

Q	Marking Instructions	AO	Marks	Typical Solution
10(a)	Verifies that $x = 1$ gives $y = 3$	AO1.1b	B1	$y = 2 \times 1^2 - 8 \times 1^{\frac{3}{2}} + 8 \times 1 + 1 = 3$ $y = 2x^2 - 8x^{\frac{3}{2}} + 8x + 1$ $\frac{dy}{dx} = 4x - 12\sqrt{x} + 8$ <p>For stationary point  <math>4(\sqrt{x})^2 - 12\sqrt{x} + 8 = 0</math></p> $\sqrt{x} = 1 \text{ or } \sqrt{x} = 2$ $x = 1 \text{ or } x = 4$ $\frac{d^2y}{dx^2} = 4 - \frac{6}{\sqrt{x}}$ $x = 1 \text{ gives } \frac{d^2y}{dx^2} = -2$ <p>Negative so maximum when <math>x = 1</math></p> <p>Maximum at (1, 3)</p>
	Expresses $x\sqrt{x}$ as $x^{\frac{3}{2}}$	AO1.1b	B1	
	Attempts to differentiate (at least one term correct)	AO1.1a	M1	
	Correctly differentiates	AO1.1b	A1	
	Explains $\frac{dy}{dx} = 0$ for stationary or maximum point Must be explicitly seen	AO2.4	E1	
	Shows solution of $\frac{dy}{dx} = 0$ to give $x = 1$ (and $x = 4$ ) (May be awarded for work seen in (b)) or correct verification of $x = 1$	AO1.1b	B1	
	Differentiates again (May be awarded for work seen in (b))	AO1.1a	M1	
	Shows that $x = 1$ gives a negative value (in a correct second differential)	AO1.1b	A1	
Concludes that maximum point is at (1, 3). Constructs rigorous mathematical argument to show the required result. Failure to score E1 does not rule out award of this mark	AO2.1	R1		
(b)	States coordinates	AO1.1b	B1	(4, 1)
	States minimum point	AO1.1b	B1	Minimum
<b>Total</b>			<b>11</b>	

**Notes:**

A candidate who does not handle the  $x\sqrt{x}$  term can score B1 B0 M1 A0 E1 B0 M1 A0 R0