MCR3U - Unit 4 Test

Question Sheet

Name: _____ **Mark:** _____ **/ 30**

K&U	A	T	C
_____ / 9	_____ / 9	_____ / 6	_____ / 6

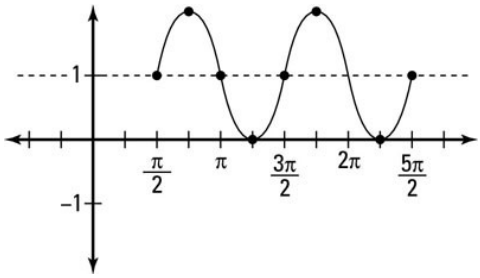
Section I

Part A: Knowledge - Fill in Blanks (9 marks, 1 mark per each)

1. Convert the angle in degree measure to radian measure (show your work): 240° = _____

2. Convert the angle in radian measure to degree measure (show your work): $\frac{5}{6}\pi$ = _____

3. Given the graph of a sine function below:
   1) determine its period _____;
   2) determine its amplitude _____.



4. Determine the following key properties of $h(x) = 3\sin[\frac{1}{2}(x + \frac{\pi}{4})] + 2$. Please show your work. (5 marks)
   1) State the value of each transformation parameter a, k, d, and c compared to its parent function;
   2) State the midline (in equation) of h(x);
   3) State the amplitude of h(x);
   4) State the range of h(x);

Part B: Short Answers - Application (9 marks)

- Apply what you have learned in this unit to solve the following problems.
- The question requires mathematical calculations, so please show all of your work

5. For $g(x) = 9\cos(-2x + 60°) - 5$ (5 marks):
   1) State its parent function f(x);
   2) Describe how g(x) can be transformed from its parent function in the correct order. (Please show your work, like how you got a, k, d, c)

6. Given descriptions of transformations, write the equation of transformed sinusoidal functions. (4 marks)
   1) A parent cosine function is stretched horizontally by a factor of 2, with a phase shift of 45° and vertical translation up 1 unit.
   2) A parent sine function is reflected across the x-axis, compressed vertically by a factor of 0.5 with a phase shift of –30°, vertical translation down 5 units.

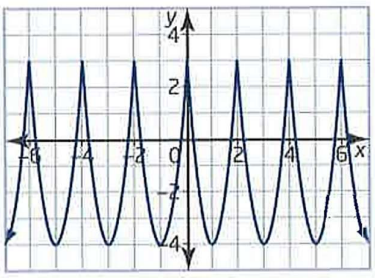
Part C: Short Answers - Thinking (6 marks)

7. Given $f(x) = 4\cos(2x)$ (2 marks):
   1) Identify which of the following function has the same period as f(x). (1 mark)

   A. $y = 4\cos(x)$ B. $y = 4\sin(x)$ C. $y = 2\sin(2x)$ D. $y = -3\cos(0.5x)$

   2) Explain your reasoning and analysis. (1 mark)

8. Consider the periodic function shown on the right: (4 marks)



1) Analyze what the period of the function is.
2) Find f(0) and predict f(9) based on analysis (show your work).
3) Analyze what the amplitude of the function is.

Section II

Part D: Short Answers - Communication (6 marks)

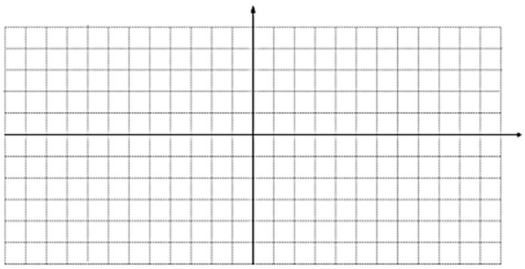
9. Group A: **Gordon, Steven, Danny, and Jerry**

Given g(x) = 3 cos (x + 135°) – 1,

1) Find the mapping rule $(\frac{x}{k} + d, ay + c)$. Please show your work. (1 mark)

2) Find the coordinates of five original points on the parent function and five transformed points on g(x). Please show your work. (3 marks)

3) Sketch the graph of g(x) on the given interval -360° ⩽ x ⩽ 360°. (2 marks)



Group B: **Wilder, Enzo, and Everlyn**

Given h(x) = sin 2(x – 120°) + 1

1) Find the mapping rule $(\frac{x}{k} + d, ay + c)$. Please show your work. (1 mark)

2) Find the coordinates of five original points on the parent function and five transformed points on h(x). Please show your work. (3 marks)

3) Sketch the graph of h(x) on the given interval -180° ⩽ x ⩽ 180°. (2 marks)