Unit 6 Trig Functions Part II Test Review

1) Find an angle that is co-terminal with 852°.

$$852 - 360° = \boxed{492°} - 360° = \boxed{132°}$$
or

2) Find the smallest positive co-terminal with 705°.

$$705 - 360° = \boxed{345°}$$

3) Identify the period and amplitude of $y = -4 \sin(2x)$.

amplitude = $\boxed{4}$

period = $\dfrac{2\pi}{2} = \boxed{\pi}$

4) Identify the period, amplitude and any transformations of $y = -1/2 \cos(2x) - 4$.

· flip
· vertical shrink
· down 4

period = $\dfrac{2\pi}{2} = \pi$

amplitude = $\dfrac{1}{2}$

5) Without the use of technology, explain why $\cos 240° = \cos 120°$.

120° is an angle in the 2nd Quadrant and 240° is an angle in the 3rd quadrant so they would have the same x-values.

6) Without the use of technology, explain why $\sin 52° = \sin 412°$.

412° has the same terminal side as 52 since 412 - 360 = 52

7) You have probably noticed that when you ride a Ferris Wheel, the distance from the ground varies sinusoidally with time. When the last seat is filled and the Ferris wheel starts, your seat is at the position in the figure below. Let t be the number of seconds that have elapsed since the Ferris wheel started. You find that it takes you four seconds to reach the top, 43 feet above the ground, and that the wheel makes a revolution every eight seconds. The diameter of the wheel is 40 feet.

a) Write an equation to model this situation.
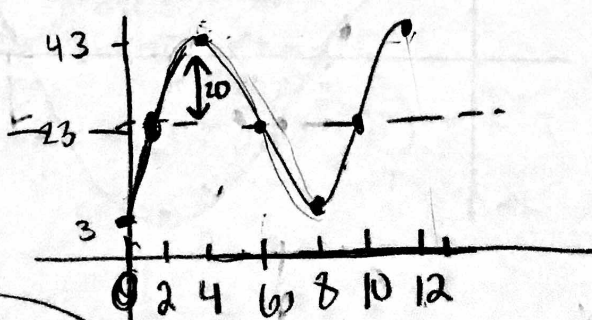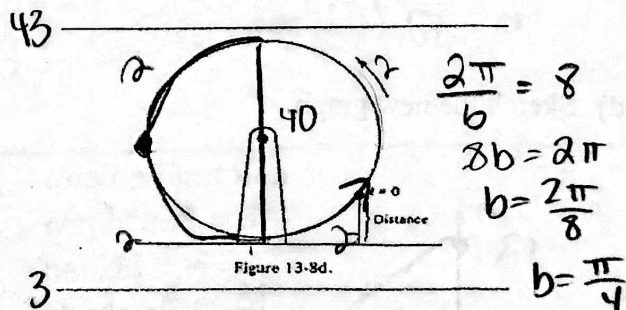
$$y = 20 \sin \dfrac{\pi}{4}(x-2) + 23$$

b) Identify the period of the function and the amplitude.

amp = 20

period = 8

c) Predict the height above the ground when: $t = 6$, $t = 9$, and $t = 0$.

$\boxed{23}$ $\boxed{8.858}$ $\boxed{3}$

43

a

40

12

Distance

Figure 13-8d.

3

$\dfrac{2\pi}{b} = 8$

$8b = 2\pi$

$b = \dfrac{2\pi}{8}$

$b = \dfrac{\pi}{4}$

43

10

-23

3

0 2 4 6 8 10 12

$\left(20 \sin \dfrac{\pi}{4}(x-2) + 23\right)$

$y = 20 \cos \dfrac{\pi}{4}(x-4) + 23$

8) A buoy bobbing up and down in the water as waves passes, it moves from its highest point to its lowest point, and back to its highest point every 10 seconds. The distance between the highest and lowest points is three feet.

a) Determine the amplitude and period of sinusoidal function that models the bobbing buoy.

$$amp = 1.5 \text{ feet} \qquad period = 10 \text{ seconds}$$

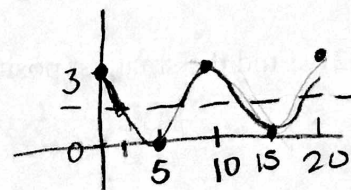b) Write an equation of a sinusoidal function that models the bobbing buoy, using x = 0 as its highest point.

$$y = 1.5 \cos\left(\tfrac{\pi}{5}x\right)$$
$$\text{or } y = 1.5 \sin\tfrac{\pi}{5}(x + 2.5)$$

$$10 = \tfrac{2\pi}{b}$$
$$10b = 2\pi$$
$$b = \pi/5$$

c) Find the height of the buoy after 15 seconds.

