

Daily Question

Day 1 Pure Mathematics – Mark Scheme

Question 1

(a)	$\frac{dy}{dx} = 3x^2 - 16x + 20$	M1 A1
	$3x^2 - 16x + 20 = 0 \quad (3x - 10)(x - 2) = 0 \quad x = \dots, \quad \frac{10}{3} \text{ and } 2$	dM1, A1 (4)
(b)	$\frac{d^2y}{dx^2} = 6x - 16$ At $x = 2$, $\frac{d^2y}{dx^2} = \dots$ -4 (or < 0 , or both), therefore maximum	M1 A1ft (2)
(c)	$\int (x^3 - 8x^2 + 20x) dx = \frac{x^4}{4} - \frac{8x^3}{3} + \frac{20x^2}{2} (+C)$	M1 A1 <u>A1</u> (3)
(d)	$4 - \frac{64}{3} + 40 \quad \left(= \frac{68}{3} \right)$ At $x = 2$: $y = 8 - 32 + 40 = 16$ (Maybe scored elsewhere)	M1 B1
	Area of $\Delta =$ $\frac{1}{2} \left(\frac{10}{3} - 2 \right) \times 16 \quad \left(\frac{1}{2} (x_B - x_A) \times y_A \right) \quad \left(= \frac{32}{3} \right)$	M1
	Shaded area = $\frac{68}{3} + \frac{32}{3} = \frac{100}{3} \quad \left(= 33\frac{1}{3} \right)$	M1 A1 (5)

Question 2

(a)	$\left(\frac{dy}{dx} = \right) 8 + 2x - 3x^2$	M1 A1
	$3x^2 - 2x - 8 = 0 \quad (3x + 4)(x - 2) = 0 \quad x = 2$	A1 <u>cso</u> (3)
(b)	Area of triangle = $\frac{1}{2} \times 2 \times 22$	M1 A1
	$\int 10 + 8x + x^2 - x^3 dx = 10x + \frac{8x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4}$	M1 A1 <u>A1</u>
	$\left[10x + \frac{8x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} \right]_0^2 = \dots \left(= 20 + 16 + \frac{8}{3} - 4 \right)$	M1
	Area of $R = 34\frac{2}{3} - 22 = \frac{38}{3} \left(= 12\frac{2}{3} \right)$ (Or 12.6)	M1 A1 (8)