Question	Answer	Marks	Partial Marks
11(b)	$\frac{x-9}{x+6}=\frac{\frac{1}{2}(x+1)}{x-9}$ or $(x-9)\left(\frac{x-9}{x+6}\right)=\frac{1}{2}(x+1)$ $(x+6)\left(\frac{x-9}{x+6}\right)^2=\frac{1}{2}(x+1)$ oe	**M2**	**M1** for either $\frac{x-9}{x+6}$ or $\frac{\frac{1}{2}(x+1)}{x-9}$; may be embedded
	Correct simplification to given equation $x^2-43x+156=0$	**A1**	
	Factorises or solves: $(x-4)(x-39)=0$	**M1**	
	$x=4, x=39$	**A1**	
	$r=-\frac{1}{2}$ $r=\frac{2}{3}$ $\lvert r\rvert<1$ for each progression [and so the sum to infinity exists]	**A2**	**A1** for either value of r
12	$\frac{\pi x^2 y}{2}=25000$ oe	**M1**	
	$y=\frac{50000}{\pi x^2}$ or $\pi xy=\frac{50000}{x}$	**A1**	
	$S=\pi x\left(\frac{50000}{\pi x^2}\right)+\pi x^2$	**M1**	**FT** *their y* providing of the form $\frac{k}{\pi x^2}$
	$S=\frac{50000}{x}+\pi x^2$	**A1**	
	$\frac{dS}{dx}=-50000x^{-2}+2\pi x$ oe	**M1**	FT from expression of form $\frac{k}{x}+m\pi x^2$
	Equates to zero and solves for x: $x=\sqrt[3]{\frac{25000}{\pi}}$ or 19.9647....	**A1**	
	$S_{\min}=\frac{50000}{\sqrt[3]{\frac{25000}{\pi}}}+\pi\left(\sqrt[3]{\frac{25000}{\pi}}\right)^2$	**DM1**	**dep** on previous **M1;** **FT** *their* positive value of x used in a correct expression for S
	3760 or 3756 to 3757	**A1**	

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