Question Number	Scheme	Marks
3a	$\dfrac{8-\sqrt{15}}{2\sqrt{3}+\sqrt{5}}\times\dfrac{2\sqrt{3}-\sqrt{5}}{2\sqrt{3}-\sqrt{5}}=\dfrac{16\sqrt{3}-8\sqrt{5}-2\sqrt{45}+\sqrt{75}}{12-5}$	M1
	e.g. $\dfrac{21\sqrt{3}-14\sqrt{5}}{7}$	dM1
	$3\sqrt{3}-2\sqrt{5}$	A1
		(3)
b	$\left(x+5\sqrt{3}\right)\sqrt{5}=40-2x\sqrt{3}\Rightarrow x\sqrt{5}+2x\sqrt{3}=40-5\sqrt{15}$	M1
	$(x=)\ \dfrac{40-5\sqrt{15}}{2\sqrt{3}+\sqrt{5}}$	A1
	$(x=)\ 15\sqrt{3}-10\sqrt{5}$	A1ft
		(3)
		(6 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}: $2^{4k}\times2^{-3}$, $\dfrac{2^{4k}}{8}$, $8^{\frac{4k-3}{3}}$, $4^{\frac{4k-3}{2}}$, $\left(\sqrt{2}\right)^{8k-6}$ For 8^{1-k}: 8×8^{-k}, $\dfrac{8}{8^{k}}$, $2^{3(1-k)}$, $4^{\frac{2(1-k)}{3}}$, $\left(\sqrt{2}\right)^{6-6k}$ These may be seen in isolation e.g. not in an equation. But not just e.g. $8=2^3$	M1
	e.g. $2^{4k-3}=\dfrac{8^{1-k}}{4\sqrt{2}}\Rightarrow 2^{4k-3}=\dfrac{2^{3(1-k)}}{2^{\frac{5}{2}}}\Rightarrow 2^{4k-3}=2^{3(1-k)-\frac{5}{2}}$ $\Rightarrow 4k-3=3(1-k)-\dfrac{5}{2}\Rightarrow k=\ldots$	dM1
	$k=\dfrac{1}{2}$	A1
		(3)

(ii)	$\dfrac{x\sqrt{3}+2}{\sqrt{3}-1}=x\sqrt{3}-4\Rightarrow x\sqrt{3}+2=\left(x\sqrt{3}-4\right)\left(\sqrt{3}-1\right)$ $\Rightarrow x\sqrt{3}+2=3x+4-4\sqrt{3}-x\sqrt{3}$ $\Rightarrow 2\sqrt{3}x-3x=2-4\sqrt{3}$	M1
	$\Rightarrow x\left(2\sqrt{3}-3\right)=2-4\sqrt{3}$	A1
	$\Rightarrow x=\dfrac{2-4\sqrt{3}}{2\sqrt{3}-3}\times\dfrac{2\sqrt{3}+3}{2\sqrt{3}+3}$	dM1
	$=-6-\dfrac{8}{3}\sqrt{3}$	A1
		(4)

Question	Scheme	Marks
6(a)	$\left(r-\frac{1}{r}\right)^2 = r^2 - r\times\frac{1}{r} - r\times\frac{1}{r} + \frac{1}{r^2}$	M1
	$= r^2 + \frac{1}{r^2} - 2$	A1
		(2)
(b)	$\frac{1}{3+2\sqrt{2}} = \frac{1}{3+2\sqrt{2}} \times \frac{3-2\sqrt{2}}{3-2\sqrt{2}}$	M1
	$= \frac{3-2\sqrt{2}}{3^2-\left(2\sqrt{2}\right)^2} = 3-2\sqrt{2}$	A1
		(2)
(b) ALT	$\frac{1}{3+2\sqrt{2}} = p+q\sqrt{2} \Rightarrow 1 = \left(p+q\sqrt{2}\right)\left(3+2\sqrt{2}\right) = 3p+4q+2p\sqrt{2}+3q\sqrt{2}$ $\Rightarrow \begin{matrix} 3p+4q=1 \\ 2p+3q=0 \end{matrix}$	M1
	$\Rightarrow \begin{matrix} 3p+4q=1 \\ 2p+3q=0 \end{matrix} \Rightarrow \begin{matrix} 6p+8q=2 \\ 6p+9q=0 \end{matrix} \Rightarrow q=-2 \Rightarrow 3p-8=1 \Rightarrow p=3$ $\frac{1}{3+2\sqrt{2}} = 3-2\sqrt{2}$	A1
		(2)
(c)	$\left(\sqrt{3+2\sqrt{2}} - \frac{1}{\sqrt{3+2\sqrt{2}}}\right)^2 = 3+2\sqrt{2} + \frac{1}{3+2\sqrt{2}} - 2$	M1
	$= 3+2\sqrt{2}+3-2\sqrt{2}-2 = \ldots(=4)$	dM1
	so $\sqrt{3+2\sqrt{2}} - \frac{1}{\sqrt{3+2\sqrt{2}}} = 2$	A1
		(3)
(c) Alt	$\sqrt{3+2\sqrt{2}} - \frac{1}{\sqrt{3+2\sqrt{2}}} = 2 \Rightarrow 3+2\sqrt{2}-1 = 2\sqrt{3+2\sqrt{2}}$	M1
	$\Rightarrow \left(2+2\sqrt{2}\right)^2 = 4\left(3+2\sqrt{2}\right)$	dM1
	$\Rightarrow 4+8\sqrt{2}+8 = 12+8\sqrt{2}$ ✓ Hence true	A1
		(3)
		(7 marks)

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	$(x=)\ 15\sqrt{3}-10\sqrt{5}$	A1ft
		(3)
		(6 marks)