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Matkul : Elektrodinamika (UTS)

1). B. Benda tersebut kekurangan elektron

Jika, benda tersebut kekurangan elektron, maka benda tersebut akan bermuatan positif (+). Karena elektron itu bermuatan negatif (-). Jadi jika kekurangan muatan negatif, maka dia akan bermuatan positif.

2). Diketahui :

$$q_1 = q_2 = Q$$

$$r_1 = 2m$$

$$r = R$$

$$r_2 = 2 \cdot r_1$$

$$F = F$$

Ditanya $F_2 = \dots ?$

Jawab :

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

$$\frac{F_1}{F_2} = \frac{k \frac{q_1 \cdot q_2}{r^2}}{k \frac{q_1 \cdot q_2}{r^2}}$$

$$\frac{F_1}{F_2} = \frac{r_2^2}{r_1^2}$$

$$\frac{F_1}{F_2} = \frac{(2 \cdot r_1)^2}{r_1^2}$$

$$F_1 \cdot r_1^2 = F_2 \cdot 4r_1^2$$

$$F_2 = \frac{1}{4} F_1 \quad (0,25) \text{ jawaban E}$$

3). Diketahui :

$$r = 3 \text{ m}$$

$$q_1 = 9 \times 10^{-6}$$

$$q_2 = 6 \times 10^{-6}$$

$$k = 9 \times 10^9$$

$$F = \dots ?$$

jawab :

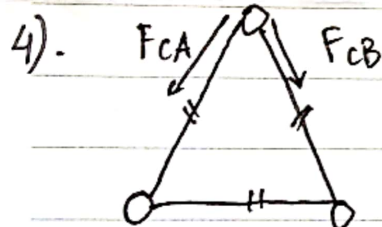
$$F = k \frac{q_1 \cdot q_2}{r^2}$$

$$F = 9 \times 10^9 \cdot \frac{9 \times 10^{-6} \cdot 6 \times 10^{-6}}{(3)^2}$$

$$F = 54 \cdot 10^9 \cdot 10^{-6} \cdot 10^{-6}$$

$$F = 54 \cdot 10^{-3}$$

$$F = 0,054 \text{ N jawabannya (C) .}$$



Segitiga sama sisi memiliki sudut 60° di setiap sisinya

$$F_{CA} = F$$

$$F_{CB} = F$$

maka

$$F_c = \sqrt{F_{CA}^2 + F_{CB}^2 + 2 \cdot F_{CA} \cdot F_{CB} \cdot \cos \theta}$$

$$F_c = \sqrt{F^2 + F^2 + 2 \cdot F \cdot F \cdot \cos 60}$$

$$F_c = \sqrt{2F^2 + 2F^2 \cdot \cos 60}$$

$$F_c = \sqrt{2F^2 + 2F^2 \cdot \frac{1}{2}}$$

$$F_c = \sqrt{2F^2 + F^2}$$

$$F_c = \sqrt{3F^2}$$

$$F_c = F\sqrt{3} \text{ jawaban (C)}$$

5). Diketahui

$$Q_1 = 24 \mu\text{C} = 24 \times 10^{-6} \text{ C}$$

$$k = 9 \times 10^9$$

$$Q_2 = 20 \mu\text{C} = 2 \times 10^{-5} \text{ C}$$

$$r = 12 \text{ cm} = 12 \times 10^{-2} \text{ m}$$

$$E = 3$$

$$F = \dots ?$$

Gaya dapat dihitung menggunakan persamaan hukum Coulomb, yaitu :

$$F = \frac{k}{E} \times \frac{Q_1 \cdot Q_2}{r^2}$$

Jadi,

$$F = \frac{k}{E} \times \frac{Q_1 \cdot Q_2}{r^2}$$

$$F = \frac{9 \times 10^9}{3} \times \frac{(2 \times 10^{-5})(24 \times 10^{-6})}{(12 \times 10^{-2})^2}$$

$$F = 3 \times 10^9 \times \frac{48 \times 10^{-11}}{144 \times 10^{-4}}$$

$$F = \frac{10^{-21}}{10^{-12}}$$

$$F = 100 \text{ N jawaban (C)}$$

g). Diketahui :

$$q_1 = 5 \mu C = 5 \times 10^{-6} C$$

$$q_2 = 5 \mu C = 5 \times 10^{-6} C$$

$$F = 0,025 N$$

$$r = \dots ?$$

jawab :

