Answer on Question #52240 – Math – Vector Calculus

1. IF line(OA) =4i + 3j, line(OB) = 6i - 2j and line(OC) =2i - j . Deduce the length of the triangle CA.

13––√

20––√

29––√

17––√

2 What quantity have both magnitude and direction ?

vector

scalar

mass

dot product

3 Find the vector product axb. If a = i + 2j - k and b = 2i + 3j + k

5i - 3j - k

2i - 4j - k

3i + j - k

I - j + 3k

4 a and b are vectors defined by a = 8i + 2j - 3k and b = 3i - 6j + 4k, where I,j,k are mutually perpendicular unit vectors. Show that a and b are perpendicular to each other.
90
45
1
0

5 a and b are vectors defined by a = 8i + 2j - 3k and b = 3i - 6j + 4k, where I,j,k are mutually perpendicular unit vectors. Calculate a and b.

1

0

2

4

Solution

1. $\overline{AC} = \overline{OC} - \overline{OA} = 2i - j - (4i + 3j) = -2i - 4j$

$|\overline{AC}| = \sqrt{2^2 + 4^2} = \sqrt{20}$

2. **vector**

3. **Cross (or vector) product**

$$a \times b = \begin{vmatrix} i & j & k \\ 1 & 2 & -1 \\ 2 & 3 & 1 \end{vmatrix} = \begin{vmatrix} 2 & -1 \\ 3 & 1 \end{vmatrix} i - \begin{vmatrix} 1 & -1 \\ 2 & 1 \end{vmatrix} j + \begin{vmatrix} 1 & 2 \\ 2 & 3 \end{vmatrix} k =$$

$$= 5i - 3j - k$$

4. **Dot (or scalar) product**

$$ab = 8 * 3 + 2 * (-6) + (-3) * 4 = 24 - 12 - 12 = 0$$

Angle between a and b equals 90°.

5. **Dot (or scalar) product**

$$ab = 8 * 3 + 2 * (-6) + (-3) * 4 = 24 - 12 - 12 = 0$$