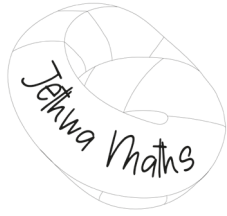


A-Level Starter Activity



Topic: 3D Vectors

Chapter Reference: Pure 2, Chapter 14

6
minutes

1. In triangle ABC, $\vec{AB} = 6\mathbf{i} + 2\mathbf{j} - \mathbf{k}$, $\vec{AC} = 8\mathbf{i} - 5\mathbf{j} + 4\mathbf{k}$.

a. Find the vector \vec{BC}

b. Find the length of the line AB

(2)

2. Three forces act on an object $F_1 = -5\mathbf{i} + 7\mathbf{j} + 4\mathbf{k}$, $F_2 = 4\mathbf{i} + 6\mathbf{j} - 2\mathbf{k}$ and $F_3 = 3\mathbf{i} - 5\mathbf{j} + 3\mathbf{k}$. Find the resultant force.

(3)

Solutions

1a.

$\begin{pmatrix} 8 \\ -5 \\ 4 \end{pmatrix} - \begin{pmatrix} 6 \\ 2 \\ -1 \end{pmatrix} = \begin{pmatrix} 2 \\ -7 \\ 5 \end{pmatrix}$	M1
$\overrightarrow{BC} = 2\mathbf{i} - 7\mathbf{j} + 5\mathbf{k}$	M1

1b.

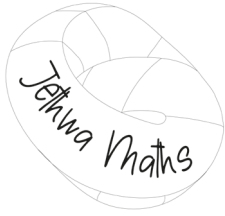
$\sqrt{6^2 + 2^2 + 1^2}$	M1
$\sqrt{41}$	M1

2.

$\begin{pmatrix} -5 \\ 7 \\ 4 \end{pmatrix} + \begin{pmatrix} 4 \\ 6 \\ -2 \end{pmatrix} + \begin{pmatrix} 3 \\ -5 \\ 3 \end{pmatrix}$	M1
$= \begin{pmatrix} 2 \\ 8 \\ 5 \end{pmatrix}$ $(= 2\mathbf{i} + 8\mathbf{j} + 5\mathbf{k})$	M1



A-Level Starter Activity



Topic: Magnitude of 3D Vectors

Chapter Reference: Pure 2, Chapter 12

6
minutes

1. Given that the point A has position vector $3\mathbf{i} + 4\mathbf{j} - 2\mathbf{k}$ and the point B has position vector $-4\mathbf{i} + 7\mathbf{k} + 5\mathbf{k}$.

a. Find the vector \overrightarrow{AB}

(2)

c. Find $|\overrightarrow{AB}|$

(2)

2. Given that $|3\mathbf{i} + k\mathbf{j} + 2\mathbf{k}| = 7$. Find the two possible values of k .

(3)

Solutions

1a.

$\begin{pmatrix} -4 \\ 7 \\ 5 \end{pmatrix} - \begin{pmatrix} 3 \\ 4 \\ 2 \end{pmatrix}$	M1
$= \begin{pmatrix} -7 \\ 3 \\ 7 \end{pmatrix}$ $\vec{AB} = -7i + 3j + 7k$	M1

1b.

$ \vec{AB} = \sqrt{(-7)^2 + 3^2 + 7^2}$	M1
$= \sqrt{107}$	M1

2.

$\sqrt{3^2 + k^2 + 2^2} = 7$ $\sqrt{13 + k^2} = 7$	M1
$13 + k^2 = 49$ $k^2 = 36$	M1
$k = \pm 6$	M1