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

$$0,025 = \frac{(9 \times 10^9) \cdot (5 \times 10^{-6}) (5 \times 10^{-6})}{r^2}$$

$$0,025 = \frac{225 \times 10^{-3}}{r^2}$$

$$0,025 r^2 = 0,225$$

$$r^2 = \frac{0,225}{0,025}$$

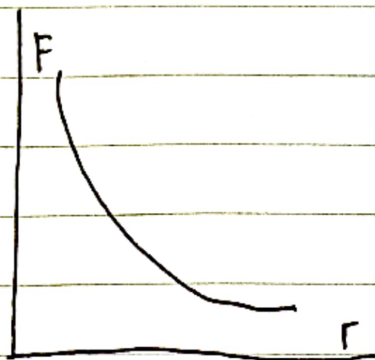
$$r^2 = 9$$

$$r = \sqrt{9}$$

$$r = 3 m \text{ jawaban (D)}$$

Essay:

1).



dengan $F = k \cdot \frac{q_1 q_2}{r}$

$$F = \frac{1}{r^2}$$

2). Diketahui :

$$k = 9 \times 10^9$$

$$q_1 = 8 \mu C = 8 \times 10^{-6} C$$

$$F = \dots ?$$

$$q_2 = 4 \mu C = 4 \times 10^{-6} C$$

$$r = 2 m$$

Jawab :

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

$$F = \frac{9 \times 10^9 \cdot 8 \times 10^{-6} \cdot 4 \times 10^{-6}}{(2)^2}$$

$$F = 72 \times 10^3$$

3). (a).

(A)
 $Q_1 = 24$

(B)
 $Q_2 = 18$

$r = 12 \text{ cm}$

Diketahui :

$$r = 12 \text{ cm} = \frac{12}{100} m$$

$$q_1 = 24 \mu C = 24 \times 10^{-6} C$$

$$q_2 = 18 \mu C = 18 \times 10^{-6} C$$

$$k = 9 \times 10^9 \text{ Nm}^2/\text{C}^2$$

Ditanya:

$$F_{\text{udara}} = \dots ?$$

Jawab:

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

$$F = \frac{9 \times 10^9 \times 24 \times 10^{-6} \times 18 \times 10^{-6}}{\left(\frac{12}{100}\right)^2}$$

$$F = \frac{9 \times 24 \times 18 \times 10^{-3}}{\frac{12 \times 12}{10^4}}$$

$$F = \underline{\underline{270 \text{ N}}}$$

$$\textcircled{b}. F = \frac{k}{\epsilon} \times \frac{q_1 q_2}{r^2}$$

$$F = \frac{9 \times 10^9}{2} \times \frac{(24 \times 10^{-6})(18 \times 10^{-6})}{\left(\frac{12}{100}\right)^2}$$

$$F = \frac{9 \times 10^9 \times 24 \times 10^{-6} \times 18 \times 10^{-6}}{2 \cdot \frac{144}{10^4}}$$

$$F = \frac{9 \times 24 \times 18 \times 10^{-3}}{288 \times 10^{-4}}$$

$$F = \frac{38880}{288}$$

$$F = \underline{\underline{135 \text{ N}}}$$

Diketahui :

$$b) \cdot Q_1 = -9 \mu C = -9 \times 10^{-6} C$$

$$Q_2 = -4 \mu C = -4 \times 10^{-6} C$$

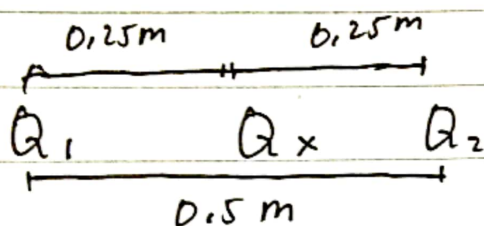
$$r_{12} = 50 \text{ cm} = 0,5 \text{ m}$$

$$Q_x = +5 \mu C = 5 \times 10^{-6} C$$

$$r_{1x} = 0,25 \text{ m}$$

$$r_{2x} = 0,25 \text{ m}$$

Ditanya : $F \dots ?$ dan Arah $= \dots ?$



Jawab :

