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ST BENEDICT'S

SUBJECT
GRADE
EXAMINER
NAME
TEACHER

Mathematics
12
Miss A Balzer

PAPER
DATE
MARKS
MODERATOR
DURATION

Calculus Part A
4 March 2020
45
Gr 12 Teachers
40min

QUESTION NO	DESCRIPTION	MAXIMUM MARK	ACTUAL MARK
1	Average Gradient and Limits	6	
2	First Principles	5	
3	Differentiation Rules	19	
4	Cubic Functions	15	
TOTAL		45	

INSTRUCTIONS:

1. This paper consists of 4 questions and 8 pages.
2. Read the questions carefully.
3. Answer all questions in the spaces provided.
4. You may use an approved non-programmable and non-graphical calculator, unless otherwise stated.
5. Round off your answers to two decimal digits where necessary.
6. All necessary working details must be shown. Answers only, without the relevant calculations, will not be given marks. Equations may not be solved solely with a calculator.
7. It is in your interest to write legibly and present your work neatly.

FORMULAS:

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

QUESTION 1**6 MARKS**

- a) If $f(x) = 5x^2 + 3x$, find the average gradient in the interval $[-3 ; 4]$. (3)

- b) Calculate the following:

$$\lim_{x \rightarrow 1} \frac{1-x^3}{1-x} \quad (3)$$

QUESTION 2**5 MARKS**

Determine $f'(x)$ from first principles if $f(x) = x^2 - 6x$.

(5)

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QUESTION 3**18 MARKS**

All answers must be given with positive exponents.

a) If $f(x) = 2x^3$; explain what $f'(2)$ will represent. (2)

b) In each of the following, determine $\frac{dy}{dx}$:

1) $y = (3x^2 - x)^2$ (3)

2) $y = \frac{2x^2 - 3}{5x^3}$ (4)

c) Determine:

1) $D_x \left[\frac{4x^2 - 12x + 9}{2x - 3} \right]$ (3)

2) $D_x \left[\frac{x^3 - 2x + 3}{x^{-1}\sqrt{x}} \right]$ (7)

QUESTION 4**15 MARKS**

Given function $f(x) = -x^3 + 10x^2 - 17x - 28$ where $f(7) = 0$.

- a) Determine the co-ordinates of all the x and y intercepts.

(5)

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- b) Determine the co-ordinates of the stationary points, and hence classify what type of stationary point each one is.

(7)

- c) For which values of x is f concave down?

(3)