 \text{ m}$ (radius of wheel)
 $h(t) = -20 \cos\left(\frac{\pi}{4}t\right) + 20$

Feb 6-7:00 PM

Day 7: Mixed Problems

Nov 11-4:30 PM

1. Based on climate data that have been collected in Bar Harbor, Maine, the average monthly temperature, in degrees F, can be modeled by the equation $B(x) = 23.914\sin(0.508x - 2.116) + 55.300$. The same governmental agency collect average monthly temperature data for Phoenix, Arizona, and found the temperatures could be modeled by the equation $P(x) = 20.238\sin(0.525x - 2.148) + 86.729$.

Which statement **can not** be concluded based on the average monthly temperature models x months after starting data collection?

- (1) The average monthly temperature variation is more in Bar Harbor than in Phoenix.
- (2) The midline average monthly temperature for Bar Harbor is lower than the midline temperature for Phoenix.
- (3) The maximum average monthly temperature for Bar Harbor is 79°F , to the nearest degree.
- (4) The minimum average monthly temperature for Phoenix is 20°F , to the nearest degree.

Bar Harbor	Phoenix
$[-23.914, 23.914]$	$[-20.238, 20.238]$
$+55.3$	$+86.729$
$[\quad , \quad]$	$[\quad , \quad]$
$\text{min} \quad , \quad \text{max}$	$\text{min} \quad , \quad \text{max}$

Nov 11-4:35 PM

2. A sine function increasing through the origin can be used to model light waves. Violet light has a wavelength of 400 nanometers. Over which interval is the height of the wave decreasing, only?

- | | |
|----------------|----------------|
| (1) (0, 200) | (3) (200, 400) |
| (2) (100, 300) | (4) (300, 400) |

3. The hours of daylight, y , in Utica in days, x , from January 1, 2013 can be modeled by the equation $y = 3.06\sin(0.017x - 1.40) + 12.23$. How many hours of daylight, to the nearest tenth, does this model predict for February 14, 2013?

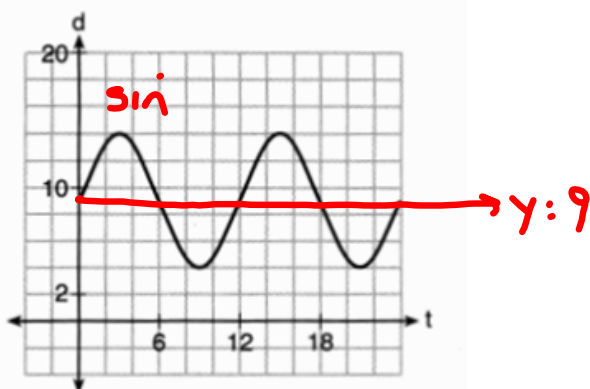
- | | |
|----------|----------|
| (1) 9.4 | (3) 12.1 |
| (2) 10.4 | (4) 12.2 |

4. Relative to the graph of $y = 3\sin x$, what is the shift of the graph of $y = 3\sin(x + \pi/3)$?

- | | |
|-------------------|------------------|
| (1) $\pi/3$ right | (3) $\pi/3$ up |
| (2) $\pi/3$ left | (4) $\pi/3$ down |

Nov 11-4:32 PM

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



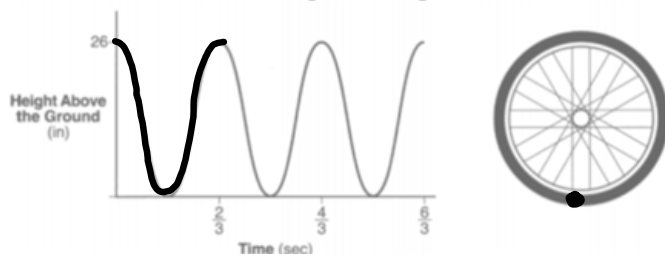
If the depth, d , is measured in feet and time, t , is measured in hours since midnight, what is the equation for the depth of the water at the marker?

- ~~(1)~~ $d = 5\cos(\pi/6t) + 9$ (3) $d = 9\sin(\pi/6t) + 3$
~~(2)~~ $d = 9\cos(\pi/6t) + 5$ (4) $d = 5\sin(\pi/6t) + 9$

Nov 11-4:32 PM

6. The volume of air in a person's lungs, as the person breathes in and out, can be modeled by a sine graph. A scientist is studying the difference in this volume for people at rest compared to people told to take a deep breath. When examining the graphs, should the scientist focus on the amplitude, period, or midline? Explain your choice.

7. The graph below represents the height above the ground, h , in inches, of a point on a triathlete's bike wheel during a training ride in terms of time, t , in seconds.

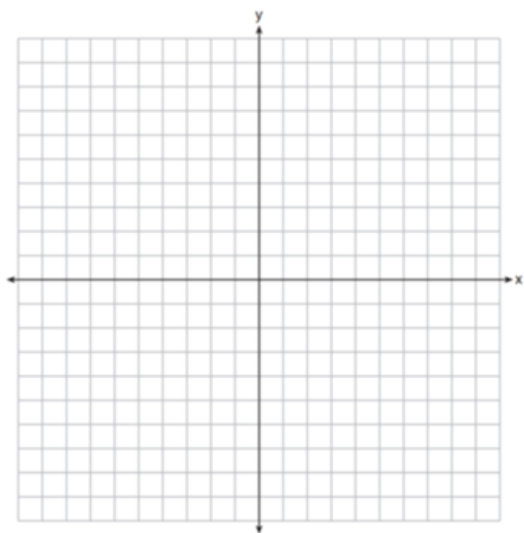


Identify the period of the graph and describe what the period represents in this context.

