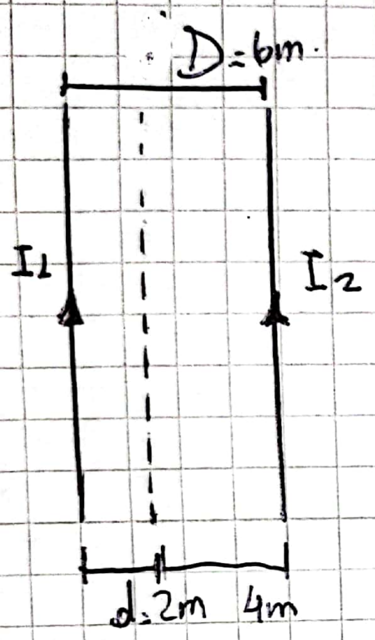
2. [illegible]

3. Dos conductores rectilíneos paralelos ∞ $D = 6m$ separados



$q = 1mC = 1 \cdot 10^{-3} C$. $d = 2m$ de $cond_1$.

no se desvía

$\frac{I_1}{I_2}$?

$\bar{B} = \frac{\mu_0 . I}{2\pi r}$ $\Rightarrow$ $\bar{B}_1 = \frac{\mu_0 . I_1}{2\pi.(2m)}$ $\bar{B}_2 = \frac{\mu_0 I_2}{2\pi . 4m}$

$\odot$ B_1 $\odot$ B_2.

$B_1 = B_2 \Rightarrow F_M = 0$.

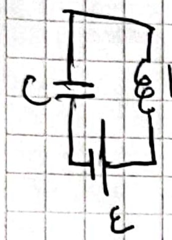
$\frac{\mu_0 . I_1}{\cancel{2}\pi . \cancel{2}} = \frac{\mu_0 . I_2}{\cancel{2}\pi . \cancel{4}_2}$ $\Rightarrow$ $\boxed{\frac{I_1}{I_2} = \frac{1}{2}}$

4. En región del espacio hay $B(t)$

$\bar{\nabla} \bar{B}$ (div) $= 0$
$\bar{\nabla}_x \bar{B}$ (rot) $\neq 0$.
$\bar{\nabla} x \bar{E}$ (rot) $\neq 0$.

rotor de E distinto de 0
div B nula

6_ $C_{ap} = 40 \cdot 10^{-6} F$ $\quad q_0 = 400 \cdot 10^{-6} C$

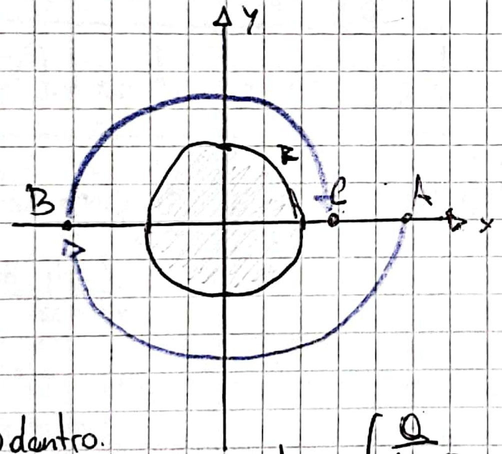


• $q(t) = q_0 \cdot \cos\left(\frac{t}{\sqrt{LC}}\right)$ $\quad$ • $I(t) = \frac{q_0}{\sqrt{LC}} \operatorname{sen}\left(\frac{t}{\sqrt{LC}}\right)$ $\quad$ • $U_L(t) = \frac{1}{2} L \cdot I^2(t)$

• $\frac{1}{2C} \cdot q_0^2 - \frac{1}{2C} \cdot q^2(t) = \frac{1}{2C}\left([400 \cdot 10^{-6}]^2 - [200 \cdot 10^{-6}]^2\right) = \frac{1}{80 \cdot 10^{-6}}\left([400 \cdot 10^{-6}]^2 - [200 \cdot 10^{-6}]^2\right)$

$= \boxed{1,5 \cdot 10^{-3}}$

7_



• Esfera cond. $R = 5cm = 0,05 m$

$Q = 0,5 mC = 0,5 \cdot 10^{-3} C$.

