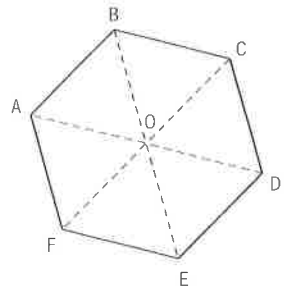
1 Draw a diagram to show that the addition of vectors is associative.

2 The diagram shows a regular hexagon ABCDEF.



Using only vectors defined by the vertices of the hexagon, copy and complete these statements.

a $\overrightarrow{AF} + \overrightarrow{BC} = \ldots$

b $\frac{1}{2}\overrightarrow{AD} + \overrightarrow{ED} = \ldots$

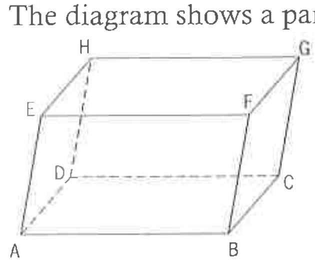
c $2\overrightarrow{FE} - \overrightarrow{AF} - \overrightarrow{FE} = \ldots$

d $\frac{1}{2}(\overrightarrow{AD} + \overrightarrow{BE}) = \ldots$

e $-\frac{1}{2}\overrightarrow{FC} + \overrightarrow{BC} = \ldots$

f $-2\overrightarrow{ED} - \overrightarrow{AF} + \overrightarrow{AB} = \ldots$

3 The diagram shows a parallelepiped ABCDEFGH.



a Let $\mathbf{u} = \overrightarrow{AB}$, $\mathbf{v} = \overrightarrow{AD}$ and $\mathbf{w} = \overrightarrow{AG}$. Express each of these vectors in terms of **u**, **v** and **w**.

i $\overrightarrow{AC}$ **ii** $\overrightarrow{HB}$ **iii** $\overrightarrow{CE}$ **iv** $\overrightarrow{AF}$

b Given that $|\overrightarrow{AD}| = 3$, $|\overrightarrow{AB}| = 4$ and $|\overrightarrow{AC}| = 6$, find

i the angle ABC

ii the area of the parallelogram ABCD.

4 Use the properties of vector addition and scalar multiplication to solve these equations for **x**

a $3\mathbf{x} - \mathbf{u} = 6\mathbf{v} + 2\mathbf{u}$

b $2(\mathbf{x} - \mathbf{u}) + 3(\mathbf{u} - \mathbf{v}) = \mathbf{0}$

c $\frac{1}{2}(\mathbf{x} - \mathbf{u}) = \frac{1}{3}(\mathbf{x} + \mathbf{v})$

For the cube of edge length 8 cm, find

i. the length of DB.

ii. the inclination of the diagonal BH.