

Due: _____

Name: _____

MCR 3UI – Graphing Trig Functions Assignment

Instructions:**Complete solutions must be written neatly on a separate piece of paper (ie. not on this one!)****All graphs must be drawn neatly on grid paper with the scale clearly labelled on the axes.**

1. For each of the following trig functions, (i) state the *amplitude*, *period*, and *phase shift*
(ii) graph one complete cycle
 - a) $y = 2 \sin\left(\frac{x}{3}\right)$
 - b) $y = \frac{1}{3} \cos(x + 45^\circ)$
 - c) $y = -3 \sin(x - 60^\circ) + 1$
 - d) $y = -2 \cos 3(x + 90^\circ) + 2$
 - e) $y = \frac{1}{2} \sin[3x + 90^\circ] + 2$

2. State the **equation** of the trig function with the following properties, then graph **one complete cycle** of each function (*closest to $x = 0$*).
 - a) Sine curve with amplitude 4, period 120° , shifted up 5 units
 - b) Cosine curve with amplitude 3, period 720° , phase shift *left* 90° units
 - c) Sine curve with amplitude 2, period 240° , reflected in the x -axis, phase shift *right* 60° , shifted down 1 unit

3. The tallest Ferris Wheel in the world is the “Singapore Flyer” located in Singapore. The wheel has a diameter of 492 ft. and is built on top of a three-storey building that is 49 ft. tall. The giant wheel makes one complete rotation every 30 minutes.
 - a) Determine a function to represent the height, h , of a rider above the ground from the start of the ride to the end. (Assume the ride is only one rotation.)
 - b) Graph the function and clearly label all key points.
 - c) Determine your height above the ground after 20 minutes.
 - d) After how many minutes would your height be 250 ft. above the ground?

4. The water depth in a harbour is 21 m at high tide and 11 m at low tide. One cycle is completed every 12 hours.
 - a) Determine an equation for the depth of the water, d , as a function of time, t hours after low tide.
 - b) Draw a graph of the function for 24 hours after low tide, which occurs at 14:00.
 - c) State the times when the water depth is (i) a maximum, (ii) a minimum
 - d) Use your equation to determine:
 - (i) the depth of the water at 18:00
 - (ii) the time(s) when the water depth is 18 m

5. A bicycle with a wheel of radius 30 cm moves along the road at a speed of 6m/s.
 - a) Determine the time required for the tire to make one complete revolution. (This is called the *period of rotation*.)
 - b) The outside of the tire has a speck of paint on it. Determine an equation for the height, y , in metres, of the speck above the road as a function of time, t seconds. Assume the speck is at its highest point when $t = 0$.