

| Question Number | Scheme | Marks |
|-----------------|---|-----------------------|
| 4(a) | $x^2(2x+1) - 15x \Rightarrow 2x^3 + x^2 - 15x = x(2x^2 + x - 15)$ $x(2x-5)(x+3) = 0 \Rightarrow x = \dots$ <p>Two of $x = 0, \frac{5}{2}, -3$</p> $x = 0, \frac{5}{2}, -3$ | M1 dM1 B1 A1 |
| | | (4) |
| (b) | $y^{\frac{2}{3}} = \frac{5}{2} \Rightarrow y = \left(\frac{5}{2}\right)^{\frac{3}{2}}$ $\frac{5}{4}\sqrt{10}$ | M1 A1cso |
| | | (2) |
| | | (6 marks) |

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|-------------|---|------------------|
| 6(a) | $2xy - 3x^2 = 50; y - x^3 + 6x = 0$ | |
| | $\Rightarrow 2x(x^3 - 6x) - 3x^2 = 50$ | M1 |
| | $\Rightarrow 2x^4 - 12x^2 - 3x^2 - 50 = 0 \Rightarrow 2x^4 - 15x^2 - 50 = 0^*$ CSO | A1* |
| | | (2) |
| (b) | $\Rightarrow (2x^2 + 5)(x^2 - 10) = 0 \Rightarrow x^2 = \dots$ | M1 |
| | So $x^2 = 10$ | A1 |
| | $\Rightarrow y = (\sqrt{10})^3 - 6\sqrt{10} = \dots$ | M1 |
| | one solution pair is $x = \sqrt{10}, y = 4\sqrt{10}$ | A1 |
| | Solutions are $x = \sqrt{10}, y = 4\sqrt{10}$ and $x = -\sqrt{10}, y = -4\sqrt{10}$ CSO | A1 |
| | (5) | |
| | | (7 marks) |

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| 4 (a) | $2 \times 4^x - 2^{x+3} = 17 \times 2^{x-1} - 4$ <p>Uses an index law and states or implies any of</p> $4^x = p^2, \quad 2^{x+3} = 8p \quad \text{or} \quad 2^{x-1} = \frac{p}{2}$ <p>Writes the given equation in terms of p</p> $2 \times 4^x - 2^{x+3} = 17 \times 2^{x-1} - 4 \Rightarrow 2p^2 - 2^3 \times p = \frac{17p}{2} - 4$ <p>Proceeds to $4p^2 - 33p + 8 = 0$ via $2p^2 - 8p = \frac{17p}{2} - 4$ * CSO</p> | B1 M1 A1* |
| | (b) | $4p^2 - 33p + 8 = 0 \Rightarrow (4p-1)(p-8) = 0 \Rightarrow p = \dots, \dots$ <p>Sets $2^x = \frac{1}{4}, 8 \Rightarrow x = \dots$</p> $x = -2, 3$ |

| Question | Scheme | Marks |
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| 2(a) | $b = 2$ $\dots \pm \dots (x \pm 3)^2$ $(f(x) =) 21 - 2(x-3)^2$ | B1 M1 A1 |
| | (b) | $R \text{ is } (0, -4) \text{ or } "h" = 4$ $f(x) - 7 = 14 - 2(x-3)^2 \Rightarrow x = \dots \quad \text{or} \quad f(x) - 7 = -4 + 12x - 2x^2 \Rightarrow x = \dots$ <p>(NB $x = 3 \pm \sqrt{7}$)</p> $\text{Area} = \frac{1}{2} \times ("3 + \sqrt{7}" - ("3 - \sqrt{7}")) \times "4"$ $= 4\sqrt{7}$ |
| | | (4) |
| | | (7 marks) |

| Question Number | Scheme | Marks |
|-----------------|---|---|
| 5 (a) | $9x^3 - 10x^2 + x = x(9x^2 - 10x + 1) = x(ax \pm 1)(bx \pm 1) \text{ with } ab = 9$ $= x(9x - 1)(x - 1)$ | M1 A1 (2) |
| (b) | <p>States or implies that $x = 3^y$ AND sets = to their 1 or $\frac{1}{9}$</p> <p>Solves their $3^y = "1"$ or $3^y = "\frac{1}{9}"$</p> <p>$y = 0, -2$</p> | M1 dM1 A1 (3) (5 marks) |