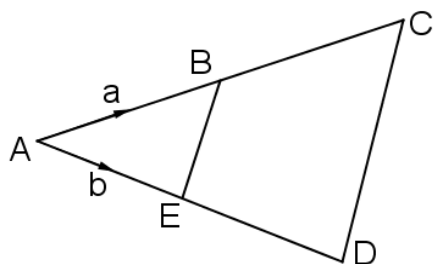


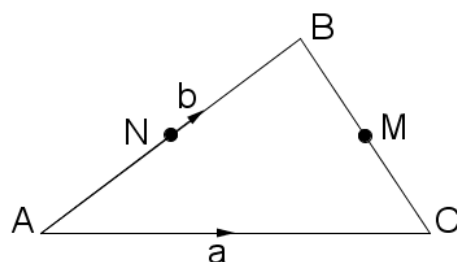
## Vector Geometry

- Q1. Triangle ABE and ACD are similar where  $AC = 3AB$ .  
 $\overrightarrow{AB} = \mathbf{a}$  and  $\overrightarrow{AE} = \mathbf{b}$ .



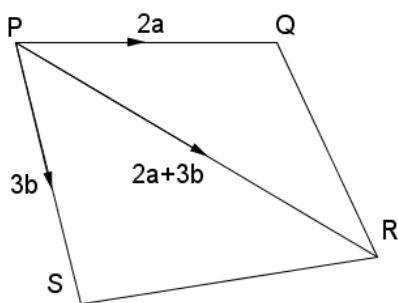
- a) Write down the vectors  $\overrightarrow{AC}$ ,  $\overrightarrow{AD}$ ,  $\overrightarrow{BE}$  and  $\overrightarrow{CD}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ .  
 b) What do the vectors show about BE and CD?

- Q2.  $\overrightarrow{AN} : \overrightarrow{NB} = 2 : 3$  and  $\overrightarrow{BM} = \frac{3}{5}\overrightarrow{BC}$   
 $\overrightarrow{AB} = \mathbf{b}$ ,  $\overrightarrow{AC} = \mathbf{a}$



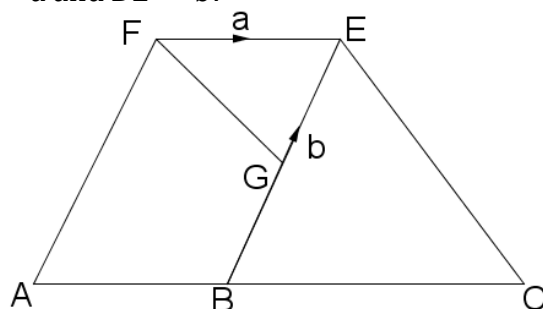
- a) Write  $\overrightarrow{NB}$ ,  $\overrightarrow{BC}$ ,  $\overrightarrow{BM}$  and  $\overrightarrow{NM}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ .  
 b) What do the vectors show about NM and AC?

- Q3. PQRA is a quadrilateral.  
 $\overrightarrow{PQ} = 2\mathbf{a}$ ,  $\overrightarrow{PS} = 3\mathbf{b}$  and  $\overrightarrow{PR} = 2\mathbf{a} + 3\mathbf{b}$



- a) Write the vectors  $\overrightarrow{QR}$ , and  $\overrightarrow{RS}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ .  
 b) What do the vectors show about the quadrilateral?

- Q4. ABEF is a parallelogram. ABC is a straight line where  $AC = 3AB$  and G is the midpoint of BE.  
 $\overrightarrow{FE} = \mathbf{a}$  and  $\overrightarrow{BE} = \mathbf{b}$ .



- a) Write  $\overrightarrow{GF}$  and  $\overrightarrow{EC}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ .  
 b) What do the vectors show about GF and EC?

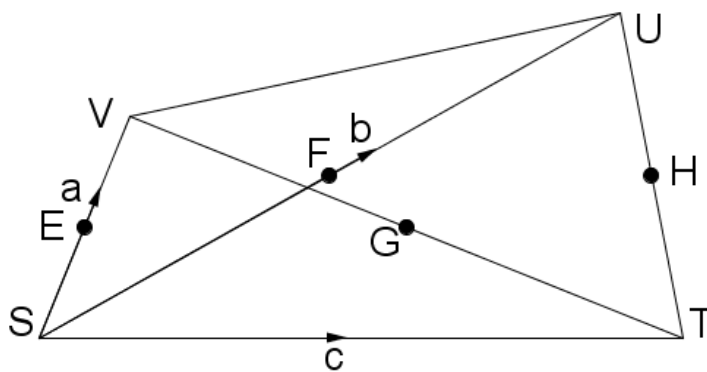
- Q5. OABC is a parallelogram with  $\overrightarrow{OA} = \mathbf{a}$  and  $\overrightarrow{OC} = \mathbf{b}$ . D is a point on OC such that  $OD:DC = 1:2$  and E is a point on AC such that  $AE:EC = 2:1$ .

- a) Show that OB is parallel to DE.  
 b) Show that  $OB = 3DE$ .

- Q6. STUV is a quadrilateral. E, F, G and H are mid-points of SV, SU, VT and UT respectively.

$$\overrightarrow{SV} = \mathbf{a}, \overrightarrow{SU} = \mathbf{b}, \text{ and } \overrightarrow{ST} = \mathbf{c}.$$

- a) Write vectors  $\overrightarrow{EF}$ ,  $\overrightarrow{EG}$  and  $\overrightarrow{FH}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ .  
 b) What type of quadrilateral is EFHG?



## Vector Geometry

### Solutions

Q1.

a)  $\overrightarrow{AC} = 3a$ ,  $\overrightarrow{AD} = 3b$ ,  $\overrightarrow{BE} = b - a$  and  $\overrightarrow{CD} = 3b - 3a$

b) BE and CD are parallel

Q2.

a)  $\overrightarrow{NB} = \frac{3}{5}b$ ,  $\overrightarrow{BC} = a - b$ ,  $\overrightarrow{BM} = \frac{3}{5}(a - b)$  and  $\overrightarrow{NM} = \frac{3}{5}a$

b) GF and EC are parallel

Q3.

a)  $\overrightarrow{QR} = 3b$  and  $\overrightarrow{RS} = -2a$

b) PQRA is a Rhombus

Q4.

a)  $\overrightarrow{GF} = \frac{1}{2}b - a$  and  $\overrightarrow{EC} = 2a - b$

b) GF and EC are parallel

Q5.  $\overrightarrow{OB} = a + c$ ,  $\overrightarrow{DE} = \frac{1}{3}(a + c)$

Q6.

a)  $\overrightarrow{EF} = \frac{1}{2}(b - a)$ ,  $\overrightarrow{EG} = \frac{1}{2}c$  and  $\overrightarrow{FH} = \frac{1}{2}c$

b) EFHG is a parallelogram