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. $f(x) = 20\cos\left(\frac{\pi}{6}x\right) + 5$
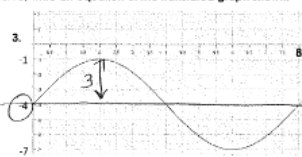
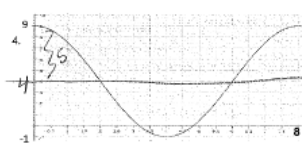9. $h(t) = -20\cos\left(\frac{\pi}{4}t\right) + 20$

Feb 6-6:59 PM

Name: _____ key _____   Algebra 2 Homework 11-5

Period : _____

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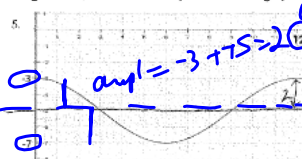
D   2. If f(x) = 2cos($\frac{1}{2}$x) - 3, what is the minimum value of y? $-3-2=-5$
       a. -3   b. 2   c. -1   d. -5
                           $\times$ $3 = -5$

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.

3.

$f(x) = 3\sin\left(\frac{\pi}{4}x\right) - 4$
$Per = 8$
$|w| = \frac{2\pi}{8} = \frac{\pi}{4}$

4.

$f(x) = 5\cos\left(\frac{\pi}{4}x\right) + 4$
$Per = 8$
$|w| = \frac{2\pi}{8} = \frac{\pi}{4}$
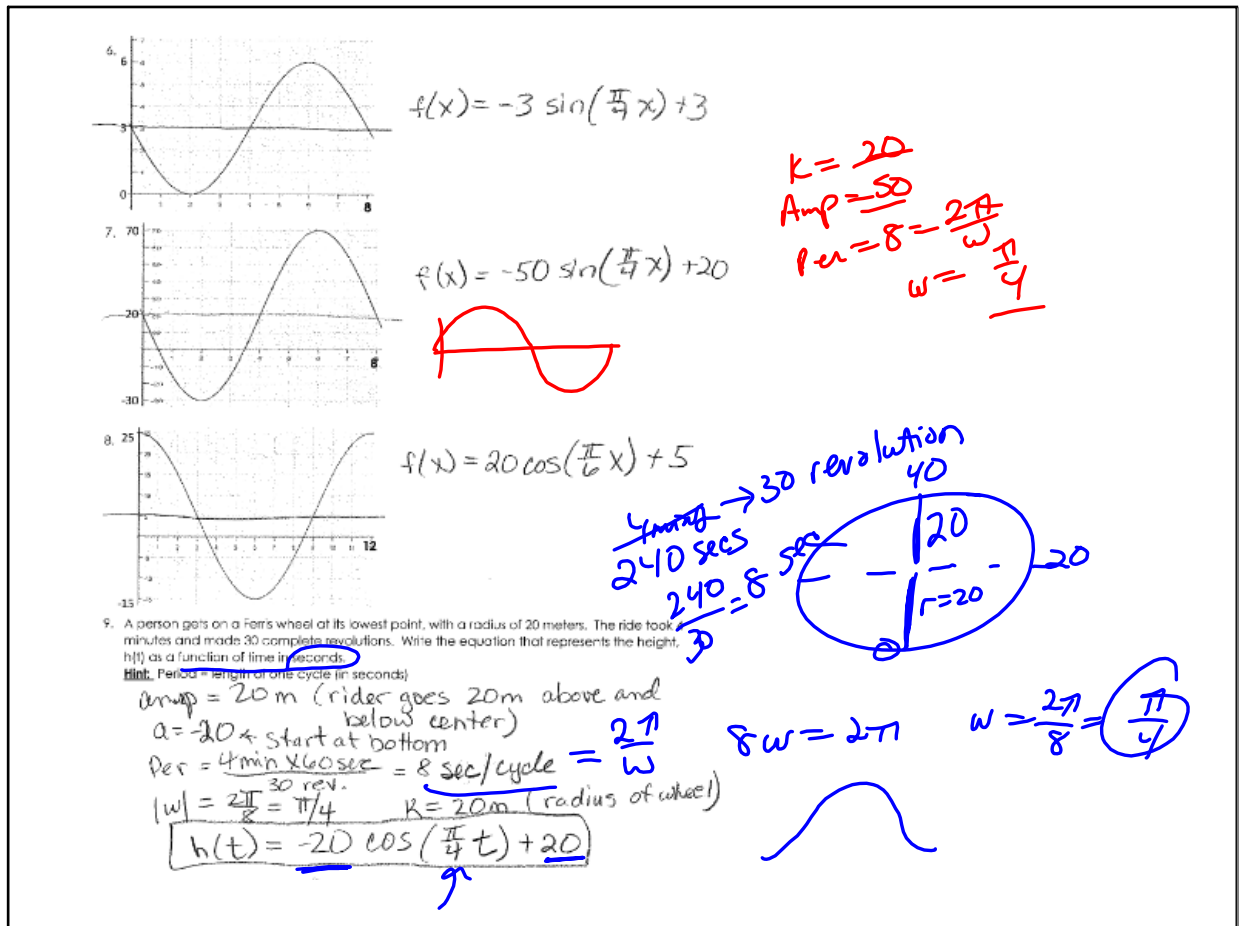
For 5 – 8, each of the following graphs can be modeled by the equation:
f(x) = A sin(BX) + D or f(x) = A cos(BX) + D
Showing all work, determine the equation of each graph.

