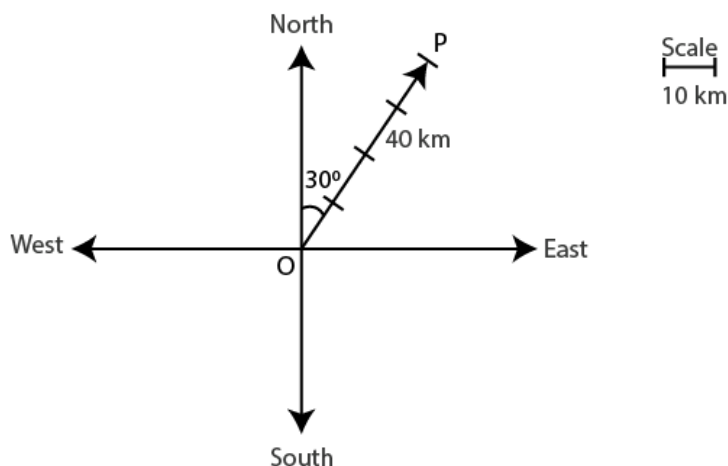


### Exercise 10.1

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**1. Represent graphically a displacement of 40 km,  $30^\circ$  east of north.**

**Solution:**



The vector  $\overrightarrow{OP}$  represents the displacement of 40 km,  $30^\circ$  east of north.

**2. Classify the following measures as scalars and vectors.**

- |              |                          |                         |
|--------------|--------------------------|-------------------------|
| (i) 10 kg    | (ii) 2 metres north-west | (iii) $40^\circ$        |
| (iv) 40 watt | (v) $10^{-19}$ coulomb   | (vi) $20 \text{ m/s}^2$ |

**Solution:**

- (i) 10 kg is a scalar quantity because it has only magnitude.
- (ii) 2 meters north-west is a vector quantity as it has both magnitude and direction.
- (iii)  $40^\circ$  is a scalar quantity as it has only magnitude.
- (iv) 40 watts is a scalar quantity as it has only magnitude.
- (v)  $10^{-19}$  coulomb is a scalar quantity as it has only magnitude.
- (vi)  $20 \text{ m/s}^2$  is a vector quantity as it has both magnitude and direction.

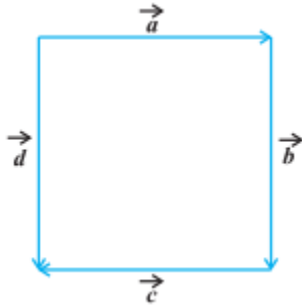
**3. Classify the following as scalar and vector quantities.**

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

**Solution:**

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

**4. In Figure, identify the following vectors.**



**(i) Coinitial (ii) Equal (iii) Collinear but not equal**

**Solution:**

- (i) Vectors  $\vec{a}$  and  $\vec{d}$  are coinitial because they have the same initial point.
- (ii) Vectors  $\vec{b}$  and  $\vec{d}$  are equal because they have the same magnitude and direction.
- (iii) Vectors  $\vec{a}$  and  $\vec{c}$  are collinear but not equal. This is because although they are parallel, their directions are not the same.

**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) True.

Vectors  $\vec{a}$  and  $-\vec{a}$  are parallel to the same line.

(ii) False.

Collinear vectors are those vectors that are parallel to the same line.

(iii) False.

Two vectors having the same magnitude need not necessarily be parallel to the same line.

(iv) False.

Only if the magnitude and direction of two vectors are the same, regardless of the positions of their initial points the two vector are said to be equal.