

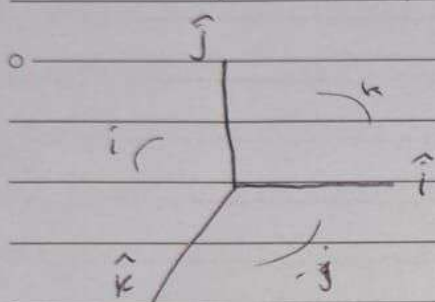
Kelistrikan dan kemagnetan

Role of mathematic in physics

Vektor.

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

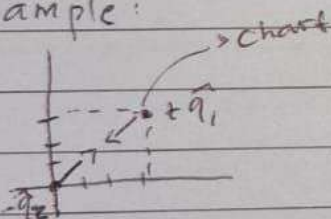
$$\vec{V} = v_1 \hat{i} + v_2 \hat{j} + v_3 \hat{k}$$



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

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

example:

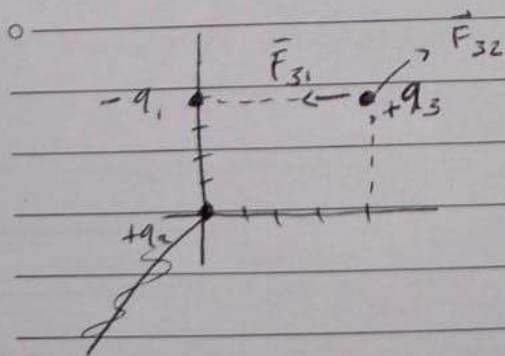


$$F_{+q} = k \frac{q_1 q_2}{r^2} \vec{r}$$

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

$$\vec{F}_{-q} = k \frac{q_1 q_2}{r^2} \vec{r}$$

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



$$F_{q3} = \vec{F}_{31} + \vec{F}_{32}$$

$$= k q_3 \left[\frac{q_1 (-1)}{4} + \frac{q_2}{5^2} (4\hat{i} + 3\hat{j}) \right]$$

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

$$\hat{P} = \frac{\vec{P}}{|\vec{P}|} = \frac{-4\hat{i}}{4} = -\hat{i}$$

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

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

$$\vec{v}_1 \cdot \vec{v}_2 =$$

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

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

$$\begin{aligned} c) \vec{a} \cdot \vec{b} &= (3\hat{i} \cdot 2\hat{i}) + (4\hat{j} \cdot (-3\hat{j})) + ((-3)\hat{k} \cdot 2\hat{k}) \\ &= 6 + (-12) + (-6) \\ &= -12 \end{aligned}$$

$$\begin{aligned} a) \vec{a} \cdot \vec{a} &= (3 \cdot 3) + (4 \cdot 4) + ((-3) \cdot (-3)) \\ &= 9 + 16 + 9 = 34 \end{aligned}$$

$$\begin{aligned} b) \vec{a} \times \vec{b} &= \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 3 & 4 & -3 \\ 2 & -3 & 2 \end{vmatrix} = \hat{i}(8-9) + \hat{j}(6+6) + \hat{k}(-9-8) \\ &= -\hat{i} + 12\hat{j} - 17\hat{k} \end{aligned}$$

$$\begin{aligned} &= \cancel{\hat{i}((-3)(-3) - (-3)(-3))} \quad \vec{a} = 4\hat{i} - 5\hat{j} + \hat{k} \\ &\quad \vec{b} = 2\hat{i} + 3\hat{j} - 2\hat{k} \end{aligned}$$

$$\begin{aligned} \vec{a} \times \vec{b} &= \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 4 & -5 & 1 \\ 2 & 3 & -2 \end{vmatrix} = \hat{i}(-10+3) + \hat{j}(8-2) - \hat{k}(-10-12) \\ &= -7\hat{i} + 6\hat{j} + 22\hat{k} \end{aligned}$$