First name: _____ Last name: _____   Student ID: _____

Trigonometric Functions (3) Homework

1. Sketch a height-versus-time graph of the sinusoidal function that models each situation. Draw at least three cycles. Assume that the first point plotted on each graph is at the lowest possible height.

a) A Ferris wheel with a radius of 7 m, whose axle is 8 m above the ground, and that rotates once every 40 s.

b) A water wheel with a radius of 3 m, whose centre is at water level, and that rotates once every 15 s.

c) A bicycle tire with a radius of 40 cm and that rotates once every 2 s.

d) A girl lying on an air mattress in a wave pool that is 3 m deep, with waves 0.5 m in height that occur at 7 s intervals.
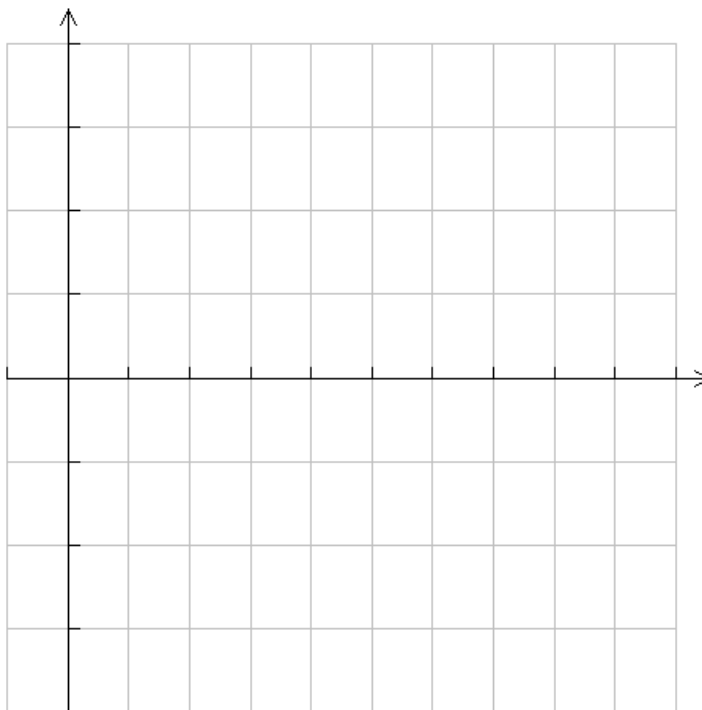
2. On the axes from 0 to 180°, graph $y = 2\sin(3x - 270) - 2$. State the properties of this graph.

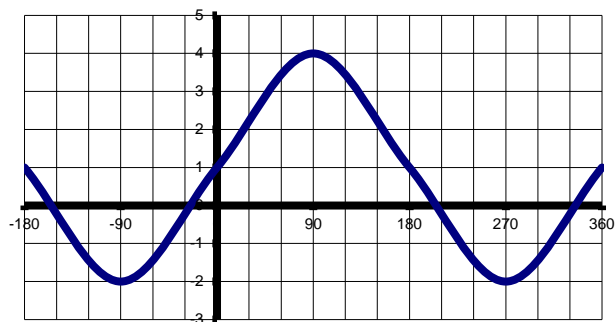|	$y = 2\sin(3x - 270) - 2$
Domain	
Range	
Amplitude	
Period	
Max	
Min	
Axis	
Phase Shift	
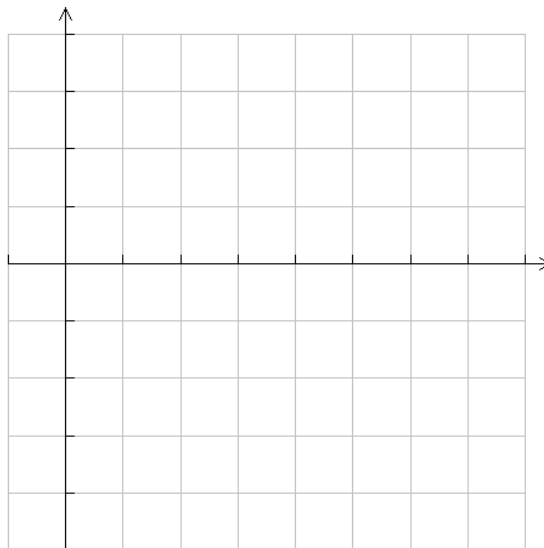
3. Consider $y = -2\cos\left(\dfrac{\theta}{3} - 20\right) - 1$, where $0 \le \theta \le 1080^\circ$.

     (a) State the values of the period, phase shift, amplitude, and axis.
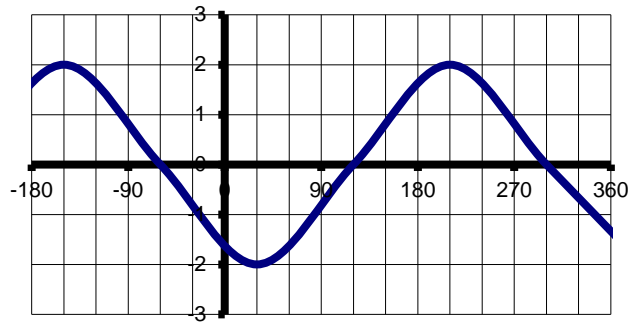
     (b)   Sketch the graph.

4. Write the equations for the following sinusoidal functions in base function sin and cos.

a)

b)

5. A sinusoidal function has an amplitude of ½ units, a period of 720°, and a maximum at (0, 3/2).

a) Represent the function with an equation using a sine function.

b) Represent the function with an equation using a cosine function.

6. Candice is holding onto the end of a spring that is attached to a lead ball. As she moves her hand slightly up and down, the ball moves up and down. With a little concentration, she can repeatedly get the ball to reach a maximum height of 20 cm and a minimum height of 4 cm from the top of a surface. The first maximum height occurs at 0.2 s, and the first minimum height occurs at 0.6 s.
a) Determine the equation of the sinusoidal function that represents the height of the lead ball in terms of time.

b) Determine the domain and range of the function.

c) What is the equation of the axis, and what does it represent in this situation?

d) What is the height of the lead ball at 1.3 s?

7. Matthew is riding a Ferris wheel at a constant speed of 10 km/h. The boarding height for the wheel is 1 m, and the wheel has a radius of 7 m. What is the equation of the function that describes Matthew's height in terms of time, assuming Matthew starts at the highest point on the wheel?