| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 4(a) | $4(y-3)^2 = 36-9$ or $4y^2-24y+9\,[=0]$ | **M1** | |
| | $y = 3 \pm \sqrt{\frac{27}{4}}$ or exact equivalent, soi | **A1** | |
| | $3+\sqrt{\frac{27}{4}}-\left(3-\sqrt{\frac{27}{4}}\right)$ oe | **M1** | **FT** *their* $a \pm \sqrt{b}$ providing $b$ is not a square number |
| | $\sqrt{27}$ or $3\sqrt{3}$ or exact equivalent, nfww | **A1** | |
| 4(b) | Eliminates one unknown and simplifies terms: $2x^2+83 = x^2-20x$ oe, soi | **M1** | |
| | $x^2+20x+83=0$ | **A1** | |
| | Applies quadratic formula or completes the square: $x = \frac{-20 \pm \sqrt{20^2-4[1](83)}}{2}$ | **M1** | **FT** *their* 3-term quadratic |
| | $x = -10 \pm \sqrt{17}$ | **A1** | |
| | $y = \frac{1}{-10 \pm \sqrt{17}} \times \frac{-10 \mp \sqrt{17}}{-10 \mp \sqrt{17}}$ | **M1** | **FT** *their* $x = a \pm \sqrt{b}$ providing previous **M1** awarded |
| | $x = -10 \pm \sqrt{17}$, $y = -\frac{10}{83} \mp \frac{\sqrt{17}}{83}$ | **A1** | **dep** on all marks previously awarded |
| 5(a)(i) | 30 240 | **2** | **M1**for $3 \times 7! \times 2$ or ${}^3P_1 \times {}^7P_7 \times {}^2P_1$ oe |
| 5(a)(ii) | 17 280 | **2** | **M1**for $4! \times 6!$ oe or ${}^4P_4 \times {}^6P_5$ oe |
| 5(b)(i) | 35 | **2** | **M1** for ${}^7C_4$ or 1 + 4 + 18 + 12 |
| 5(b)(ii) | 51 | **2** | **M1** for ${}^3C_2 \times {}^6C_2 + {}^3C_3 \times {}^6C_1$ oe or 18 + 4 + 3 + 2 + 24 |

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| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 6 | $\frac{\mathrm{d}}{\mathrm{d}x}(\sin^2 x) = 2\sin x\cos x$ soi | **B1** | |
| | $\cos x \times \textit{their}(2\sin x\cos x) +$ $(\textit{their} - \sin x) \times \sin^2 x$ | **M1** | **FT** *their* $\frac{\mathrm{d}}{\mathrm{d}x}(\sin^2 x)$ |
| | $\cos x \times \textit{their}(2\sin x\cos x) + (-\sin x) \times \sin^2 x$ isw | **A1** | **FT** *their* $\frac{\mathrm{d}}{\mathrm{d}x}(\sin^2 x)$ |
| | $\frac{\delta y}{h} = \textit{their}(2\sin 3\cos^2 3 - \sin^3 3)$ or better | **M1** | **FT** *their* derivative |
| | 0.274$h$ or<br>0.2738[08...]$h$ where the coefficient of $h$ is rot to 4 or more sf | **A1** | **dep** on correct derivative seen |
| 7 | $\frac{\mathrm{d}y}{\mathrm{d}x} = 2mx + \frac{1}{2}$ | **B1** | |
| | $\frac{\mathrm{d}^2 y}{\mathrm{d}x^2} = 2m$ | **B1** | |
| | $m = \frac{1}{4}$ and $n = -\frac{5}{4}$ and no other values | **2** | **M1** for<br>$3(2m) = \left(2mx + \frac{1}{2}\right)^2 - \left(mx^2 + \frac{x}{2} + n\right)$<br>soi |