Question Number	Scheme	Marks
4(i)(a)	ay^3	B1
		(1)
(i)(b)	$\dfrac{5}{\left(3a^{1-x}\right)^{-2}} = \dfrac{45}{\ldots}$	B1
	$\left(\ldots a^{1-x}\right)^{-2} = a^{-2} \times a^{2x}$	M1
	$= \dfrac{45a^2}{y^2}$	A1
		(3)
(ii)(a)	e.g. $3^{4t+2} = \left(3^{2t}\right)^2 \times 9 = 9p^2$ (see notes)	M1
	$\Rightarrow 27 \times p^2 + 3 = 82 \times p \Rightarrow 27p^2 - 82p + 3 = 0$ *	A1*
		(2)
(ii)(b)	Solves the quadratic $\Rightarrow 3, \dfrac{1}{27}$	B1
	$\left(3^t\right)^2 = 3$ or $9^t = 3 \Rightarrow t = \dfrac{1}{2}$ or $\left(3^t\right)^2 = \dfrac{1}{27} \Rightarrow 3^t = \dfrac{1}{3\sqrt{3}} \Rightarrow t = -\dfrac{3}{2}$ or $9^t = \dfrac{1}{27} \Rightarrow t = -\dfrac{3}{2}$	M1
	$(t =)\ \dfrac{1}{2},\ -\dfrac{3}{2}$	A1
		(3)
		(9 marks)

	$-a+6a+8+a^2=32 \Rightarrow a^2+5a-24=0$ $(a+8)(a-3)=0$ $a=3$ or $a=-8$ and chooses $a=3$ with reason *	M1 dM1 A1* cso
		(3)
(ii)	$3x^3+26x^2-9x=0 \Rightarrow x(3x^2+26x-9)=0$ $x(3x-1)(x+9)$ $(x=)\ 0, \frac{1}{3}, -9$	M1 A1
		(2)
(b)(i)	$(y=)\ 0$ $y^{\frac{1}{3}}=\text{"}\frac{1}{3}\text{"}$ or $y^{\frac{1}{3}}=\text{"}-9\text{"} \Rightarrow y=\ldots$ (or $(-9)^3=\ldots$ or $\left(\frac{1}{3}\right)^3=\ldots$) $(y=)\ \frac{1}{27},\ -729$	B1 M1 A1
		(3)
(b)(ii)	$9^z=\text{"}\frac{1}{3}\text{"} \rightarrow z=\ldots$ $(z=)\ -\frac{1}{2}$ only	M1 A1
		(2)
		(10 marks)

Question Number	Scheme	Marks
5.(a)	$2x^3+3x^2-35x=0 \Rightarrow x\left(2x^2+3x-35\right)=0$	M1
	$(2x-7)(x+5)=0 \Rightarrow x=\dots$	dM1
	$x=-5, 0, \frac{7}{2}$	A1
		(3)
(b)	$2(y-5)^6+3(y-5)^4-35(y-5)^2=0$	
	States that $y=5$ is a solution	B1
	$(y-5)^2="\frac{7}{2}" \Rightarrow y=\dots$	M1
	$y=5+\sqrt{\frac{7}{2}}$ or $y=5-\sqrt{\frac{7}{2}}$ or exact equiavlent	A1ft
	Both $y=5+\sqrt{\frac{7}{2}}$ and $y=5-\sqrt{\frac{7}{2}}$ or exact equivalent.	A1
		(4)
		(7 marks)

Question Number	Scheme	Marks
2 (a)	$3^{3x}=\left(3^x\right)^3=y^3$	B1
		(1)
(b)	$\frac{1}{3^{x-2}}=\frac{1}{3^x\times 3^{-2}}=\frac{9}{y}$	M1 A1
		(2)
(c)	$\frac{81}{9^{2-3x}}=\frac{9^2}{9^{2-3x}}=9^{2-(2-3x)}=9^{3x}=3^{6x}=y^6$	M1 A1
		(2)
		(5 marks)

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)

Question Number	Scheme	Marks
1. (a)	$p^{\frac{1}{2}}=\left(\frac{1}{16}x^4\right)^{\frac{1}{2}}=\frac{1}{4}x^2$	B1
		(1)
(b)	$(pq)^{-1}=\left(\frac{1}{16}x^4\times\frac{40}{x^3}\right)^{-1}=\left(\frac{5}{2}x\right)^{-1}=\frac{2}{5}x^{-1}$	M1, A1
		(2)
(c)	$p\,q^2=\frac{1}{16}x^4\times\left(\frac{40}{x^3}\right)^2=\frac{1600}{16}\times\frac{x^4}{x^6}=100x^{-2}$	M1, A1
		(2)
		(5 marks)

Question Number	Scheme	Marks
4(i)	Uses a correct law of indices on 2^{4k-3} or 8^{1-k} The possibilities are endless but some more common examples are: For 2^{4k-3}: $2^{4k}\times 2^{-3}$, $\frac{2^{4k}}{8}$, $8^{\frac{4k-3}{3}}$, $4^{\frac{4k-3}{2}}$, $\left(\sqrt{2}\right)^{8k-6}$ For 8^{1-k}: 8×8^{-k}, $\frac{8}{8^k}$, $2^{3(1-k)}$, $4^{\frac{2(1-k)}{3}}$, $\left(\sqrt{2}\right)^{6-6k}$ These may be seen in isolation e.g. not in an equation. But not just e.g. $8=2^3$	M1
	e.g. $2^{4k-3}=\frac{8^{1-k}}{4\sqrt{2}}\Rightarrow 2^{4k-3}=\frac{2^{3(1-k)}}{2^{\frac{5}{2}}}\Rightarrow 2^{4k-3}=2^{3(1-k)-\frac{5}{2}}$ $\Rightarrow 4k-3=3(1-k)-\frac{5}{2}\Rightarrow k=...$	dM1
	$k=\frac{1}{2}$	A1
		(3)
(ii)	$\frac{x\sqrt{3}+2}{\sqrt{3}-1}=x\sqrt{3}-4\Rightarrow x\sqrt{3}+2=\left(x\sqrt{3}-4\right)\left(\sqrt{3}-1\right)$ $\Rightarrow x\sqrt{3}+2=3x+4-4\sqrt{3}-x\sqrt{3}$ $\Rightarrow 2\sqrt{3}x-3x=2-4\sqrt{3}$	M1
	$\Rightarrow x\left(2\sqrt{3}-3\right)=2-4\sqrt{3}$	A1
	$\Rightarrow x=\frac{2-4\sqrt{3}}{2\sqrt{3}-3}\times\frac{2\sqrt{3}+3}{2\sqrt{3}+3}$	dM1
	$=-6-\frac{8}{3}\sqrt{3}$	A1
		(4)