

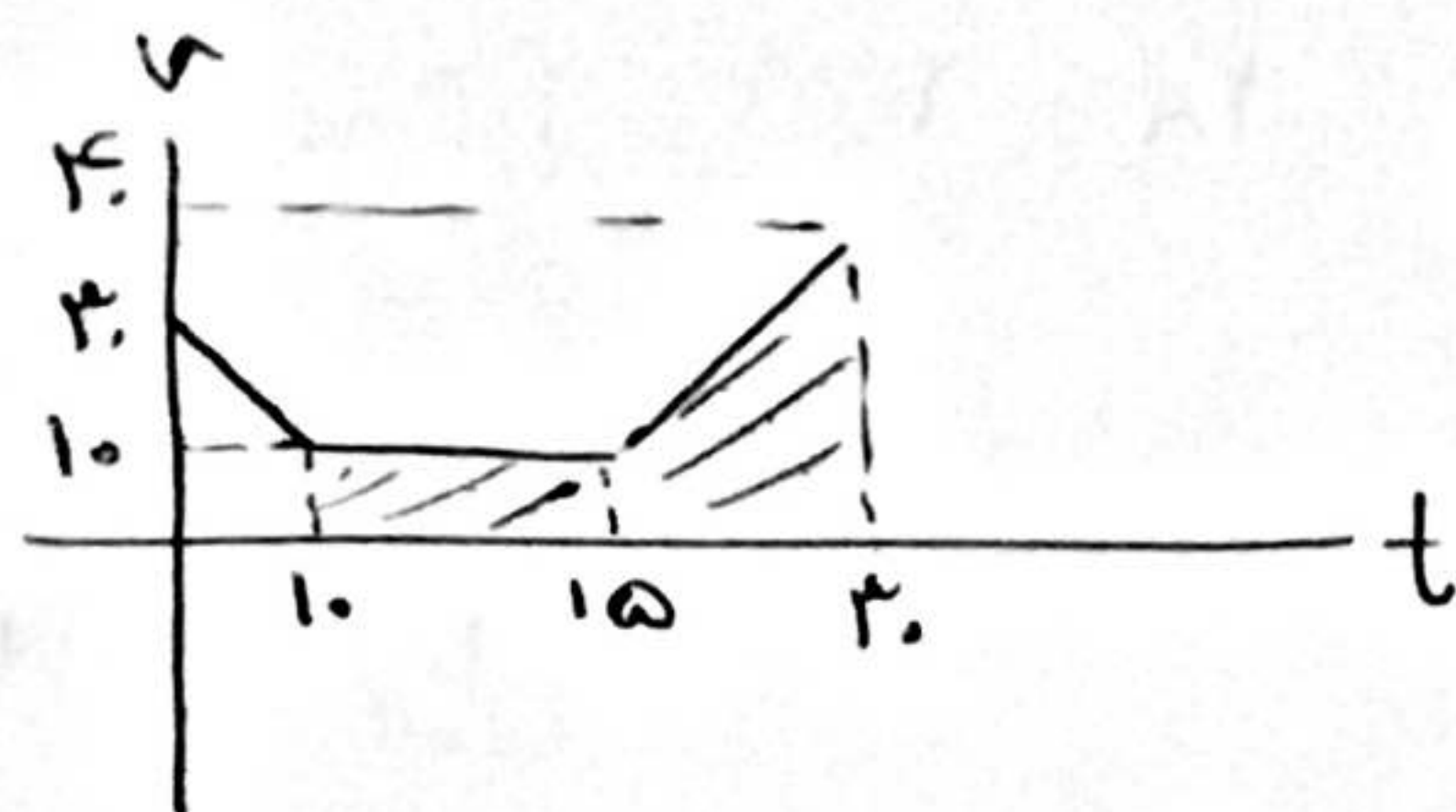
$$t_1 = 2 \quad v_1 = -2$$

$$t_2 = 4 \quad v_2 = 14$$

$$\bar{a} = \frac{\Delta v}{\Delta t} = \frac{14}{2} = 7 \text{ m/s}$$

(ف) - ۲.۴

(ج) - ۲.۵



$$t=1. \quad v_1 = at + v_0 = -2 \times 1 + 2 = 0 \text{ m/s}$$

$$t=2. \quad v = 2 \times 1.5 + 1 = 4 \text{ m/s}$$

۳. مسافت، در نمودار زیر، ۱.۲۵

$$S = \Delta x = 21, 25$$

$$\bar{u} = \frac{\Delta x}{\Delta t} = \frac{S}{t} = 21, 25$$

$$x_A = \frac{1}{2} a_A t^2 \rightarrow v \omega = \frac{1}{2} \times 1, 5 t^2 \rightarrow t = 1, 5$$

