"Physics"

* Lecture 4 *

* Electric Current التيار الكهربي :-

- It is the movement of electric charge «Q» from one place to another in a period of time «t».

$$I = \frac{Q}{t}$$

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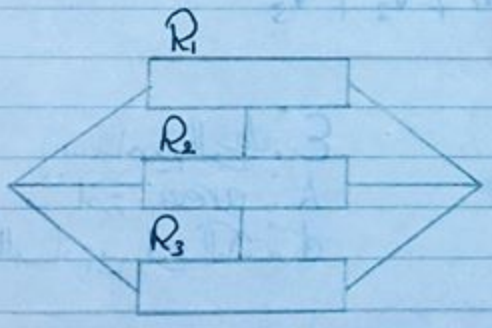
* Electric Resistance المقاومة الكهربية :-

- It is a measure of the difficulty of passing an electric current through a conductor.

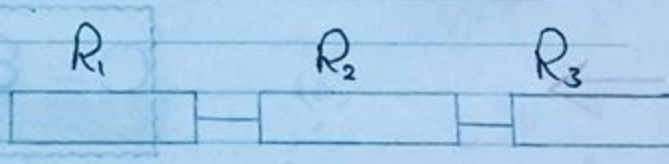
Ohm's Law: $R = \frac{V}{I}$

Parallel توازي



* $\frac{1}{R'} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$
* $I = I_1 + I_2 + I_3$
* $V_1 = V_2 = V_3$

Series توالي



* $R' = R_1 + R_2 + R_3$
* $I_1 = I_2 = I_3$
* $V = V_1 + V_2 + V_3$

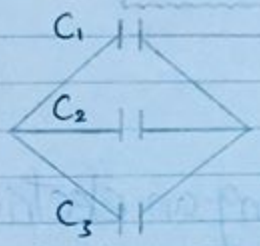
$$V = E\ «V_B» - Ir$$

q_1

* **Capacitor المكثف:-**

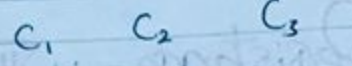
$$C = \frac{Q}{V}$$

Parallel



* $C = C_1 + C_2 + C_3$
* $I = I_1 + I_2 + I_3$
* $V_1 = V_2 = V_3$

Series



* $\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$
* $I_1 = I_2 = I_3$
* $V = V_1 + V_2 + V_3$

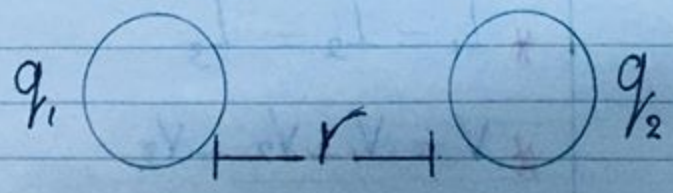
$$\Rightarrow \quad C = \frac{\varepsilon A}{d}$$

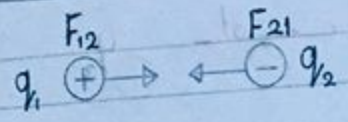
ε: سماحية الوسط
A: area مساحة
d المسافة بين لوحي المكثف

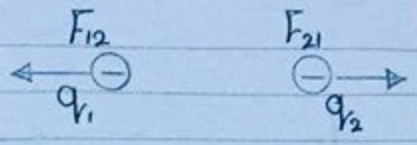
* **Coulomb's Law:-**

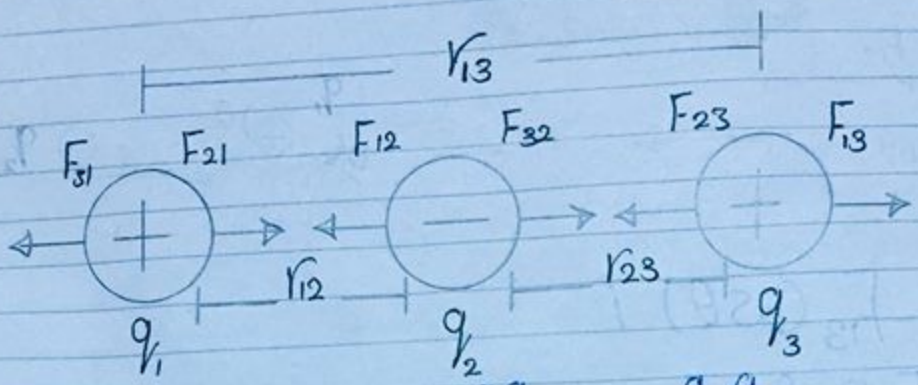
$$F = K \frac{q_1 q_2}{r^2}$$

K: 9×10^9
r^2 مسافة بين شحنتين







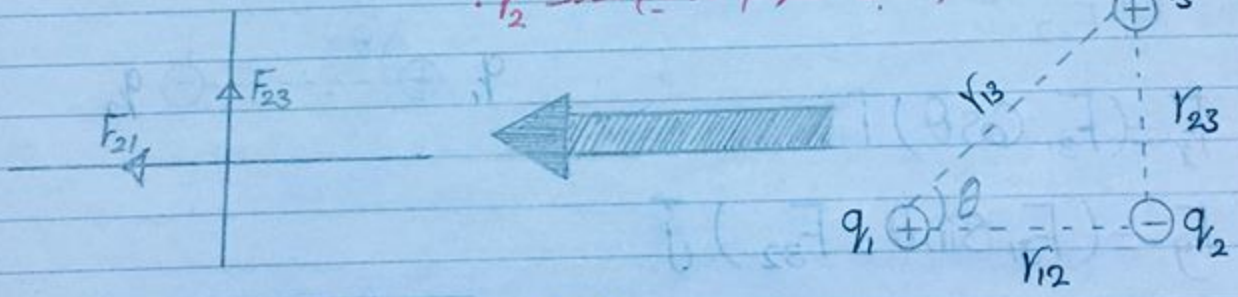


$$\rightarrow F_3 = F_{13} - F_{23} = K\frac{q_1 q_3}{(r_{13})^2} - K\frac{q_2 q_3}{(r_{23})^2}$$

