Assignment Exercise 7

40. Draw separate diagrams to illustrate the following.

(a) $\overrightarrow{FE} + \overrightarrow{JI}$

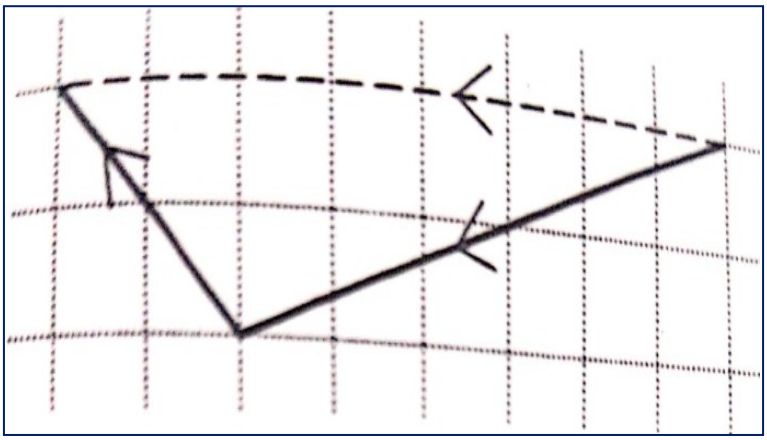
(b) $\overrightarrow{HG} + \overrightarrow{FE}$

(c) $\overrightarrow{JI} - \overrightarrow{FE}$

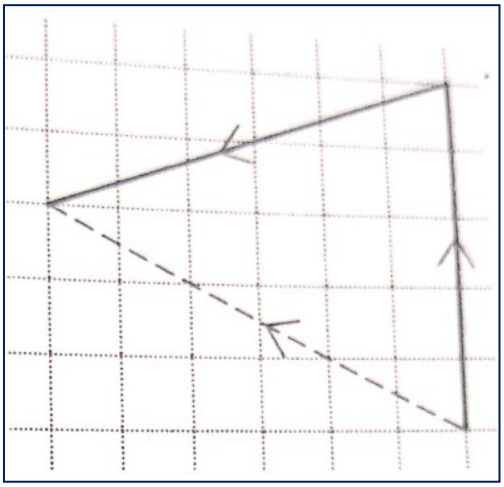
(d) $\overrightarrow{HG} + \overrightarrow{JI}$

Solution

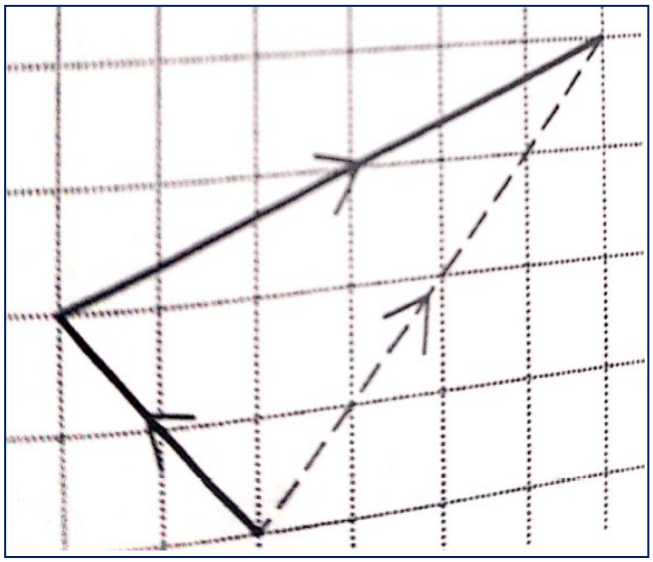
(a) $\overrightarrow{FE} + \overrightarrow{JI}$