(د) - ۲.۸

$$x_B = \frac{1}{2} a_B t^2 - v \omega \rightarrow a_B = 2 \text{ m/s}^2$$

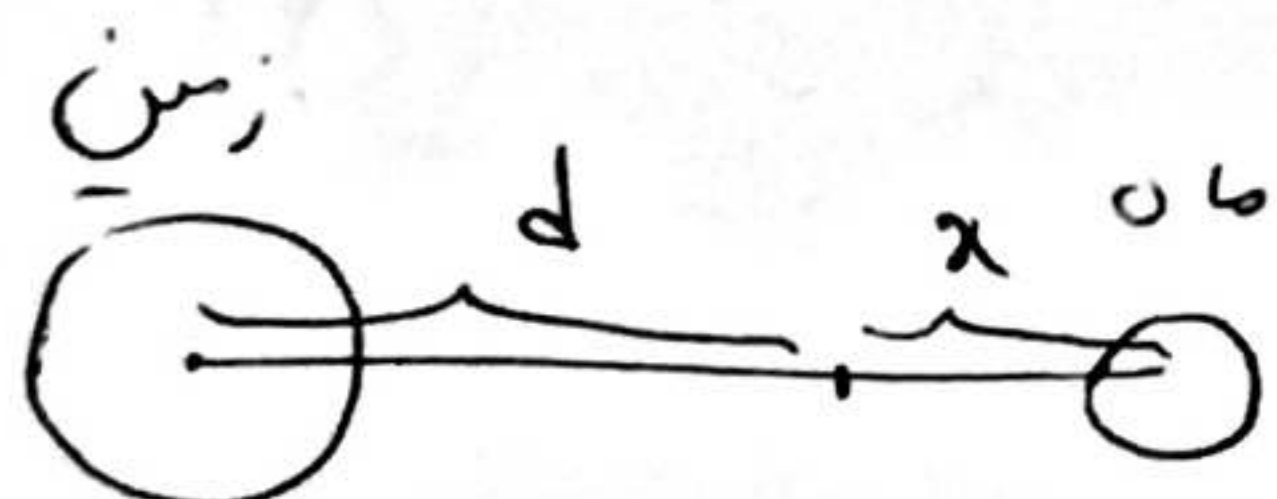
$$\frac{v_B}{v_A} = \frac{a_B}{a_A} = 2$$



(ج) - ۲.۹

$$f_{\text{static}} = \mu_s N = \mu_s mg \rightarrow \mu_s = \frac{35}{200} = 0, 17$$

۲۱. (س) چون جسم (۱) متراکز (۱) است پس نسبت به آن بی‌تأثیر است. سطح (۱) است در زمین پس جوابی آن بی‌تأثیر است.



$$F_1 = F_2$$

$$\frac{m g}{d^2} = \frac{m}{r^2}$$

$$\frac{g}{d} = \frac{1}{r} \rightarrow d = gr$$

(ج) - ۲۱۱

$$\frac{\omega_2}{\omega_1} = \frac{k_2 - k_1}{k_1 - k_2} = \frac{9 \times 10^2 - 10^2}{10^2 - 9 \times 10^2} = 1$$

(ج) - ۲۱۲

$$\frac{k_B}{k_A} = \left(\frac{P_B}{P_A} \right)^2 \left(\frac{m_A}{m_B} \right) = 2$$

(د) - ۲۱۳

$$\frac{v'}{2 \times 1.4} = \frac{0, 4 \times 2}{0, 4} \rightarrow v' = 2, 8 \times 1.4$$

