| Question Number | Scheme | Marks |
|---|---|---|
| **1(a)** | $\left(\frac{\mathrm{d}y}{\mathrm{d}x}=\right) \ldots x^2+\ldots x+\ldots x^{-2}$ | M1 |
| | $\left(\frac{\mathrm{d}y}{\mathrm{d}x}=\right) \frac{3}{4}x^2-2x-17x^{-2}$ | A1A1 |
| | | **(3)** |
| **(b)** | $\left(\frac{\mathrm{d}y}{\mathrm{d}x}=\right) \frac{3}{4}(2)^2-2(2)-17(2)^{-2}=-\frac{21}{4}$ | M1 |
| | $y-\frac{13}{2}="-\frac{21}{4}"(x-2)$ | dM1 |
| | $21x+4y-68=0$ | A1 |
| | | **(3)** |
| | | **(6 marks)** |

**(a)**

M1 Reduces the power by 1 on any of the following terms $\ldots x^3 \to \ldots x^2$, $\ldots x^2 \to \ldots x^1$, $\ldots x^{-1} \to \ldots x^{-2}$. Be careful not to allow just sight of $x^2$. The index does not have to be processed for this mark.

A1 Two of $+\frac{3}{4}x^2, -2x, -17x^{-2}$ or exact unsimplified equivalent terms. Accept eg $\frac{-17}{x^2}$ but the indices must be processed. Double signs eg $+\frac{-17}{x^2}$ is fine.

A1 $\frac{3}{4}x^2-2x-17x^{-2}$ all on one line or exact simplified equivalent. Allow $x^1$. Withhold the final mark if they attempt to multiply all the terms by 4 for example or a +*c* appears.

**(b)**

M1 Attempts to substitute $x=2$ into their $\frac{\mathrm{d}y}{\mathrm{d}x}$ which must be a changed function to find the gradient of the tangent at *P*

dM1 It is for the method of finding a line passing through $\left(2, \frac{13}{2}\right)$ using their $\frac{\mathrm{d}y}{\mathrm{d}x}$ at $x=2$ eg it cannot be the gradient of the normal.

Score for sight of $y-\frac{13}{2}="-\frac{21}{4}"(x-2)$ with both coordinates substituted in correctly or if they use the form $y=mx+c$ they must proceed as far as *c* = … It is dependent on the previous method mark.

A1 $21x+4y-68=0$ or any equivalent multiple where the coefficients are integers and all terms are on one side of the equation. If they state values which contradict the equation then the equation takes precedence.