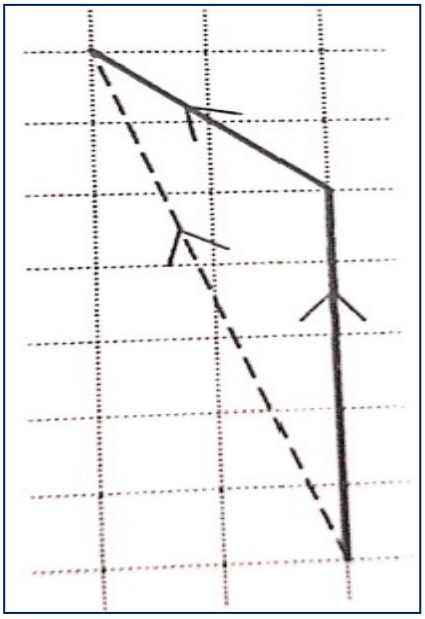
(b) $\overrightarrow{HG} + \overrightarrow{FE}$



(c) $\overrightarrow{JI} - \overrightarrow{FE}$

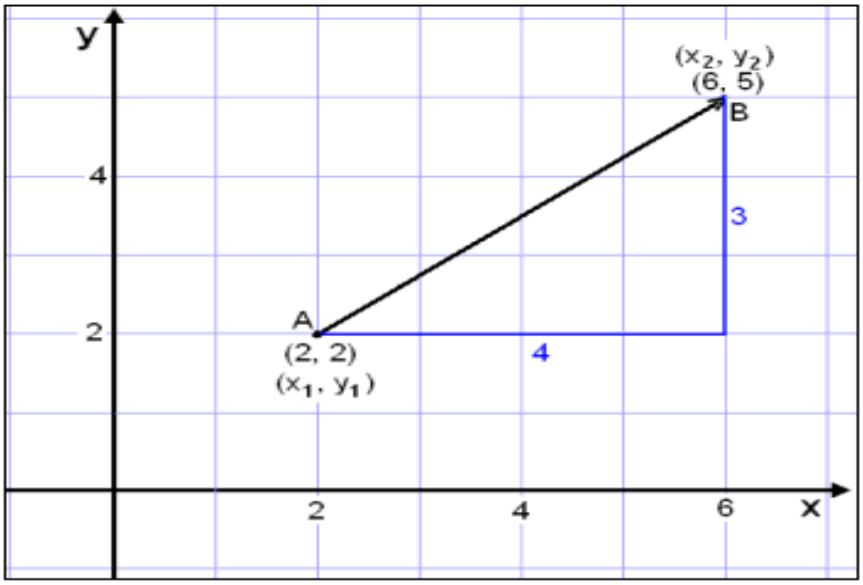


(d) $\overrightarrow{HG} + \overrightarrow{JI}$



TO find a vector given two co-ordinates :-

$$\begin{pmatrix} x_2 - x_1 \\ y_2 - y_1 \end{pmatrix}$$



Assignment

Exercise 8

1. If D has coordinates (7, 2) and E has coordinates (9, 0), find the column vector for $\overrightarrow{DE}$.

Solution:-

Column vector for $\overrightarrow{DE}$

$$= \begin{pmatrix} 9 - 7 \\ 0 - 2 \end{pmatrix}$$

$$\overrightarrow{DE} = \begin{pmatrix} 2 \\ -2 \end{pmatrix}$$

2. Find the column vector $\overrightarrow{XY}$ where X and Y have coordinates $(-1, 4)$ and $(5, 2)$ respectively.

Solution:-

Column vector for $\overrightarrow{XY}$

$$= \begin{pmatrix} 5-(-1) \\ 2-4 \end{pmatrix}$$

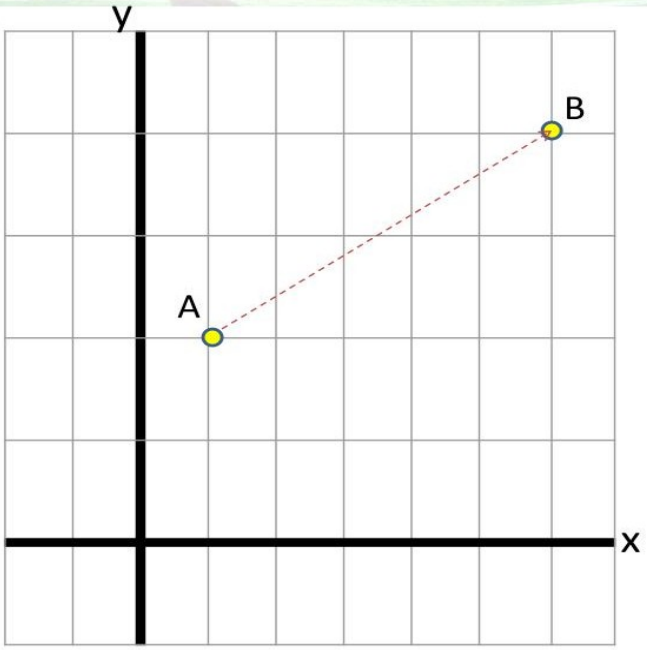
$$\overrightarrow{XY} = \begin{pmatrix} 6 \\ -2 \end{pmatrix}$$