$$y = -1.5$$

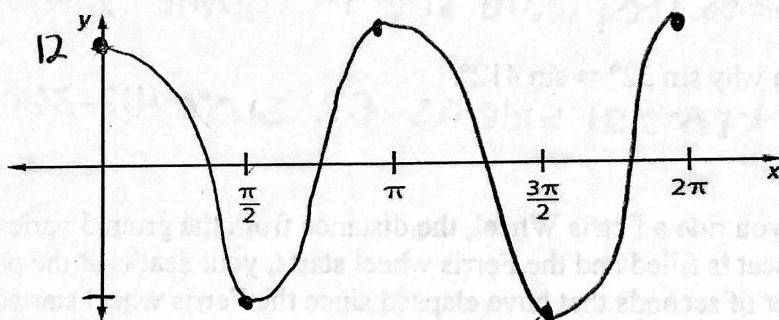**9)** A function rule in the form y = a cos(bx) has period π and the distance between the highest and lowest point is 24.

$$24 \updownarrow \quad amp = \boxed{12 = a}$$
$$0-$$

a) Find a and b. $\pi = \tfrac{2\pi}{b}$

$$\boxed{b = 2}$$

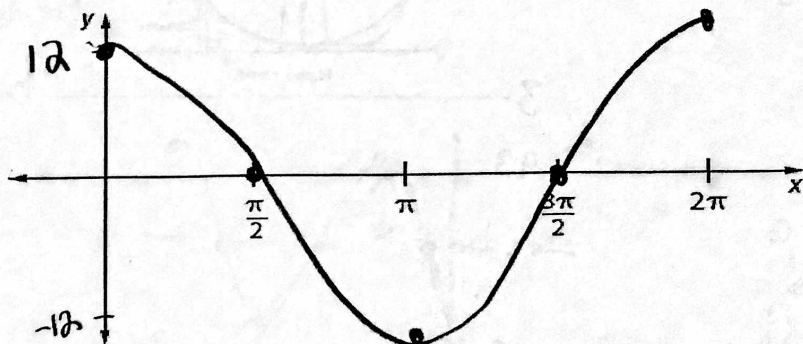b) Graph the function in Part a. Mark the scale on the y-axis.

$$y = 12 \cos(2x)$$

$$\tfrac{2\pi}{2}$$

c) Change one number in the above function rule so the period is 2π. Write the new rule.

$$y = 12 \cos x$$

d) Sketch the new graph.

Identify the amplitude, period, phase shift and vertical shift of the following trig functions.

10. $y = -10 \cos\left(\dfrac{x}{6}\right)$

Amplitude: 10

Period: $2\pi / \frac{1}{6} = 12\pi$

Phase Shift: 0

Vertical Shift: 0

11. $y = 5 - 2\sin\left(\dfrac{2x}{3}\right)$

Amplitude: 2

Period: $2\pi / \frac{2}{3} = 3\pi$

Phase Shift: 0

Vertical Shift: up 5

12. $y = 3\cos(6x + \pi)$

$$y = 3\cos\left(6\left(x + \tfrac{\pi}{6}\right)\right)$$

Amplitude: 3

Period: $2\pi / 6 = \pi/3$

Phase Shift: $-\pi/6$

Vertical Shift: 0

13. $y = -4\sin\left(\dfrac{2}{3}x - \dfrac{\pi}{3}\right) \rightarrow y = -4\sin\dfrac{2}{3}\left(x - \dfrac{\pi}{2}\right)$

Amplitude: 4

Period: $2\pi / \frac{2}{3}$

Phase Shift: $\pi/2$

Vertical Shift: 0

Given the following information about each trig function, write a possible equation for each.

14. Sine Function

amplitude $= \dfrac{1}{2}$

period $= \dfrac{\pi}{3}$

vertical shift $= -4$

$\dfrac{2\pi}{b} = \dfrac{\pi}{3}$

$(2\pi)(3) = (b)(\pi)$

$6\pi = b\pi$

$6 = b$

$$y = \tfrac{1}{2}\sin 6x - 4$$

15. Sine Function

amplitude $= 7$

period $= 4\pi$

phase shift $= -\dfrac{\pi}{3}$

$\dfrac{2\pi}{b} = 4\pi$

$b4\pi = 2\pi$

$b = \tfrac{1}{2}$

$$y = 7\sin\tfrac{1}{2}\left(x + \tfrac{\pi}{3}\right)$$

16. Cosine Function

amplitude $= 1$

period $= 2\pi$

phase shift $= \dfrac{5\pi}{6}$

vertical shift $= 3$

$$y = \cos\left(x - \tfrac{5\pi}{6}\right) + 3$$

17. Cosine Function

amplitude $= 3$

period $= \pi$

phase shift $= -\pi$

vertical shift $= -1.5$

$$y = 3\cos 2(x + \pi) - 1.5$$