Question Number	Scheme	Marks
2 (a)	$\overrightarrow{AB} = \overrightarrow{OB} - \overrightarrow{OA}, = (3\mathbf{i} + 9\mathbf{j}) - (6\mathbf{i} + 5\mathbf{j}) = -3\mathbf{i} + 4\mathbf{j}$	M1,A1cao (2)
(b)	$\frac{\lambda}{12} = \frac{4}{(-)3}$, $\lambda = -16$	M1,A1cao (2)
ALT:	$\overrightarrow{PQ} = \mu\overrightarrow{AB}$ $12\mathbf{i} + \lambda\mathbf{j} = \mu(-3\mathbf{i} + 4\mathbf{j})$ M1 (Their $\overrightarrow{AB}$) Allow $\mu = \frac{12\mathbf{i} + \lambda\mathbf{j}}{-3\mathbf{i} + 4\mathbf{j}}$	
	$\mu = -4$ $\lambda = -16$ A1	
(c)	$\left\|\overrightarrow{AB}\right\| = \sqrt{(3^2 + 4^2)} = 5$ or $\left\|\overrightarrow{PQ}\right\| = 20$	M1
	$= \pm\frac{1}{5}(3\mathbf{i} - 4\mathbf{j})$ oe	A1 (2)
		[6]

(a)M1	$\overrightarrow{AB} = \overrightarrow{OB} - \overrightarrow{OA}$ or $\overrightarrow{OB} + \overrightarrow{AO}$ or use a diagram. Column vectors allowed for the M mark.
A1cao	$-3\mathbf{i} + 4\mathbf{j}$ or $4\mathbf{j} - 3\mathbf{i}$ or $\begin{pmatrix} -3\mathbf{i} \\ 4\mathbf{j} \end{pmatrix}$ but **i**, **j** must be included
(b)M1	Finding and equating the gradients of the two lines. Fractions can be either way up as long as consistent and attempting to solve for λ There may be sign errors in the equation. Or compare the components. **NB:** Using $\overrightarrow{PQ} = \overrightarrow{AB}$ scores M0 unless a fresh start is made.
A1cao	$\lambda = -16$
(c)M1	Use Pythagoras with a + sign to obtain the length of their *AB* or their *PQ*
A1	A correct unit vector in either direction and any equivalent form inc column vector