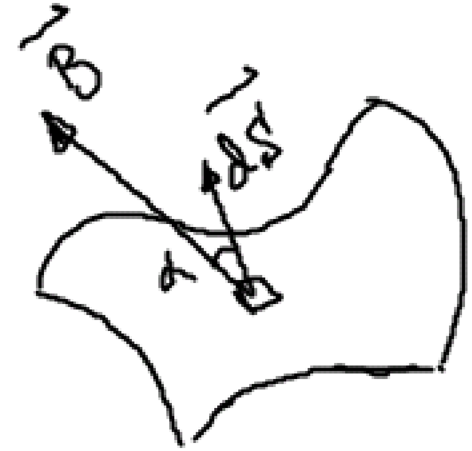
1-

a) NO SE PUEDE ASEGURAR.

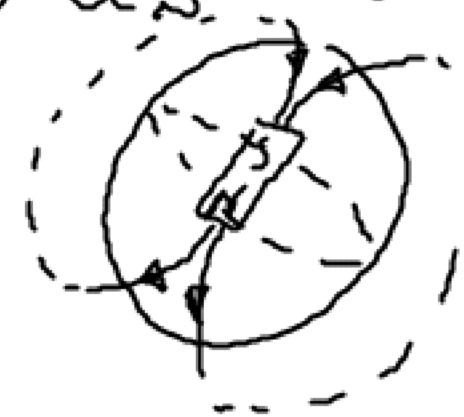
medida del nº de líneas de campo

$$\boxed{\Phi = \int_S \vec{B} \cdot d\vec{S}}$$



Al ser cerradas, se anula el flujo sobre superficies cerradas.

$$\Phi = 0 \Rightarrow \oint_S \vec{B} \cdot d\vec{S} = 0$$

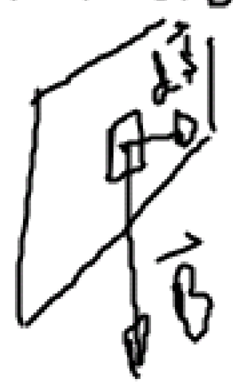


$$\Phi = \int B \cdot dS \cdot \cos\alpha \rightarrow \text{Si } \cos\alpha = 0$$

$$\alpha = 90^\circ \text{ o } 270^\circ$$

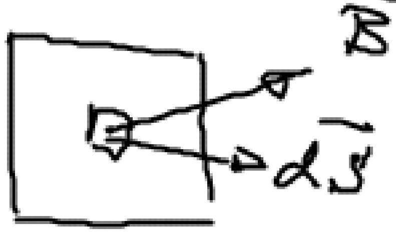
Si $\vec{B}$ y $\vec{dS}$ son $\perp$

LAS LÍNEAS DE CAMPO NO ATRAVIESAN A LA SUPERFICIE



b) $\boxed{\varepsilon = -\dfrac{d\Phi}{dt}}$ LEY FARADAY-LENZ

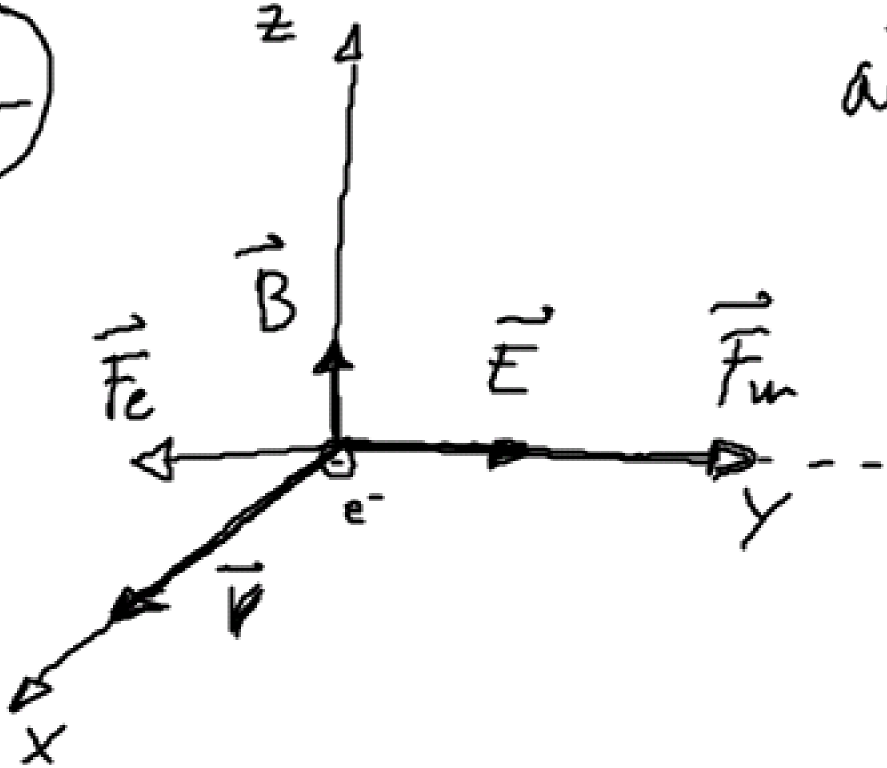
ε_{ind} depende de la variación temporal del flujo, no del valor del flujo.



