Question	Answer	Marks	Guidance
9(a)	$\left[\frac{1}{2}k^2\times\frac{25}{4}-2k\times\frac{5}{2}+2=\frac{1}{2}\right.$ OR $\left.\frac{1}{2}k^2\times\frac{25}{4}-2k\times\frac{5}{2}+2=k\times\frac{5}{2}+\left(\frac{1}{2}-\frac{5}{2}k\right)\right]$ $25k^2-40k+12\ \ [=0]$	**M1***	Using $\left(\frac{5}{2},\ \frac{1}{2}\right)$ in the curve equation or equating the line and the curve and then using $x=\frac{5}{2}$ and $p=\frac{1}{2}-\frac{5}{2}k$. Simplify to get a three-term quadratic in k. Condone errors in simplification.
	$k=\frac{2}{5}$	**A1**	OE Condone inclusion of $k=\frac{6}{5}$.
	$\frac{1}{2}=\left(their\frac{2}{5}\right)\left(\frac{5}{2}\right)+p\ \Rightarrow p=$	**DM1***	Using $\left(\frac{5}{2},\ \frac{1}{2}\right)$ and *their* k in an equation in p. Either the line (as shown) or $4p^2+12p+5=0$ are the most likely and solving for p.
	$p=-\frac{1}{2}$	**A1**	OE Condone inclusion of $p=-\frac{5}{2}$.
	$\frac{2}{25}x^2-\frac{6}{5}x+\frac{5}{2}\ [=0]\ \left[4x^2-60x+125\ [=0]\right]$	**DM1**	Equating the line and curve using *their* k and p and simplify to get a three-term quadratic [= 0].
	$\left(\frac{25}{2},\frac{9}{2}\right)$	**A1 A1**	OE Accept $x=\frac{25}{2}$, $y=\frac{9}{2}$.

Question	Answer	Marks	Guidance
9(a)	**Alternative Method for Question 9(a)**		
	$\left[\frac{1}{2}k^2 \times \frac{25}{4} - 2k \times \frac{5}{2} + 2 = k \times \frac{5}{2} + p\right]$ $4p^2 + 12p + 5\ [=0]$	**M1***	OE Using $\left(\frac{5}{2}, \frac{1}{2}\right)$ in the curve equation or equating the line and the curve and then using $x = \frac{5}{2}$ and $k = \frac{1}{5} - \frac{2}{5}p$. Simplify to get a three-term quadratic in p [= 0].
	$p = -\frac{1}{2}$ OE	**A1**	Condone inclusion of $p = -\frac{5}{2}$.
	$\frac{1}{2} = \left(\frac{5}{2}k\right) + \left(their - \frac{1}{2}\right) \Rightarrow k =$	**DM1***	Using $\left(\frac{5}{2}, \frac{1}{2}\right)$ and *their p* in the line equation and solving for *k*.
	$k = \frac{2}{5}$	**A1**	OE Condone inclusion of $k = \frac{6}{5}$.
	$\frac{2}{25}x^2 - \frac{6}{5}x + \frac{5}{2}[=0]\ \left[4x^2 - 60x + 125[=0]\right]$	**DM1**	Equating the line and curve using *their k* and *p* and simplify to get a three-term quadratic [= 0].
	$\left(\frac{25}{2}, \frac{9}{2}\right)$	**A1 A1**	OE Accept $x = \frac{25}{2}, y = \frac{9}{2}$.
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Question	Answer	Marks	Guidance
9(b)	$\left[\frac{1}{2}k^2x^2 - 2kx + 2 = kx + p \Rightarrow\right] \quad \frac{1}{2}k^2x^2 - 3kx + 2 - p$	M1*	Equate the original equations of the curve and the line and collect like terms; k and p must still be present.
	$9k^2 - 4\times\frac{1}{2}k^2(2-p)$	DM1	Use of $b^2 - 4ac$ for their quadratic in x to give an expression in k and p. This expression can come from *their* equation in **(a)**.
	$p < -\frac{5}{2}$	A1	
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