Question Number	Scheme	Notes	Marks
9(a)	$y^2=\frac{1}{2}x,\ P\left(\frac{t^2}{8},\frac{t}{4}\right)\Rightarrow y=\frac{1}{\sqrt{2}}\sqrt{x}\Rightarrow\frac{\mathrm{d}y}{\mathrm{d}x}=\frac{1}{2\sqrt{2}\sqrt{x}}=\frac{\sqrt{2}}{4\sqrt{x}}=\frac{\sqrt{2}}{4\sqrt{\frac{t^2}{8}}}\left\{=\frac{1}{t}\right\}$ or $x=\frac{t^2}{8},y=\frac{t}{4}\Rightarrow\frac{\mathrm{d}y}{\mathrm{d}x}=\frac{\frac{1}{4}}{\frac{2}{8}t}\left\{=\frac{1}{t}\right\}$ or $2y\frac{\mathrm{d}y}{\mathrm{d}x}=\frac{1}{2}\Rightarrow\frac{\mathrm{d}y}{\mathrm{d}x}=\frac{1}{4y}=\frac{1}{4\left(\frac{t}{4}\right)}\left\{=\frac{1}{t}\right\}$ or $x=2y^2\Rightarrow\frac{\mathrm{d}x}{\mathrm{d}y}=4y\Rightarrow\frac{\mathrm{d}y}{\mathrm{d}x}=\frac{1}{4y}=\frac{1}{4\left(\frac{t}{4}\right)}\left\{=\frac{1}{t}\right\}$ Correct $\frac{\mathrm{d}y}{\mathrm{d}x}$ **in terms of *t*.** Could be unsimplified. Accept just "$\frac{\mathrm{d}y}{\mathrm{d}x}$ or $m=\frac{1}{t}$"		B1
	$y-\frac{t}{4}=\frac{1}{t}\left(x-\frac{t^2}{8}\right)$ or $\frac{t}{4}=\frac{1}{t}\left(\frac{t^2}{8}\right)x+c\Rightarrow c=...\ \left\{\frac{t}{8}\right\}$	Correct straight line method with an unchanged gradient in terms of *t*. Condone late substitution of *x*/*y* into gradient if initial gradient not in terms of *t* (the first two marks are then accessible and A1* is possible)	M1
	e.g., $8ty-2t^2=8x-t^2$ or $8yt=8x+t^2$ or $y=\frac{1}{t}x+\frac{t}{8}$ $\Rightarrow 8yt-8x=t^2$ *	Obtains the answer via intermediate line and no errors. Accept answer with t^2 on one side and $8ty-8x$ or $8(yt-x)$ or $8(ty-x)$ on the other (these 2 terms in either order). Requires both previous marks.	A1*
			(3)
(b)	$x=0\Rightarrow 8yt=t^2\Rightarrow y=\frac{t}{8}\quad\left\{Q_y=\frac{t}{16}\right\}$	Correct *y* coordinate of *A* Could be unsimplified.	B1 (M1 on ePen)
	{Midpoint of *AP*:} $\left(\frac{0+\frac{t^2}{8}}{2},\frac{"\frac{t}{8}"+\frac{t}{4}}{2}\right)\left\{=\left(\frac{t^2}{16},\frac{3t}{16}\right)\right\}$	Finds midpoint of *AP* using a fully correct method for **their** *A* which is of the form (0, f(*t*)) May be given as $x=...,\quad y=...$	M1
	$\{\text{equation of } l_2:\}\ y-"\frac{3t}{16}"=-t\left(x-"\frac{t^2}{16}"\right)$ or $y=-tx+c\Rightarrow "\frac{3t}{16}"=-t\left("\frac{t^2}{16}"\right)+c\Rightarrow c=...\ \left\{\frac{3t+t^3}{16}\right\}$	Forms the equation of the perpendicular bisector of *AP* correct for **their midpoint of *AP*** and with gradient $-t$ (oe). Not dependent but the coordinates of their midpoint must both be functions of *t*	M1
	$y=\frac{t}{16}\Rightarrow\frac{t}{16}-\frac{3t}{16}=-tx+\frac{t^3}{16}\Rightarrow x=\frac{2+t^2}{16}\Rightarrow 2+256y^2=16x$ or e.g., $\frac{t}{16}=-tx+\frac{3t+t^3}{16}\Rightarrow 1=-16x+3+t^2\Rightarrow -2=-16x+256y^2$ $y-3y=-16y\left(x-\frac{256y^2}{16}\right)\Rightarrow -2=-16\left(x-\frac{256y^2}{16}\right)\ \left\{\Rightarrow -2=-16x+256y^2\right\}$ Any correct 3 term equation (may be factorised) with *t* eliminated		A1
	$y^2=\frac{1}{16}x-\frac{1}{128}$ Correct equation in the correct form with y^2 on its own on one side. Allow $y^2=0.0625x-0.0078125$ or equivalent fractions for α and β in $y^2=\alpha x+\beta$ e.g., $-\frac{2}{256}+\frac{16}{256}x=y^2$ and isw if **subsequent** factorisation/multiplication etc.		A1
			(5)
			Total 8

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