(د) - ۲۱۴

$$f = \frac{v}{\lambda} = \frac{2 \times 1.4}{0, 4 \times 1.4} = 5 \times 1.4 \text{ Hz}$$

$$\lambda = 5 \text{ cm} \rightarrow T = \frac{\lambda}{v} = \frac{5}{2} = \frac{1}{4} \text{ s}$$

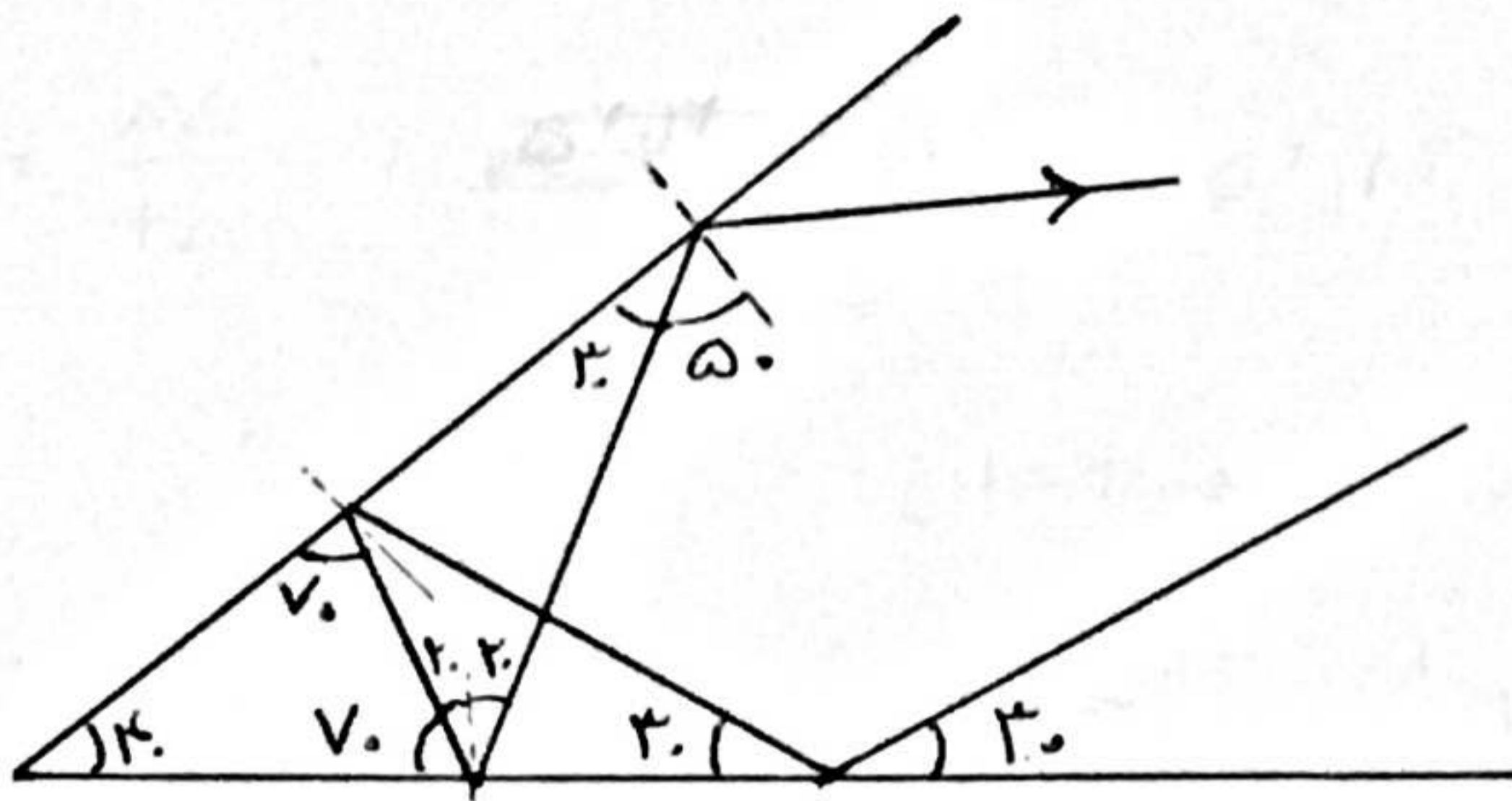
ج - ۲۱۵

$$\frac{1}{\lambda} = \frac{T}{\lambda} \rightarrow$$

در مدت $\frac{T}{2}$ هر ذره λ اندازه جابجایی شود

$$2\lambda = 2 \times 2 = 4 \text{ cm}$$

ج - ۲۱۴



$$E = 2K \quad \frac{1}{2} m A^2 \omega^2 = 2 \left(\frac{1}{2} m v^2 \right) \quad T = \frac{1}{f} \rightarrow f = 1. \quad \omega = 2\pi f$$

