

Question	Answer	Marks	Guidance
(a)	Obtain direction vector $-\mathbf{i} - 3\mathbf{j} + \mathbf{k}$	B1	OE
	Use a correct method to form a vector equation	M1	
	Obtain answer $\mathbf{r} = 2\mathbf{i} + \mathbf{j} + \mathbf{k} + \lambda(-\mathbf{i} - 3\mathbf{j} + \mathbf{k})$ or $\mathbf{r} = \mathbf{i} + 2\mathbf{j} + 2\mathbf{k} + \lambda(-\mathbf{i} - 3\mathbf{j} + \mathbf{k})$	A1	Need \mathbf{r} or r on LHS
		3	
(b)	Carry out the correct process for evaluating the scalar product of the direction vectors.	M1	$(-1, -3, 1) \cdot (1, -3, -2) = -1 + 9 - 2$
	Using the correct process for the moduli, divide the scalar product by the product of the moduli and find the inverse cosine of the result for any 2 vectors	M1	$\cos^{-1}\left(\frac{1 + 9 - 2}{((1 + 9 + 1)(1 + 9 + 4))}\right)$
	Obtain answer 61.1°	A1	61.086°
		3	

Question	Answer	Marks	Guidance
(c)	Express general point of AB or l in component form, e.g. $(2 - \lambda, 1 - 3\lambda, 1 + \lambda)$ or $(1 + \mu, 2 - 3\mu, -3 - 2\mu)$	B1	
	Equate at least two pairs of components and solve for λ or for μ	M1	
	Obtain a correct answer for λ or μ , e.g. $\lambda = 6, \frac{1}{3}, \text{ or } -\frac{14}{9}; \mu = -5, \frac{2}{3} \text{ or } -\frac{11}{9}$	A1	
	Verify that all three equations are not satisfied, and the lines do not intersect	A1	
	Express general point of AB or l in component form, e.g. $(1 - \lambda^*, -2 - 3\lambda^*, 2 + \lambda^*)$ or $(1 + \mu^*, 2 - 3\mu^*, -3 - 2\mu^*)$	4	