| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 5(c) | $x=(2y+3)^2$ or equivalent | **M1** | For a correct attempt to find the inverse |
| | $y=\frac{\sqrt{x}-3}{2}$ | **M1** | For correct rearrangement |
| | $\mathrm{f}^{-1}=\frac{\sqrt{x}-3}{2}$ | **A1** | Must have correct notation |
| 5(d) | $x>9$ | **B1** | **FT** on *their* (a) |
| 5(e) | $\mathrm{f}(\ln(x+4))=49$ | **M1** | For correct order |
| | $(2\ln(x+4)+3)^2=49$<br>$\ln(x+4)=2$ | **M1** | For correct attempt to solve, dep on previous M mark, as far as $x=$ |
| | $x=\mathrm{e}^2-4$ | **A1** | |
| 6(a) | $A\left(-\frac{5}{2},\ 0\right)$ | **B1** | |
| | $x(-5-2x)+3=0$<br>$2x^2+5x-3=0$<br>$(2x-1)(x+3)=0$ | **M1** | For attempt to eliminate one variable, obtain a 3-term quadratic equation = 0 and attempt to solve |
| | $B\left(\frac{1}{2},\ -6\right)$ | **A1** | Allow A1 if just the $x$-coordinates or just the y-coordinates are given |
| 6(b) | Area of triangle $=\frac{1}{2}\left(\frac{5}{2}+\frac{1}{2}\right)\times 6$ , $=9$ | **M1** | For attempt at triangle using *their* values |
| | $\int_{\frac{1}{2}}^{1}-\frac{3}{x}\mathrm{d}x=\left[-3\ln x\right]_{\frac{1}{2}}^{1}$ | **M1** | For attempt to integrate, must have ln |
| | $=3\ln\frac{1}{2}$ | **M1** | correct application of limits, dep on previous M mark |
| | $=-3\ln 2$ | **M1** | realisation that value of integral is negative and making the adjustment |
| | | **M1** | application of log law, dep on previous M mark |
| | Area $=9+\ln 8$ | **A1** | |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| 7(a) | $\frac{dy}{dx} = (x^2-1)\frac{5}{2}(5x+2)^{-\frac{1}{2}} + 2x(5x+2)^{\frac{1}{2}}$ | **B1** | For $\frac{5}{2}(5x+2)^{-\frac{1}{2}}$ |
| | | **M1** | For differentiation of a product |
| | | **A1** | |
| | $\frac{dy}{dx} = \frac{(5x+2)^{-\frac{1}{2}}}{2}\left(5(x^2-1)+4x(5x+2)\right)$ or equivalent | **M1** | Dep on previous M mark for attempt to simplify |
| | $\frac{dy}{dx} = \frac{25x^2+8x-5}{2\sqrt{5x+2}}$ | **A1** | |
| 7(b) | $25x^2+8x-5=0$ | **M1** | Equating their numerator in (a) to zero and attempt to solve |
| | $x = 0.315$ | **A1** | |
| | $y = -1.70$ | **A1** | |
| 7(c) | Consideration of gradient or $y$ values either side of stationary point, remembering that $x > 0$. | **M1** | Must be a complete method making use of *their* (a). Allow consideration of $25x^2+8x-5$ as a 'minimum curve'. Accept 2nd derivative method. |
| | Minimum | **A1** | |
| 8(a) | $\mathbf{b}-\mathbf{a}$ | **B1** | |
| 8(b) | $\frac{1}{4}\mathbf{a}+\frac{1}{2}(\mathbf{b}-\mathbf{a})$ or $-\frac{3}{4}\mathbf{a}+\frac{1}{2}(\mathbf{a}+\mathbf{b})$ | **B1** | For $\frac{1}{4}\mathbf{a}$ or $-\frac{3}{4}\mathbf{a}$ |
| | | **B1** | For $\frac{1}{2}(\mathbf{b}-\mathbf{a})$ or $\frac{1}{2}(\mathbf{a}+\mathbf{b})$ |
| | $\frac{1}{2}\mathbf{b}-\frac{1}{4}\mathbf{a}$ | **B1** | Correct and simplified |
| 8(c) | $n\left(\frac{1}{2}\mathbf{b}-\frac{1}{4}\mathbf{a}\right)$ | **B1** | **FT** on *their* answer to (b) |
| 8(d) | $\frac{1}{2}(\mathbf{b}-\mathbf{a})+k\mathbf{b}$ | **M1** | For use of *their* (a) and $k\mathbf{b}$ |
| | | **A1** | |