

NCERT/CBSE MATHEMATICS CLASS 12 textbook

<http://www.TutorBreeze.com>

Contact for Online Tutoring in Physics, Math, Chemistry,

English, Accounts, MBA

MISCELLANEOUS EXERCISES

Solutions to NCERT/CBSE MATH (Class XII) textbook

Chapter 10

VECTOR ALGEBRA

14. If \vec{a} , \vec{b} , \vec{c} are mutually perpendicular vectors of equal magnitudes, show that the vector $\vec{a} + \vec{b} + \vec{c}$ is equally inclined to \vec{a} , \vec{b} and \vec{c} .

Solution:

$$\text{Let } |\vec{a}| = |\vec{b}| = |\vec{c}| = \lambda$$

$\therefore \vec{a}, \vec{b}, \vec{c}$ are mutually perpendicular.

$$\therefore \vec{a} \cdot \vec{b} = \vec{b} \cdot \vec{c} = \vec{c} \cdot \vec{a} = 0$$

Let θ be the angle between vectors \vec{a} and $\vec{a} + \vec{b} + \vec{c}$

$$\vec{a} \cdot (\vec{a} + \vec{b} + \vec{c}) = |\vec{a}| |\vec{a} + \vec{b} + \vec{c}| \cos \theta$$

$$\Rightarrow \vec{a} \cdot \vec{a} + \vec{a} \cdot \vec{b} + \vec{a} \cdot \vec{c} = |\vec{a}|^2 = \lambda^2 = \lambda |\vec{a} + \vec{b} + \vec{c}| \cos \theta$$

$$\Rightarrow \cos \theta = \frac{\lambda}{|\vec{a} + \vec{b} + \vec{c}|} \Rightarrow \theta = \cos^{-1} \left(\frac{\lambda}{|\vec{a} + \vec{b} + \vec{c}|} \right)$$

Similarly angle between \vec{b} and $\vec{a} + \vec{b} + \vec{c}$; \vec{c} and $\vec{a} + \vec{b} + \vec{c}$ comes out to be θ .

Thus $\vec{a} + \vec{b} + \vec{c}$ is equally inclined to \vec{a}, \vec{b} and \vec{c} .

Please do not copy the answer given here

[Write to us for help](#)