Differentiation

Answers

A-level Maths topic practice

This topic online

Q	Answer	Marks
1	**a)** $60x^2(4x^3 + 1)^4$ **b)** $\frac{10x}{5x^2 + 2}$ **c)** 4 sec 4x tan 4x	5
2	**a)** a = 3, b = 2 **b)** $\frac{-3x^2 + 2x + 6}{(x^2 + 2)^2}$	5
3	**a)** 18 ln 3 **b)** shown	6
4	the gradient of the chord tends to 3 cos 3x as h → 0	5
5	**a)** (1, -2e) and $(-3, 6e^{-3})$ **b)** (1, -2e) is a minimum; $(-3, 6e^{-3})$ is a maximum	7
6	**a)** $\frac{dy}{dx} = -\frac{2x + 3y}{3x - 2y}$ **b)** x - 5y + 12 = 0	6
7	**a)** shown **b)** $x = \frac{\pi}{3}$	5
8	**a)** $f''(x) = 12x^2 - 36x + 24$ **b)** $\{x : 1 < x < 2\}$ **c)** (1, 12) and (2, 21); f′(1) = 10, f′(2) = 8	6
9	**a)** shown **b)** 0.796 cm s^{-1} **c)** 10 cm^2 s^{-1}	7
10	**a)** $\frac{dy}{dx} = -\frac{2x + y}{x + 2y}$ **b)** (2, -4) and (-2, 4) **c)** (4, -2) and (-4, 2)	8
11	**a)** 5000 at launch; limit 40 000 **b)** shown **c)** 5 thousand per week at t = 3.89 **d)** dN/dt has a maximum there: it increases before and decreases after, so the curve changes from convex to concave	9
12	**a)** shown **b)** $(\sqrt{e}, \frac{1}{2e})$, a maximum **c)** $\{x : x > e^{5/6}\}$ **d)** two solutions	10

Full worked solutions, written out by hand, are on the solutions sheet for this topic.

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