ج - ۲۱۷

$$v = \frac{\sqrt{r}}{2} A \omega = \frac{\sqrt{r}}{2} \times 5 \times 2\pi \times 1 = 5 \cdot \sqrt{r} \pi$$

$$\frac{\Delta E_{1,2}}{\Delta E_{4,8}} = \frac{\frac{1}{1} - \frac{1}{9}}{\frac{1}{14} - \frac{1}{34}} = 25,4$$

د - ۲۱۸

د - ۲۱۹

$$A \times \frac{A-n}{z} \rightarrow \frac{A-n}{z} + 2 \frac{f}{2} \alpha + \frac{f}{-1} \beta$$

د - ۲۲۰

$$E = \frac{kq}{r^2} \rightarrow 1,20 \times 10^{-10} = \frac{kq}{0,4^2} \quad kq = 0,4^2 \times 1,20 \times 10^{-10}$$

د - ۲۲۱

$$F = \frac{kq_1 q_2}{r^2} \rightarrow F = \frac{0,4^2 \times 1,20 \times 10^{-10} \times 9 \times 10^{-9}}{0,9^2} = 1,4$$

د - ۲۲۲

$$1,20 \times 9_1 = 2 \cdot \mu C \rightarrow q'_1 = 1 - 2 = -1 \cdot \mu C$$

$$q'_2 = -5 + 2 = -3 \cdot \mu C$$

$$\frac{F'}{F} = \frac{q'_1 q'_2}{q_1 q_2} = \frac{1 \times 3}{1 \times 5} = \frac{3}{5} \quad \frac{\Delta F}{F} \times 100 = -40\%$$

د

$$u = \frac{1}{r} cu^r = \frac{1}{r} \times \Delta \times l \dots = r \Delta \cdot \mu J$$

