#### Vector diagram

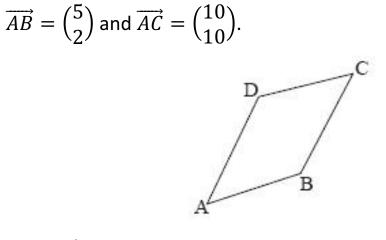
# earning Center

### Parallelogram

- 1. Opposite sides are parallel (Same direction vector)
- 2. Opposite sides are equal length (Same magnitude)



1. The following diagram shows the parallelogram ABCD, with



(a) Find  $\overrightarrow{BC}$ .

- (b) Find  $\overrightarrow{BD}$ .
- (c) Find  $|\overrightarrow{AB}|$  and  $|\overrightarrow{AD}|$
- (d) Find the value of  $\cos DAB$ .
- (e) Hence, using the answer in part (d), find the value of  $\sin DAB$ .
- (f) Find the area of the parallelogram ABCD.






#### Triangle

1. The vertices of the triangle ABC are defined by the position vectors

$$\overrightarrow{OA} = \begin{pmatrix} 2 \\ -2 \\ 1 \end{pmatrix}, \overrightarrow{OB} = \begin{pmatrix} 4 \\ -1 \\ 3 \end{pmatrix} and \overrightarrow{OC} = \begin{pmatrix} 7 \\ -2 \\ 4 \end{pmatrix}$$

(a) Find

(i)  $\overrightarrow{AB}$ (ii)  $\overrightarrow{AC}$ 

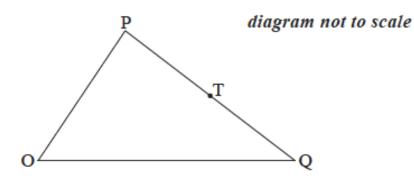
- (b) Find the value of  $cos C \hat{A} B$ .
- (c) (i) Find the value of  $sin C\hat{A}B$ .
- (ii) Hence, find the area of triangle ABC.



#### Paper 1



1. In the following diagram, 
$$\overrightarrow{OP} = p$$
,  $\overrightarrow{OQ} = q$  and  $\overrightarrow{PT} = \frac{1}{2}\overrightarrow{PQ}$ .

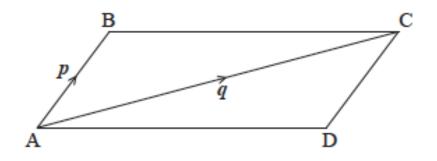


Express each of the following vectors in terms of p and q.

- (a)  $\overrightarrow{PQ}$
- (b)  $\overrightarrow{OT}$



2. 1 The following diagram shows the parallelogram ABCD.



Let  $\overrightarrow{AB} = p$  and  $\overrightarrow{AC} = q$ . Find each of the following vectors in terms of p and/or q.

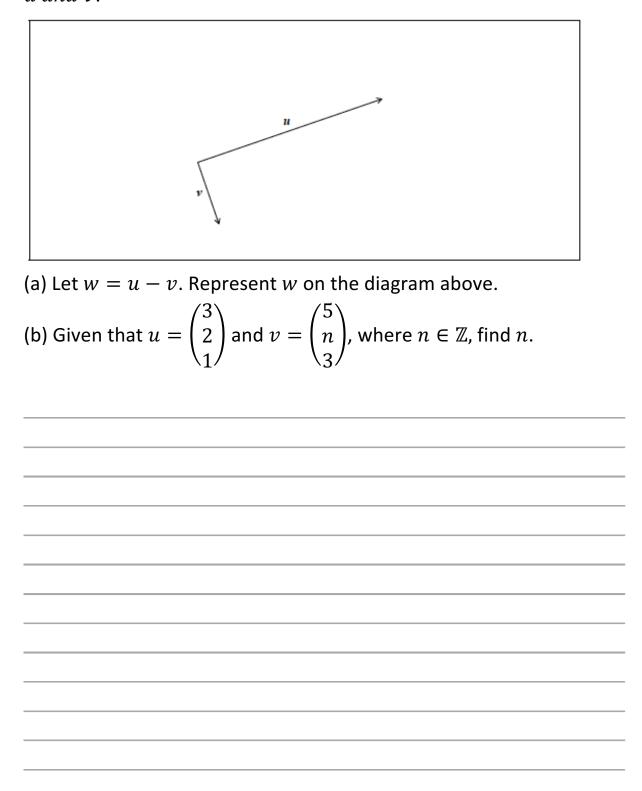
(a)  $\overrightarrow{CB}$ (b)  $\overrightarrow{CD}$ (c)  $\overrightarrow{DB}$ 

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#### Paper 2



## 1. The following diagram shows two perpendicular vectors u and v.



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2. Consider the points A(1, 5, -7) and B(-9, 9, -6).

(a) Find  $\overrightarrow{AB}$ .

Let *C* be a point such that 
$$\overrightarrow{AC} = \begin{pmatrix} 6 \\ -4 \\ 0 \end{pmatrix}$$
.

(b) Find the coordinates of C.

The line L passes through B and is parallel to (AC).

(c) Write down a vector equation for *L*.

(d) Given that  $|\overrightarrow{AB}| = k |\overrightarrow{AC}|$ , find k.

(e) The point D lies on L such that  $|\overrightarrow{AB}| = |\overrightarrow{BD}|$ . Find the possible coordinates of D.