• Carga puntual $q = 1 \mu C = 1 \cdot 10^{-6} C$

De $A = (0,25 ; 0)$ a $C = (0,1 ; 0)$

$E = \begin{cases} 0 & \text{dentro.} \\ \frac{Q}{4\pi\varepsilon_0 r^2} & \text{fuera.} \end{cases}$ $\quad V(r) = \begin{cases} \frac{Q}{4\pi\varepsilon_0 R} & \text{dentro} \\ \frac{Q}{4\pi\varepsilon_0 r} & \text{fuera.} \end{cases}$

• $V(C) = \frac{Q}{4\pi\varepsilon_0 \cdot 0,1} = \frac{0,5 \cdot 10^{-3} C}{4\pi \cdot 8,85 \cdot 10^{-12} \cdot 0,1} = 4,5 \cdot 10^{7}$

• $V(A) = \frac{Q}{4\pi\varepsilon_0 0,25} = 1,8 \cdot 10^{7}$.

$\cancel{U = \frac{Q \cdot \Delta V}{2} = \frac{1 \cdot 10^{-6} (V_C - V_A)}{2} = \frac{1 \cdot 10^{-6} \cdot 2,7 \cdot 10^{7}}{2} = 13,5}$

$W = \Delta V_{if} \cdot q_0 = (V_C - V_A) \cdot 1 \cdot 10^{-6} = 2,7 \cdot 10^{7} \cdot 10^{-6} = 27 J$.

$\boxed{\text{La energía aumenta en } 27 J}$

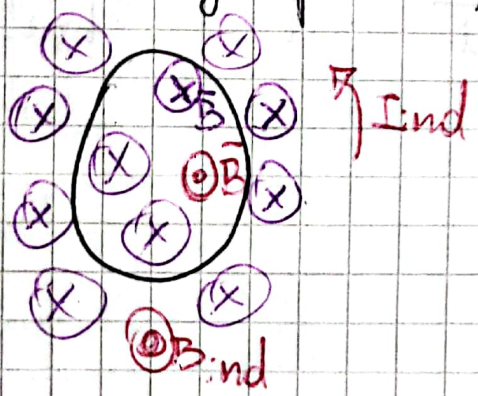
9. Mat. magnético cerrado toroidal μ_r, N espiras, circula I

$\cancel{B = \frac{\mu_0 \mu_r I N}{2\pi R_m}}$

→ $\boxed{\text{La circ. de M es distinta de 0 a lo largo de curva cerrada en toroide}}$

$B = \mu_0 \mu_r \frac{NI}{2\pi r}$ $\quad H = \frac{NI}{2\pi r}$ $\quad M = \frac{B}{\mu_0} - H = \frac{\mu_r NI}{2\pi r} - \frac{NI}{2\pi r}$

10. En reg. espacio hay $B(t) = 4t^2 \ \frac{T}{s^2}$. ¿Volts en $R = 0{,}2m$ $t = 10s$?

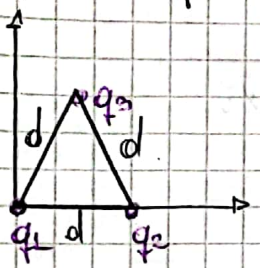


$\varepsilon = -\frac{d\phi}{dt}$ con $\phi = \iint_S \bar{B} d\bar{s} = B_0 2\pi \frac{R^2}{2} = B_0 \pi R^2$

$\varepsilon = -\frac{d(B\pi R^2)}{dt} = -8t\pi R^2$

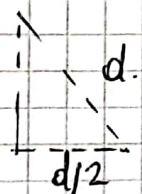
$\varepsilon(10s) = -8 \cdot 10s \cdot \pi (0{,}2m)^2 = \boxed{10V}$

11. $q_1 = 2q$ $\quad q_2 = -q$ $\quad q_3 = 4q$



Último q_1 $\quad \bar{r}_1 = \bar{0}$. Luego q_2. $\quad \bar{r}_2 = d\hat{i}$.

Primero q_3 $\quad \bar{r}_3 = \frac{d}{2}\hat{i} + \frac{\sqrt{3}}{2}d\hat{j}$



$$h^2 + \left(\frac{d}{2}\right)^2 = d^2$$

$$h = \sqrt{d^2 - \frac{d^2}{4}}$$

$$h = \sqrt{\frac{3}{4}}\,d$$

$$W_{\infty \bar{0}}^{q_3} = q_3 . \bar{0} = \boxed{0\,J}$$

Traigo q_2: $W_{\infty q_2}^{q_2} = q_2\left(k.\frac{q_3}{\left|d\hat{i} - \frac{d}{2}\hat{i} - \frac{\sqrt{3}}{2}d\hat{j}\right|}\right) = \boxed{q_2 k q_3 \cdot \frac{1}{\sqrt{\left(\frac{d}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}d\right)^2}}}$

