| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 9(a) | Derivative of $e^{2x}$: $2e^{2x}$ soi | **B1** | |
| | $x \times 2e^{2x} + e^{2x}$ isw | **B1** | **FT** *their* $2e^{2x}$ |
| 9(b) | [When $x = 1$] $y = e^2$ | **B1** | |
| | [gradient tangent =] *their* $\left.\frac{dy}{dx}\right\|_{x=1}$ | **B1** | **FT** *their* derivative which must include at least one term in $e^{2x}$ |
| | Gradient of normal = $\frac{-1}{\textit{their}(3e^2)}$ | **B1** | **FT** $\frac{-1}{\textit{their}\left.\frac{dy}{dx}\right\|_{x=1}}$ |
| | $y - e^2 = \frac{-1}{3e^2}(x - 1)$ oe, isw | **B1** | **dep** on 2 marks awarded in part (a) and all previous marks awarded in this part |
| 9(c) | $\left[xe^{2x} - \frac{1}{2}e^{2x}\right]_0^2$ | **M3** | **M2** for $xe^{2x} + ke^{2x}$ where $k < 0$ or $k = \frac{1}{2}$<br>or **M1** for $\int 2xe^{2x}dx = xe^{2x} - \int e^{2x}dx$ |
| | $\left(2e^4 - \frac{1}{2}e^4\right) - \left(-\frac{1}{2}\right)$ | **A1** | |
| | $1.5e^4 + 0.5$ or exact equivalent | **A1** | |
| 10(a) | $a + 4d = 11$ oe | **B1** | |
| | $a + 6d = 3(a + d)$ oe | **B1** | |
| | Correctly eliminates one unknown and solves for $a$ or $d$ | **M1** | **FT** *their* linear equations in $a$ and $d$ providing **B1** earned. |
| | $d = 2,\ a = 3$ | **A1** | |

| Question | Answer | Marks | Guidance |
|---|---|---|---|
| 10(b) | $3+d=3r^2$ | **B1** | |
| | $3+5d=3r^4$ | **B1** | |
| | $3+5d=3\left(\frac{3+d}{3}\right)^2$ oe<br>or $3+5\left(3r^2-3\right)=3r^4$ oe | **M1** | |
| | $d^2-9d\left[=0\right]$ or $3r^4-15r^2+12\left[=0\right]$ | **A1** | |
| | $d = 9$ and $r = 2$ and no other values | **A2** | **A1** for $d = 9$ and no other value of $d$ or for $r = 2$ and no other value of $r$ |