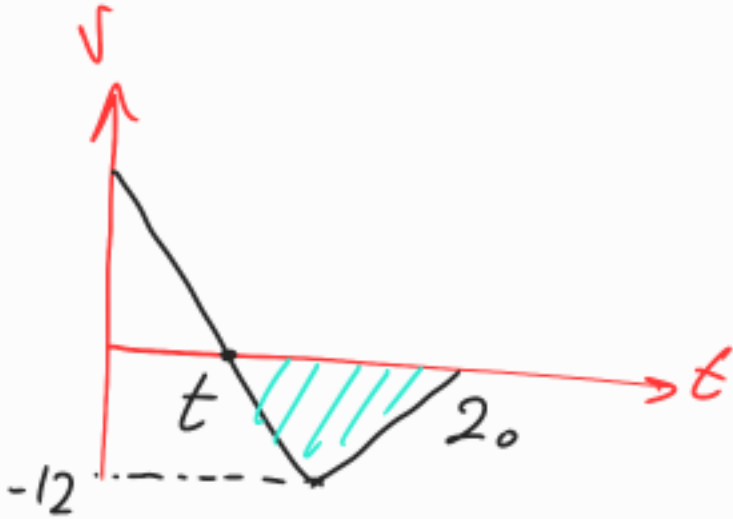


حل لؤالات کنکور 1400 - دکتر محمد علی لوری

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156 - گزینه 1 (حقیقی)



