(A) Lesson Context

BIG PICTURE of this UNIT:	• How do work through geometry based problems, wherein triangles are used to model the problem • How do we model phenomenon that are periodic in nature		
CONTEXT of this LESSON:	Where we've been We have graphed periodic phenomenon and described features of their graphs	Where we are What type of an equation do we use to model graphs of periodic/cyclic phenomenon	Where we are heading How do we mathematically model phenomenon that are periodic in nature)

(B) Lesson Objectives:

a. Review the 2 special triangles and the exact trig ratios of special angles 30°, 45°, & 60°.

b. Introduce the "Cartesian" versions of the primary trig ratios ➔ $\sin(\theta)=\frac{y}{r}$, $\cos(\theta)=\frac{x}{r}$, $\tan(\theta)=\frac{y}{x}$

c. Determine the primary trig ratios of angles measuring 90n°

d. Determine the trig ratios of 2nd, 3rd, 4th quadrant angles that arise from our special triangles/angles

e. Sketch the sinusoidal functions using the accumulated data from objectives (a) – (d)

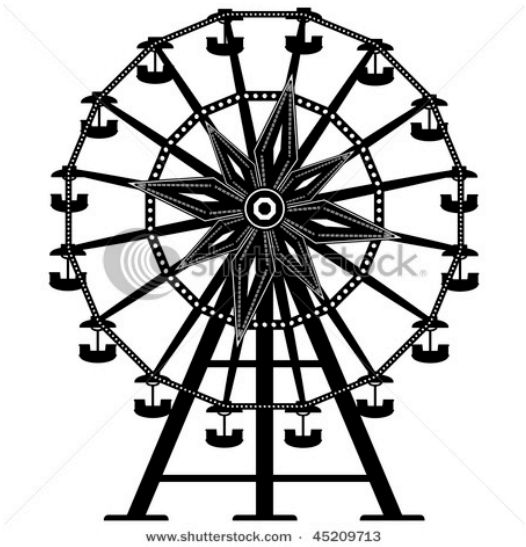
(C) *Review of Special Triangles & Angles*

45° - 45° - 90° Triangle	30° - 60° - 90° triangle	
sin(45°) = cos(45°) =	sin(30°) = cos(30°) =	sin(60°) = cos(60°) =

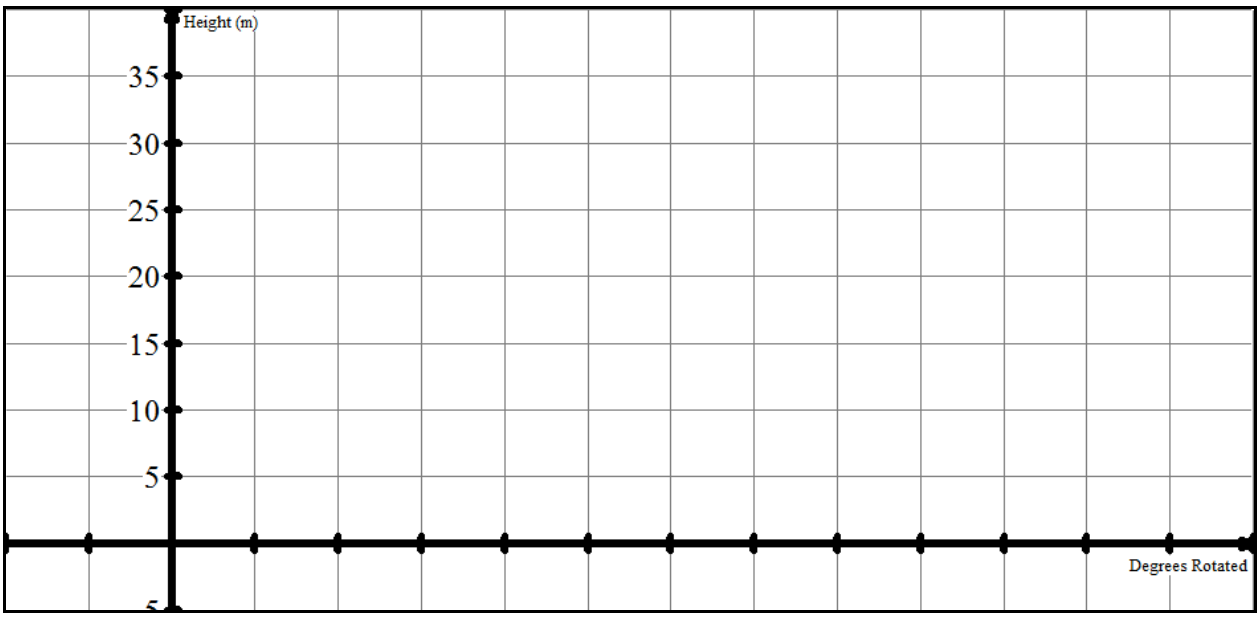
(D) Modelling Periodic Phenomenon – Riding on a Ferris Wheel

Now, let's make a COUPLE OF CHANGES to our analysis from Lesson 5.6. Again, you will be graphing the height (H), of your carriage in meters above the ground, but this time, let's change our INDEPENDENT variable to DEGREES of ROTATION

This time, you get into your carriage at the ***MIDDLE*** of the wheel and you go around twice.



