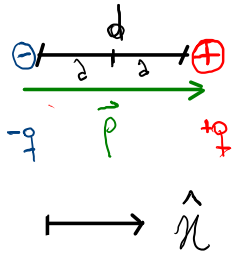


DIPOLLO : momento dipolar

$$\vec{p} = - \int \rho \vec{r}$$

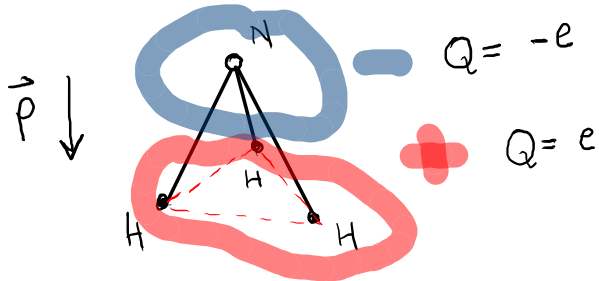


$$\vec{p} = 2aq \hat{n} = qd \hat{n}$$

1.1.9)

NH3 $|\vec{p}| = 5,00 \times 10^{-30} \text{ cm}$

$$e = 1,6 \times 10^{-19} \text{ C}$$



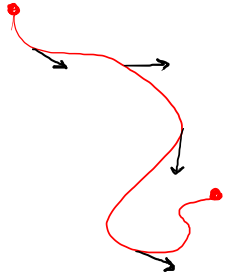
$$|\vec{p}| = qd$$

$$\frac{|\vec{p}|}{e} = d = 3,13 \times 10^{-11} \text{ m}$$

ENERGÍA POTENCIAL ELÉCTRICA

$$W = \int \vec{F} \cdot d\vec{e}$$

$$W = \vec{F} \cdot \Delta \vec{x}$$



→ Conservativas:

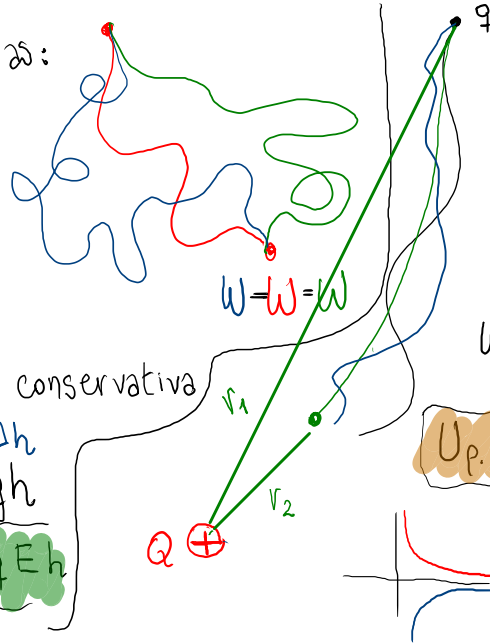
$$\vec{p} = m\vec{g}$$

→ Electrostático: $\vec{F}_E = q \vec{E}$ es conservativa

$$W = -qE \Delta h$$

$$U_{pg} = mgh$$

$$U_{p.el.} = qEh$$



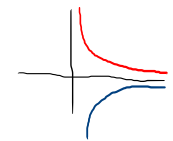
$$|\vec{F}| = \frac{qQ k_e}{r^2}$$

$$W = -k_e q Q$$

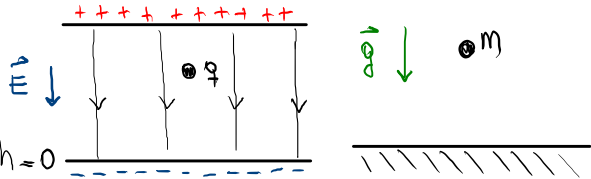
$$\cdot \left[\frac{1}{r_2} - \frac{1}{r_1} \right]$$

$$W = -\Delta U$$

$$U_{p.el.} = k_e \frac{qQ}{r}$$



→ Electrostático:



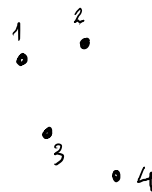
- Ppio de superposición:



$$U = k_e q \sum_i \frac{Q_i}{r_i}$$

$$W_N = W_1 + W_2 + W_3 + \dots = -\Delta U_1 - \Delta U_2 - \Delta U_3 - \dots$$

$$W = \int F dl = \int \frac{k_e Q q}{r^2} dr = k_e Q q \int_{\infty}^{r_f} \frac{dr}{r^2} = k_e Q q \left[\frac{1}{r} \right]_{\infty}^{r_f}$$



$$U = k_e \sum_i \sum_{j \neq i} \frac{q_i q_j}{r_{ij}}$$

POTENCIAL: $V = U^{el} / q_0$

Campo
cte:

$$U = qEd$$

$$V = Ed$$

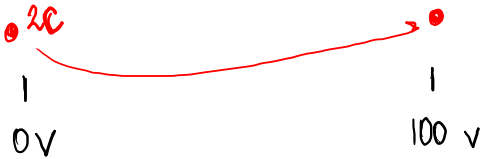
Carga puntual:

