

Chapter: Vector Algebra.

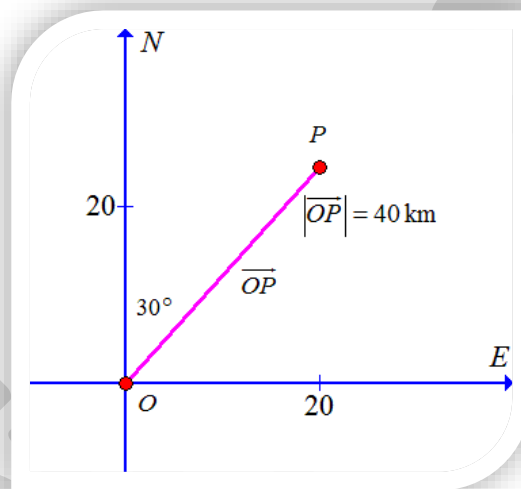
Exercise: 10.1

1. Represent graphically a displacement of 40km, 30° east of north

Solution:

Given that there is a vector with magnitude 40 kilometers and it makes an angle of 30° with y -axis and it makes an angle of 60° with x -axis

The graph of \overline{OP} is as below.



Here, the vector \overline{OP} represents the displacement of 40km, 30° in East of North direction.

2. Classify the following measures as scalars and vectors.
- i) 10kg
 - ii) 2 meters north-west
 - iii) 40°
 - iv) 40 watt
 - v) 10^{-19} coulomb
 - vi) 20m/s^2

Solution:

- i) The mass 10kg is a scalar quantity because it has only magnitude not direction
- ii) 2 meters north-west is a vector, because it has magnitude and direction.
- iii) 40° is a scalar quantity because it has only magnitude not direction.
- iv) 40 watts is a scalar quantity because it has only magnitude not direction.
- v) 10^{-19} Coulomb is a scalar quantity because it has only magnitude not direction.
- vi) 20 m/s^2 is a vector quantity because it has both magnitude as well as direction.

3. Classify the following as scalar and vector quantities

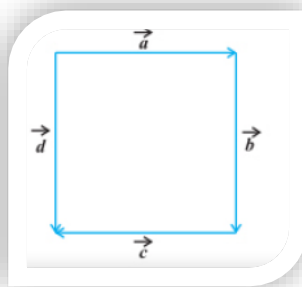
- i) Time period
- ii) Distance
- iii) Force
- iv) Velocity
- v) work done

Solution:

- i) Time period is a scalar quantity because it has only magnitude.
- ii) Distance is a scalar quantity because it has only magnitude.
- iii) Force is a vector quantity because it has both magnitude as well as direction
- iv) Velocity is a vector quantity because it has both magnitude as well as direction
- v) Work done is a scalar quantity because it has only magnitude.

4. In the following figure, identify the following

- i) Co-initial
- ii) Equal
- iii) Collinear but not equal



Solution:

Observing the above figure, the vectors based on the opposite sides are equal

It implies that vectors \vec{a} and \vec{d} are co-initial, because both have same initial point. Vectors \vec{b} and \vec{d} are equal and vectors \vec{a} and \vec{c} are collinear but not equal

5. Answer the following as true or false

- i) \vec{a} and $-\vec{a}$ are collinear.
- ii) Two collinear vectors are always equal in magnitude.
- iii) Two vectors having same magnitude are collinear.
- iv) Two collinear vectors having the same magnitude are equal.

Solution:

- i) Two vectors which are opposite to each other are collinear, hence the statement “ \vec{a} and $-\vec{a}$ are collinear” is TRUE.
- ii) Collinear vectors are vectors which have same or parallel base lines, so there is no constraint on magnitude. Hence the statement “ Two collinear vectors are always equal in magnitude” is FALSE
- iii) Collinear vectors are vectors which have same or parallel base lines, so there is no constraint on magnitude. Hence the statement “ Two vectors having same magnitude are collinear” is FALSE
- iv) Two collinear vectors are may be in the same direction or in the opposite direction, hence the statement “Two collinear vectors having the same magnitude are equal” is FALSE