Test - Differentiation

Year: Year 12 · Duration: 60 minutes · /20

Name:	Date:	**Mark: /20**

Question	1	2	3	4	5	Total
marks	4	4	4	4	4	**20**
Mark						

Show your working.

Question 1 (4 marks)

Question 1 – Differentiating

Differentiate (a) $y = 4x^3 - \frac{5}{x} + \sqrt{x}$ and (b) $y = \frac{x^3 + 2x}{x^2}$. (4 marks)

Question 2 (4 marks)

Question 2 – Tangent and normal

The curve $y = x^3 - 2x^2 + 3$ passes through $(2, 3)$. Find the equation of the tangent and the normal at this point.

Question 3 (4 marks)

Question 3 – Stationary points

$y = 2x^3 - 9x^2 + 12x$. Find the coordinates of the stationary points and determine their nature.

Question 4 (4 marks)

Question 4 – Increasing function

Show that $f(x) = x^3 + 3x + 1$ is increasing for all x.

Find the range of values of k for which $g(x) = x^3 + kx$ is increasing for all x. (Total 4 marks)

Question 5 (4 marks)

Question 5 – Problem: a fenced enclosure

A farmer has 80 m of fencing for a rectangular enclosure against a wall (three sides). The width is x m.

a. Show that the area is $A = 80x - 2x^2$. (1 mark)
b. Use calculus to find the maximum area. (3 marks)