$$\rightarrow F_2 = F_{32} - F_{12} = K\frac{q_3 q_2}{(r_{32})^2} - K\frac{q_1 q_2}{(r_{12})^2}$$

$$\rightarrow F_1 = F_{21} - F_{31} = K\frac{q_2 q_1}{(r_{21})^2} - K\frac{q_3 q_1}{(r_{31})^2}$$

- احسب الطاقة الكلية عند q_2.

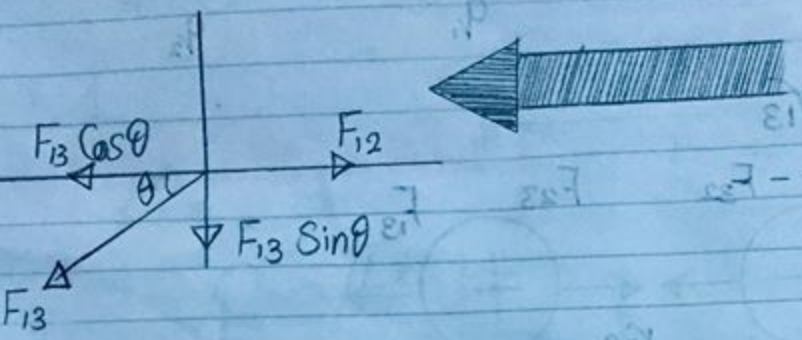


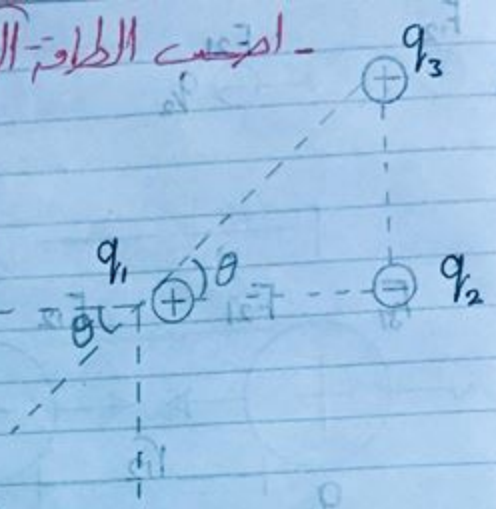
$$\rightarrow F_x = -F_{21}\,\vec{i} = -K\frac{q_2 q_1}{(r_{21})^2}$$

$$\cdot F_y = F_{23}\,\vec{j} = K\frac{q_2 q_3}{(r_{23})^2}$$

$$\cdot F_T = \sqrt{(F_x)^2 + (F_y)^2}$$

- احسب الطاقة الكلية عند q_1



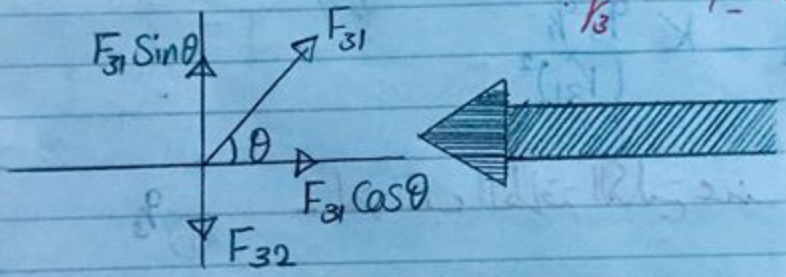


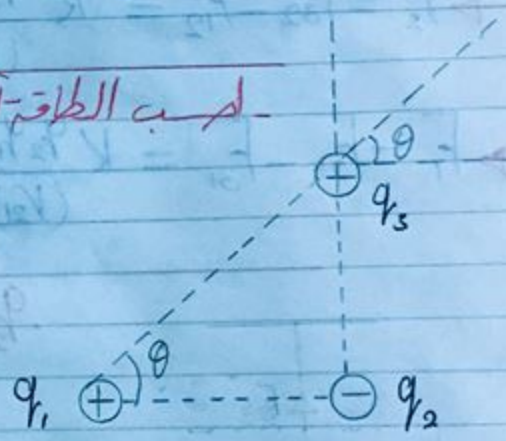
$$\rightarrow F_x = (F_{12} - F_{13}\cos\theta)\,\vec{i}$$

$$, F_y = (-F_{13}\sin\theta)\,\vec{j}$$

$$, F_T = \sqrt{(F_x)^2 + (F_y)^2}$$

- احسب الطاقة الكلية عند q_3





$$\rightarrow F_x = (F_{31}\cos\theta)\,\vec{i}$$

$$, F_y = (F_{31}\sin\theta - F_{32})\,\vec{j}$$

$$, F_T = \sqrt{(F_x)^2 + (F_y)^2}$$