Answer on Question #43511 – Physics – Other

the magnitude of the vector product of two vectors is (square root of 3) times their scalar product. the angle between the two vectors is?

Solution:

Vector product of two vectors (vector $\vec{a}\ and\ \vec{b}, \alpha$ −angle between two vectors):

$$\vec{a} \times \vec{b} = |a| \cdot |b| \cdot \sin\alpha \quad (1)$$

Scalar product of two vectors (vector $\vec{a}\ and\ \vec{b}, \alpha$ −angle between two vectors):

$$\vec{a} \cdot \vec{b} = |a| \cdot |b| \cdot \cos\alpha \quad (2)$$

$$(vector\ product) = \sqrt{3} \cdot (scalar\ product)$$

$$\vec{a} \times \vec{b} = \sqrt{3} \cdot \vec{a} \cdot \vec{b} \quad (3)$$

$$(1) and (2) in (3):$$

$$|a| \cdot |b| \cdot \sin\alpha = \sqrt{3} \cdot |a| \cdot |b| \cdot \cos\alpha$$

$$\frac{\sin\alpha}{\cos\alpha} = \sqrt{3}$$

$$\tan\alpha = \sqrt{3}$$

$$\alpha = \arctan\left(\sqrt{3}\right) = 60° \ or \frac{\pi}{3}$$

Answer: the angle between the two vectors is $60°$.