Traer q_1: $W_{\infty r_1}^{q_1} = q_1\left(k\frac{q_3}{\left|-\frac{d}{2}\hat{i} - \frac{\sqrt{3}}{2}d\hat{j}\right|} + k.\frac{q_2}{|-d\hat{i}|}\right) = \boxed{q_1 k\left(\frac{q_3}{\left(\frac{d^2}{4} + \frac{3d^2}{4}\right)^{1/2}} + \frac{q_2}{d}\right)}$

$$0J + (-q).k.(4q)\frac{1}{\left(\frac{d^2}{4} + \frac{3d^2}{4}\right)^{1/2}} + (2q).k.\left(\frac{4q}{\left(\frac{d^2}{4} + \frac{3d^2}{4}\right)^{1/2}} + \left(\frac{-q}{d}\right)\right)$$

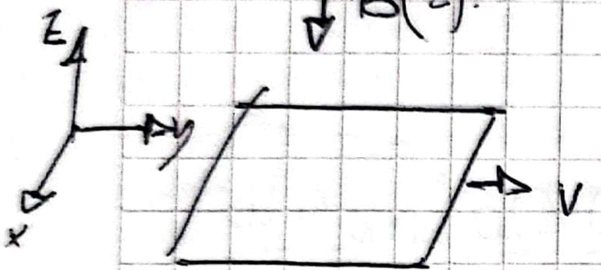
$$= -4q^2 k.\left(\frac{1}{d}\right) + 2q.k.\left(\frac{4q}{d} - \frac{q}{d}\right) = -\frac{4q^2k}{d} + \frac{8q^2k}{d} - \frac{2q^2k}{d} = \frac{2q^2k}{d}$$

$$= \frac{1}{\cancel{4}_2\pi\varepsilon_0} . \frac{\cancel{2}.q^2}{d} = \boxed{\frac{q^2}{2\pi\varepsilon_0 d}}$$

12

B uniforme y cte.

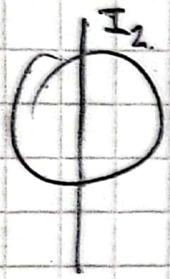
$\downarrow \vec{B}(-z)$.



Para mí, no se induce corriente en la espira pq. $\Phi = \text{cte}$.

15. Toroide N vueltas. $\varepsilon_r = 1$ $I_1 = 2mA$.

$I_2 = 12A \Rightarrow \vec{B} = 0$.



$B_1 + B_2 = 0$.

$$B_{hilo} = \frac{\mu_0 \cdot I}{2\pi r} = \frac{\mu_0 \cdot \cancel{12}A}{\cancel{2}\pi \cdot r} = \boxed{\frac{6\mu_0}{\pi r}}$$

$$B_{Toroide} = \mu_0 \cdot \cancel{\mu_r} \cdot \frac{N \cdot I}{2\pi r} = \frac{\mu_0 \cdot N \cdot \cancel{2} \cdot 10^{-3}}{\cancel{2}\pi r} = \boxed{\frac{\mu_0 \cdot N \cdot 10^{-3}}{\pi r}}$$

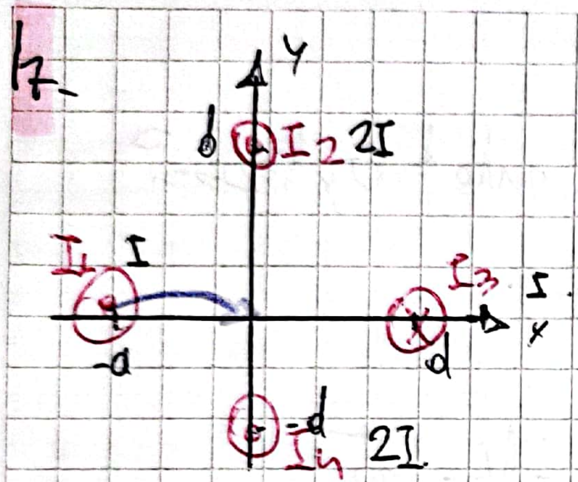
$$|\vec{B}_h| = |\vec{B}_T| \Rightarrow \frac{6\cancel{\mu_0}}{\cancel{\pi r}} = \frac{\cancel{\mu_0} \cdot N \cdot 10^{-3}}{\cancel{\pi r}}$$

$$6 \cdot 10^3 = N.$$

$$\boxed{6000 = N.}$$

CamScanner

17-



¿$\vec{B}(0,0)$?

