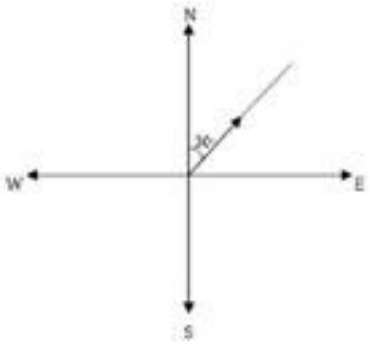
CBSE Class–10 Mathematics
NCERT solution
Chapter - 10
Vector Algebra - Exercise 10.1

1. Represent graphically a displacement of 40 km, 30° East of North.

Ans. Displacement 40 km, 30° East of North

$\Rightarrow$ Displacement vector $\overrightarrow{OA}$ (say) such that $|\overrightarrow{OA}|$ = 40 km (given) and vector $\overrightarrow{OA}$ makes an angle 30° with North in East-North quadrant.



2. Check the following measures as scalars and vectors:

(i) 10 kg
(ii) 2 meters north-west
(iii) 40°
(iv) 40 Watt
(v) 10^{-19} **coulombs**
(vi) 20 m/sec^2

Ans. (i) 10 kg is a measure of mass, it has no direction, it is magnitude only and therefore it is a scalar.

(ii) 2 meters North-West is a measure of displacement. It has magnitude and direction both and hence it is a vector.

(iii) 40° is a measure of angle or temperature. It has no direction, it has magnitude only. Therefore it is a scalar.

(iv) 40 Watt is a measure of power or Rate of electricity. It has no direction, only magnitude and therefore, it is a scalar.

(v) 10^{-19} coulombs is a measure of electric charge and it has magnitude only, therefore, it is a scalar.

(vi) 20 m/sec^2 is a measure of acceleration. It is a measure of rate of change of velocity, therefore, it is a vector.

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3. Classify the following as scalar and vector quantities:

(i) time period
(ii) distance
(iii) force
(iv) velocity
(v) work done

Ans. (i) Time-scalar
(ii) Distance-scalar
(iii) Force-vector
(iv) Velocity-vector
(v) Work done-scalar

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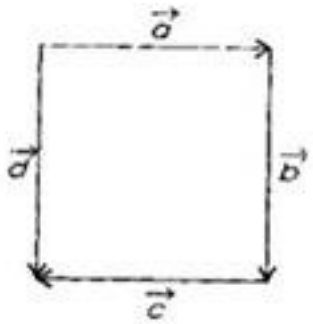
4. In the adjoining figure, (a square) identify the following vectors:



(i) Co-initial

(ii) Equal
(iii) Collinear but not equal

Ans. (i) $\vec{a}$ and $\vec{d}$ have same initial point and therefore co-initial vectors.

(ii) $\vec{b}$ and $\vec{d}$ have same direction and same magnitude. Therefore $\vec{b}$ and $\vec{d}$ are equal vectors.

(iii) $\vec{a}$ and $\vec{c}$ have parallel support, so that they are collinear. Since they have opposite directions, they are not equal. Hence $\vec{a}$ and $\vec{c}$ are collinear but not equal.

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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.

Ans. (i) True.

(ii) False. [$\because$ $\vec{a}$ and $2\vec{a}$ are collinear vectors but $\left|2\vec{a}\right| = 2\left|\vec{a}\right|$]

(iii) False. [$\because$ $\left|\hat{i}\right| = \left|\hat{j}\right| = 1$ but $\hat{i}$ and $\hat{j}$ are vectors along $x-$ axis (OX) and $y-$axis (OY) respectively]

(iv) False. [$\because$ Vectors $\vec{a}$ and $-\vec{a}\left\{=(-1)\vec{a} = m\vec{a}\right\}$ are collinear vectors and $\left|\vec{a}\right| = \left|-\vec{a}\right|$ but we know that $\vec{a} \neq -\vec{a}$ because their directions are opposite.]