



3. In the diagram, $\vec{AB} = \mathbf{u}$, $\vec{BC} = \mathbf{v}$ and $\vec{CD} = \mathbf{w}$.

(a) Express each of the following as a single vector.

(i) $\mathbf{u} + \mathbf{v}$

$$\begin{aligned} \mathbf{u} + \mathbf{v} &= \vec{AB} + \vec{BC} \\ &= \vec{AC} \end{aligned}$$

(ii) $\mathbf{v} + \mathbf{w}$

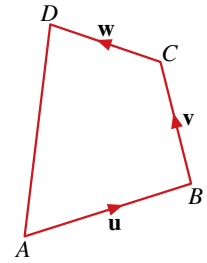
$$\begin{aligned} \mathbf{v} + \mathbf{w} &= \vec{BC} + \vec{CD} \\ &= \vec{BD} \end{aligned}$$

(iii) $(\mathbf{u} + \mathbf{v}) + \mathbf{w}$

$$\begin{aligned} (\mathbf{u} + \mathbf{v}) + \mathbf{w} &= \vec{AC} + \mathbf{w} \\ &= \vec{AD} \end{aligned}$$

(iv) $\mathbf{u} + (\mathbf{v} + \mathbf{w})$

$$\begin{aligned} \mathbf{u} + (\mathbf{v} + \mathbf{w}) &= \mathbf{u} + \vec{BD} \\ &= \vec{AD} \end{aligned}$$



(b) What is the relationship between $(\mathbf{u} + \mathbf{v}) + \mathbf{w}$ and $\mathbf{u} + (\mathbf{v} + \mathbf{w})$?

From (a), $(\mathbf{u} + \mathbf{v}) + \mathbf{w} = \mathbf{u} + (\mathbf{v} + \mathbf{w})$.

i.e. addition of vectors satisfies the associative law.

Class Activity 2

1. In the following diagram, the vector $\vec{PQ} = \mathbf{u}$.

(a) On a piece of graph paper, copy the diagram and draw the following vectors.

(i) $3\mathbf{u}$

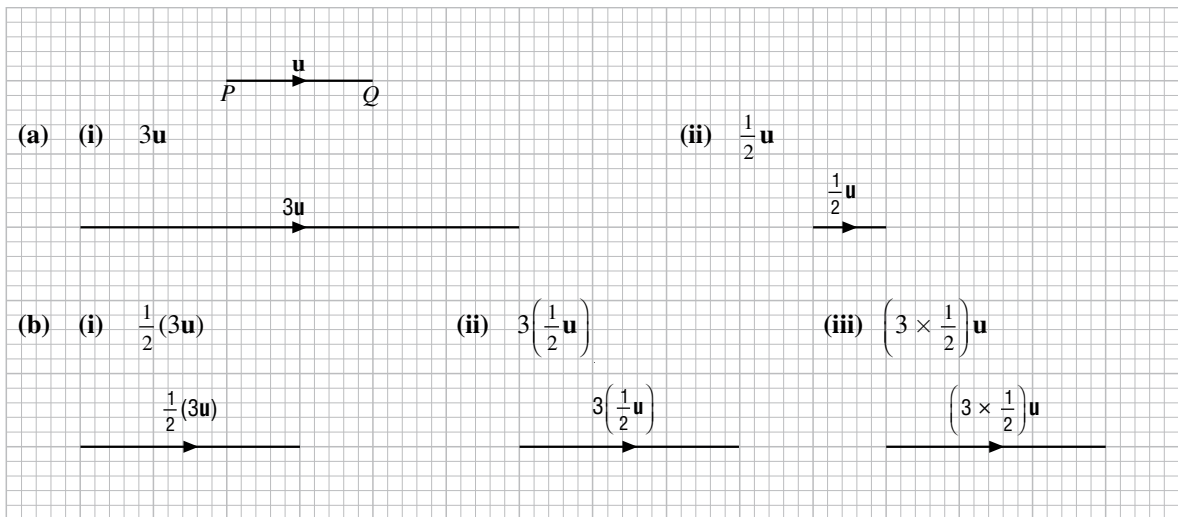
(ii) $\frac{1}{2}\mathbf{u}$

(b) Draw the following vectors on the same piece of graph paper in (a).

(i) $\frac{1}{2}(3\mathbf{u})$

(ii) $3\left(\frac{1}{2}\mathbf{u}\right)$

(iii) $\left(3 \times \frac{1}{2}\right)\mathbf{u}$



(c) What is the relationship between the vectors, $\frac{1}{2}(3\mathbf{u})$, $3\left(\frac{1}{2}\mathbf{u}\right)$ and $\left(3 \times \frac{1}{2}\right)\mathbf{u}$?

$$\frac{1}{2}(3\mathbf{u}) = 3\left(\frac{1}{2}\mathbf{u}\right) = \left(3 \times \frac{1}{2}\right)\mathbf{u}$$