

STEP II, 2000, Q7

- 7 The line l has vector equation $\mathbf{r} = \lambda \mathbf{s}$, where

$$\mathbf{s} = (\cos \theta + \sqrt{3}) \mathbf{i} + (\sqrt{2} \sin \theta) \mathbf{j} + (\cos \theta - \sqrt{3}) \mathbf{k}$$

and λ is a scalar parameter. Find an expression for the angle between l and the line $\mathbf{r} = \mu(a\mathbf{i} + b\mathbf{j} + c\mathbf{k})$. Show that there is a line m through the origin such that, whatever the value of θ , the acute angle between l and m is $\pi/6$.

A plane has equation $x - z = 4\sqrt{3}$. The line l meets this plane at P . Show that, as θ varies, P describes a circle, with its centre on m . Find the radius of this circle.



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