$\vec{B}$ (cte) con resp. $\vec{S}$

$$\Phi_{esp.} = B\cos\alpha \int d\vec{S} = B\,S\cos\alpha$$

2-



a) $\vec{F}_R = \vec{F}_e + \vec{F}_m$

$\vec{F}_R = q\left(\vec{E} + \vec{v} \times \vec{B}\right)$

$\vec{F}_R = -e\left(4\hat{j} - 8\hat{j}\right) = \boxed{4e\hat{j}\ N}$

$\boxed{F_R = 6{,}4 \cdot 10^{-19}\ N}$

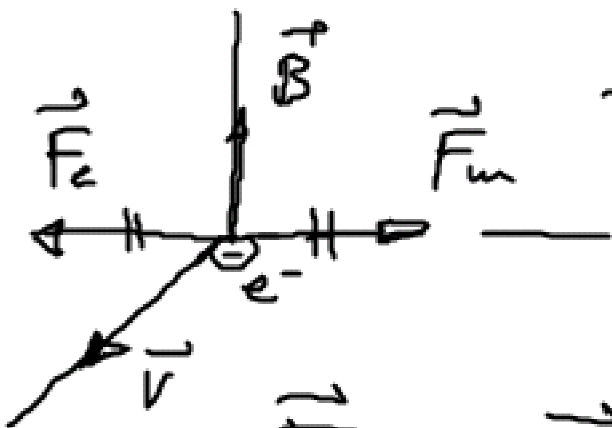
$\vec{B} = 0{,}4\ \hat{k}\ T$

$\vec{E} = 4\hat{j}\ V/m$

$\vec{v} = 20\hat{i}\ m/s$

$$\vec{v} \times \vec{B} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 20 & 0 & 0 \\ 0 & 0 & 0{,}4 \end{vmatrix} = -8\hat{j}\ \frac{m}{s} \cdot T$$

b) MRU $\Rightarrow \vec{R} = \vec{0} \Rightarrow \vec{F}_e{}' + \vec{F}_m = \vec{0}$



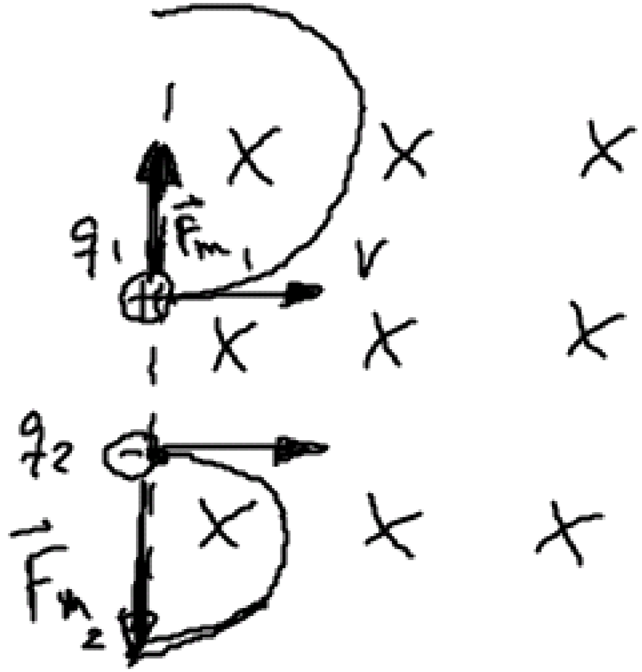
$$-\cancel{e}\left(\vec{E}' + \vec{v} \times \vec{B}\right) = \vec{0} \quad F_m = F_e'$$

$$\vec{F}_e = -e\vec{E}$$

$$\cancel{e}\, E' = \cancel{e}\, v B \cancel{\sin\alpha}^{\,1}$$

$$E' = vB = \boxed{8\ N/C}$$

3. a)



$$|q_1| = |q_2|$$

$$q_1 = -q_2$$

$$m_1 = 2m_2$$

$$v_1 = v_2$$

$$\vec{F}_m = q\left(\vec{v} \times \vec{B}\right)$$

$$\boxed{F_{m_1} = F_{m_2}}$$

$$F_m = F_c$$

$$|q| \cdot v \cdot B \cdot \cancel{\operatorname{sen} 90}^{\,1} = \frac{m v^{\cancel{2}}}{r}$$

$$\boxed{r = \frac{mv}{|q| B}}$$

$$\frac{r_1}{r_2} = \frac{\dfrac{2\cancel{m_2} \cdot \cancel{v}}{\cancel{|q_1| \cdot B}}}{\dfrac{\cancel{m_2} \cdot \cancel{v}}{\cancel{|q_2| \cdot B}}} = \boxed{2}$$