$$\textcircled{r} - r r r$$

$$\mathcal{E} = 12V$$

$$V = IR \quad 9,4 = I \times \Delta \rightarrow I = 1,1r$$

$$\textcircled{r} - r r r$$

$$V = 9,4$$

$$V = \mathcal{E} - Ir \rightarrow r = \frac{9,4 - 12}{-1,1r} = r$$

$$\textcircled{r} - r r r$$

$$P = \frac{u^r}{R}$$

$$P_1 = \frac{u^r}{r \Delta \Delta}$$

$$P_r = \frac{u^r}{1 r r}$$

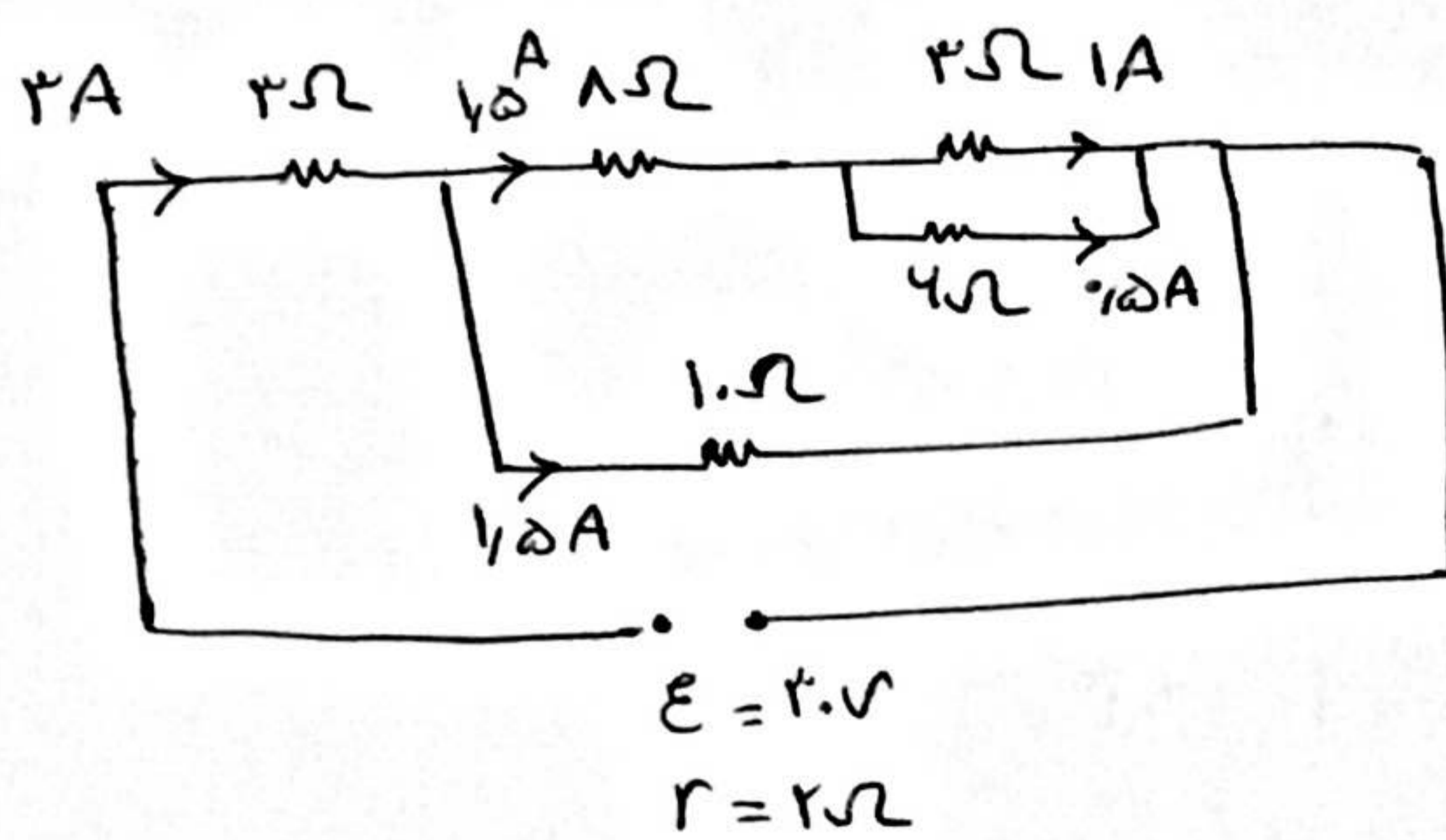
$$P_r = \frac{u^r}{R_{eq}} = \frac{u^r}{9,4}$$

