Question	Answer	Marks	Guidance
3	$y^3 = m\ln x + c$	**B1**	May be implied by subsequent work
	$5 = m + c$ $15 = 6m + c$ $m = 2,\ \ c = 3$	**2**	**B1** for $m = 2$ **B1** for $c = 3$
	$y = \sqrt[3]{2\ln x + 3}$	**B1**	
	Alternative		
	$y^3 = m\ln x + c$	**(B1)**	May be implied by subsequent work
	Gradient = 2	**(B1)**	For finding the gradient and equating to m
	$5 = m + c$ $15 = 6m + c$ $c = 3$	**(B1)**	For at least one correct equation and finding c
	$y = \sqrt[3]{2\ln x + 3}$	**(B1)**	
4	$x = \dfrac{2 \pm \sqrt{4 + 4\left(\sqrt{5}-1\right)\left(\sqrt{5}+1\right)}}{2\left(\sqrt{5}-1\right)}$	**M1**	For a correct use of the quadratic formula with sufficient detail
	$x = \dfrac{2 \pm 2\sqrt{5}}{2\left(\sqrt{5}-1\right)}$ or $x = \dfrac{1 \pm \sqrt{5}}{\left(\sqrt{5}-1\right)}$	**2**	**Dep M1** for attempt to simplify to obtain 2 real roots **A1** for either
	$x = \dfrac{\left(\sqrt{5}+1\right)}{\left(\sqrt{5}-1\right)} \times \dfrac{\left(\sqrt{5}+1\right)}{\left(\sqrt{5}+1\right)}$	**M1**	For attempt at rationalisation
	$x = \dfrac{3}{2} + \dfrac{\sqrt{5}}{2}$	**A1**	
	$x = -1$	**B1**	
5(a)	$a + 3d = 25$ $a + 8d = 50$	**M1**	For at least one correct equation and attempt to solve to find at least one unknown
	$a = 10$	**A1**	
	$d = 5$	**A1**	

Question	Answer	Marks	Guidance
5(b)	$\frac{n}{2}\left(20+\left(n-1\right)5\right)\ \ \left(=25\ 000\right)$	**M1**	For attempting the sum to *n* terms using *their a* and *d*
	$5n^2+15n-50\ 000=0$ $n=98.5...$	**A1**	
	$n=99$	**A1**	
6	$1-4x+\frac{68}{9}x^2$	**2**	**B1** for $1-4x$ **B1** for $\frac{68}{9}x^2$ or $7.56x^2$
	$1+9x+27x^2$	**B1**	
	Term in x: $-4x+9x=5x$ or coefficients of x: $-4+9$	**M1**	For $\left(their\ -4\left(x\right)\right)+\left(their\ 9\left(x\right)\right)$
	$a=5$	**A1**	
	Term in x^2: $\frac{68}{9}x^2+27x^2-36x^2$ or coefficients of x^2: $\frac{68}{9}+27-36$	**M1**	For $\left(their\frac{68}{9}\left(x\right)\right)+\left(their27\left(x\right)\right)+$ $\left(\left(their-4\left(x\right)\right)\times\left(their\ 9\left(x\right)\right)\right)$
	$b=-\frac{13}{9}$	**A1**	Must be exact
7(a)	$2\pi r+4x+2x\theta$	**3**	**B1** for $2\pi r$ **B1** for $+4x$ **B1** for $2x\theta$
7(b)	$\pi r^2-x^2\theta$	**B1**	
7(c)	Least value when $x=r$	**B1**	
	Least value = $r^2\left(\pi-\theta\right)$ oe	**B1**	
8	$2\ln\left(x+1\right)-\ln\left(x+2\right)$	**2**	**B1** for $2\ln\left(x+1\right)$ **B1** for $-\ln\left(x+2\right)$
	$\left(2\ln\left(a+1\right)-\ln\left(a+2\right)\right)+\ln2$	**M1**	For attempt to apply limits correctly, dependent on having 2 log terms.
	$\ln\frac{2\left(a+1\right)^2}{\left(a+2\right)}$	**2**	**M1** for use of either power rule or the division rule.