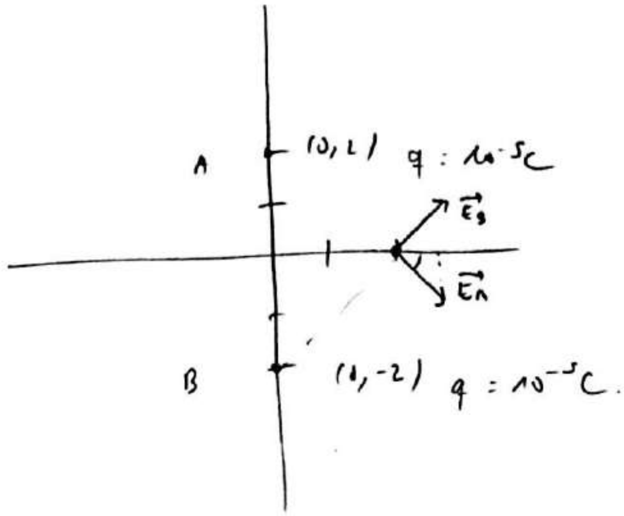
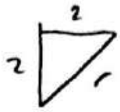
16





$r^2 = 2^2 + 2^2$

$r = \sqrt{8}$

$\boxed{r = 2\sqrt{2}}$

(a) $\vec{E}_T = \vec{E}_A + \vec{E}_B$

EN AQUEST CAS LA COMPONENT Y S'ANULA EN TENIR MATEIXA MÒDULS, PERÒ DIFERENT SENTIT.

$$\vec{E}_{Ax} = K \cdot \frac{q}{r^2}\hat{i} = \frac{9 \cdot 10^9 \cdot 10^{-5}}{(2\sqrt{2})^2} \cdot \frac{\cancel{2}}{\cancel{2}\sqrt{2}} = 7{,}95 \cdot 10^3 \ N/C.$$

$$\vec{E}_{Bx} = \vec{E}_{Ax}$$

$$\vec{E}_T = 2\vec{E}_{Ax} = 1{,}6 \cdot 10^4 \ N/C$$

$$\boxed{\vec{F}_T = q \cdot \vec{E} = 1 \cdot 10^{-6} \cdot 1{,}6 \cdot 10^4 = 1{,}6 \cdot 10^{-2} \ N}$$

(b) $V_\infty = 0$

$$V_P = K \cdot \frac{q_A}{r_A} + K \cdot \frac{q_B}{r_B} = 2K \cdot \frac{q}{r} = \cancel{2} \cdot 9 \cdot 10^9 \, \frac{1 \cdot 10^{-5}}{\cancel{2}\sqrt{2}}$$

com $q_A = q_B$ i $r_A = r_B$

$$\boxed{V_P = 63640 \ V}$$

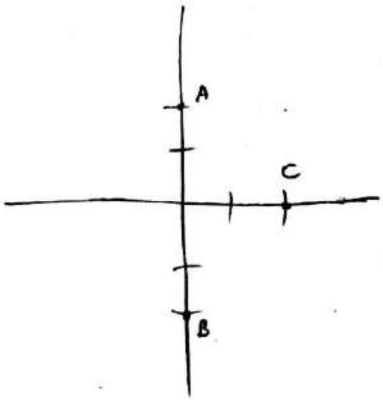
$$W = q\,(V_P - V_\infty) = q \cdot V_P = 1 \cdot 10^{-6} \cdot 63640 = \boxed{6{,}36 \cdot 10^{-2} \ J}$$

(c)

$$U_T = U_1 + U_2 + U_3$$

PUNT (2,0)

$$U_T = K \cdot \frac{q_A \cdot q_C}{r_{AB}} + K \cdot \frac{q_B \, q_C}{r_{BC}} + K \cdot \frac{q_A \cdot q_C}{r_{AC}}$$

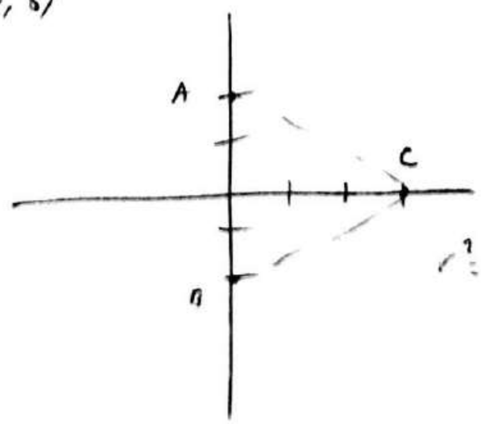


$$U_T = 9 \cdot 10^9 \cdot \frac{10^{-5} \cdot 10^{-6}}{2\sqrt{2}} + 9 \cdot 10^9 \cdot \frac{10^{-5} \cdot 10^{-6}}{2\sqrt{2}} + 9 \cdot 10^9 \cdot \frac{10^{-5} \cdot 10^{-5}}{4}$$

$$U_T = 2{,}89 \cdot 10^{-1} \, J$$

PUNT (3,0)

U_T



$r^2 = 2^2 + 3^2 \Rightarrow r = \sqrt{4+9}$

$\boxed{r = \sqrt{13}}$

$$U_T = 9 \cdot 10^9 \cdot \frac{10^{-5} \cdot 10^{-6}}{\sqrt{13}} + 9 \cdot 10^9 \cdot \frac{10^{-5} \cdot 10^{-6}}{\sqrt{13}} + 9 \cdot 10^9 \cdot \frac{10^{-5} \cdot 10^{-5}}{4}$$

$$\boxed{U_T = 2{,}75 \cdot 10^{-1} \, J}$$

$\Delta U = 2{,}89 \cdot 10^{-1} - 2{,}75 \cdot 10^{-1} = 0{,}014 \text{ J}.$

AQUESTA VARIACIÓ D'ENERGIA POTENCIAL S'UTILITZARÀ
(PÈRDUA)

PER AUGMENTAR LA VELOCITAT DE LA CÀRREGA.

$$\underbrace{\frac{1}{2} m \cdot v^2}_{E_{c_f}} - \underbrace{\frac{1}{2} m \cdot v_0^2}_{E_{c_0}} = \Delta U.$$

ESTÀ EN REPÒS
PER TANT
$v_0 = 0.$

$$\frac{1}{2} m \cdot v^2 = 0{,}014 \text{ J}$$

$$v = \sqrt{\frac{2\Delta U}{m}} = \sqrt{\frac{2 \cdot 0{,}014}{3 \cdot 10^{-3}}} \simeq \boxed{3 \text{ m/s}}$$