Question	Scheme	Marks
8(a)	$y^2 = 4ax, y = k \Rightarrow P = \left(\frac{k^2}{4a}, k\right)$	**B1**
	Either $PS = \frac{k^2}{4a} + a = ...$ *or* $PS^2 = \left(\frac{k^2}{4a} - a\right)^2 + k^2 = ... \Rightarrow PS = ...$	**M1**
	$PS = \frac{k^2 + 4a^2}{4a}$ *	**A1***
		(3)
(b)	Gradient of l_2 is $\frac{k}{\frac{k^2 + 4a^2}{4a}} = \frac{4ak}{k^2 + 4a^2}$ oe	**B1**
	$l_2 : y = \frac{4ak}{k^2 + 4a^2}(x + a) \Rightarrow y = \frac{4ak}{k^2 + 4a^2} \times (0 + a) = ..$	**M1**
	$y\big\vert_{x=0} = \frac{4a^2k}{k^2 + 4a^2}$ *	**A1***
		(3)
(c)	Area $OSP = \frac{1}{2} \times a \times k$	**B1**
	Area $BPA = \frac{1}{2} \times \frac{k^2 + 4a^2}{4a} \times \left(k - \frac{4a^2k}{k^2 + 4a^2}\right) \quad \left(= \frac{k^3}{8a}\right)$	**M1**
	$\frac{\text{Area } BPA}{\text{Area } OSP} = \frac{\frac{k^2 + 4a^2}{4a} \times \left(k - \frac{4a^2k}{k^2 + 4a^2}\right)}{ak} = 4k^2$	**M1**
	$\Rightarrow k^3 + 4a^2k - 4a^2k = 16a^2k^3 \Rightarrow a = ...$	**dM1**
	$a = \frac{1}{4}$	**A1**
		(5)
		(11 marks)

Notes:

(a)

B1: Correct x coordinate at P found. May be seen on diagram.

M1: For a full method to find an expression for PS. Either use of focus-directrix property or may use Pythagoras with their coordinates.

A1*: Reaches the correct expression with a suitable intermediate step and no errors seen. If using Pythagoras the suitable step must be one with brackets expanded before factorising again.

(b)

B1: Correct expression for the gradient of l_2 given or implied by working. Need not be simplified. If using a similar triangles approach this may be scored for e.g. $\frac{k^2+4a^2}{4a} \div k = \frac{a}{y}$ or $k = \left(\frac{k^2+4a^2}{4a}\right)m$

M1: Full method to find the *y* intercept, e.g. by forming the equation of the line and substituting $x = 0$

May use $y - k = \frac{4ak}{k^2+4a^2}\left(x - \frac{k^2}{4a}\right) \Rightarrow y = k + \frac{-k^3}{k^2+4a^2}$

A1*: Reaches correct answer with no errors seen.

(c)

NB: If a value is chosen for *k* (or $k = 2a$) used, all marks are available, score for the relevant correct expressions/methods with their value.

B1: Correct area of *OSP* stated or implied. Note that if they go direct to ratios, the $\frac{1}{2}$ may not be seen (as it cancels with that in *BPA*)

M1: Correct method for the area of the triangle *BPA*. Allow sign slips if the method is clear (e.g. $\frac{k^2}{4a} - "-a" = \frac{k^2}{4a} - a$ if it is clear *BP* is meant). Allow if the negative of the area is found.

M1: Applies the ratio correctly to the problem.

dM1: Attempts to solve their equation.

A1: Correct answer. Allow if the negative of the area was found and later made positive as recovery.