1 cycle

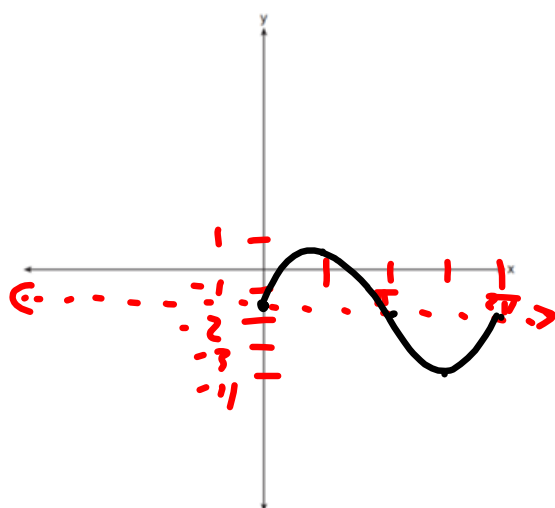
Nov 11-4:32 PM

8. On the axes below, graph one cycle of a cosine function with amplitude 3, period $\pi/2$, midline $y = -1$, and passing through the point $(0, 2)$.



Nov 11-4:33 PM

- 9 a) On the axes below, sketch at least one cycle of the sine curve with an amplitude of 2, a midline at $y = -3/2$, and a period of 2π .



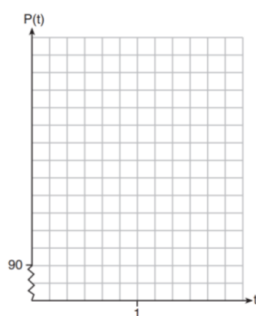
$$\begin{array}{l}
 0, 1, 0, -1, 0 \\
 0, 2, 0, -2, 0 \\
 -\frac{3}{2} \\
 -\frac{3}{2}, \frac{1}{2}, -\frac{3}{2}, -\frac{5}{2}, -\frac{3}{2}
 \end{array}$$

- b) Explain any difference between a sketch of part a and a sketch of the equation $y = 2\sin(x - \pi/3) - 3/2$.

Nov 11-4:33 PM

10. The resting blood pressure of an adult patient can be modeled by the function P below, where $P(t)$ is the pressure in millimeters of mercury after time t in seconds.
 $P(t) = 24\cos(3\pi t) + 120$

On the set of axes below, graph $y = P(t)$ over the domain $0 \leq t \leq 2$.



Determine the period of P . Explain what this value represents in the given context.

Normal resting blood pressure for an adult is 120 over 80. This means that the blood pressure oscillates between a maximum of 120 and a minimum of 80. Adults with high blood pressure (above 140 over 90) and adults with low blood pressure (below 90 over 60) may be at risk for health disorders. Classify the given patient's blood pressure as low, normal, or high and explain your reasoning.

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Answers:

1. 4

2. 2

3. 2

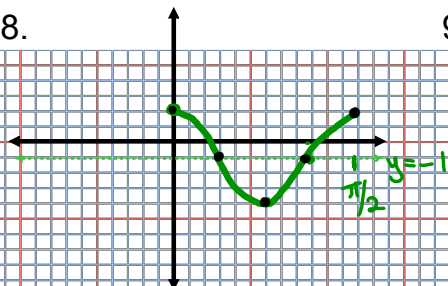
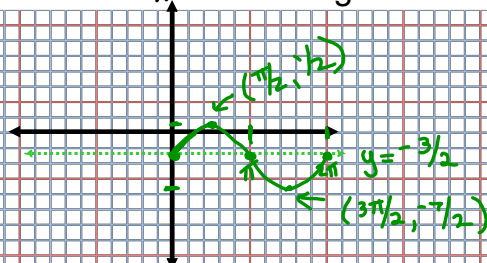
4. 2

5. 4

6. Amplitude because it measures the volume. Period measures how quickly they breath, and midline measures the average air volume.

7. Period is $2/3$ seconds, which represents the amount of time it takes the wheel to complete one revolution.

8.

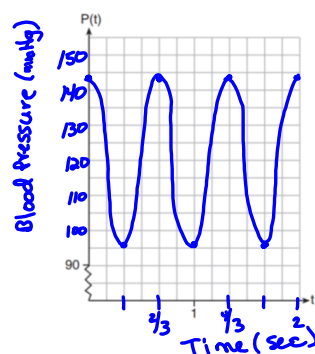
9. b) Translated $\pi/3$ to the right.

#10 →

10. The resting blood pressure of an adult patient can be modeled by the function P below, where $P(t)$ is the pressure in millimeters of mercury after time t in seconds.

$$P(t) = 24\cos(3\pi t) + 120$$

On the set of axes below, graph $y = P(t)$ over the domain $0 \leq t \leq 2$.



$$\text{Per} = \frac{2\pi}{3\pi} = \frac{2}{3}$$

$$\text{Max} = 120 + 24 = 144$$

$$\text{Min} = 120 - 24 = 96$$

Determine the period of P . Explain what this value represents in the given context.

Period = $\frac{2}{3}$ seconds = time between beats.

Normal resting blood pressure for an adult is 120 over 80. This means that the blood pressure oscillates between a maximum of 120 and a minimum of 80. Adults with high blood pressure (above 140 over 90) and adults with low blood pressure (below 90 over 60) may be at risk for health disorders. Classify the given patient's blood pressure as low, normal, or high and explain your reasoning.

This person's BP is 144 over 96 which is considered High BP because it is higher than 140 over 90.

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Nov 13-1:20 PM

Jan 22-8:39 AM