5.

$ampl = -3 + -7 = -2$ $f(x) = 2\cos\left(\frac{\pi}{6}x\right) - 5$
                          $Per = 12$
                          $|B| = \frac{2\pi}{12} = \frac{\pi}{6}$
$y = D = -5$

$f(x) = A\cos(BX) + D$

$D = midline\ (avg) = \frac{-3 + -7}{2} = \frac{-10}{2}$
$= -5 = D$

$amplit\ (A) = 2$

$per = \frac{2\pi}{B} = 12$

$12B = 2\pi$

$B = \frac{2\pi}{12} = \frac{\pi}{6}$

Feb 6-7:00 PM

6.

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

7.

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

$k = 20$
$Amp = 50$
$Per = 8 = \frac{2\pi}{w}$
$w = \frac{\pi}{4}$

8.

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

→ 30 revolution
4 mins → 40
240 secs
$\frac{240}{30} = 8$ sec
$r = 20$

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)

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

$8w = 2\pi$ $w = \frac{2\pi}{8} = \frac{\pi}{4}$

Feb 6-7:00 PM

6. The percentage of the moon's surface that is visible to a person standing on the Earth varies with the time since the moon was full. The moon passes through a full cycle in 28 days, from full moon to full moon. The maximum percentage of the moon's surface that is visible is 50%. Determine an equation, in the form $P(t) = A\cos(Bt) + C$ for the percentage of the surface that is visible, P, as a function of the number of days, t, since the moon was full. Show the work that leads to the values of A, B, and C.

max = 50
min = 0
midline = 25 = V.S. = C
A = 25

full cycle = 28 = w?
period = $\frac{28}{1} = \frac{2\pi}{w}$

$w = \frac{2\pi}{28} = \frac{28w}{28}$
$w = \frac{2\pi}{28} = \frac{\pi}{14} = w = B$

freq   or   period
$\frac{w}{2\pi}$ $\frac{2\pi}{w}$

$P(t) = A\cos(Bt) + C$
$P(t) = 25\cos\left(\frac{\pi}{14}t\right) + 25$

Nov 12-4:24 PM

Day 7: Mixed Problems

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?

A   B > P

(1) The average monthly temperature <u>variation</u> is more in Bar Harbor than in Phoenix.

B ✗ P

(2) The <u>midline</u> 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.*　　55.3 + 33.9 = 79

(4) The minimum average monthly temperature for Phoenix is 20°F, to the *nearest degree.*　　86.7 - 20.2

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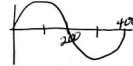
3. The hours of daylight, y, in Utica in days, x, from January 1, 2013 can be modeled by the equation $y = 3.06\sin(0.017x - 1.40) + 12.23$. How many hours of daylight, to the *nearest tenth,* does this model predict for February 14, 2013?

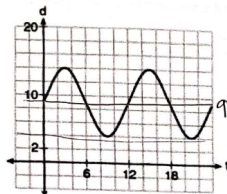(1) 9.4　　　　(3) 12.1
(2) 10.4　　　(4) 12.2

31 + 14 = 45
30 ?　　　10.4
44 ~ 10.4

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) π/3 right　　　(3) π/3 up
(2) π/3 left　　　(4) π/3 down

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

Amp = 5
per = 12
K = 9

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) $d = 5\sin(\pi/6t) + 9$

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.

Amplitude = how large of a breath (Resting = midline)
Period = how fast breathing

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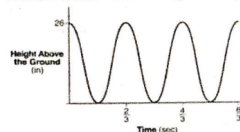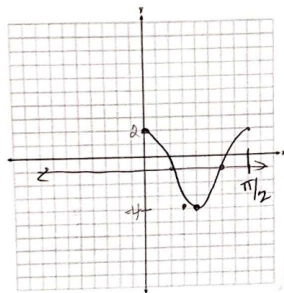
Identify the period of the graph and describe what the period represents in this context.