$$R_{eq} = 9,4 \Omega$$

↓
min

↓
max

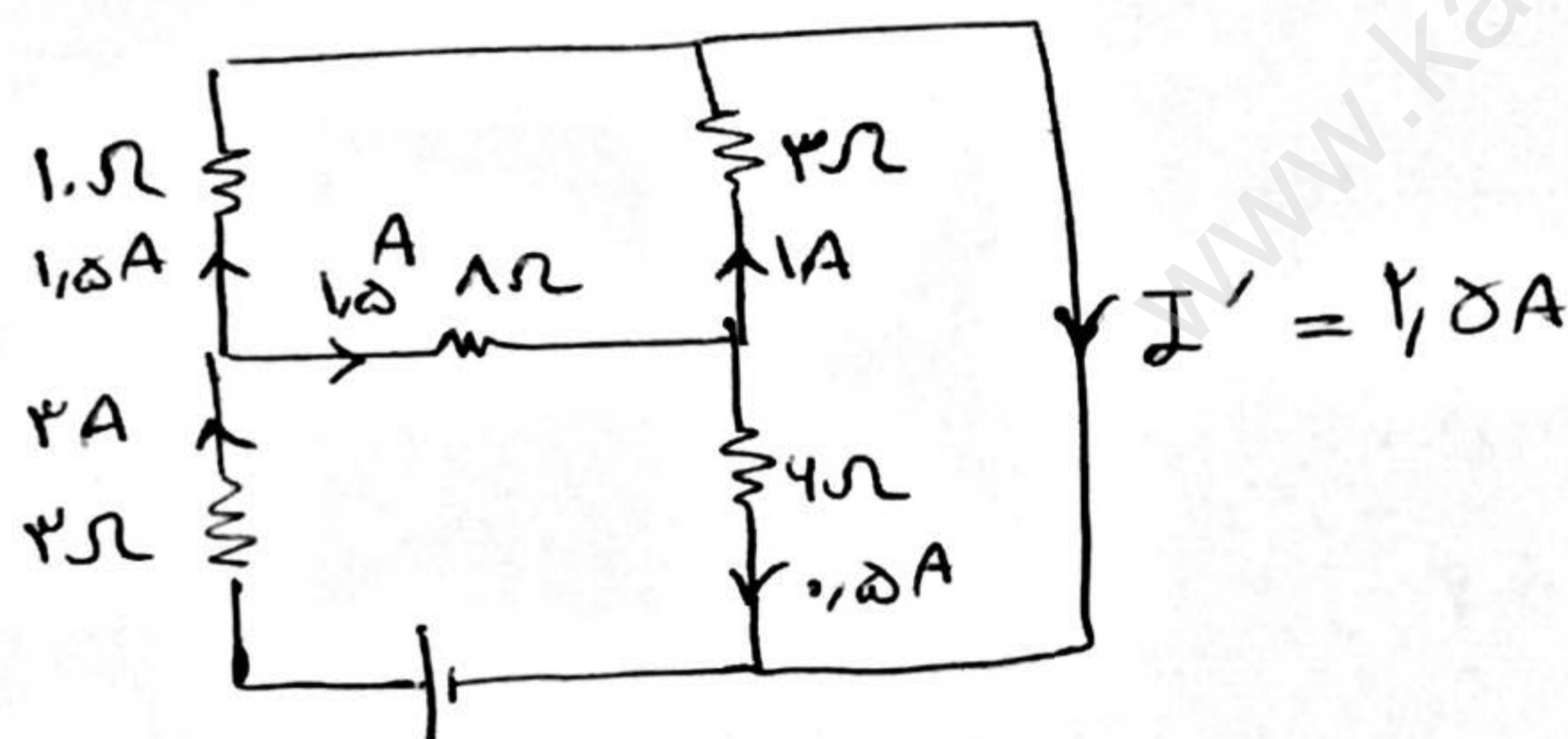
$$\frac{P_r}{P_1} = r$$



$$\textcircled{r} - r r r$$

$$R_{eq} = 1 \Omega$$

$$I = \frac{\mathcal{E}}{r + R_{eq}} = \frac{r}{1} = r A$$



$$mg = qvB \rightarrow B = \frac{\Delta \times l \cdot r \times l}{\Delta \times l \cdot r \times \frac{1}{2} \Delta \times l \cdot r}$$

