

Class 12

Chapter 10 - Vector Algebra

1. If θ is the angle between ant two vectors \mathbf{a} and \mathbf{b} , then $\mathbf{a} \cdot \mathbf{b} = |\mathbf{a} \times \mathbf{b}|$ when θ is equal to

- a) 0 b) $\frac{\pi}{4}$ c) $\frac{\pi}{2}$ d) π

Solution:

Given,

$$|\mathbf{a} \cdot \mathbf{b}| = |\mathbf{a} \times \mathbf{b}| \quad (1)$$

Since, scalar product of two vectors is $|\mathbf{a} \cdot \mathbf{b}| = |\mathbf{a}| |\mathbf{b}| \cos \theta$ (2)

and vector product of two vector is $|\mathbf{a} \times \mathbf{b}| = |\mathbf{a}| |\mathbf{b}| \sin \theta$ (3)

Substituting (3) (2) in (1), we get

$$\implies |\mathbf{a}| |\mathbf{b}| \cos \theta = |\mathbf{a}| |\mathbf{b}| \sin \theta \quad (4)$$

$$\implies \cos \theta = \sin \theta \quad (5)$$

$$\implies \tan \theta = 1 \quad (6)$$

$$\implies \theta = \frac{\pi}{4} \quad (7)$$