Unit 1 Test - Functions

Part A: Knowledge and Understanding (13 marks)

1) *The point* $(-6, 3)$ *is on the graph of* $y = f(x)$. *Find the corresponding point on the graph of* $y = 5f(-3x + 12) - 6$. (3 *marks*)

2) *Given the function* $f(x) = 4(x - 2)^2 + 3$ (6 *marks*)

a) *sketch both* $f(x)$ *and its inverse*.

b) *find the equation of the inverse*

c) *is the inverse a function*? *Explain*.

d) *State the domain range and range of the inverse*.

3) *Evaluate* $\frac{|-72|}{-8} - 3|11 - 18|$ (2 *marks*)

4) *Graph on a number line* : $|x| < 2$ (2 *marks*)

Part B: Application (13 marks)

1) *Under a certain tax law*, *the first* \$60 000 *of earnings is subject to a* 30% *tax*; *earnings greater than* \$60 000 *are subject to* 42% *tax*.

a) *write a function that models this situation*. (3 *marks*)

b) *determine the amount of tax paid if earnings were* \$110 000 (1 *mark*)

2) *Graph the function* $f(x) = -3\left|\frac{1}{2}x + 3\right| + 4$ *and state the properties below.* (6 *marks*)

Domain : _____

Range : _____

Interval of Increase : _____

Interval of Decrease : _____

Odd, Even or Neither : _____

End Behaviour : _____

3) *The equation* $A = \pi r^2$ *can be used to find the area of a circle,* A*, given radius,* r

a) find the inverse of this relation and describe what it would be used for. (2 *marks*)

b) Find the radius of a circle with an area of $31cm^2$. (1 *mark*)

Part C: Communication (9 marks)

1) *Is the function* $f(x) = \sqrt{x-3}$ *an even function? Explain using the definition of an even function.* (2 *marks*)

2) *What is a continuous function (explain)? Give the equation of a function that is not continuous and determine where it is not continuous?* (3 *marks*)

3) *Consider* $f(x) = \sin(x)$ *and* $g(x) = \frac{1}{x}$*. Describe a characteristic that the two functions have in common and one characteristic that they don't share.* (2 *marks*)

4) *Explain specifically why the functions* $f(x) = 4x^2 - 3$ *and* $g(x) = 4(x^2 - 3)$ *are different.* (2 *marks*)

Part D: Thinking (13 marks)

1*a*) *Sketch the graph of* : (3 *marks*)

$$f(x) = \begin{cases} 2^x + 2 & x < 0 \\ \sqrt{x} + 3 & x \geq 0 \end{cases}$$

b) *Comment on the continuity of the function above.* (1 *mark*)

2) *If* $f(x) = kx^3 - 2$ *and* $f^{-1}(498) = 5$. *Find* k. (3 *marks*)

3) *Graph the following function and state properties listed below.* (6 *marks*)

$$f(x) = \frac{-4}{3x-6} + 1$$

Equation of Asymptote(*s*) : _____

Symmetry (*Odd, even or neither*) : _____

End Behaviour : _____