Question Number	Scheme	Notes	Marks
3(a)(i)	$(\pm 7e, 0)$	Correct **coordinates** or $x = \pm 7e$, $y = 0$	B1
(ii)	$x = \pm\frac{7}{e}$	Correct **equations**	B1
	SC: If "49" used for "7" consistently in (i) and (ii) score B0 B1		
			(2)
(b)(i)	$\left(PS^2 =\right)(x-'7e')^2 + y^2$ oe e.g. $\left(PS^2 =\right)('7e'-x)^2 + y^2$	Correct expression or equivalent with their $7e$. Must be in terms of e, x and y only. Apply isw once a correct expression is seen.	B1ft
(ii)	$\left(PM^2 =\right)\left('\frac{7}{e}'-x\right)^2$ oe e.g. $\left(x-'\frac{7}{e}'\right)^2$	Correct expression or equivalent with their $\frac{7}{e}$. Must be in terms of e and x only. Apply isw once a correct expression is seen.	B1ft
			(2)
(c)	$\left(\frac{PS}{PM} = e \Rightarrow\right) PS^2 = e^2 PM^2 \Rightarrow (x-'7e')^2 + y^2 = e^2\left('\frac{7}{e}'-x\right)^2$ $\Rightarrow x^2 - 14ex + 49e^2 + y^2 = 49 - 14ex + e^2x^2$ Applies $PS^2 = e^2PM^2$ with their PS and PM and expands (condone poor squaring)		M1
	$x^2(1-e^2) + y^2 = 49(1-e^2)$ $\Rightarrow \frac{x^2}{49} + \frac{y^2}{49(1-e^2)} = 1 \Rightarrow b^2 = 49(1-e^2)$*	Reaches given answer with fully correct proof. All shown steps required. Note that it is possible to obtain this result even if the B marks are not scored in (b) e.g. correct expressions but not in the forms required.	A1*
			(2)
(d)	$(4\sqrt{3})^2 = 49(1-e^2) \Rightarrow e^2 ...$ or $e = ...$	Replaces b^2 with $(4\sqrt{3})^2$ and solves for e^2 or e.	M1
	$e = \frac{1}{7}$	Correct exact value for e (Not $\pm$)	A1
			(2)

(e)	$x=\frac{7}{2}\Rightarrow\frac{\left(\frac{7}{2}\right)^2}{49}+\frac{y^2}{'48'}=1\Rightarrow y=...\left[(\pm)6\right]$	Substitutes into their ellipse equation and obtains a value for y	M1
	Area $\Delta OPM=\left(\frac{1}{2}\right)\left(\frac{7}{'\left(\frac{1}{7}\right)'}-\frac{7}{2}\right)('6')=...$ Correct method for area of triangle OPM with their $\frac{7}{e}$ and their 6 May see other approaches, e.g., "shoelace" method e.g. $\frac{1}{2}\begin{vmatrix}3.5 & 0 & 49 & 3.5\\ 6 & 0 & 6 & 6\end{vmatrix}=\frac{1}{2}\left(49\times6-6\times3.5\right)=...$		**d**M1
	$\frac{273}{2}$ or $136\frac{1}{2}$ or 136.5	Any correct exact value	A1
	Special Case: $x=\frac{7}{2}\Rightarrow\frac{\left(\frac{7}{2}\right)^2}{49}+\frac{y^2}{'48'}=1\Rightarrow y=36\Rightarrow$ Area $\Delta OPM=\left(\frac{1}{2}\right)\left(\frac{7}{'\left(\frac{1}{7}\right)'}-\frac{7}{2}\right)(36)=...(819)$ **Scores M0M1A0**		
			(3)
			Total 11