14 Feb 2025

Kelistrikan dan Kemagnetan.

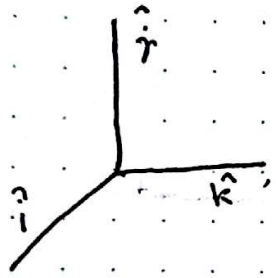
Vektor:

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

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

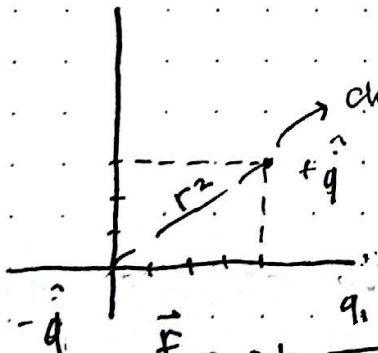
$$\begin{vmatrix} i \cdot \hat{i} \\ j \cdot \hat{j} \\ k \cdot \hat{k} \end{vmatrix} = 1$$

$$i \cdot j = 0$$



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

example:



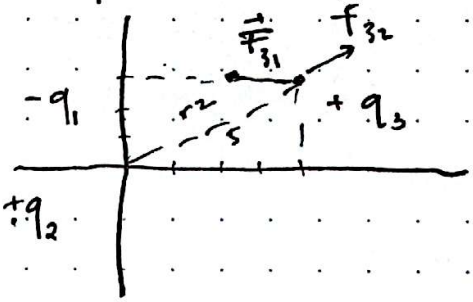
$$\vec{F}_{+\hat{q}_1} = k \frac{q_1 q_2}{r^2} \hat{r}$$

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

$$F_{-\hat{q}} = k \frac{q_1 q_2}{5^2} r^2$$

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

example:



$$F_{23} = \vec{F}_{31} + \vec{F}_{32}$$

$$= k\, q_3 \left[\frac{q_1 |-\hat{i}|}{4^2} + \frac{q_2}{5^2}\right]$$

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

$$= -\hat{i}$$

$$\frac{(4\hat{i} + 3\hat{j})}{5}$$

1. $\vec{v_1} = 4\hat{i} + 2\hat{j} + \hat{k}$

$\vec{v_2} = 2\hat{i} + 3\hat{k}$

$\vec{v_1} \cdot \vec{v_2} = (4\times2)\hat{i} + (2\times0)\hat{j} + (1\times3)\hat{k}$

$= 8\hat{i} + 3\hat{k}$

$= 11$

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

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

1) $\vec{a} \cdot \vec{a} =$

2) $\vec{a} \cdot \vec{b} = (3\hat{i} \times 2\hat{i}) + (4\hat{j} \times -3\hat{j}) + (-3\hat{k} \times 2\hat{k})$

3) $= 6\hat{i} + 12\hat{j} + 6k^2$

Jawaban:

1) $\vec{a} \cdot \vec{a} = (A_i \times A_i) + (A_j \times A_j) + (Ak + Ak)$

$= (3\times3) + (4\times4) + (-3 \times -3)$

$= 9 + 16 + 19 = 34$

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

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

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

Jika mencari $\hat{i}$ maka yang dikali j dan k saja. begitu pula sebaliknya.

3) $\vec{a} \cdot \vec{b} = (A_i B_i) + (A_j B_j) + (A_k B_k)$

$= (3\cdot2) + (4 \cdot -3) + (-3 \cdot 2)$

$= 6 \quad -12 - 6$

$= -12$