

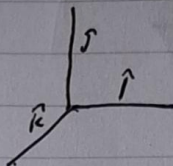


Role of Mathematics in Physic.

1. Vector.

$$\vec{X} = x_1 \hat{i} + x_2 \hat{j} + x_3 \hat{k}$$

$$v = v_1 \hat{i} + v_2 \hat{j} + v_3 \hat{k}$$

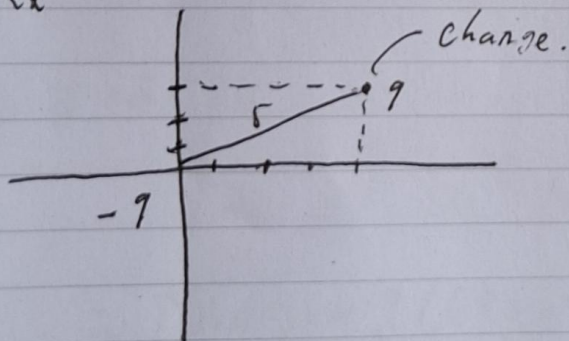


$$\hat{P} = \frac{\vec{P}}{|\vec{P}|}$$

$$\vec{P} = x \hat{i} + y \hat{j} + z \hat{k}$$

$$\hat{P} = \frac{\vec{P}}{|\vec{P}|} = \frac{x \hat{i} + y \hat{j} + z \hat{k}}{\sqrt{x^2 + y^2 + z^2}}$$

Ex

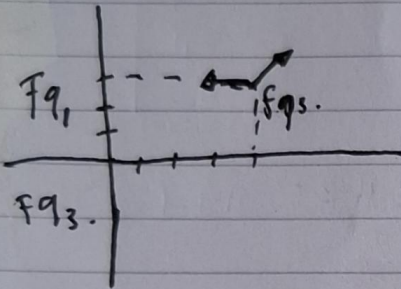


$$\vec{F}_{g_1} = k \frac{q_1 q_2}{r^2} \hat{P} = \frac{q_1 q_2}{\sqrt{3^2 + 4^2}} = \frac{-4\hat{i} - 3\hat{j}}{5^2}$$

$$= k \frac{q_1 q_2}{r^2}$$

$$F_{q_2} = k \frac{q_1 q_2}{r^2}$$

$$= \frac{q_1 q_2}{5^2} = \frac{(4^2 + 3^2)}{5}$$



$$\hat{p} = \frac{-4\hat{i} + 0 + 0}{\sqrt{4^2 + 0^2 + 0^2}} = -\hat{i}$$

$$\vec{F}_s = \vec{F}_{q_1} + \vec{F}_{q_2}$$

$$= q_3 \left[\frac{q_1 (-\hat{i})}{4^2} + \frac{q_2}{5^2} = \frac{(-4\hat{i} + 3\hat{j})}{5} \right]$$

Diket:

$$\vec{V}_1 = 4\hat{i} + 2\hat{j} + \hat{k}$$

$$\vec{V}_2 = 2\hat{i} + 3\hat{k}$$

$$\vec{V}_1 \cdot \vec{V}_2 = 4\hat{i} \cdot 2\hat{i} + \hat{k} \cdot 3\hat{k}$$

$$= 8 + 3$$

$$= 11$$

$$\vec{a} = 3\hat{i} + 4\hat{j} - 3\hat{k}$$

$$\vec{b} = 2\hat{i} - 3\hat{j} + 2\hat{k}$$

$$\vec{a} \cdot \vec{a} = 3\hat{i} + 4\hat{j} - 3\hat{k}$$

$$= 3\hat{i} + 4\hat{j} - 3\hat{k}$$

$$a \cdot a = 3 \cdot 3 + 4 \cdot 4 + 3 \cdot 3$$

$$= 9 + 16 + 9$$

$$= 34$$

$$c. \vec{a} \cdot \vec{b} = 3 \cdot 2 + 12 + 6$$

$$= 6 + 12 + 6 = 24$$

$$b. \vec{a} \times \vec{b} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 3 & 4 & -3 \\ 2 & -3 & 2 \end{vmatrix}$$

$$= \hat{i}(8 - 9) + \hat{j}(6 + 6) + \hat{k}(-9 - 8)$$

$$= -\hat{i} + 12\hat{j} - 17\hat{k}$$

Fold

$$\vec{a} = 4\hat{i} - 5\hat{j} + \hat{k}$$

$$\vec{b} = 2\hat{i} + 3\hat{j} - 2\hat{k}$$

$$\vec{a} \times \vec{b} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 4 & -5 & 1 \\ 2 & 3 & -2 \end{vmatrix}$$

$$\vec{a} \times \vec{b} = \hat{i}(-10+3) + \hat{j}$$