# **Vectors**

Scalars such as temperature have magnitude.

Vector such as displacement have a magnitude and direction.

Additive property: a+b = b+a

Associative property: (a+b)+c = a+(b+c)

Components of a vectors:

ax = aCos0

ay = aSin0

Q.1 What are x and y components of a vector **a** in an xy plane if it’s direction is 250˚ counter clock-wise from the +ve x-axis and it’s magnitude is 7.3m?

Q.2 A displacement vector **r** in an xy-plane, 15m long is directed at 30˚. Determine it’s xy components.

Q.3 The x-component of a vector **a** is -25m and the y-component is 40m.

A. What is the magnitude of **a**

B. What is the angle between them from +ve x-axis.

Q.4 Express the following angles in Radians:

1. 20˚

2. 50˚

3. 100˚

Q.5 Convert the following angles into Degree:

1. 0.330 rad

2. 2.10 rad

3. 7.70 rad

Q.6 A ship sets out to sail to a point 120km North an unexpected storm blows the ship 100km to East of it’s staring point.

A. How far the ship went?

B. In what direction it must now sail to attain It’s original position?

# **Unit Vector**

**a** = axi + ayj + azk

unit vectors i, j, and k have magnitude of unity and are directed into the +ve direction of x, y, and z axes. Respected in the right hand co-ordinate system in which axi, ayj, and azk are vector component of **a** and ax, ay and az are scalar component.

Q.1 A person walks in the following pattern 3.1km North then 2.4km West then finally 5.2km South:

A. Sketch the vector diagram of the motion.

B. How far the person had walk.

C. What direction would the bird fly from same starting point and same ending point as that of the person.

Q.2 **a** = 4mi – 3mj +1mk

**b** = -1mi -1mj + 4mk

Find:

1. **a** + **b**
2. **a** – **b**
3. **a** – **b** + **c**

Q.3 Find x, y, and z component of sum **r** vector of the displacement **c** and **d** whose components inn meters are:

Cx = 7.4m Dx = 4.4m

Cy = -3.8m Dy = -2m

Cz = -6.1m Dz = 3.3m

Q.4 **a** = 4mi + 3mj

**b** = -13mi + 7mj

1. What is the sum a+b ?
2. What is their Magnitude?
3. What is their direction?

Q.5 A car is driven East for a distance of 50km then North for 30km and then in a direction 30˚ East of North for 25km:

A. Sketch the diagram.

B. Determine it’s magnitude.

C. Determine it’s direction.