$$U = \frac{k_e Q q}{r}$$

$$V = \frac{k_e Q}{r}$$

carga de prueba

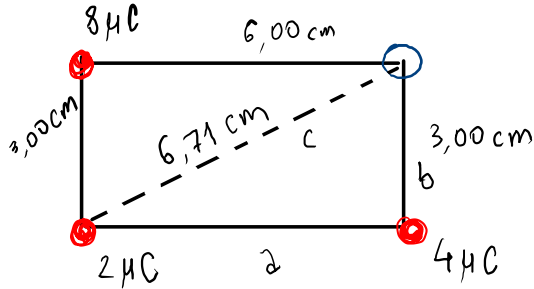
ΔV = variación de energía
x unidad de carga



$$\Rightarrow \Delta V = 100 \text{ V}$$

$$\Delta U = q \Delta V = 200 \text{ J}$$

1.2.13



$$a^2 + b^2 = c^2$$

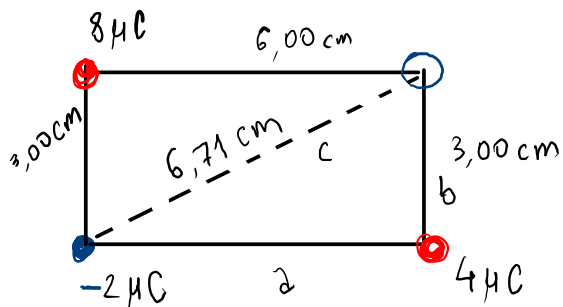
¿ Cuánto vale V en \circ ?

$$V = k_e \sum \frac{Q_i}{r_i}$$

$$V_{\circ} = \underbrace{k_e}_{9,0 \times 10^9 \frac{\text{Nm}^2}{\text{C}^2}} \left[\frac{8,00 \mu\text{C}}{6,00 \text{cm}} + \frac{2,00 \mu\text{C}}{6,71 \text{cm}} + \frac{4,00 \mu\text{C}}{3,00 \text{cm}} \right] = 2,67 \times 10^6 \frac{\text{V}}{\text{V/C}}$$

$$1 \mu\text{C} = 10^{-6} \text{C}$$

$$1 \text{cm} = 10^{-2} \text{m}$$

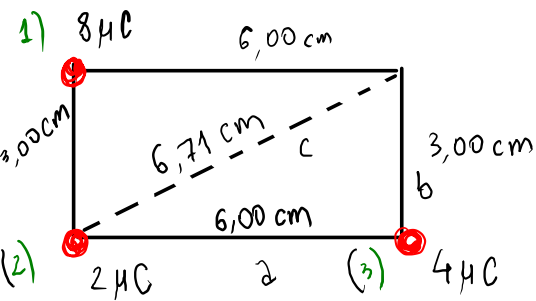


$$\underline{b} \quad V = k_e \sum \frac{Q_i}{r_i}$$

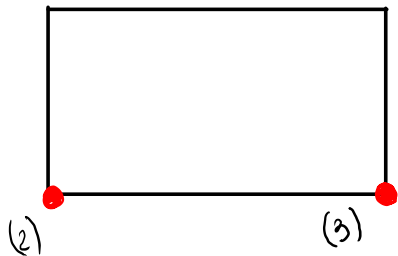
$$V_o = k_e \left[+ \frac{8,00 \mu\text{C}}{6,00 \text{ cm}} - \frac{2,00 \mu\text{C}}{6,71 \text{ cm}} + \frac{4,00 \mu\text{C}}{3,00 \text{ cm}} \right] = 2,13 \times 10^6 \quad \frac{\text{V}}{\text{V/C}}$$

$9,0 \times 10^9 \frac{\text{Nm}^2}{\text{C}^2}$

$1 \mu\text{C} = 10^{-6} \text{ C}$
 $1 \text{ cm} = 10^{-2} \text{ m}$



$$2 \mu\text{C} = 2 \times 10^{-6} \text{ C}$$



\underline{c} $\dot{=}$ \dot{c} quanto vale $U_{p.e.l}$?

$$U = U_{12} + U_{13} + U_{23} = k_e \sum_i \sum_{\substack{j > i}} \frac{Q_i Q_j}{r_{ij}}$$

$$= k_e \left[\frac{Q_1 Q_2}{r_{12}} + \frac{Q_1 Q_3}{r_{13}} + \frac{Q_2 Q_3}{r_{23}} \right]$$