Per = 2/3 seconds = length of time for 1 rotation

18

3

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

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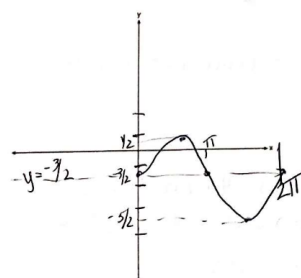
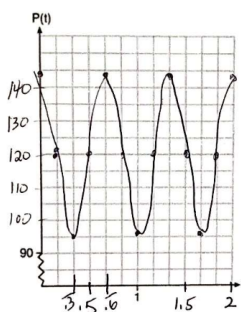b) Explain any difference between a sketch of part a and a sketch of the equation y = 2sin(x - π/3) - 3/2.

Translated π/3 to Rt.

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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 ≤ t ≤ 2.

$Pen = \dfrac{2\pi}{3\pi} = \dfrac{2}{3}$ sec.

Determine the period of P. Explain what this value represents in the given context.
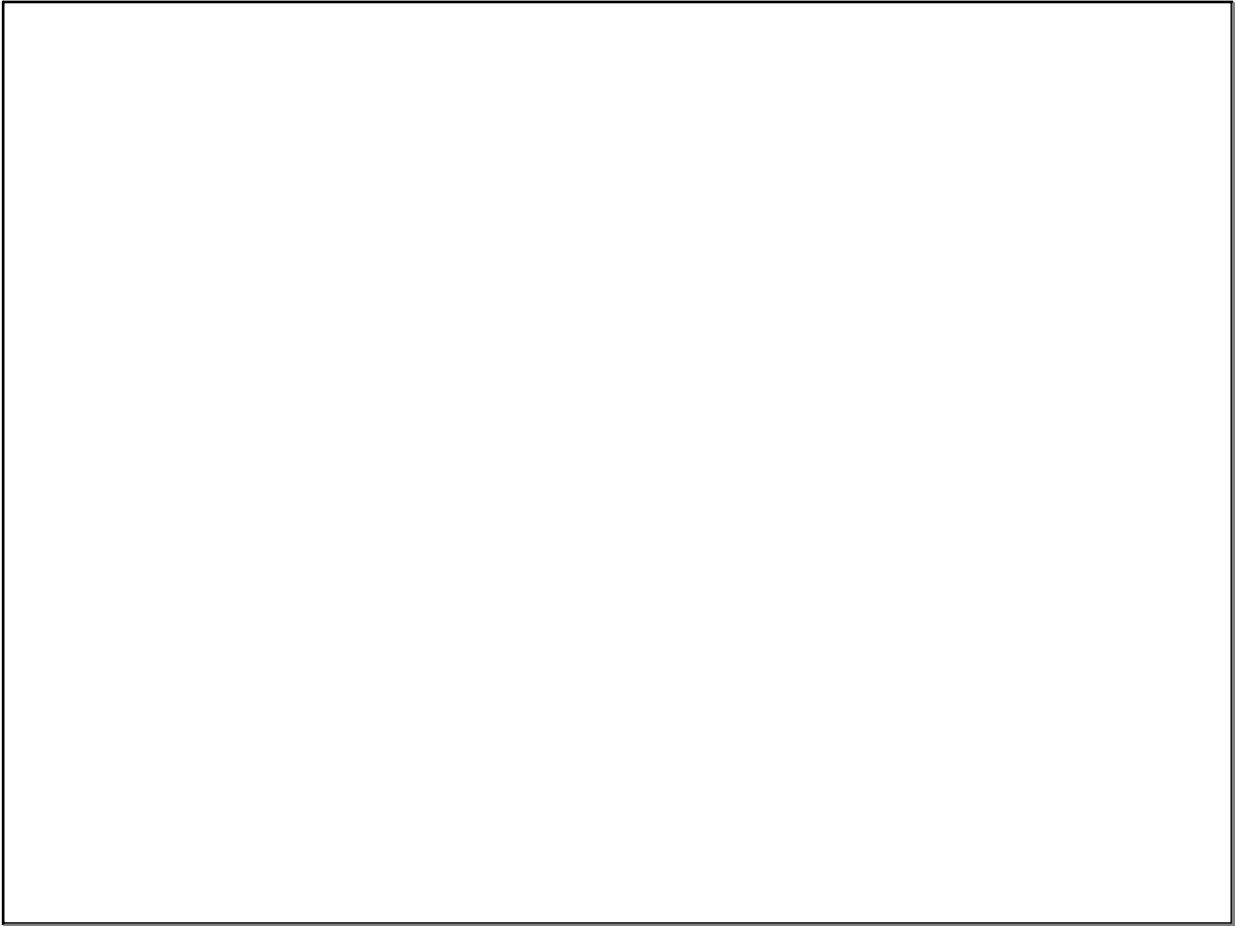
2/3 seconds = time between beats

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 ove 96 so they are considered high BP.

max = 120 + 24 = 144
min = 120 - 24 = 96

20

4

Jan 21-12:47 PM