

Lesson 6

Further A-Level Pure Mathematics Vectors III : Core 1

*Any solution based entirely on graphical
or numerical methods is not acceptable*

Marks Available : 28

6.1 Test

Question 1

Two points, V and W have coordinates $V(9, 8, -7)$ and $W(11, 11, -1)$
In addition, O is the origin with coordinates $O(0, 0, 0)$.

(i) Determine the vector $\overrightarrow{VW}$

[2 marks]

(ii) Calculate $|\overrightarrow{VW}|$

[2 marks]

(iii) Show that $\overrightarrow{VW} \cdot \overrightarrow{VO} = 0$

[2 marks]

(iv) What does part (c) tell you about $\triangle OVW$?

[1 mark]

Question 2

- (i) Determine the vector equation of the line, l , that passes through the points A and B with coordinates $A (2, 8, 3)$ and $B (7, 5, 1)$

[3 marks]

- (ii) State, giving a reason if the point $C (- 8, 2, 7)$ is on the line , l

[2 marks]

Question 3

With respect to an origin O , the position vectors of the points L and M are $\mathbf{i} - \mathbf{j} + 3\mathbf{k}$ and $2\mathbf{i} - 4\mathbf{j} + 2\mathbf{k}$ respectively.

(i) Write down the vector $\overrightarrow{LM}$

[1 mark]

(ii) Show that $|\overrightarrow{OL}| = |\overrightarrow{LM}|$

[2 marks]

(iii) Find $\angle OLM$, giving your answer to the nearest tenth of a degree

[3 marks]

Question 4

C4 Examination Question from January 2008, Q6

The points A and B have position vector $2\mathbf{i} + 6\mathbf{j} - \mathbf{k}$ and $3\mathbf{i} + 4\mathbf{j} + \mathbf{k}$ respectively.

The line l_1 passes through the points A and B

(a) Find the vector $\overrightarrow{AB}$

[2 marks]

(b) Find a vector equation for the line l_1

[2 marks]

A second line l_2 passes through the origin and is parallel to the vector $\mathbf{i} + \mathbf{k}$

The line l_1 meets the line l_2 at the point C

(c) Find the acute angle between l_1 and l_2

[3 marks]

(d) Find the position vector of the point C

[4 marks]