Question	Answer	Marks	Partial Marks
1(a)	$a = 1$	**B1**	
	$b = 2,\ c = -1$ or $c = 2,\ b = -1$	**B1**	
1(b)	Critical values: awrt –1.7, –1, awrt 1.2	**B1**	
	$-1.7 \leqslant x \leqslant -1$	**B1**	**FT** *their* reasonable attempts at –1.7
	$x \geqslant 1.2$	**B1**	**FT** *their* reasonable attempts at 1.2
2	$(4k)^2 - 4(k+3)$ soi	**M1**	For correct use of discriminant
	$16k^2 - 4k - 12$ oe	**A1**	
	$(4k+3)(k-1) = 0$ oe	**M1**	**Dep** on previous **M** mark for solving a 3 term quadratic equated to zero to obtain 2 values for k
	$k = -\frac{3}{4}, 1$	**A1**	Mark final answer
3	$A = -31$	**B1**	
	$x - 1$ or $x - 5$ or $x + 6$	**B1**	For finding a factor
	$[x-1](x^2 + x - 30)$ $[x-5](x^2 + 5x - 6)$ $[x+6](x^2 - 6x + 5)$	**2**	**M1** for a quadratic factor with 2 correct terms or for one further linear factor
	$(x - 1)(x - 5)(x + 6)$	**A1**	
4	$\frac{2}{\log_x 10} = 2\lg x$	**B1**	
	$\lg\left(\frac{x^2}{x+4}\right) = \lg 2$ soi	**M1**	For use of power and subtraction rules
	$x^2 - 2x - 8 = 0$	**A1**	
	$(x-4)(x+2) = 0$	**M1**	**Dep** on previous **M** mark
	$x = 4$ only	**A1**	

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Question	Answer	Marks	Partial Marks
5(a)	Centre $(5, 12)$ soi	**B1**	
	Gradient of radius = $\frac{12-4}{5-11}$ $\left(=-\frac{4}{3}\right)$	**M1**	
	Equation of normal: $y-4=\frac{3}{4}(x-11)$	**M1**	Must be using *their* perpendicular gradient and the correct point
	$3x-4y=17$	**A1**	
5(b)	Distance between centres = 13 Sum of radii = 12	**M1**	For both
	$13>12$ so no intersection	**A1**	
6	$8(\ln x)^2-10\ln x+3$ $(=0)$	**2**	**M1** for elimination of y and re-arrangement to a 3 term quadratic in terms of $\ln x$
	$\ln x=0.75,\quad \ln x=0.5$	**2**	**Dep** on previous **M** mark for correct method of solution
	$x=e^{0.75},\quad x=e^{0.5}$	**A1**	For both
7(a)	$\frac{1}{2}\times 6\times 6\times\sin\theta=9$ oe	**M1**	
	$\sin\theta=\frac{1}{2}$	**A1**	
7(b)	$\frac{1}{2}(36)(\theta-their\sin\theta)=15\pi-9$ oe	**M1**	
	$\theta=\frac{5\pi}{6}$	**A1**	
	5π	**2**	**M1** for $6\times their\frac{5\pi}{6}$, but not $\frac{\pi}{6}$
8(a)	$\frac{5}{2}$, 1	**B1**	

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