Some Basic Concept About Vectors

SUBJECT : MATHEMATICS
CHAPTER NUMBER:10
**CHAPTER NAME :VECTORS**

What we expect to learn?

- Students will be able to learn about the mathematical concept of vectors.

- Students will be able to learn about different types of vectors.

- Students will be able to learn about addition of vectors and its properties.

- Students will able to find DCS and DRS of a vector and can solve questions related to them.

- Students will be able to learn about multiplication of vectors.

- Students will able to find scalar product and can solve questions related to these.

- Students will able to find vector product and can solve questions related to these.

- Students will able to find scalar triple product and can solve questions related to these.

Vector and Scalar:

Definition:

➢ A quantity that has magnitude as well as direction is called a vector.

➢ A quantity that involves only one value (magnitude) which is a real number called as a scalar.

A vector is generally represented by a directed line segment, say $\overrightarrow{AB}$. A is called the initial point and B is called the terminal point. The magnitude of a vector $\overrightarrow{AB}$ is expressed by $\left|\overrightarrow{AB}\right|$; which is the distance of A from B.
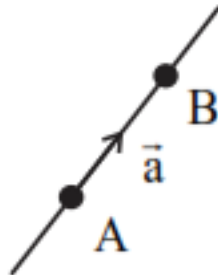
Types of Vectors

Zero Vector:

A vector which has the same initial and terminal point, is called a zero vector.

- The magnitude of a zero vector is zero. It is denoted by $\vec{0}$.

- The direction of the zero vector is indeterminate.

Unit Vector:

A vector of unit magnitude is called a unit vector

The unit vector in direction of $\vec{a}$ is is denoted by $\hat{a}$; where $\left[\hat{a} = \dfrac{\vec{a}}{|\vec{a}|}\right]$

Types of Vectors

Equal vectors:

Two vectors are said to be equal if they have the same magnitude and direction.

Collinear vector:

Two vectors are said to be collinear if their directed line segments are parallel disregards to their direction.

- Collinear vectors are also called parallel vectors. If they have the same direction they are called the like vectors otherwise called as, unlike vectors.

- Two non zero vector $\vec{a}$ and $\vec{b}$ are collinear if and only if $\vec{a} = k\vec{b}$, where $k \in R - \{0\}$.

Types of Vectors

Coinitial Vectors:

Two or more vectors having the same initial point called coinitial vector hence $\overrightarrow{AB}$ & $\overrightarrow{AC}$ are coinitial vector.
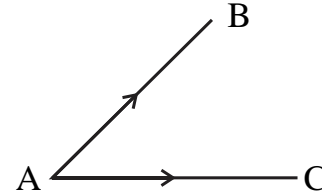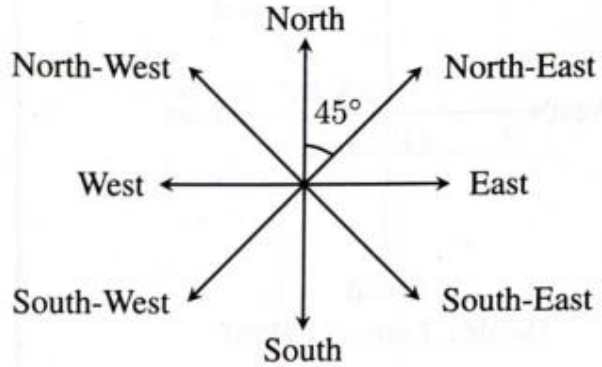

Negative of a vector :

Two vectors having the same magnitudes but opposite directions called as negative vectors.

A given vector (say $\overrightarrow{PQ}$) but the opposite direction is called negative of the given vector.

$\overrightarrow{PQ}$ and $\overrightarrow{QP}$ are negative to each other and written as $\overrightarrow{PQ} = -\overrightarrow{QP}$.

Standard Directions

These are the following standard directions

Classify the following quantities as vectors or scalar quantities

(i) 5 seconds

(ii) 10kg

(iii) 40^0

(iv) 40 watts

(v) 20m/sec^2

(vi) 2 meters north-west

(vii) 10^{-19} coloumb

Classify the following quantities as vectors or scalar quantities

(i) Work   (ii) intensity   (iii) time-period

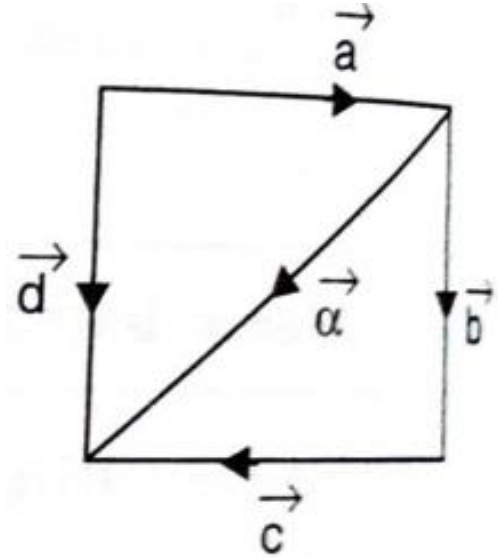(iv) momentum   (v) force   (vi) distance

Represent graphically

(i)   A displacement of 40 km, 300 east of north.

(ii)   A displacement of 20km, south-east

Example

In the given figure identify the following vectors.

(i)   equal

(ii)   Coinitial

(iii)   Collinear but not equal

Assignments

1.   Answer the following as true or false.

(i) Two collinear vectors are always equal in magnitude.

(ii) Two vectors having same magnitude are collinear.

(iii) Two collinear vectors having the same magnitude are equal.

(iv) $\vec{a}$ and $\vec{a}$ are collinear.

(v) Zero vector is unique.

2. Exercise 10.1 From NCERT book.

THANKING YOU
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