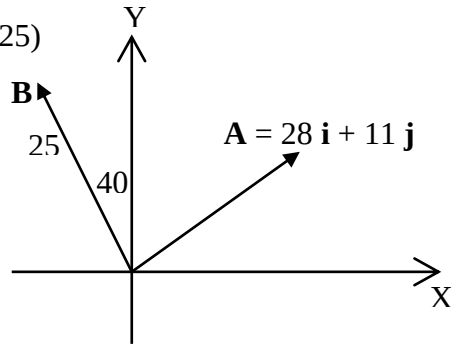
Chapter 3 (Vectors)

1- Tow vectors $\vec{A} = -2\hat{i} + 5\hat{j} - \hat{k}$, and $\vec{B} = \hat{i} + \hat{j} + \hat{k}$, Find the following: $|\vec{A}|$, $|\vec{B}|$, angel between $\vec{A}$ and $\vec{B}$, $\vec{A}.\vec{B}$, $\vec{A}\times\vec{B}$, $|\vec{A}\times\vec{B}|$, unit vector of $\vec{A}\times\vec{B}$. (A: $\sqrt{30}$, $\sqrt{3}$, 77.8°, 2, $6\hat{i} + \hat{j} - 7\hat{k}$, $\sqrt{86}$, $\frac{20}{31}\hat{i} + \frac{10}{93}\hat{j} - \frac{70}{93}\hat{k}$)

2- The angle between vector **B** = 4.0 **j** + 3.0 **k**, and the positive y axis is approximately: (A: 37 degrees)

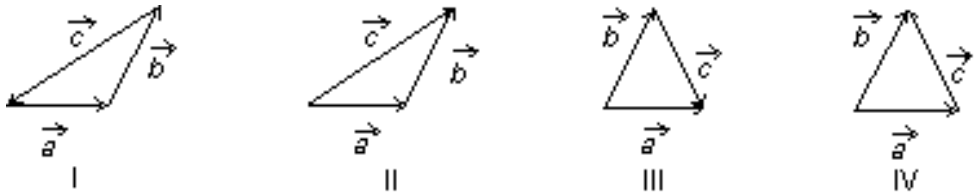
3- Vector **A** = (5.0 **i** + 3.0 **j**) m, and vector **B** is 6m in length and making 120 degrees angle with +ve x-axis. Find **A**-**B**. (A: (8.0 **i** - 2.2 **j**) m)

4- If vector **A** = 28 **i** + 11 **j** and vector **B** (magnitude of B = 25) as shown in the figure, what is the magnitude of the sum of these two vectors? (A: 32)



5- Vector **A** = -6 **i** + 14 **j**. Find vector **B** whose magnitude is twice that of **A** and is opposite in direction to **A**. (A: 12 **i** - 28 **j**)

6- The vectors **a**, **b**, and **c** are related by **c** = **a** + **b**. Which diagram below illustrates this relationship? (A: II)



7- If vector **A** = 6 **i** - 7 **j** and vector **B** = -12 **i** + 10 **j**, what angle does vector **C** = 2×**A** - **B** make with +x-axis measured counterclockwise. (A: 315º)

8- Two vectors **A** = 3 **i** + **j** + 2 **k** and **B** = 2 **i** + 4 **j** – q **k** (q is a constant) are perpendicular to each other. Find the constant q. (A: 5)

9- If **a** = (3.0 **i** + 4.0 **j**) m and **b** = (5.0 **i** - 2.0 **j**) m, find the angle between the two vectors. (A: 75 degrees)

10- A vector in the xy-plane has a magnitude of 25.0 and an x-component of 12.0. The angle that it makes with the positive x-axis is: (A: 61.3 degrees)

11- The unit vectors in the positive directions of the x, y, and z axes are labeled **i**, **j**, and **k**. The value of [**i**.(**j**× **k**)] is: (A: +1)

12- A vector of magnitude 3 CANNOT be added to a vector of magnitude 4 so that the magnitude of the resultant is: (A: zero)

A) zero B)1 C) 3 D) 5 E)7

Summary of Chapter 3 topics

1- Definition of scalar and vector quantities
2- Representation of vector graphically: tail to head= magnitude, direction= angle)
3- Projection of a vector in 3 dimensions
4- Resultant of two vectors and more (addition and subtraction)
5- Magnitude of a vector
6- Scalar product and vector product (Right Hand Rule)