Question Number	Scheme	Marks
1(a)	$y = 6x^2 + 3\sqrt{x} + \frac{5}{8}$	
	$\left(\frac{dy}{dx} =\right) 12x + \frac{3}{2}x^{-\frac{1}{2}}$	M1 A1 A1
		(3)

Notes

(a)

M1: Attempts to differentiate achieving one correct index or for $\frac{5}{8} \to 0$

Award for $6x^2 \to ...x$ or $3\sqrt{x} \to ...x^{-\frac{1}{2}}$ (oe) or for $\frac{5}{8} \to 0$

Allow indices to be unprocessed for this mark e.g. $6x^2 \to ...x^{2-1}$ or $3\sqrt{x} \to ...x^{\frac{1}{2}-1}$

A1: One correct simplified algebraic term. E.g. $12x$ or $\frac{3}{2}x^{-\frac{1}{2}}$ oe e.g. $\frac{3}{2\sqrt{x}}, \frac{1.5}{x^{\frac{1}{2}}}$

Condone $12x^1$ for $12x$ for this mark.

Do not allow $3\times\frac{1}{2}x^{-\frac{1}{2}}$ for $\frac{3}{2}x^{-\frac{1}{2}}$

Award as soon as a correct simplified term is seen.

A1: $\left(\frac{dy}{dx}\right) = 12x + \frac{3}{2}x^{-\frac{1}{2}}$ or simplified equivalent such as $12x + \frac{1.5}{\sqrt{x}}$.

Do **not** allow $12x^1$ for $12x$ for this mark.

There is no need for "$\frac{dy}{dx} =$" so just look for the correct expression and apply isw once a correct answer is seen.

$\left(\frac{dy}{dx}\right) = 12x + \frac{3}{2}x^{-\frac{1}{2}} + c$ scores A0 here as does $\left(\frac{dy}{dx}\right) = 12x + \frac{3}{2}x^{-\frac{1}{2}} + 0$

(b)	$x=\frac{1}{4}\Rightarrow \frac{\mathrm{d}y}{\mathrm{d}x}=12\times\frac{1}{4}+\frac{3}{2}\times\sqrt{\left(\frac{4}{1}\right)}=...\left(6\right)$	M1
	$\left(\frac{1}{4},\frac{5}{2}\right)\Rightarrow y-\frac{5}{2}="6"\left(x-\frac{1}{4}\right)$ or e.g. $y="6"x+c\Rightarrow\frac{5}{2}=6\times\frac{1}{4}+c\Rightarrow c=...$	**d**M1
	$\Rightarrow y=6x+1$	A1
		(3)
		(6 marks)

Notes

(b)

M1: Substitutes $x=\frac{1}{4}$ into their $\frac{\mathrm{d}y}{\mathrm{d}x}$ and finds its value. Their $\frac{\mathrm{d}y}{\mathrm{d}x}$ cannot be the same as "y".

Score for sight of $x=\frac{1}{4}$ substituted consistently into their $\frac{\mathrm{d}y}{\mathrm{d}x}$ followed by a value **or** it may be implied by a correct value for their $\frac{\mathrm{d}y}{\mathrm{d}x}$ if no substitution is seen.

Condone a miscopy of their $\frac{\mathrm{d}y}{\mathrm{d}x}$ if the intention is clear.

Do **not** award this mark for work such as

$$\left(\frac{\mathrm{d}y}{\mathrm{d}x}\right)=12x+\frac{3}{2}x^{-\frac{1}{2}}+c=12\left(\frac{1}{4}\right)+\frac{3}{2}\left(\frac{1}{4}\right)^{-\frac{1}{2}}+c=0\left(\text{or}\frac{5}{2}\right)\Rightarrow c=...$$

dM1: Correct method for finding the equation of the tangent (not the normal). Look for the correct use of their non-zero $\frac{\mathrm{d}y}{\mathrm{d}x}$ at $x=\frac{1}{4}$ and the point $\left(\frac{1}{4},\frac{5}{2}\right)$ with the values correctly placed.

If the form $y=mx+c$ is used they must proceed as far as $c=...$ e.g. $\frac{5}{2}="6"\frac{1}{4}+c\Rightarrow c=...$

Depends on the first method mark.

A1: $y=6x+1$ Cso

Note if they do not use part (a) for part (b) e.g. just use a calculator they will need to obtain a gradient of 6 for the first mark, then apply the scheme.