F_1 = gaya antara $Q_1 - Q_x$, F_2 = gaya antara $Q_2 - Q_x$

$$F_1 = k \frac{Q_1 \cdot Q_x}{r_{1x}^2}$$

$$F_1 = 9 \times 10^9 \cdot \frac{9 \times 10^{-6} \cdot 5 \times 10^{-6}}{(0,25)^2}$$

$$F_1 = \frac{9 \times 10^9 \cdot 45 \times 10^{-12}}{0,0625}$$

$$F_1 = \frac{405 \cdot 10^{-3}}{625 \times 10^{-4}}$$

$$F_1 = 6,48 \text{ N}$$

$$F_2 = k \cdot \frac{q_1 \cdot q_2}{r_{2x}^2}$$

$$F_2 = 9 \times 10^9 \cdot \frac{5 \times 10^{-6} \cdot 4 \times 10^{-6}}{(0,25)^2}$$

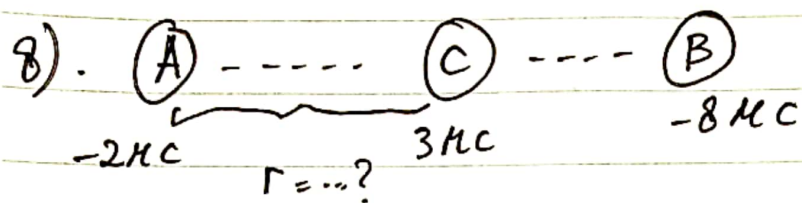
$$F_2 = \frac{9 \times 10^9 \cdot 20 \times 10^{-12}}{0,0625}$$

$$F_2 = \frac{180 \times 10^{-1}}{625 \times 10^{-4}}$$

$$F_2 = 2,88 \text{ N}$$

$$F_{Q_x} = 6,48 \text{ N} - 2,88 \text{ N}$$

$$= 3,6 \text{ N} \text{ ke arah kiri mendekati } Q_1 \quad \underline{\underline{(B)}}$$



$$q_1 = 2 \times 10^{-6}$$

$$q_2 = 3 \times 10^{-6}$$

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

$$1 = \frac{9 \times 10^9 \times 2 \cdot 10^{-6} \times 3 \cdot 10^{-6}}{r^2}$$

$$r^2 = 54 \times 10^{-3}$$

$$r = \sqrt{0,054}$$

$$\underline{\underline{r = 0,23 \text{ m}}}$$

jawaban (B)

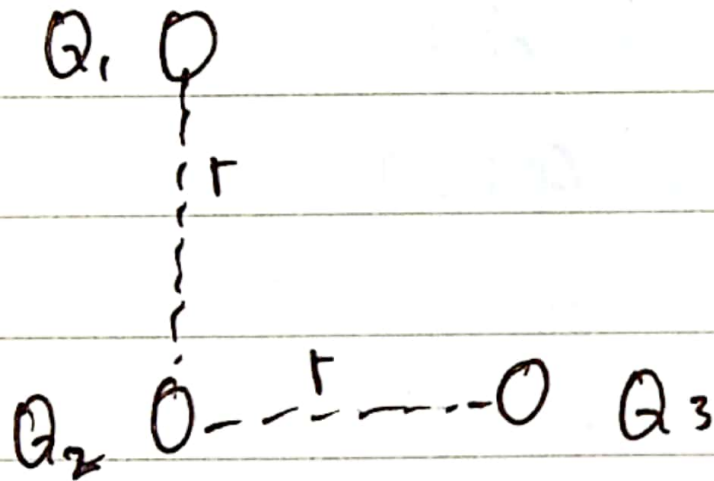
10). Diketahui :

$$q_1 = q_3 = 50 \mu C = 50 \times 10^{-6} C \quad \nearrow 5 \times 10^{-5} C \quad r = 2m$$

$$q_2 = 40 \mu C = 40 \times 10^{-6} C = 4 \times 10^{-5} C$$

$$F_{Q_2} = \dots ?$$

jawab :



Lanjutan NO. 10

$$F_{Q_2} = k \cdot \frac{q_1 q_2}{r^2}$$

$$F_{Q_2} = 9 \times 10^9 \times \frac{5 \times 10^{-5} \times 4 \times 10^{-5}}{(2)^2}$$

$$F_{Q_2} = \frac{9 \times 10^9 \times 20^5 \times 10^{-10}}{4}$$

$$F_{Q_2} = 9 \times 10^9 \times 5 \times 10^{-10}$$

$$F_{Q_2} = 45 \cdot 10^{-1}$$

$$F_{Q_2} = 4,5 \text{ N}$$

= jawaban