

KNOW	/ 12	APP	/ 12	INQ	/ 12	COMM	/ 6
-------------	-------------	------------	-------------	------------	-------------	-------------	------------

MCV4U1 - UNIT 1 – INTRODUCTION TO CALCULUS
TEST

ROUND ALL ANSWERS TO THE NEAREST TENTH, UNLESS OTHERWISE STATED.

1) Evaluate each of the following limits. All answers should be exact. (*K – 1,2,2,3,2,2 marks*)

a) $\lim_{x \rightarrow 5} \frac{\sqrt{x+20} + 25}{x+5}$

b) $\lim_{x \rightarrow -4} \frac{3x^2 + 7x - 20}{x^2 + 3x - 4}$

c) $\lim_{x \rightarrow 10} \frac{2x - 20}{\sqrt{x-6} - 2}$

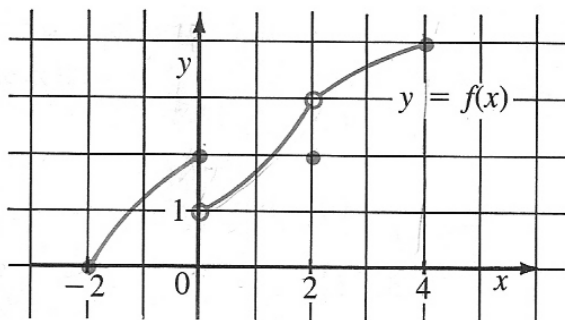
d) $\lim_{x \rightarrow 130} \frac{\sqrt[3]{x-5} - 5}{x-130}$

e) $\lim_{x \rightarrow 8} \begin{cases} 3x - 5, & x < 8 \\ -x^2 + 2x + 27, & x \geq 8 \end{cases}$

f) $\lim_{x \rightarrow -2} \frac{4|x+2|}{x+2}$

- 2) Use the difference quotient method to determine the equation of the tangent to the graph of $f(x) = x^2 - 2x + 13$ where $x = 3$. (A – 4 marks)

- 3) For the graph of $y = f(x)$ shown below, determine each of the following limits.
(A – 4 marks)



- a) $\lim_{x \rightarrow 2^-} f(x) =$ _____
 b) $\lim_{x \rightarrow 2^+} f(x) =$ _____
 c) $\lim_{x \rightarrow 2} f(x) =$ _____
 d) $\lim_{x \rightarrow 0} f(x) =$ _____

- 4) As a snowball melts, its volume decreases. The volume in cubic centimetres is given by the equation $V(r) = \frac{4}{3}\pi r^3$, where r is the radius in centimetres. Determine, to the nearest tenth, the rate of change of the snowball's volume when its radius is 10 cm. (A – 4 marks)

5) For the following function, $\lim_{x \rightarrow -2} f(x) = 8$. Determine the values of a and b .

(1 – 6 marks)

$$f(x) = \begin{cases} -3ax^3 - 4b, & x \leq -2 \\ ax + b, & x > -2 \end{cases}$$

6) Determine the **coordinates** of the points on the graph of $f(x) = x^3 + 3x^2 - 21x + 2$ at which the tangent is parallel to the line $6x - 2y = 19$. (1 – 6 marks)

7) While engaged in an intense conversation about limits, Karlo claimed that $\lim_{x \rightarrow -12} \sqrt{x+12}$ is equal to 0. Is Karlo's claim correct? Explain. (*C – 3 marks*)

8) A few days after their intense conversation about limits, Jenny and Karlo went on a date. While they were enjoying their meal, Jenny told Karlo that the expression $\frac{f(x) - f(5)}{x - 5}$ is the slope of the tangent line to $f(x)$ at the point where $x = 5$. Is Jenny's claim correct? Explain. (*C – 3 marks*)