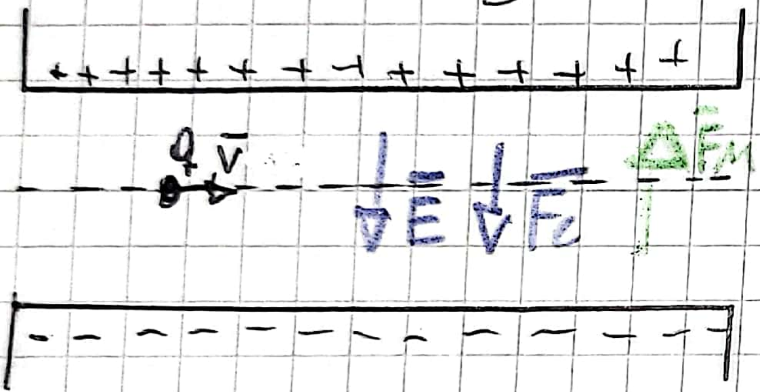
$B_1 = \frac{\mu_0 . I}{2\pi r} = \frac{\mu_0 . I}{2\pi d}\,(+\hat{j})$. $\quad$ $\cdot B_2 = \frac{\mu_0 . 2I}{2\pi d}(\hat{x})$ $\quad$ $\cdot B_3 = \frac{\mu_0 . I}{2\pi d}(\hat{j})$ $\quad$ $\cdot B_4 = \frac{\mu_0\, 2I}{2\pi d}(-\hat{x})$

$\hat{x} : \frac{2\mu_0 I}{2\pi d} - \frac{2\mu_0 I}{2\pi d} = \boxed{0.}$ $\quad$ $\hat{y} : +\frac{\mu_0 . I}{2\pi d} + \frac{\mu_0 I}{2\pi d} = \frac{\cancel{2}\mu_0 I}{\cancel{2}\pi d} = \boxed{\frac{\mu_0 I}{\pi d}}$

Para mi son casi 0. $Q_1 = Op_1$ y $Q_2 = Op$...

$\frac{m}{q} = 10^8 \frac{kg}{C}$.

20. $v = cte = 2000 \frac{m}{s}$



B_0.

$a = 4.10^{-5} \frac{m}{s^2}$ $(\bar{E}) \downarrow$.

$\Rightarrow E?$ $m.\bar{a} = q.\bar{E}$.

$\frac{m}{q}.\bar{a} = \bar{E}$.

$10^8 . 4.10^{-5} = E$

$4000 \frac{N}{m} = E \Rightarrow F = 4000 \frac{N}{m}.q$.

$B = F \Rightarrow \cancel{q}.v.B_0 = 4000 \frac{N}{m}.\cancel{q}$

$B_0 = 4000 \frac{N}{m} : 2000 = 2T.$ (~~saliente~~ entrante).

22.- Capacitor $5.10^{-6}F$ $\quad q_0 = 100.10^{-6}C$. $\quad$ ¿$U_{d:s}$ entre $t=0$ y $t=2s$?

Resistencia $R = 500\,\Omega$.

$$\frac{1}{2}\cdot C . V_0^2 \left(1 - e^{-2t/\tau}\right).$$

$$V_R = I\,R \qquad = V_0 = \boxed{\frac{q_0}{C}}$$

$$I(0) = \frac{q_0}{RC}\,R$$

$$V(2s) = I(2s)R.$$

$$= \frac{q_0}{RC}\cdot e^{-2s/RC}.$$

$$\left[V(2s) - V(0) = \frac{q_0}{C}\left(\frac{e^{-2s/RC}}{R} - 1\right)\right]\frac{C}{2}$$

$$RC = 2{,}5.10^{-3}.$$

$$\frac{1}{2}q_0\left(\frac{e^{-2s/RC}}{R} - 1\right)$$

$$\frac{1}{2}.100.10^{-6}\left(\frac{e^{-2s/(2{,}5.10^{-3})}}{500} - 1\right).$$

$$U = -5.10^{-5}$$

$$U_R(t) = \frac{1}{2}5.10^{-6}.V_p^2 = \frac{5}{2}10^{-6}\left(V(2s) - V(0)\right)^2 = \frac{5}{2}10^{-6}\left(I(2s).R - I(0).R\right)^2 = \cancel{2{,}5.10^{-6}}$$

$$= 2{,}5.10^{-6}\left(\frac{q_0}{RC}e^{-2s/RC}R - \frac{q_0}{RC}.R\right)^2 = \cancel{2{,}5.10^{-6}\frac{q_0}{RC}R\left(e^{-2s/RC} - 1\right)^2} =$$

$$= 2{,}5.10^{-6}\left(\frac{100.10^{-6}}{2{,}5.10^{-3}}.e^{-2s/(2{,}5.10^{-3})}.500\,\Omega - \frac{100.10^{-6}}{2{,}5.10^{-3}}.500\,\Omega\right)^2 =$$

$$= 1.10^{-3}$$