Math 3201   **Chapter 8.4 Worksheet**   Name:_____

Part I: **Multiple Choice. Place the correct answer in the corresponding blank at the end of this section.**

1.   Which function below has the greatest amplitude?

    (A) $y = \underline{2}\sin3(x + 90°) + 5$

    (B) $y = \underline{3}\sin2(x - 90°) - 3$

    (C) $y = \frac{1}{3}\sin(x + 90°) - 1$

    (D) $y = \underline{1}\sin0.5(x - 90°)$

2.   Which function has the greatest period?

    (A) $y = 2\sin3(x + 90°) + 5$ $360/3 = 120$

    (B) $y = 3\sin2(x - 90°) - 3$ $360/2 = 180$

    (C) $y = \frac{1}{3}\sin(x + 90°) - 1$ $360/1 = 360$

    (D) $y = \sin0.5(x - 90°)$ $360/0.5 = 720$

3.   Which function has the greatest maximum value? $max = d + a$

    (A) $y = 2 \sin 3(x + 90°) + 5$ $5 + 2 = 7$

    (B) $y = 3 \sin 2(x - 90°) - 3$ $-3 + 3 = 0$

    (C) $y = \frac{1}{3} \sin (x + 90°) - 1$ $-1 + \frac{1}{3} = -\frac{2}{3}$

    (D) $y = \sin 0.5(x - 90°)$ $0 + 1 = 1$

4.   What is the amplitude for the following function: $y = \underline{3} \sin 2(x + 90°) - 1$

    (A)   2

    (B)   3

    (C)   4

    (D)   5

5. What is the period for the following function: $y = \cos \frac{1}{3}x + 12$

(A) 180°

(B) 360°

(C) 720°

(D) 1080°

period $= \frac{360°}{\frac{1}{3}} = 360° \cdot 3 = 1080°$

6. What is the midline of the following function: $y = 0.5 \sin(x - 2)$ *+0*

(A) $y = -2$

(B) $y = 0.5$

(C) $y = 0$

(D) $y = 2$

7. What is the range of the following function: $y = 3 \sin 2(x + 90°) - 1$

(A) $\{y| -3 \le y \le 3, y \in R\}$

(B) $\{y| -2 \le y \le 4, y \in R\}$

(C) $\{y| -4 \le y \le 2, y \in R\}$

(D) $\{y| y \in R\}$

Max $= -1+3 = 2$
min $= -1-3 = -4$
$\{y| -4 \le y \le 2, y \in R\}$

8. What is the domain of the following function: $y = 0.5 \sin(x - 2)$

(A) $\{x| -3 \le x \le -1, x \in R\}$

(B) $\{x| -0.5 \le x \le 0.5, x \in R\}$

(C) $\{x| -2 \le x \le 2, x \in R\}$

(D) $\{x| x \in R\}$

Part II: Constructed Response. Answer each question in the space provided. Show all workings.

9. What is the amplitude of the following function: $y = \frac{2}{5}\cos(x - \pi)$
   $$\underset{a}{}$$

   $$\frac{2}{5}$$

10. What is the midline of the following function: $y = 5\sin 1.5(x + 60°) - 5$
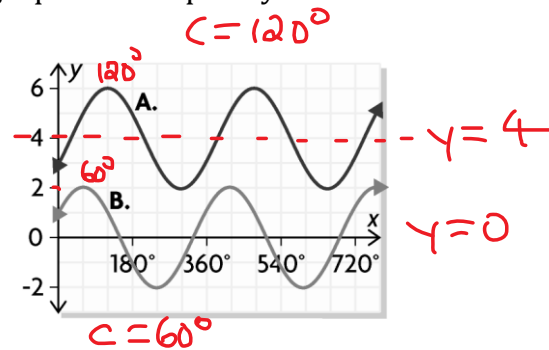 $$\underset{d}{}$$

    $$Y = -5$$

11. What is the range of the following function: $y = 10\cos 4(x - 180°) + 2$

    $$max = 2 + 10 = 12$$
    $$min = 2 - 10 = -8$$
    $$\{y \mid -8 \le y \le 12, y \in R\}$$