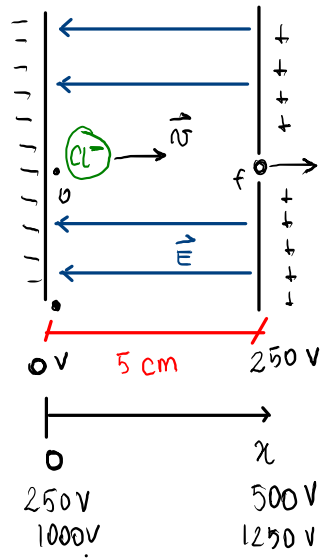
$$U_i = 10,28 \text{ J}$$

$$\Delta U < 0 \rightarrow W_{F_{ele}} > 0$$

$$\Delta U = -9,08 \text{ J}$$

$$U_F = k_e \frac{Q_2 Q_3}{r_{23}} = 1,20 \text{ J}$$

1.1.5?
1.2.3



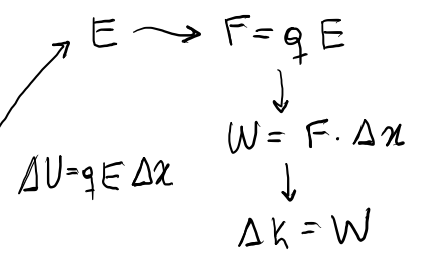
$U_{p.el.}^0 = q E x = 0$

con esta elección de origen

$k_0^0 = 0$ $-e = -1,6 \times 10^{-19} C$

$U = q E \cdot x$
 $V = \frac{U}{q} = E x$

$\Delta V = E \Delta x$
 $250V = E \cdot 5,00 cm$



$E^0 = k^0 + U_{p.el.}^0 = 0$

$k^f ?$ $E^0 = E^f = 0 \Rightarrow k^f = -U_{p.el.}^f$
fuerzas conservativas $k^f = 4,01 \times 10^{-17} J$

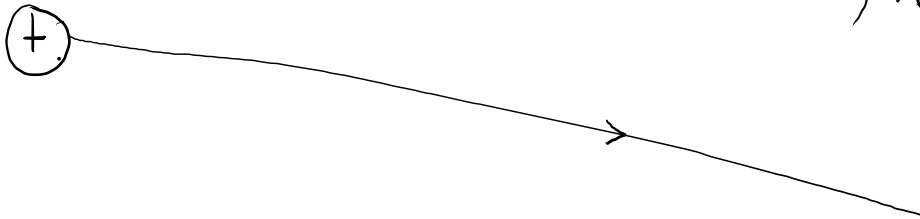
$\Delta U = q \Delta V = -4,01 \times 10^{-17} J$

$U^f - U^0$

$U^0 = U^f + k^f$
 $U^0 - U^f = -\Delta U = k^f$

$$U = kqQ/r$$

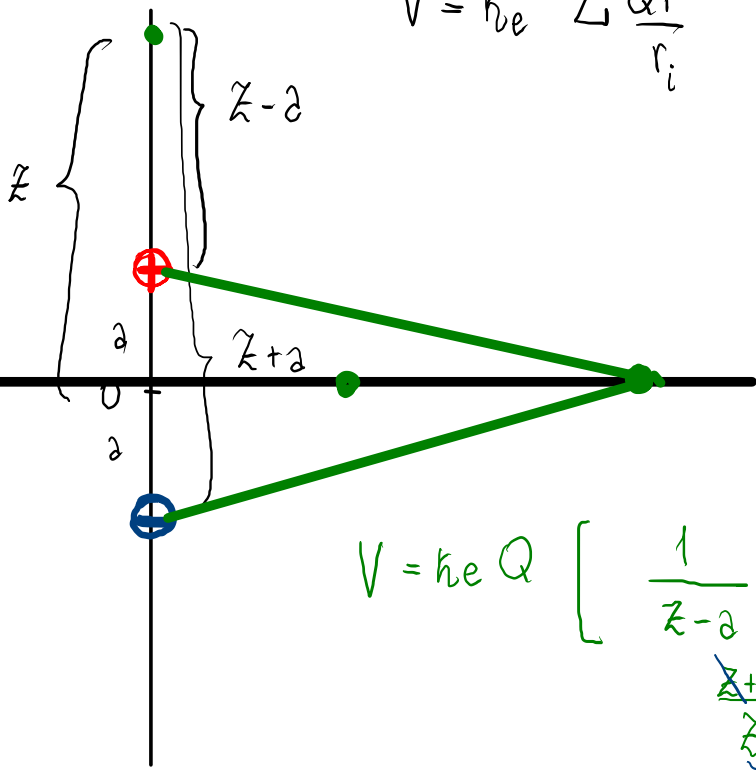
$$V = \frac{k_2 Q}{r}$$



$$V_B < V_A$$

$$V = 0$$

1.2.12



$$V = k_{be} \sum \frac{Q_i}{r_i}$$

$$V_z = \frac{k_{be} P}{z^2}$$

$$V = k_{be} Q \left[\frac{1}{z-a} - \frac{1}{z+a} \right]$$

$$\frac{z+a - z+a}{z^2 - a^2}$$

$$\approx z^2$$

$$= \frac{k_{be}}{z^2} \underbrace{Q \cdot (2a)}_P$$