

CHAPTER-10
VECTOR ALGEBRA

1 EXERCISE - 10.2

1. Compute the magnitude of the following vectors:

$$\vec{a} = \hat{i} + \hat{j} + k; \vec{b} = 2\hat{i} - 7\hat{j} - 3\hat{k}; \vec{c} = \frac{1}{\sqrt{3}}\hat{i} + \frac{1}{\sqrt{3}}\hat{j} - \frac{1}{3}\hat{k}$$

2. Write two different vectors having same magnitude.
3. Write two different vectors having same direction.
4. Find the values of x and y so that the vectors $2\hat{i} + 3\hat{j}$ and $x\hat{i} + y\hat{j}$ are equal.
5. Find the scalar and vector components of the vector with initial point (2, 1) and terminal point (-5, 7).
6. Find the sum of the vectors $\vec{a} = \hat{i} - 2\hat{j} + \hat{k}$, $\vec{b} = -2\hat{i} + 4\hat{j} + 5\hat{k}$ and $\vec{c} = \hat{i} - 6\hat{j} - 7\hat{k}$.
7. Find the unit vector in the direction of the vector $\vec{a} = \hat{i} + \hat{j} + 2\hat{k}$.
8. Find the unit vector in the direction of vector \overrightarrow{PQ} , where \vec{P} and \vec{Q} are the points (1, 2, 3) and (4, 5, 6), respectively.
9. For given vectors, $\vec{a} = 2\hat{i} - \hat{j} + 2\hat{k}$ and $\vec{b} = -\hat{i} + \hat{j} - \hat{k}$, find the unit vector in the direction of the vector $\vec{a} + \vec{b}$.
10. Find a vector in the direction of vector $5\hat{i} - \hat{j} + 2\hat{k}$ which has magnitude 8 units.
11. Show that the vectors $2\hat{i} - 3\hat{j} + 4\hat{k}$ and $-4\hat{i} + 6\hat{j} - 8\hat{k}$ are collinear.
12. Find the direction cosines of the vector $\hat{i} + 2\hat{j} + 3\hat{k}$.
13. Find the direction cosines of the vector joining the points \vec{A} (1, 2, -3) and \vec{B} (-1, -2, 1), directed from \vec{A} to \vec{B} .

14. Show that the vector $\hat{i} + \hat{j} + \hat{k}$ is equally inclined to the axes OX, OY and OZ.
15. Find the position vector of a point R which divides the line joining two points \vec{P} and \vec{Q} whose position vectors are $\hat{i} + 2\hat{j} - \hat{k}$ and $-\hat{i} + \hat{j} + \hat{k}$ respectively, in the ratio 2 : 1
 - (i) internally
 - (ii) externally
16. Find the position vector of the mid point of the vector joining the points $\vec{P}(2, 3, 4)$ and $\vec{Q}(4, 1, -2)$.
17. Show that the points A, B and C with position vectors, $\vec{a} = 3\hat{i} - 4\hat{j} - 4\hat{k}$, $\vec{b} = 2\hat{i} - \hat{j} + \hat{k}$ and $\vec{c} = \hat{i} - 3\hat{j} - 5\hat{k}$, respectively form the vertices of a right angled triangle.
18. In triangle ABC (Fig 10.18), which of the following is not true:
 - (a) $\vec{AB} + \vec{BC} + \vec{CA} = \vec{0}$
 - (b) $\vec{AB} + \vec{BC} - \vec{CA} = \vec{0}$
 - (c) $\vec{AB} + \vec{BC} - \vec{CA} = \vec{0}$
 - (d) $\vec{AB} - \vec{BC} + \vec{CA} = \vec{0}$
19. If \vec{a} and \vec{b} are two collinear vectors, then which of the following are incorrect:
 - (a) $\vec{b} = \lambda\vec{a}$, for some scalar λ
 - (b) $\vec{a} = \pm\vec{b}$
 - (c) the respective components of \vec{a} and \vec{b} are not proportiona
 - (d) both the vectors \vec{a} and \vec{b} have same direction, but different magnitudes.

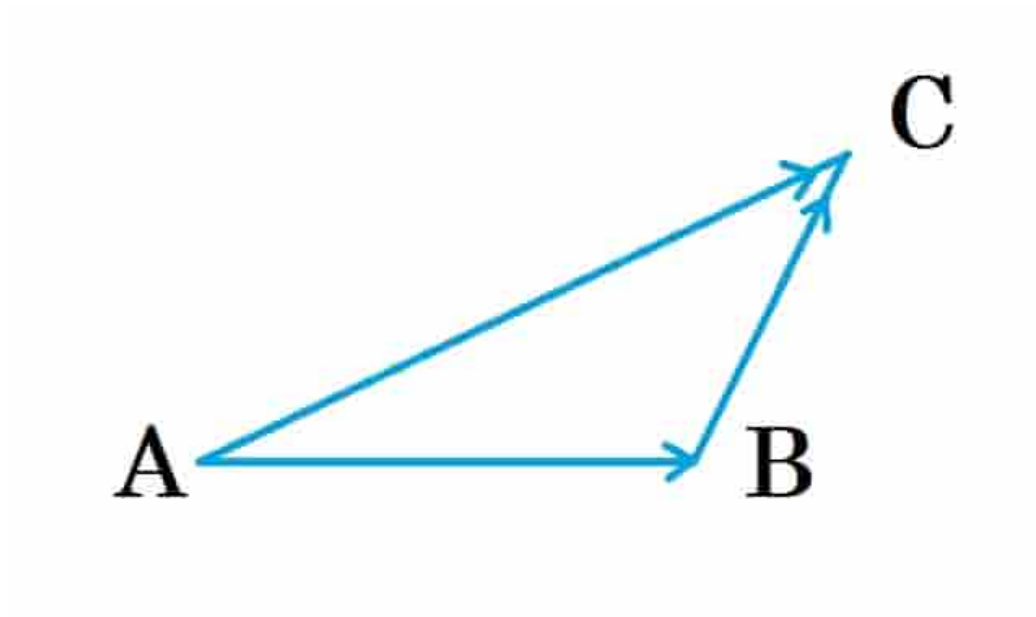


Fig 10.18