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Vectors - Lesson 4

Vector Paths

LI

- Know what Vector Paths are.
- Find vector paths in 2D and 3D.

SC

- Arithmetic.
- Geometric intuition.

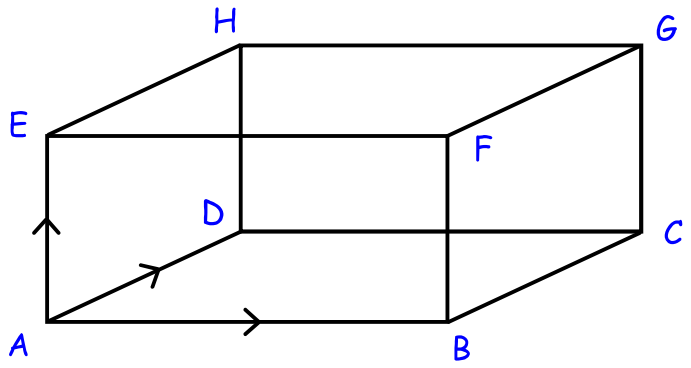
Jan 10-12:11

A vector path is a path between points written using vectors

Sep 20-16:22

Example 1

ABCDEFGH is a cuboid.



Find a single vector equivalent to
$\overrightarrow{AB} + \overrightarrow{AD} + \overrightarrow{AE}$.

As the given figure is a cuboid, there are parallel lines (and vectors).

The following vectors are equal :

- $\overrightarrow{AB} = \overrightarrow{DC} = \overrightarrow{EF} = \overrightarrow{HG}$.
- $\overrightarrow{AD} = \overrightarrow{BC} = \overrightarrow{FG} = \overrightarrow{EH}$.
- $\overrightarrow{AE} = \overrightarrow{BF} = \overrightarrow{CG} = \overrightarrow{DH}$.

So,

$$\overrightarrow{AB} + \overrightarrow{AD} + \overrightarrow{AE}$$

$$= \overrightarrow{AB} + \overrightarrow{BC} + \overrightarrow{CG}$$

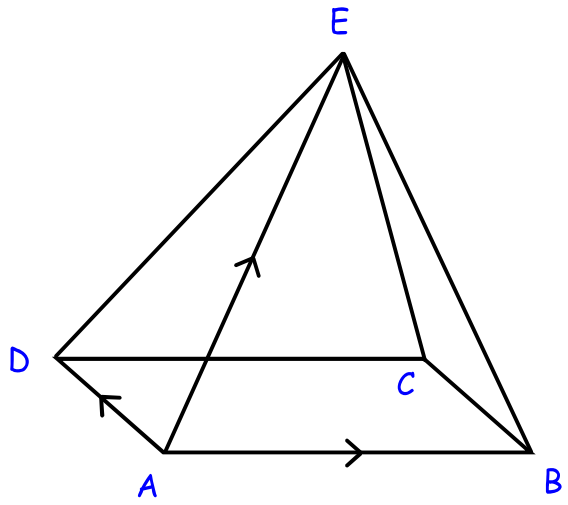
$$= \boxed{\overrightarrow{AG}}$$

Try to find vectors that 'join', so the head-to-tail rule applies

Sep 14-08:47

Example 2

ABCDE is a pyramid with a rectangular base.



If $\overrightarrow{AB} = \begin{pmatrix} 9 \\ 3 \\ 3 \end{pmatrix}$, $\overrightarrow{AD} = \begin{pmatrix} -1 \\ 9 \\ -2 \end{pmatrix}$ and

$\overrightarrow{AE} = \begin{pmatrix} 2 \\ 6 \\ 7 \end{pmatrix}$, express $\overrightarrow{CE}$ in component form.

Think how to get from C to E using the given vectors

$$\overrightarrow{CE} = \overrightarrow{CB} + \overrightarrow{BA} + \overrightarrow{AE}$$

$$= -\overrightarrow{AD} - \overrightarrow{AB} + \overrightarrow{AE}$$

$$= -\begin{pmatrix} -1 \\ 9 \\ -2 \end{pmatrix} - \begin{pmatrix} 9 \\ 3 \\ 3 \end{pmatrix} + \begin{pmatrix} 2 \\ 6 \\ 7 \end{pmatrix}$$

$$= \begin{pmatrix} -6 \\ -6 \\ 6 \end{pmatrix}$$

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CfE Higher Maths

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Oct 29-09:14