4. *Show that the vectors* $\mathbf{a} = 3\hat{\mathbf{i}} - 2\hat{\mathbf{j}}$
$\mathbf{c} = 2\hat{\mathbf{i}} + \hat{\mathbf{j}} - 4\hat{\mathbf{k}}$ *form a right angled triangle.*

Solution We have $\mathbf{b} + \mathbf{c} = (\hat{\mathbf{i}} - 3\hat{\mathbf{j}} + 5\hat{\mathbf{k}}) + (2\hat{\mathbf{i}} + \hat{\mathbf{j}} - 4\hat{\mathbf{k}})$

Hence, **a**, **b**, **c** are coplanar.

Also, we observe that no two of these vectors are para

Further, $\mathbf{a} \cdot \mathbf{c} = (3\hat{\mathbf{i}} - 2\hat{\mathbf{j}} + \hat{\mathbf{k}}) \cdot (2\hat{\mathbf{i}} + \hat{\mathbf{j}} - 4\hat{\mathbf{k}}) = 0$

Dot product of two non-zero vectors is zero. Hence, th
so they form a right angled triangle.

$$|\mathbf{a}| = \sqrt{9 + 4 + 1}$$

$$|\mathbf{b}| = \sqrt{1 + 9 + 25}$$

and $$|\mathbf{c}| = \sqrt{4 + 1 + 16}$$

$\Rightarrow$ $$\sqrt{a^2 + c^2} = \sqrt{b^2}$$