

## VECTOR

**Question 1.** Represent the following

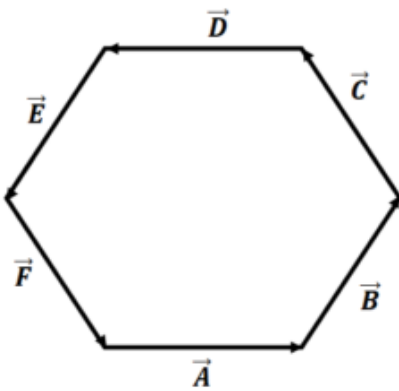
- a.  $\hat{A}$  has magnitude 5 unit along x-axis.   b.  $\hat{B}$  has magnitude 6 unit along - x axis.  
c.  $\hat{C}$  has magnitude 4 unit along - z axis   d.  $\hat{m}$  has magnitude 6 unit along y axis.  
e. A vector having magnitude 3 units along  $\vec{D}$

**Question 2:-** A vector of magnitude 5 units makes an angle of  $30^\circ$  with +ve x-axis. Find the magnitude and direction of the resultant if it is (a) multiplied by 2 (b) multiplied by -3 (c) divided by 2

**Question 3:-** Find the angle between  $\vec{A}$  and  $\vec{B}$ ,  $\vec{B}$  and  $\vec{C}$  and  $\vec{C}$  and  $\vec{A}$



**Question 4:-** Find the angle between vectors  $\vec{A}$  and  $\vec{B}$ ,  $\vec{A}$  and  $\vec{C}$ ,  $\vec{A}$  and  $\vec{D}$ ,  $\vec{A}$  and  $\vec{E}$ ,  $\vec{A}$  and  $\vec{F}$



Note that the interior angle of a regular hexagon is  $120^\circ$

## ADDITION OF TWO VECTORS

**Question 5:-** Find the magnitude and direction of the resultant of vectors  $\vec{A}$  and  $\vec{B}$  in the following case (Draw diagram also)

- A=8 units, B=6 units,  $\theta=0^\circ$
- A=8 units, B=6 units,  $\theta=180^\circ$
- A=8 units, B=6 units,  $\theta=90^\circ$
- A=8 units, B=8 units,  $\theta=90^\circ$
- A=10 units, B=10 units,  $\theta=120^\circ$

**Question 6:-** Two vectors each of magnitude 3m and 4m acts perpendicular to each other. Find the magnitude and direction of the resultant.

**Question 7:-** Two vectors of equal magnitude 5m each act perpendicular to each other. Find the resultant vector.

**Question 8:-** Two vectors of equal magnitude 4 units each acts at an angle of  $60^\circ$  with each other. Find the resultant vector.

**Question 9:-** Two vectors of equal magnitude 3 units each acts an angle  $120^\circ$  with each other. Find the resultant.

**Question 10:-** A car travels 8m due north and 6m due west. Find the magnitude and direction of the net displacement.

**Question 11:-** Two forces 5N and 12N act along east and north respectively. Find the magnitude and direction of their resultant.

**Question 12:-** the greatest and least resultant of two forces acting at a point of is 10N and 6N resp. If each force is increased by 3N. Find the resultant (Magnitude) of the new force when acting at a point at an angle of  $90^\circ$  with each other.

**Question 13:-** Two equal forces have their resultant equal to either. Find the angle between them.

**Question 14:-** Two forces whose magnitude is in the ratio 3:5, give a resultant of 28N. If the angle between them is  $60^\circ$ , find the magnitude of each force.

**Question 15:-** A vector  $\vec{A}$  makes an angle of  $20^\circ$  and  $\vec{B}$  makes an angle of  $110^\circ$  with the x-axis. The magnitude of these vectors is 3m and 4m resp. Find the resultant.

**Question 16:-** if  $|\vec{A} + \vec{B}| = A + B$  find the angle between  $\vec{A}$  and  $\vec{B}$

**Question 17:-** The maximum and minimum magnitude of the resultant of two vectors of magnitude P and Q are in the ratio of 3:1. Find the relation between P and Q.

**Question 18:-** Which pair of the following forces will never give the resultant force of 2N? (a) 2N and 2N (b) 1N and 1N (c) 1n and 3N (d) 1N and 4N

**Question 19:-** The sum of the magnitudes of two forces acting at a point is 18N and the magnitude of their resultant is 12N. If the resultant is at  $90^\circ$  with a force of smaller magnitude, what are the magnitudes of forces?

**Question 20:-** At what angle should the two force  $2F$  and  $\sqrt{2}F$  acts so that the resultant force is  $\sqrt{10}F$ ?

