

1) A ferris wheel has a radius of 35 feet with an axel 45 feet off of the ground. Write an equation to model, if it takes 4 min to rotate.

$$y = -35 \cos\left(\frac{\pi}{2} x\right) + 45$$

Radius
 $\frac{2\pi}{\text{Per}}$ 
 $\frac{2\pi}{4}$ 
Axle

2) The highest temp in Harlan is  $95^\circ$ , the lowest is  $23^\circ$ . Write an equation to model that begins in the fall.

Summer = + cos  
 Spring = + sin  
 Fall = - sin  
 Winter = - cos

$$y = -36 \sin(2\pi x) + 59$$

95 - 59
Fall
Per = 1
 $\frac{2\pi}{1}$ 
 $\frac{95+23}{2}$ 
?

3)  $h(t) = 12 \cos\left(\frac{x}{2}\right) + 30$ , models the tide at the beach...

a) What is the height when measuring started?

$$42$$

b) What is the highest?

$$30 + 12 = 42$$

c) What is the lowest?

$$30 - 12 = 18$$

d) How long is the cycle?

Period?

$$4\pi$$

$$\frac{2\pi}{\frac{1}{2}}$$

**Write a Sine Function in radians with the given criteria.**

1. Amp = 1    Period =  $\frac{2\pi}{5}$     Phase Shift = 0    Vertical (Midline) Shift = 3

$$y = \sin(5x) + 3$$

2. Amp = 5    Period =  $\pi$     Phase Shift =  $\frac{\pi}{4}$     Vertical (Midline) Shift = 0

$$y = 5 \sin\left(2x - \frac{\pi}{2}\right)$$

3. Amp =  $\frac{1}{2}$     Period =  $\frac{2}{3}$     Phase Shift = 0    Vertical (Midline) Shift = 4

$$y = \frac{1}{2} \sin(3\pi x) + 4$$

**Write a Cosine Function in radians with the given criteria.**

4. Amp = 3    Period =  $\frac{\pi}{2}$     Phase Shift = 0    Vertical (Midline) Shift = -6

$$y = 3\cos(4x) - 6$$

5. Amp = 1    Period =  $\frac{2\pi}{3}$     Phase Shift =  $-\frac{\pi}{3}$     Vertical (Midline) Shift = 3

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

6. Amp = 4    Period =  $2\pi$     Phase Shift =  $\frac{\pi}{2}$     Vertical (Midline) Shift = -5

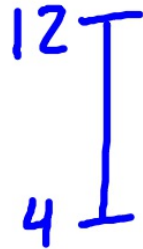
$$y = 4\cos\left(x - \frac{\pi}{2}\right) - 5$$

7. Suppose the function  $h(t) = 8.5\sin(0.017t - 1.35) + 12$  models the hours of sunlight for a town in Alaska, where  $t = 1$  is the first day of the year. Based on the function, what is the most daylight that the town gets in a single day? What is the least amount of daylight the town gets?

$$12 + 8.5 = 20.5$$

$$12 - 8.5 = 3.5$$

8. A supporting post on a pier shows the height of the water as 12 feet at high tide and a height of 4 feet at the next low tide, 6 hours later. Write an equation, using degrees, describing the depth of the water at this location  $t$  hours after high tide.



$$y = 4\cos\left(\frac{\pi}{6}x\right) + 8$$

9. The low temperature of  $52^\circ$  was recorded at 6am and the high temperature of  $78^\circ$  occurred 12 hours later. Write an equation, using degrees, describing the temperature  $t$  hours after midnight.



$$y = -13\sin\left(\frac{\pi}{12}x\right) + 65$$

10. The height of a seat on a Ferris wheel with a diameter of 14 meters,  $t$  seconds after it begins to turn at 3 rpm, can be computed using this sinusoidal model,  
 $H(t) = 7\cos\left(\frac{\pi}{10}t - \pi\right) + 8$ . What is the maximum height reached by the Ferris wheel?  
 At the bottom, how far from the ground is the Ferris wheel?

$$8 + 7 = 15 \text{ m}$$

$$8 - 7 = 1 \text{ m}$$

11. A supporting post on a pier shows the height of the water as 14.7 feet at high tide (5AM) and a height of 5.5 feet at the next low tide, 6 hours later. Write an equation, using degrees, describing the depth of the water at this location  $t$  hours after midnight.

$$14.7 \text{ I}$$

$$5.5 \text{ I}$$

$$y = 4.6 \cos\left(\frac{\pi}{6}x\right) + 10.1$$

12. The high temperatures of a city follow a sinusoidal pattern. The high in summer is  $90^\circ$  and the high in winter is  $42^\circ$ . Write an equation that begins in the summer for the temperatures in this city.

$$90 \text{ I}$$

$$42 \text{ I}$$

$$y = 24 \cos(2\pi x) + 66$$

From equation to 4 characteristics:

9.)  $y = 4 \sin 8x + 3$

Amp: **4**

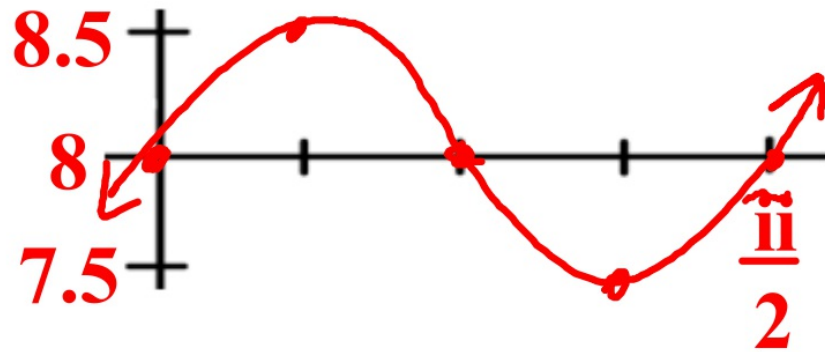
Per.:  $\frac{\tilde{\pi}}{4}$

P.S.: **0**

V.S.: **3**

From equation to graph:

11.)  $y = \frac{1}{2} \sin 4x + 8$



From characteristics to equation:

13.)  $y = 5 \cos x + 2$

Amp: 5

Per.:  $2\pi$

P.S.: 0

V.S.: 2

## U4: Trig Part II

# Now... Review

**Law of Sine**

**Law of Cosine**

**Sinusoidal Functions**



**Test Tuesday...**

**Sinusoidal:**

**Word to Equation**

**Word w/ Equation w/ Questions**

**Graph to Equation**

**Equation to Graph**

**Equation to Transformation**

**Transformation to Equation**

**Solving Triangles and Word Problems**

**Probability Review**

## Unit 4 Bullets

SINUSOIDAL FUNCTIONS...

Phase Shift

$$y = a \sin (bx + c) + d$$

### Amplitude

distance from middle to max  
radius of Ferris wheel  
 $\frac{1}{2}$  diameter of Ferris wheel  
 $\frac{1}{2}$  distance from high to low

### Period

Time for rotation  
Time for comp. cycle

**Vertical /**

### Midline Shift

Center Axle  
Mean of high/low

$$y = a \sin (bx + c) + d$$

**Amp**

**Period**

**Phase  
Shift**

**Vertical /  
Midline  
Shift**

$$y = a \sin (bx + c) + d$$