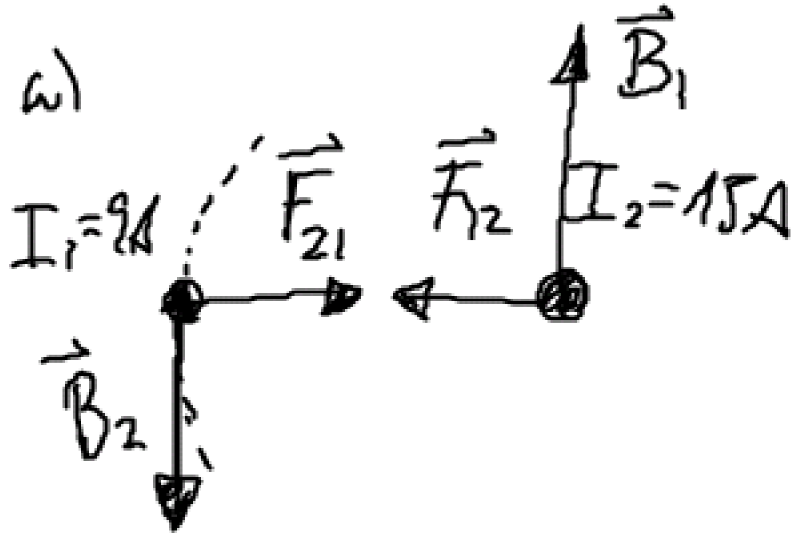
b) $\boxed{v = \omega \cdot r} \longrightarrow \omega = \frac{v}{r}$

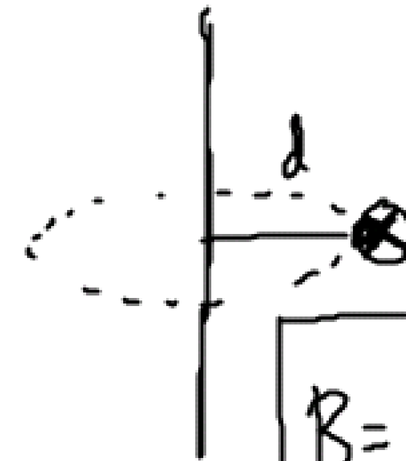
$$\frac{\omega_2}{\omega_1} = \frac{\cancel{v_2}/r_2}{\cancel{v_1}/r_1} = \frac{r_1}{r_2} = \frac{2\cancel{r_2}}{\cancel{r_2}} = 2$$

LA PARTIC. NEGAT. GIRA EL DOBLE DE RÁPIDO

4-

a)





$$\boxed{B = \frac{\mu_0 I}{2\pi d}}$$

$$\vec{F} = I \vec{l} \times \vec{B}$$

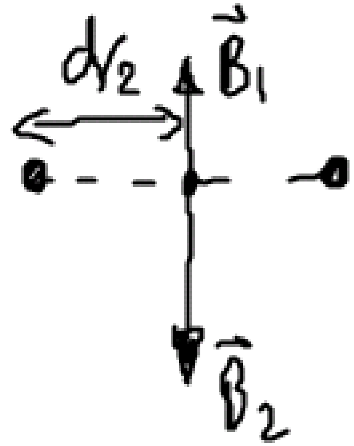
$$F_{12} = I_2 \cdot l \cdot B_1$$

$$F = I\, l\, B \operatorname{sen} \alpha$$

$$\frac{F_{12}}{l} = I_2 \cdot B_1 = I_1 \cdot B_2$$

$$\frac{F}{l} = \frac{\mu_0 I_2 I_1}{2\pi d} = \boxed{4{,}5 \cdot 10^{-4}\ N/m}$$

b)



$$\vec{B}_R = \vec{B}_1 + \vec{B}_2$$

$$\boxed{B_R = |B_1 - B_2| = 4\cdot 10^{-5}\,T}$$

$$\boxed{\vec{B}_R = -4\cdot 10^{-5}\,\hat{k}\ T}$$

$$B = \frac{\mu_0 I}{2\pi d}$$

c)

$$B_1 = B_2 \rightarrow \frac{\mu_0 I_1}{2\pi x} = \frac{\mu_0 I_2}{2\pi (d-x)}$$

$$\boxed{x = 22{,}5\ mm}$$