

## ***MCR 3UI – Graphing Trig Functions Assignment***

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### ***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  $120^\circ$ , shifted up 5 units
  - b) Cosine curve with amplitude 3, period  $720^\circ$ , phase shift *left*  $90^\circ$  units
  - c) Sine curve with amplitude 2, period  $240^\circ$ , reflected in the  $x$ -axis, phase shift *right*  $60^\circ$ , 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  $t = 0$ .