If A has the coordinate (1,2) and B has the coordinate (6,4), find the column vector for $\overrightarrow{AB}$

$\overrightarrow{AB} = \begin{pmatrix} 5 \\ 2 \end{pmatrix}$

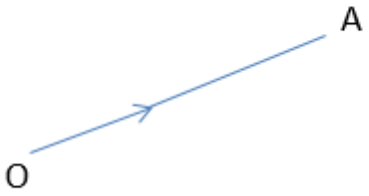
Find the column vector for $\overrightarrow{BA}$

$\overrightarrow{BA} = \begin{pmatrix} -5 \\ -2 \end{pmatrix}$



Position Vector

A position vector is a vector which starts at the origin. Sometimes a vector is fixed in position relative to a specific point. The position vector of the point ***A(x,y)*** is the vector $\overrightarrow{OA} = \begin{pmatrix} x \\ y \end{pmatrix}$

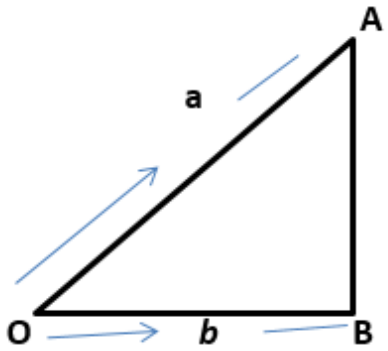


The position vector of (2, 3) is $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$.

Here are two results about position vectors:

If **A** and **B** have position vectors **a** and **b** respectively then;

1. $\overrightarrow{AB} = \overrightarrow{OB} - \overrightarrow{OA} = \boldsymbol{b} - \boldsymbol{a}$

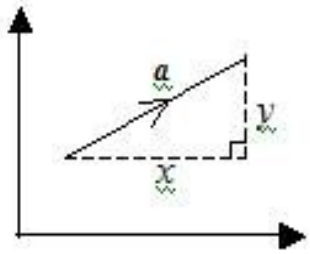


The length of a vector is called the **magnitude** or modulus of the vector.

The magnitude of vector **a** is written as $|\mathbf{a}|$.

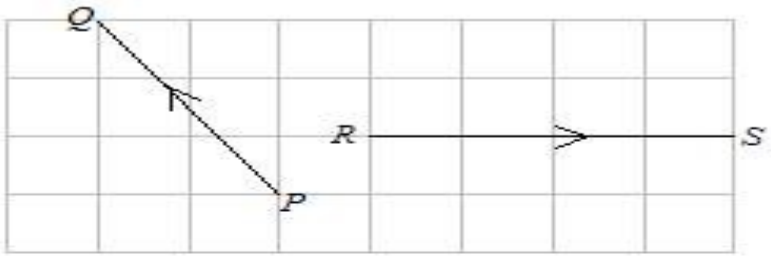
The magnitude of the vector $\overrightarrow{AB}$ is written as $|AB|$.

If $\mathbf{a} = \begin{pmatrix} x \\ y \end{pmatrix}$ then the magnitude $|\mathbf{a}| = \sqrt{x^2 + y^2}$ (using the Pythagorean theorem)



Example:

Express each of the following vectors as a column vector and find its magnitude



Solution:

$\overrightarrow{PQ} = \begin{pmatrix} -2 \\ 3 \end{pmatrix}$ and $|PQ| = \sqrt{(-2)^2 + 3^2} = \sqrt{13}$ units

$\overrightarrow{RS} = \begin{pmatrix} 4 \\ 0 \end{pmatrix}$ and $|RS| = \sqrt{4^2 + 0^2} = 4$ units

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