Question Number	Scheme	Marks
1a	$y = 5x^3 + \frac{3}{x^2} - 7x = 5x^3 + 3x^{-2} - 7x$ $\left(\frac{dy}{dx} =\right) \ 15x^2 - 6x^{-3} - 7$	M1A1A1
		(3)
b	$\left(\frac{d^2y}{dx^2} =\right) \ 30x + 18x^{-4}$	M1A1
		(2)
		(5 marks)

Do not be concerned by the labelling of their answers in part (a) or part (b)

(a)

M1: Decreases the power by 1 on one of the terms $...x^3 \rightarrow ...x^2 \quad ...x^{-2} \rightarrow ...x^{-3} \quad \pm 7x \rightarrow \pm 7$
The index does not have to be processed. e.g. $...x^3 \rightarrow ...x^{3-1}$

A1: Two correct unsimplified terms (indices must be processed). May be seen on different lines or listed. Condone $7x^0$ as an unsimplified term. Do not withhold this mark if there is a $+c$ present.

A1: $15x^2 - 6x^{-3} - 7$ or simplified equivalent. Condone any spurious notation around the expression but withhold this mark if there is a constant of integration. Isw once a correct answer is seen. Do not accept $15x^2 - 6x^{-3} - 7x^0$ or e.g. $15x^2 + -6x^{-3} - 7$

(b)

M1: Decreases the power by 1 on one of the terms of their changed function. Do not allow this mark to be scored for a constant of integration in (a) $\rightarrow 0$ in (b)

A1: $30x + 18x^{-4}$ or simplified equivalent e.g. $30x + \frac{18}{x^4}$. Condone e.g. $30x^1 + \frac{18}{x^4}$. Isw once a correct answer is seen. Withhold this mark if there is a constant of integration and it has not already been penalised in (a).
Allow this mark to be scored following $15x^2 - 6x^{-3} \pm 7$ in (a). Also allow full marks to be scored if they have no constant.

Note: (a) $15x^2 - 6x^{-1} - 7$ and (b) $30x + 6$ will score M1A1A0 M1A0

Question Number	Scheme	Marks
2a	$\frac{1}{8}x$	B1
		(1)
b	$\frac{1}{256}x^{\frac{3}{2}}$	B1
		(1)
c	$\left(\frac{1}{2}\left(\frac{1}{64}x^2\times\frac{16}{\sqrt{x}}\right)\right)^{-\frac{4}{3}}=\left(\frac{1}{8}x^{\frac{3}{2}}\right)^{-\frac{4}{3}}=16x^{-2}$	M1A1
		(2)
		(4 marks)

(a)

B1: $\frac{1}{8}x$ or simplified equivalent e.g. $0.125x$ or $\frac{1}{8}x^1$ Accept e.g. $\frac{x}{8}$ but $\pm\frac{1}{8}x$ is B0.

Do not withhold this mark unless it is clear that they intend to write $\frac{1}{8x}$

(b)

B1: $\frac{1}{256}x^{\frac{3}{2}}$ or simplified equivalent e.g. $0.00390625x^{\frac{3}{2}}$ condone $\frac{x^{\frac{3}{2}}}{256}$. Isw after a correct answer is seen.

Do not accept e.g. $\frac{1}{256}\sqrt{x^3}$ or $\frac{1}{256}\left(\sqrt{x}\right)^3$ or $\frac{1}{256}x\sqrt{x}$ as n is not a simplified constant.

Do not accept $x^{\frac{3}{2}}\div 256$ or $\frac{1}{256x^{-\frac{3}{2}}}$ (not of the required form)

Do not withhold this mark unless it is clear that they intend to write $\frac{1}{256x^{\frac{3}{2}}}$

(c)

M1: Attempts to use the index laws and proceeds to either

- $\left(...x^{\frac{3}{2}}\right)^{-\frac{4}{3}}$ or $\left(...x^{-\frac{3}{2}}\right)^{\frac{4}{3}}$
- $...x^{-\frac{8}{3}}\times...x^{\frac{2}{3}}$ (or $...x^{-\frac{8}{3}}\div...x^{-\frac{2}{3}}$)
- $...x^{-2}$
- $16x^n$ where $n\neq-\frac{1}{2}$

Allow $\frac{16}{x^2}$ to score M1.

Be aware that incorrect understanding of indices such as $\frac{16}{\sqrt{x}}=16x^{-2}$ is M0A0

A1: $16x^{-2}$ (from a correct method)
(Correct answer with no incorrect working seen can score M1A1). Isw after a correct answer is seen. $\frac{16}{x^2}$ is A0