Time (sec)	Degrees rotated	Height (m)
0 sec		
15 sec		
30 sec		
45 sec		
60 sec		

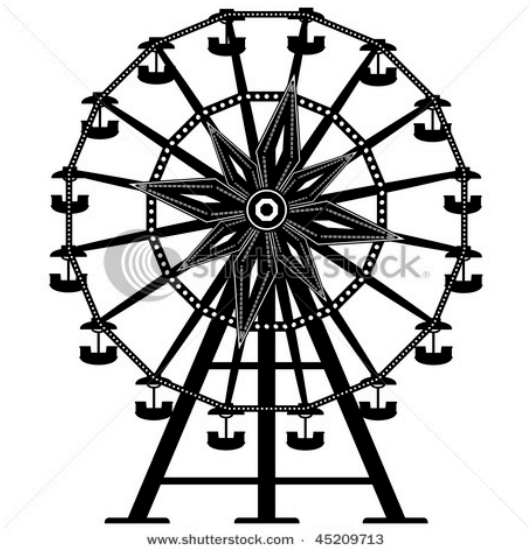


What is the amplitude? What is the period of rotation? What is the equation of the axis of the curve?

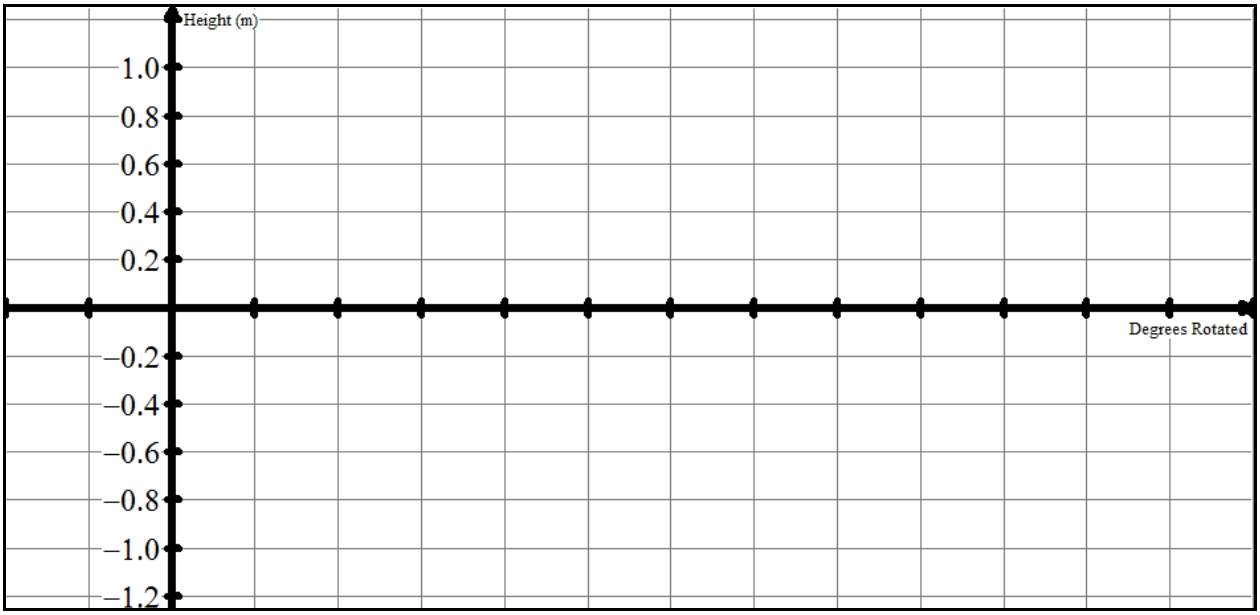
(E) Modelling Periodic Phenomenon – Riding on a Ferris Wheel

Now, let's make some FINAL changes to our analysis. You will be graphing the height (H) of your carriage above the ground, let's keep our INDEPENDENT variable as DEGREES of ROTATION, our AMPLITUDE will now be 1 meter, but our AXIS OF THE CURVE will now be the X-AXIS (y = 0).

Again, you get into your carriage at the ***MIDDLE*** of the wheel and you go around twice.

