Reading Time: An initial **2 minutes** to view **BOTH** sections

MATHEMATICS METHODS : UNITS 3 & 4, 2021

Test 1 – (10%)

3.1.1 to 3.1.16

Time Allowed	**First Name**	**Surname**	**Marks**
20 minutes			20 marks

Circle your Teacher's Name:

Mrs Alvaro	Mrs Bestall	Ms Chua
Mr Gibbon	Mrs Greenaway	Mr Luzuk
Mrs Murray	Ms Robinson	Mr Tanday

Assessment Conditions: ***(N.B. Sufficient working out must be shown to gain full marks)***

- Calculators: Not Allowed
- Formula Sheet: Provided
- Notes: Not Allowed

PART A – CALCULATOR FREE

QUESTION 1 **[7 marks]**

Differentiate the following, simplifying fully.

a) $f(r) = \frac{r+1}{r-1}$ **[2 marks]**

b) $f(x) = (3x + 7)(4x^2 + 6x)$ **[2 marks]**

c) $y = \sqrt[3]{x^2 - x - 1}$ **[3 marks]**

QUESTION 2 **[10 marks]**

Consider the function $\boldsymbol{f(x) = 2x^3 + 3x^2 - 12x - 2}$

a) Find the coordinates and nature of all stationary point(s), and point(s) of inflection **[5 marks]**

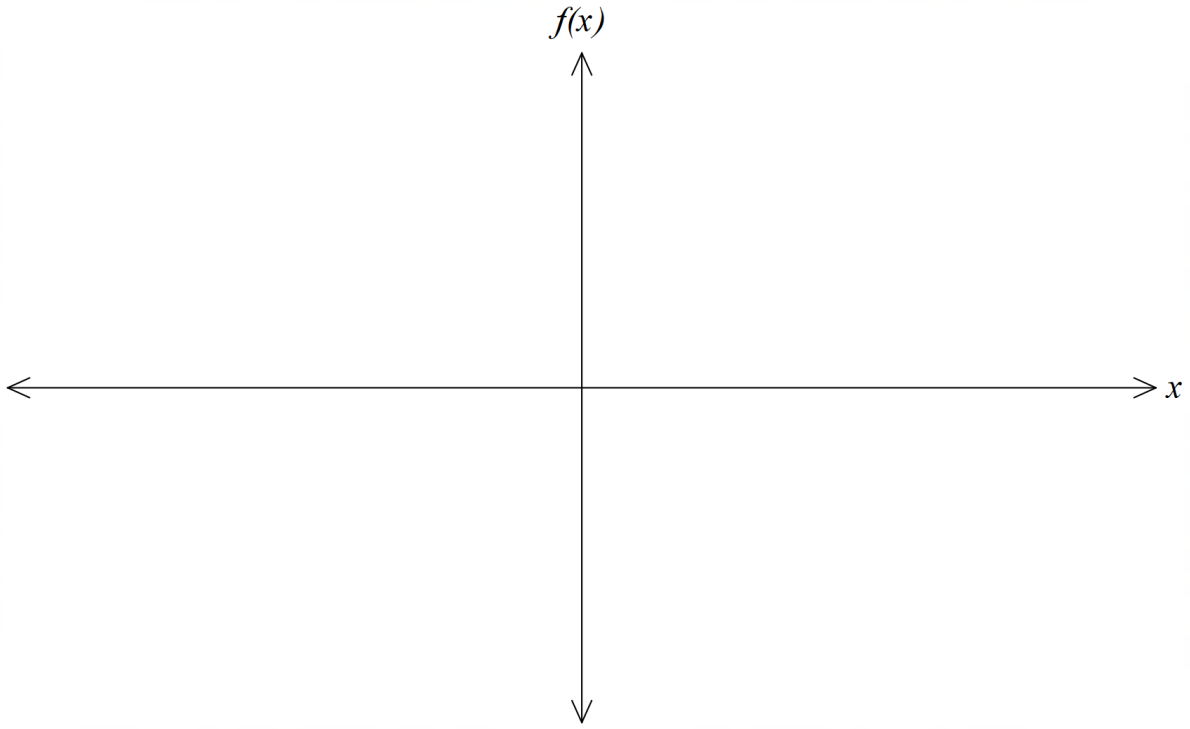
b) Describe the behaviour of $f(x)$ as $x \to \pm\infty$ **[1 mark]**

c) i) Determine $f(-4)$ **[1 mark]**

ii) Determine $f(4)$ **[1 mark]**

d) Applying your answers from parts a), b), and c), sketch $f(x)$ on the closed interval [-3,3] on the axes below labelling all relevant points.

[2 marks]



QUESTION 3 **[3 marks]**

The two variables, *p* and *q* are related by the equation $p = \frac{2q-6}{q}$

a) Find an expression for $\frac{dp}{dq}$ **[1 mark]**

b) Hence, find an expression for the approximate increase in *p*, as *q* increases from 4 to 4+*h,* where *h* is small.

[2 marks]