**Question 21:-** The resultant of the two forces has a magnitude of  $20N$ . One of the forces is of magnitude  $20\sqrt{3}N$  and makes an angle of  $30^\circ$  with the resultant. Then what is the magnitude of the other force?

**Question 22:-** Vector  $\vec{A}$  is 2cm long and is  $60^\circ$  above the x-axis in the first quadrant. Vector  $\vec{B}$  is 2cm long and is  $60^\circ$  below the x-axis in the 4th quadrant. Find the resultant of  $\vec{A} + \vec{B}$ .

**Question 23:-** The resultant of two vectors  $\vec{A}$  and  $\vec{B}$  is perpendicular to  $\vec{A}$ . Magnitude of resultant  $\vec{R}$  is equal to half magnitude of  $\vec{B}$ . Find the angle between  $\vec{A}$  and  $\vec{B}$ .

**Question 24:-** The sum of the magnitudes of two forces acting at a point is 16N. If their resultant is normal to the smaller force and has a magnitude of 8N. Find the forces.

**Question 25:-**  $\vec{A}$  and  $\vec{B}$  are two vectors such that  $A < B$ . The resultant of  $\vec{A}$  and  $\vec{B}$  is of magnitude 20 and acts at a right angle to vector  $\vec{A}$ . The angle between  $\vec{A}$  and  $\vec{B}$  is  $150^\circ$ . Find the magnitude of  $\vec{A}$  and  $\vec{B}$ .

**Question 26:-** The maximum and minimum values of the resultant of two vectors are respectively 10 and 6 units. Find the magnitude of individual vectors.

### SUBTRACTION OF VECTORS

**Question 27:-** Vector  $\vec{A}$  and  $\vec{B}$  are given which is perpendicular to each other. Draw the resultant of the following.

(a)  $\vec{A} + 2\vec{B}$  (b)  $\vec{A} - 2\vec{B}$  (c)  $2\vec{A} + \vec{B}$  (d)  $2\vec{A} - \vec{B}$  (e)  $\vec{B} - \frac{\vec{A}}{2}$

**Question 28:-** If two vectors  $\vec{A}$  and  $\vec{B}$  having magnitude 3N and 4N and the angle between them is  $60^\circ$ . Find  $|\vec{A} - 2\vec{B}|$

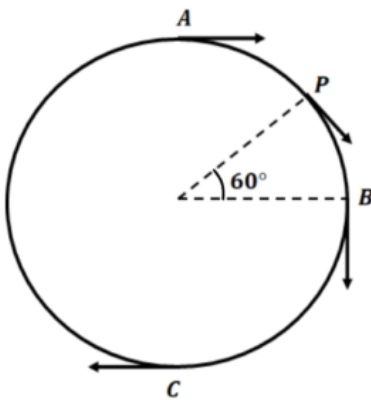
**Question 29:-** The resultant of two unit vectors is a unit vector. Find the magnitude of the difference between the two unit vectors.

**Question 30:-** two vectors of equal magnitude 5 units have an angle  $60^\circ$  between them. Find the magnitude of

(a) The sum of the vectors

(b) the difference between the vectors

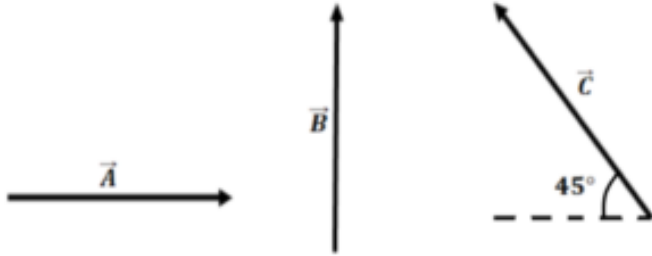
**Question 31:-** A car is moving on a circular track with constant speed  $v=20$  m/s. Find the change in velocity



(a) From A to C (b) From A to B (c) From A to P

**Question 32:-** Vector  $\vec{A}$  has a magnitude of 10 units and points towards the west, while  $\vec{B}$  has the same magnitude and points towards the south. Find the magnitude and direction of  $\vec{A} + \vec{B}$  and  $\vec{A} - \vec{B}$ . Specify the direction relative to due west.

**Question 33:-**



Draw the resultant of the following

- (a)  $\vec{R} = \vec{A} + \vec{B} + \vec{C}$  (b)  $\vec{R} = \vec{A} + \vec{B} - \vec{C}$  (c)  $\vec{R} = \vec{A} - \vec{B} - \vec{C}$  (d)  $\vec{R} = \vec{A} - \vec{B} + \vec{C}$  (e)  
 $\vec{R} = -\vec{A} - \vec{B} + \vec{C}$