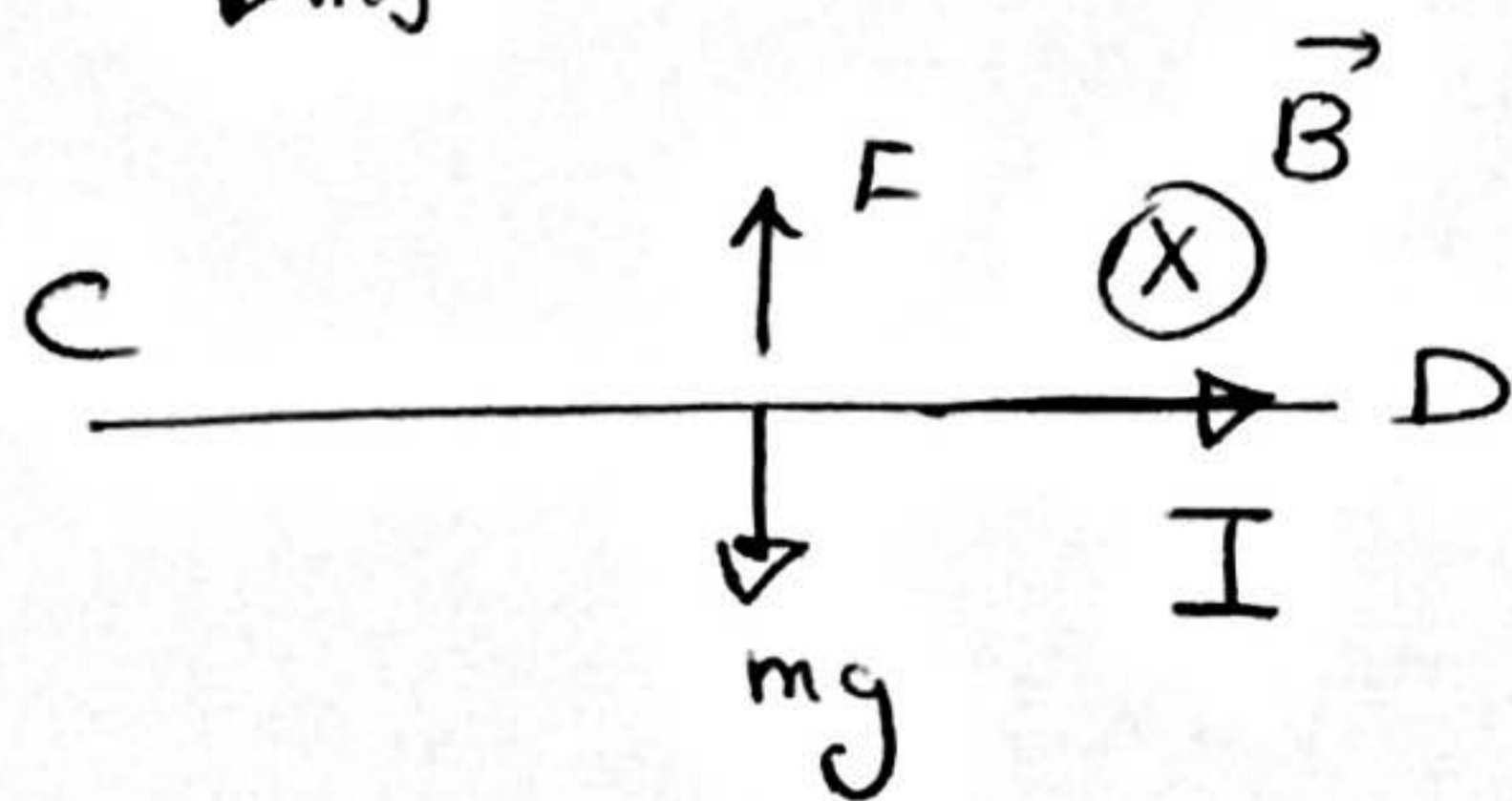
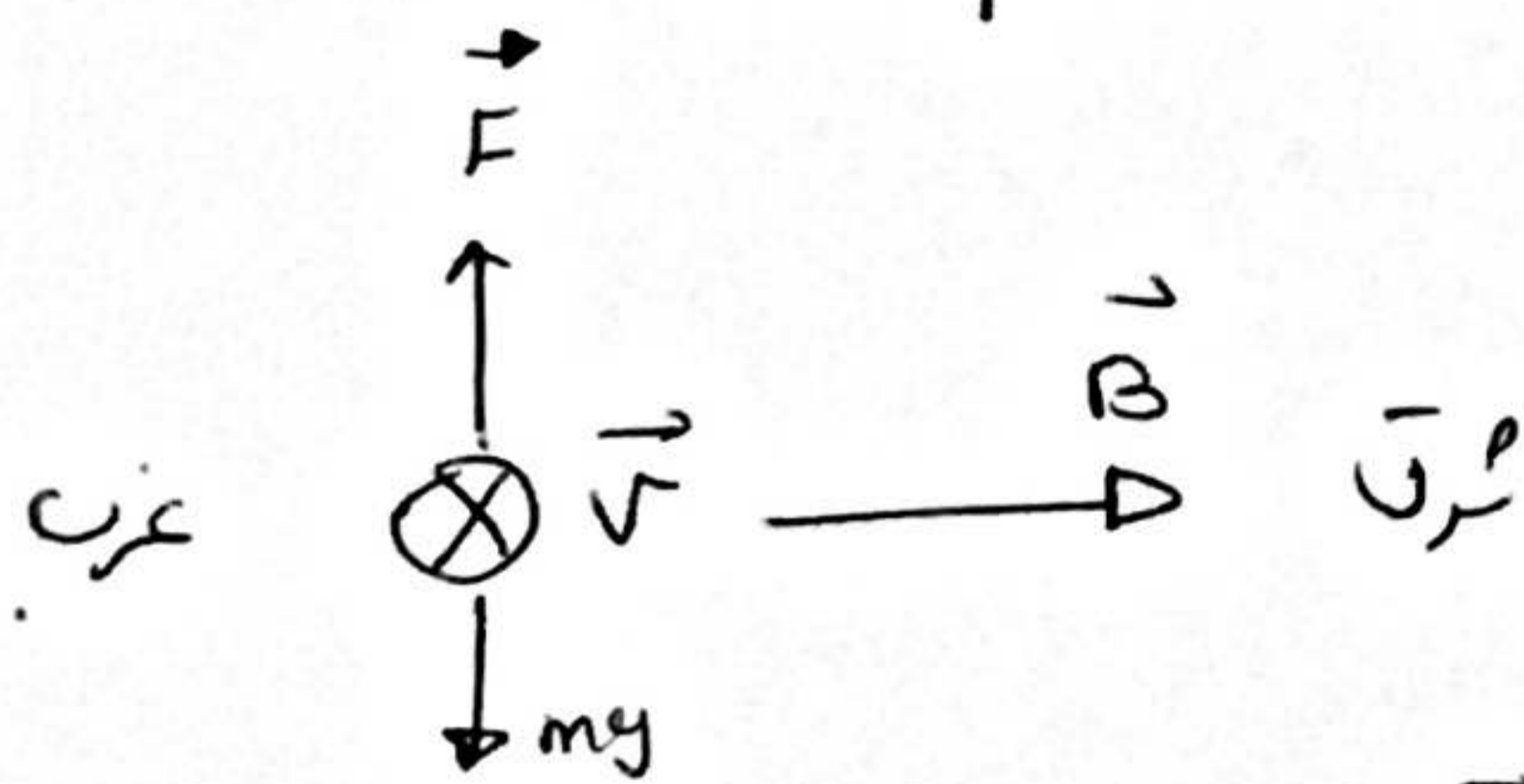
$$\textcircled{r} - r r r$$