12. Match each graph with the corresponding equation. Explain your answers:

    A ⓘ $y = \underline{2}\cos(x - \underline{120°}) + \underline{4}$ $C = 120°$

    ii) $y = \underline{2}\cos(x - 60°) + \underline{4}$

    iii) $y = \underline{2}\cos(x + 60°) + \underline{4}$

    iv) $y = \underline{2}\cos(x - 120°)$ —

    B ⓥ $y = \underline{2}\cos(x - \underline{60°})$ —

    vi) $y = \underline{2}\cos(x + 60°)$ —

    $120°$ $y = 4$ $C = 60°$ $Y = 0$

13. Describe the graph of the following function by stating the amplitude, equation of the midline, range and period. $y = \underset{a}{\frac{1}{10}}\underset{b}{\sin(2x)} + \underset{d}{3.5}$

    amplitude: $\frac{1}{10}$ or 0.1

    mid line: $y = 3.5$
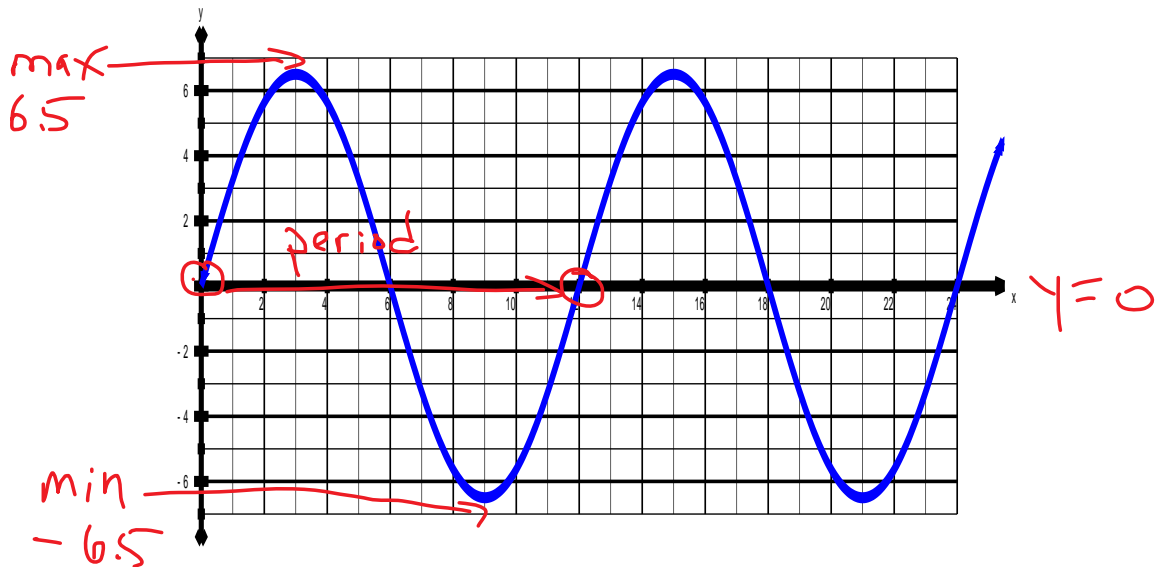   max: $3.5 + 0.1 = 3.6$
    min: $3.5 - 0.1 = 3.4$

    period $= \frac{360°}{2} = 180°$

    R: $\{y \mid 3.4 \le y \le 3.6, y \in R\}$

14. The following graph represents the rise and fall of sea level in part of the Bay of Fundy, where t is the time, in hours, and h(t) represents the height relative to the mean sea level.

max
6.5

period

min
- 6.5

$y=0$

(A) What is the range of the tide levels?

$$\{y \mid -6.5 \leq y \leq 6.5, y \in R\}$$

(B) What does the equation of the midline represent in the graph?

$y=0$ Half tide.

(C) What is the period of the graph?

12 hours.

$360° = 2\pi$

(D) The equation of the sinusoidal function is represented by: $h(t) = 6.5 \sin \frac{\pi}{6} t$.
Calculate the period from the equation and compare it to your answer in c.

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

15. The temperature of an air-conditioned home on a hot day can be modelled using the function t(x) = 1.5 cos (15°x) + 20, where x is the time in minutes after the air conditioner turns on and t(x) is the temperature in degrees Celsius.

(A) What are the maximum and minimum temperatures in the home?

$$\max = d + a = 20 + 1.5 = 21.5°$$
$$\min = d - a = 20 - 1.5 = 18.5°$$

(B) What is the temperature 10 minutes after the air conditioner has been turned on?

$$t(10) = 1.5 \cos\left[15°(10)\right] + 20$$
$$= 18.7°$$

(C) What is the period of the function? How would you interpret this value in this context?

$$period = \frac{360°}{15°} = 24 \text{ minutes}$$

It takes 24 minutes to cool down and warm back up again.