157 - گزینه 2

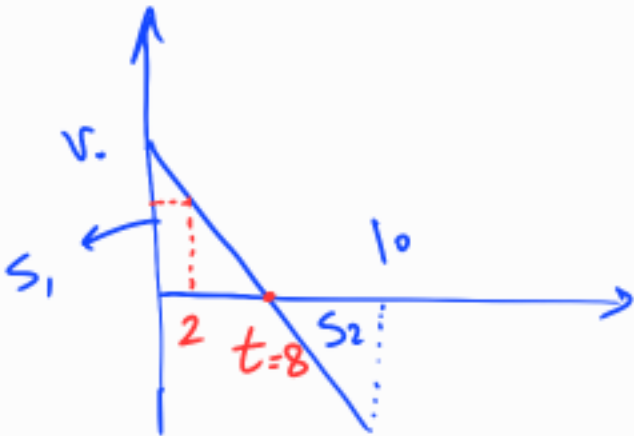
$$\bar{v} = \frac{\Delta l}{\Delta t}$$

$$\Delta l = \frac{(20-t) \times 12}{2} = 6(20-t)$$

$$\Delta t = 20 - t$$

$$\Rightarrow \bar{v} = \frac{6(20-t)}{20-t} = 6 \text{ m/s}$$

158 - گزینه 4



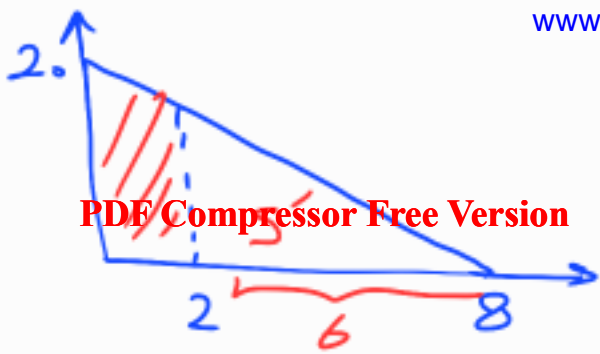
$$S_1 - S_2 = 75$$

$$S_1 + S_2 = 85$$

$$\Rightarrow S_1 = 80 \quad S_2 = 5$$

$$\Rightarrow \frac{S_1}{S_2} = 16 \Rightarrow \text{نسبت مساحتها} = 4$$

$$\Rightarrow t = 8 \Rightarrow v_0 = 20 \text{ m/s}$$



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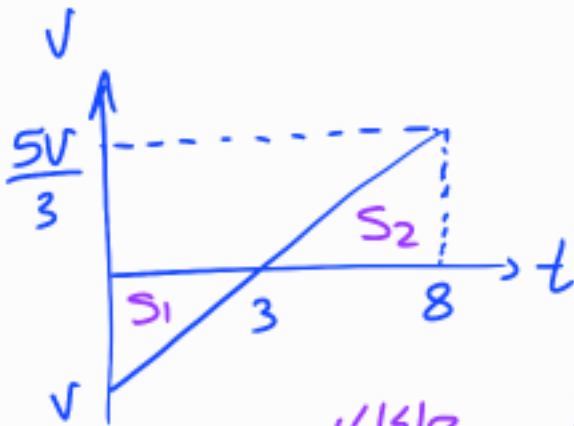
$$\frac{6}{8} = \frac{V_2}{20}$$

$$V_2 = 15 \Rightarrow S' = \frac{15 \times 6}{2}$$

$$S' = 45$$

$$\text{حالت} = 80 - 45 = 35 \text{ m}$$

۱۵۹ - گزینه ۳



$$S_1 = \frac{3v}{2}$$

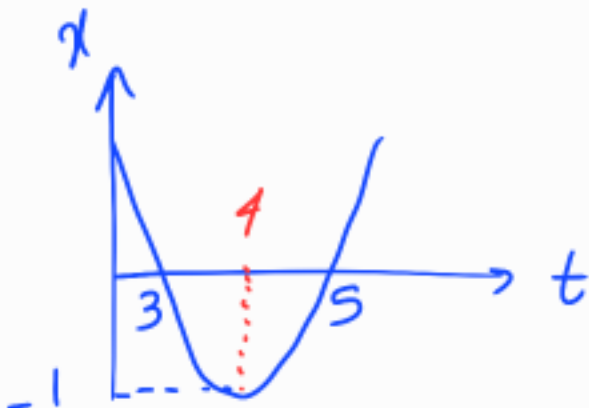
$$S_2 = \frac{25v}{6}$$

$$\text{جابجایی} = \frac{25v}{6} - \frac{3v}{2} = \frac{16v}{6}$$

$$\text{مسافت} = \frac{25v}{6} + \frac{3v}{2} = \frac{34v}{6}$$

$$\Rightarrow \frac{\text{جابجایی}}{\text{حالت}} = \frac{8}{17}$$

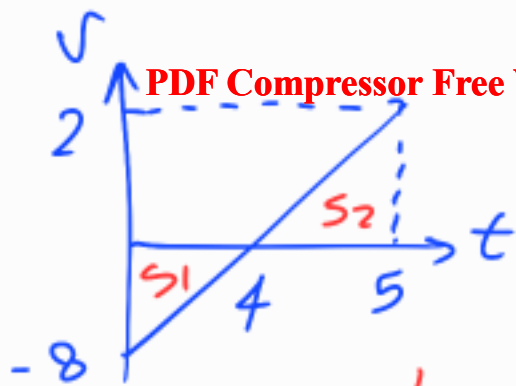
۱۶۰ - گزینه ۳



$$x = a(t-3)(t-5)$$

$$t=4 \Rightarrow x=-1 \Rightarrow a=1$$

$$x = t^2 - 8t + 15 \Rightarrow v = 2t - 8$$



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$$S_1 = -16$$

$$S_2 = 1$$

$$\Delta l = |-16| + 1 = 17$$

$$\Delta t = 5$$

$$\Rightarrow \bar{v} = \frac{17}{5} \text{ m/s}$$

سبب عودار = k

$$m_2 > m_3 > m_1 \Rightarrow k_2 > k_3 > k_1 \quad - 161$$

$$(\Delta x)_{S_2} = 4 \text{ cm}$$

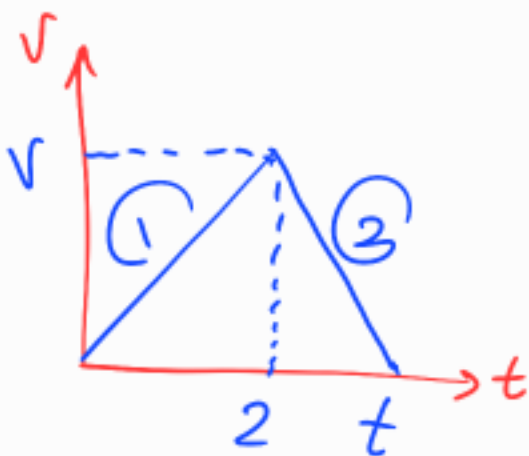
$$F_{\text{net}} \propto \Delta x \Rightarrow \Delta x_2 < \Delta x_3 < \Delta x_1$$

