Question	Answer	Marks	Guidance
1	$(3\ln 5x-1)(\ln 5x+1)=0$ $\ln 5x=\frac{1}{3},\ \ln 5x=-1$	**M1**	For recognition of a quadratic in $\ln 5x$ and attempt to solve to obtain $\ln 5x=k$
	$x=\frac{1}{5}e^{\frac{1}{3}},\ \frac{\sqrt[3]{e}}{5},\ e^{\frac{1}{3}-\ln 5}$ oe $x=\frac{1}{5e},\ \frac{e^{-1}}{5},\ e^{-1-\ln 5}$ oe	**3**	**Dep M1** for dealing with *their* $\ln 5x=k$ correctly once **A1** for $x=\frac{1}{5}e^{\frac{1}{3}}$ oe isw **A1** for $x=\frac{1}{5e}$ oe isw
2	$a=3$	**B1**	
	$b=\frac{1}{2}$	**B1**	
	$c=4$	**B1**	
3(a)	Gradient of line perp to $AB=-\frac{3}{4}$	**B1**	
	Mid-point of AB $(-1,10)$ soi	**B1**	
	$y-10=-\frac{3}{4}(x+1)$ soi	**M1**	For attempt at straight line using *their* perp gradient and *their* mid-point
	$a-10=-\frac{3}{4}(7+1)$ $a=4$	**A1**	Allow $y=4$
3(b)	$(-9, 16)$	**2**	**B1** for $x=-9$ **B1 FT** on *their a*, **dep** on **M1** from **(a)** for $y=16$ or $20-$*their a* **B1** for $-9,16$
4(a)	$2\left(x+\frac{5}{4}\right)^2-\frac{49}{8}$	**3**	**B1** for $b=\left(x+\frac{5}{4}\right)^2$ or $(x+1.25)^2$ **B1** for $c=-\frac{49}{8}$ or -6.125

Question	Answer	Marks	Guidance
4(b)	$\left(-\frac{5}{4}, -\frac{49}{8}\right)$ oe	**2**	**B1** for $-\frac{5}{4}$ as part of a set of coordinates or $x=-\frac{5}{4}$, **FT** on $-$ *their b* **B1** for $-\frac{49}{8}$ as part of a set of coordinates or $y=-\frac{49}{8}$ **FT** on *their c* Need to be using *their* answer to **(a)** and not using differentiation as 'Hence'. **B1** for $-\frac{5}{4}, -\frac{49}{8}$
4(c)		**3**	**B1** for correct shape, with maximum in the second quadrant and cusps on the *x*-axes and reasonable curvature for $x<-3$ and $x>0.5$. **B1** for $(-3,\ 0)$ and $(0.5,\ 0)$ either seen on the graph or stated, must have attempted a correct shape **B1** for $(0,\ 3)$ either seen on the graph or stated, must have attempted a correct shape
4(d)	$\frac{49}{8}$ oe	**B1**	**FT** on *their* $\lvert c\rvert$ from **(a)** Allow $\frac{49}{8}$ from other methods
5(a)	$\begin{pmatrix}-4\\3\end{pmatrix}t$ or $\begin{pmatrix}0\\0\end{pmatrix}+\begin{pmatrix}-4\\3\end{pmatrix}t$ oe	**B1**	
5(b)	$\begin{pmatrix}12\\6\end{pmatrix}+\begin{pmatrix}-5\\8\end{pmatrix}t$ or $\begin{pmatrix}12-5t\\6+8t\end{pmatrix}$	**B1**	