Question	Answer	Marks	Partial Marks
5	$27x = (x^2)^2$ or $y = \left(\frac{y^2}{27}\right)^2$ oe	**M1**	if **M0** then, for first 4 marks, **SC4** if (3, 9) only stated and verified in both equations, ignore (0, 0) or **SC2** for (3, 9) only stated with no working, ignore (0, 0) If first **M1** then (3, 9) with no additional working award **M1SC1**
	$x^4 - 27x = 0$ or $y^4 - 729y = 0$ oe nfww	**A1**	
	$x(x^3 - 27) = 0$ or $y(y^3 - 729) = 0$ oe	**M1**	
	$A(3, 9)$ oe only nfww	**A1**	
	Mid-point = $(1.5, 4.5)$	**B1**	
	$m_{OA} = \frac{9}{3}$ oe	**B1**	
	$m_{\perp} = -\frac{3}{9}$ oe	**M1**	
	$y - 4.5 = -\frac{3}{9}(x - 1.5)$ oe isw	**A1**	**FT** *their* mid-point and *their* $-\frac{1}{\frac{9}{3}}$
6	$\frac{\mathrm{d}(\mathrm{e}^{\frac{x}{2}})}{\mathrm{d}x} = \frac{1}{2}\mathrm{e}^{\frac{x}{2}}$	**B1**	
	$\frac{\mathrm{d}(\cos 2x)}{\mathrm{d}x} = -2\sin 2x$ soi	**B1**	
	$x \times$ *their*$(-2\sin 2x) + \cos 2x$	**M1**	
	$\left[\frac{\mathrm{d}y}{\mathrm{d}x} =\right] \frac{1}{2}\mathrm{e}^{\frac{x}{2}} - 2x\sin 2x + \cos 2x$	**A1**	**FT** *their* $\frac{\mathrm{d}\left(\mathrm{e}^{\frac{x}{2}}\right)}{\mathrm{d}x} = k\mathrm{e}^{\frac{x}{2}}$
	$\frac{\delta y}{h} = \textit{their}\left.\frac{\mathrm{d}y}{\mathrm{d}x}\right\|_{x=1}$	**M1**	
	$-1.41[03...]h$ nfww	**A1**	

Question	Answer	Marks	Partial Marks
7	$4x^2 + kx + k - 2 = 2x + 1$	**M1**	
	$4x^2 + (k-2)x + k - 3$ [*0] soi	**A1**	* can be <, >, =, ≤, ≥
	$(k-2)^2 - 4(4)(k-3)$	**M1**	
	$k^2 - 20k + 52 * 0$	**A1**	
	$k = \frac{-(-20) \pm \sqrt{(-20)^2 - 4(1)(52)}}{2}$	**M1**	
	$k = 10 \pm \sqrt{48}$ oe isw	**A1**	
	Alternative (using calculus) $2 = 8x + k$ oe	**(M1)**	
	$y = 4x^2 + (2-8x)x + 2 - 8x - 2$ or $y = -4x^2 - 6x$	**(M1)**	
	$0 = 4x^2 + 8x + 1$	**(A1)**	
	$x = \frac{-8 \pm \sqrt{8^2 - 4(4)(1)}}{8}$	**(M1)**	
	$x = -1 \pm \frac{\sqrt{48}}{8}$ oe	**(A1)**	
	for $k = 10 \pm \sqrt{48}$ oe	**(A1)**	
8(a)(i)	Valid explanation e.g. This ensures the argument of both logarithms is greater than 0	**B1**	
8(a)(ii)	$\log_a 6 = \log_a (y+3)^2$ oe	**B1**	
	$(y+3)^2 = 6$	**M1**	
	$y = -3 + \sqrt{6}$ oe only final answer	**A1**	