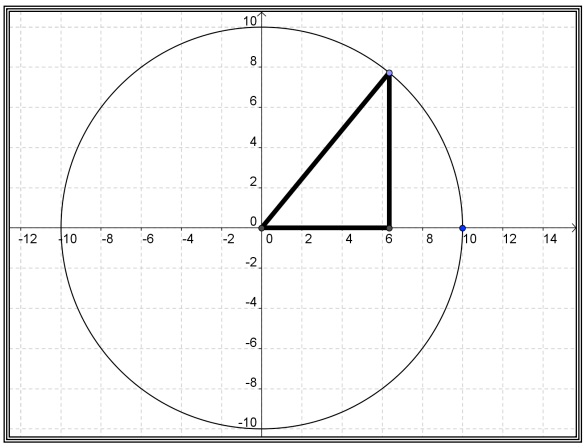


Degrees rotated	Height (m)



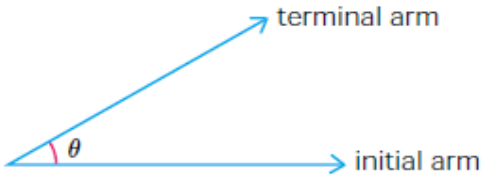
What is the amplitude? What is the period of rotation? What is the equation of the axis of the curve?

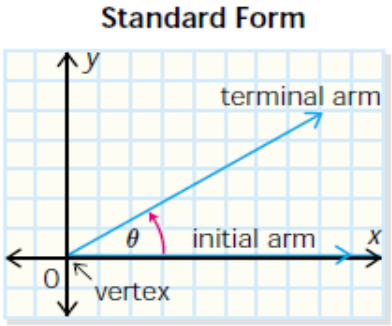
(F) ***"Cartesian Version" of Trig Ratios***

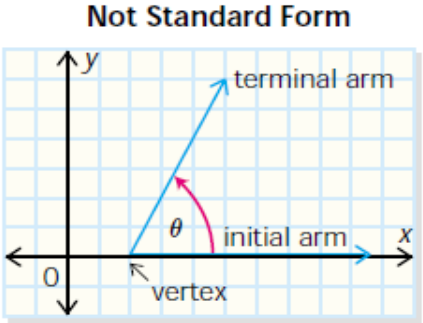


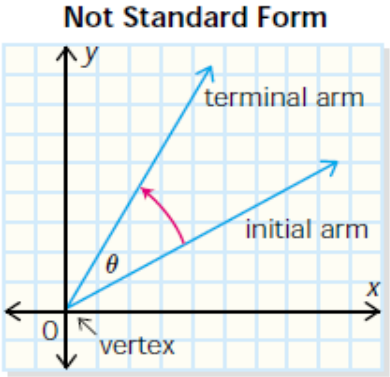
a. **Cartesian Plane**: We will now place our triangles/angles into the Cartesian plane and introduce the idea of "angles in standard position"

b. **Angles in Standard Position**: Angles in standard position are defined as angles drawn in the Cartesian plane where the initial arm of the angle is on the x axis, the vertex is on the origin and the terminal arm is somewhere in one of the four quadrants on the Cartesian ***plane***









(G) ***Table Summarizing Special Trig Ratios of First Quadrant Angles***

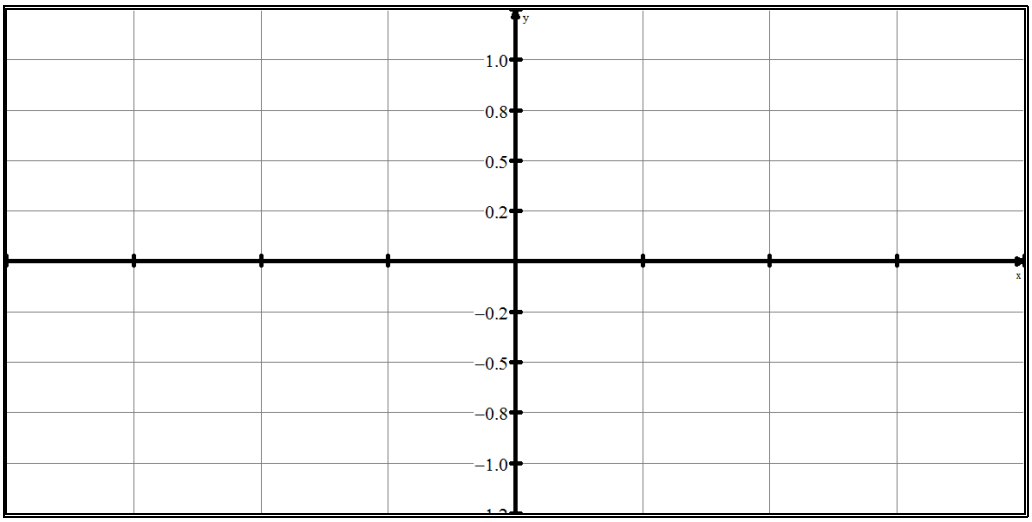
	0°	30°	45°	60°	90°
sine					
cosine					

(H) ***Summary Animations***

http://tube.geogebra.org/student/m8028 and ***http://tube.geogebra.org/student/m8029***

(I) ***Characteristics of the graphs y = sin(x) and y = cos(x)***

a. Basic sinusoidal functions ➔ Graph and analyze 2 periods of $f(x) = \sin(x)$



b. Basic sinusoidal functions ➔ Graph and analyze 2 periods of $f(x) = \cos(x)$