Question		Working		Answer	Mark	Notes
12	(a)	For $2^{\frac{x}{3}}$ eg $\left(4^{\frac{1}{2}}\right)^{\frac{x}{3}}$ **or** $4^{\frac{x}{6}}$ **or** $\left(8^{\frac{1}{3}}\right)^{\frac{x}{3}}$ **or** $8^{\frac{x}{9}}$ **or** $\left(64^{\frac{1}{6}}\right)^{\frac{x}{3}}$ **or** $64^{\frac{x}{18}}$	For 8^x eg $\left(2^3\right)^x$ **or** 2^{3x} **or** $\left(4^{\frac{3}{2}}\right)^x$ **or** $4^{\frac{3x}{2}}$ **or** 8^{x+2} **or** 8^{2+x} **or** **or** $\left(64^{\frac{1}{2}}\right)^x$ **or** $64^{\frac{x}{2}}$		3	M1 for one correct application of an index rule involving $2^{\frac{x}{3}}$ or 8^x
		eg $\frac{x}{3}-3x=6$ oe **or** $\frac{x}{6}-\frac{3x}{2}=3$ oe **or** $\frac{x}{9}-x=2$ oe **or** $\frac{x}{18}-\frac{x}{2}=1$ oe **or** $x-9x=18$ oe				M1 for setting up a **correct** equation This can be embedded in an index equation eg $2^{\frac{x}{3}-3x}=2^6$ (the base on the LHS and the RHS must be the same)
		Working required		–2.25		A1 dep on M1 oe eg $-\frac{18}{8}$ **or** $-\frac{9}{4}$ **or** $-2\frac{1}{4}$

	(b)	$4t(t+5)=4t^2+20t$ **or** $4t(2t-3)=8t^2-12t$ **or** $(t+5)(2t-3)=2t^2-3t+10t-15$ **or** $(2t^2+7t-15)$		3	M1	for an expansion with **only one error.**	M2 for 3 (out of a maximum of 4) of $8t^3-12t^2+40t^2-60t$
		eg $(4t^2+20t)(2t-3)=8t^3-12t^2+40t^2-60t$ or $(8t^2-12t)(t+5)=8t^3+40t^2-12t^2-60t$ or $4t(2t^2-3t+10t-15)=8t^3-12t^2+40t^2-60t$ or $4t(2t^2+7t-15)=8t^3+28t^2-60t$			M1	ft dep on M1 and a quadratic expression multiplied by a linear expression **Allow one further error**.	this can be implied by $8t^3+28t^2...$ or $...+28t^2-60t$ (M1 for 2 correct out of a maximum of 4)
		Correct answer scores full marks (unless from obvious incorrect working)	$8t^3+28t^2-60t$		A1	cao (terms may be in any order but must be simplified) dep on M1 ISW correct factorisation eg $2\left(4t^3+14t^2-30t\right)$ or $4\left(2t^3+7t^2-15t\right)$ Do not ISW incorrect simplification or subsequent division eg $4t^3+14t^2-30t$ or $2t^3+7t^2-15t$	
							Total 6 marks