$$B = r r r$$

$$I l B = mg$$

$$I = \frac{mg}{lB} = \frac{14 \cdot \Delta \cdot r \times l}{\Delta \times r \times \Delta} = \Delta A$$

$$\textcircled{1} - r r r$$





$$P_A = P_B$$

$$\rho h = \rho_{Hg} (25 - 2x)$$

$$1 \times 25 = 13.6 (25 - 2x) \rightarrow x = 17.5 \text{ cm}$$

① - ۲۲۹

② - ۲۳۰

$$\Delta F = l \Delta \theta \rightarrow \Delta \theta = \frac{q}{l \lambda} = \omega \dot{c}$$

③ - ۲۳۱

$$Q = mc \Delta \theta = 1 \times 1000 \times 2 \times 10^{-3} = 2 \text{ kJ}$$

با توجه به معادله برابری دما و اصل برابری

④ - ۲۳۲

⑤ - ۲۳۳

$$\Delta l_{Al} + \Delta l_{Cu} = 0, f C m$$

$$\Delta l = l_1 \alpha \Delta \theta$$

⑥ - ۲۳۴

$$\omega \cdot x \Delta \theta \left(\frac{1.7 \times 10^{-2}}{1.7 \times 10^{-2}} + \frac{1.7 \times 10^{-2}}{1.7 \times 10^{-2}} \right) = 0.16$$

$$\Delta \theta = 100 \dot{c}$$

$$0.19 mc \Delta \theta = m' L_f$$

⑦ - ۲۳۵

$$0.19 \times 1000 \times 100 \times \omega = m' \times L_f$$

$$m' = \frac{0.19 \times 1000 \times 100 \times \omega}{L_f} = 10.9 \text{ gr}$$