

L4 (6.4) Properties of Vectors

Properties of Vector Addition

- Commutative Property: $\vec{a} + \vec{b} = \vec{b} + \vec{a}$
- Associative Property: $(\vec{a} + \vec{b}) + \vec{c} = \vec{a} + (\vec{b} + \vec{c})$
- Distributive Property: $k(\vec{a} + \vec{b}) = k\vec{a} + k\vec{b}$, where $k \in \mathfrak{R}$
- Adding zero: $\vec{a} + \vec{0} = \vec{a}$

Laws of Scalar Multiplication

- Associative Law: $m(n\vec{a}) = mn\vec{a}$
- Distributive Law: $(m + n)\vec{a} = m\vec{a} + n\vec{a}$

Ex1: Given that $\vec{x} = \vec{i} + 3\vec{j} - 2\vec{k}$

$$\vec{y} = \vec{j} + 5\vec{k}$$

$$\vec{z} = 4\vec{i} - \vec{j} - 7\vec{k}$$

determine a simplified expression for $\vec{x} - \vec{y} + 3\vec{z}$
in terms of \vec{i} , \vec{j} and \vec{k}

$$\begin{aligned}\vec{x} - \vec{y} + 3\vec{z} &= \vec{i} + 3\vec{j} - 2\vec{k} - (\vec{j} + 5\vec{k}) + 3(4\vec{i} - \vec{j} - 7\vec{k}) \\ &= \vec{i} + 3\vec{j} - 2\vec{k} - \vec{j} - 5\vec{k} + 12\vec{i} - 3\vec{j} - 21\vec{k} \\ &= 13\vec{i} - \vec{j} - 28\vec{k}\end{aligned}$$

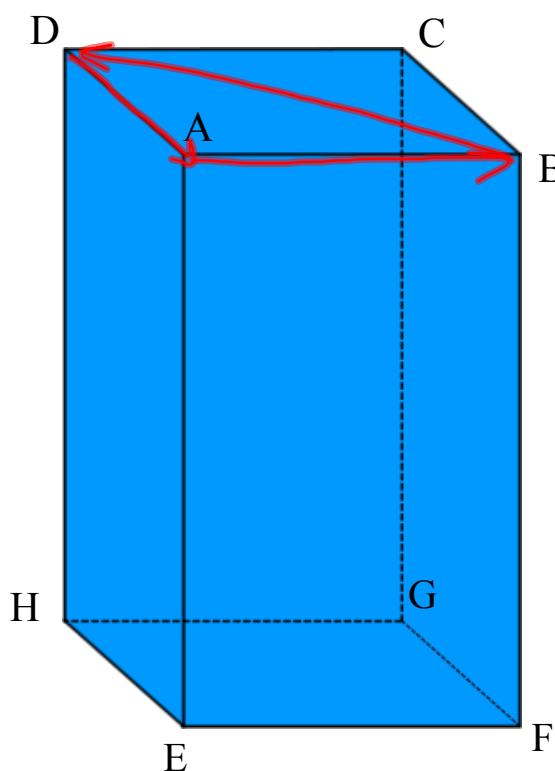
Ex2: a) Write a single vector equivalent to $\vec{EG} + \vec{GH} + \vec{HD} + \vec{DC}$ and show this on the diagram.

\vec{EC}

b) Write a vector that is equivalent to $\vec{BD} + \vec{DA} + \vec{AB}$ and show this on the diagram.

$\vec{0}$

c) Write a vector that is equivalent to $\vec{GC} + \vec{FE} - \vec{FB}$ and show this on the diagram.



Assigned Work:

p.306-307 #3, 7, 8, 10, 11