| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 1 | $y = \pm 3(x+2)(x+1)(x-4)$ | **3** | **B1** for 3<br>**B1** for $(x+2)(x+1)(x-4)$<br>**B1** for $\pm$ |
| 2(a) | 4 | **B1** | |
| 2(b) | $1080^{\circ}$ or $6\pi$ | **B1** | |
| 2(c) |  | **3** | **B1** for shape, it must be symmetrical about the *y*-axis.<br>**B1**for *y*-intercept of 5<br>**B1** for $(\pm 180^{\circ}, 3)$ |
| 3(a) | $a = \frac{3}{2}$ or $p^{\frac{3}{2}}$ | **B1** | |
| | $b = \frac{10}{3}$ or $q^{\frac{10}{3}}$ | **B1** | |
| | $c = -\frac{7}{3}$ or $r^{-\frac{7}{3}}$ | **B1** | |
| 3(b) | $\left(3x^{\frac{1}{3}} - 1\right)\left(2x^{\frac{1}{3}} - 1\right) = 0$ | **M1** | For recognising as a quadratic in $x^{\frac{1}{3}}$ and attempt to solve to obtain $x^{\frac{1}{3}} = k$ |
| | $x^{\frac{1}{3}} = \frac{1}{3}$, $x^{\frac{1}{3}} = \frac{1}{2}$<br>leading to $x = \frac{1}{27}$ or 0.0370<br>$x = \frac{1}{8}$ or 0.125 | **2** | **Dep M1** for a valid method of solving $x^{\frac{1}{3}} = k$ where $k > 0$<br>**A1** for both |
| 4(a) | $\frac{dy}{dx} = \frac{\sin x \times 3\sec^2 3x - \tan 3x \cos x}{\sin^2 x}$ | **3** | **B1** for $3\sec^2 3x$<br>**M1** for differentiation of a quotient or equivalent product<br>**A1** for all other terms apart from $3\sec^2 3x$ correct |
| | When $x = \frac{\pi}{3}$ $\frac{dy}{dx} = 2\sqrt{3}$ | **A1** | |
| 4(b) | $2\sqrt{3}h$ | **B1** | **FT** on *their* answer to **(a)** |