

Q	Marking instructions	AO	Marks	Typical solution
11(a)	Uses implicit differentiation with $x^2 \frac{dy}{dx}$ or $Ay^2 \frac{dy}{dx}$ seen	1.1a	M1	$x^2y + 4y^3 = 8x$ $2xy + x^2 \frac{dy}{dx} + 12y^2 \frac{dy}{dx} = 8$ $\frac{dy}{dx} = 0$ $\Rightarrow 2xy = 8$ $\Rightarrow y = \frac{4}{x}$
	Uses the product rule to obtain $Bxy + x^2 \frac{dy}{dx}$	3.1a	M1	
	Obtains $2xy + x^2 \frac{dy}{dx} + 12y^2 \frac{dy}{dx} = 8$ OE	1.1b	A1	
	Completes a reasoned argument using $\frac{dy}{dx} = 0$ and $2xy + x^2 \frac{dy}{dx} + 12y^2 \frac{dy}{dx} = 8$ OE with at least one correct line of intermediate working before showing that $y = \frac{4}{x}$	2.1	R1	
Subtotal			4	

Q	Marking instructions	AO	Marks	Typical solution
11(b)	Obtains $x^2 \times \frac{4}{x} + 4\left(\frac{4}{x}\right)^3 = 8x$ OE	3.1a	B1	$x^2 \times \frac{4}{x} + 4\left(\frac{4}{x}\right)^3 = 8x$ $4x + \frac{256}{x^3} = 8x$ $x^4 = 64$ $x = \pm\sqrt[4]{8}$
	Rearranges their equation to obtain $ax^4 = k$ or $ax^{-4} = k$ OE	2.1	M1	
	Deduces $x = \pm\sqrt[4]{8}$ CAO	2.2a	R1	
Subtotal			3	

Question 11 Total			7	
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