

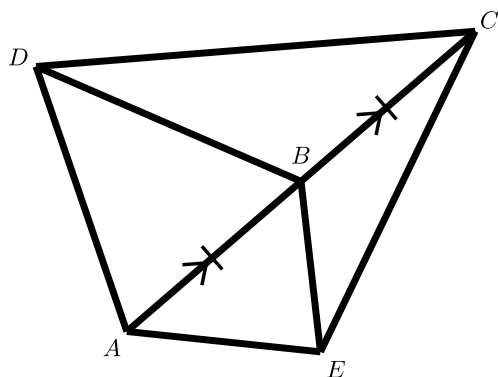
# Vectors

## Question 1

Which of the following quantities are scalars and which are vectors?

- velocity
- distance
- speed
- displacement
- length

## Question 2



Using the image above, answer yes or no to the following questions. Note that Line segments  $AB$  and  $BC$  are parallel and have equal length which means that  $\overrightarrow{AB} = \overrightarrow{BC}$ . If the answer is yes, prove your result using the following algebraic rules:

- Vector addition is commutative:  $\vec{u} + \vec{v} = \vec{v} + \vec{u}$
- Vector addition is associative:  $(\vec{u} + \vec{v}) + \vec{w} = \vec{u} + (\vec{v} + \vec{w})$
- Distributive laws:  $(k_1 + k_2)\mathbf{u} = k_1\mathbf{u} + k_2\mathbf{u}$  and  $k(\mathbf{u} + \mathbf{v}) = k\mathbf{u} + k\mathbf{v}$
- Head to tail vector addition: Given points  $P$ ,  $Q$ , and  $R$ , then  $\overrightarrow{PQ} + \overrightarrow{QR} = \overrightarrow{PR}$
- Given points  $P$  and  $Q$ , then  $\overrightarrow{QP} = -\overrightarrow{PQ}$

Answer with yes or no the following (include a proof if the answer is yes):

- Does  $\overrightarrow{BC} + \overrightarrow{CD} = \overrightarrow{BD}$  ?
- Does  $\overrightarrow{BD} + \overrightarrow{EB} = \overrightarrow{EA} + \overrightarrow{AD}$  ?
- Does  $\overrightarrow{EB} + \overrightarrow{AE} + \overrightarrow{BD} = \overrightarrow{AD}$  ?
- Does  $\overrightarrow{AB} + \overrightarrow{AE} = \overrightarrow{BE}$  ?
- Does  $\overrightarrow{AB} + \overrightarrow{CB} = \vec{0}$  ?
- Does  $\overrightarrow{AC} = 2\overrightarrow{AB}$  ?
- Does  $\overrightarrow{BC} = \frac{1}{2}\overrightarrow{CA}$  ?

### Question 3