سوال حاصل دارد (20)

بالتوجه به گزینیه ها $\Delta x_1 = 8$ یا 9

$$\Delta x_2 = 2$$
 یا 3

162. گزینیه 4



$$a_2 = -\mu_k g = -2$$

$$(F_{\text{net}})_1 = 15 - \mu_k (50) = 5 \text{ N}$$

$$(F_{\text{net}})_1 = ma_1 \Rightarrow a_1 = 1 \text{ m/s}^2$$

$$\Rightarrow v = 2 \text{ m/s} \Rightarrow t = 3 \Rightarrow \Delta x = \frac{3 \times 2}{2} = 3 \text{ m}$$

$$\text{حالت 1} \Rightarrow mg - k\Delta x = ma$$

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$$50 - 200\Delta x = 5 \times 2 \Rightarrow \Delta x_1 = 20 \text{ cm}$$

$$\text{حالت 2} \Rightarrow mg - k\Delta x = -ma$$

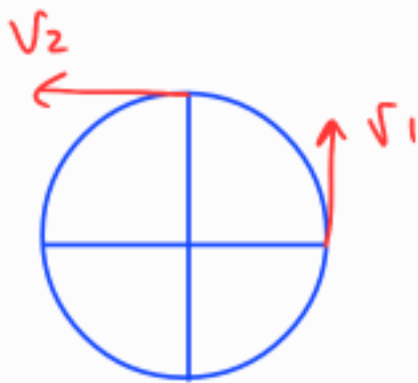
$$50 - 200\Delta x = -5 \times 1 \Rightarrow \Delta x_2 = 27.5 \text{ cm}$$

$$\Delta x_2 - \Delta x_1 = 7.5 \text{ cm}$$

164 - گزینہ 1

$$v = 10\pi \text{ m/s}$$

$$v = r \left(\frac{2\pi}{T} \right) \Rightarrow 10\pi = 20 \left(\frac{2\pi}{T} \right) \Rightarrow T = 4 \text{ s}$$



سے $\frac{1}{4}$ ثانیہ میں لوڈ $\frac{1}{4}$ دائرہ

$$\Delta v = 10\pi\sqrt{2} \text{ m/s}$$

$$\Delta t = 1 \Rightarrow \bar{a} = 10\pi\sqrt{2} \text{ m/s}^2$$

$$a_c = \frac{v^2}{r} = \frac{(10\pi)^2}{20} = 5\pi^2$$

$$\Rightarrow \frac{\bar{a}}{a_c} = \frac{2\sqrt{2}}{\pi}$$

$$t_1 = \frac{1}{12} \rightarrow \phi_1 = \frac{\pi}{24}$$

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$$t_2 = \frac{25}{12} \rightarrow \phi_2 = \frac{25\pi}{24} = \pi + \frac{\pi}{24}$$



$$\Delta\phi = \pi \Rightarrow \Delta t = \frac{T}{2} \Rightarrow \bar{S} = \frac{2A}{\frac{T}{2}} = \frac{4A}{T}$$

$$\Delta L = 2A$$

$$\omega = \frac{\pi}{2} \Rightarrow \frac{\pi}{2} = \frac{2\pi}{T} \Rightarrow \underline{T = 4s} \Rightarrow \bar{S} = \frac{4 \times 2}{4}$$

$$\omega = \frac{2\pi}{T}$$

$$\bar{S} = 2 \text{ cm/s}$$

$$\frac{3\lambda}{2} = 3.0 \Rightarrow \lambda = 2.0 \text{ m} \Rightarrow \lambda = v \cdot T$$

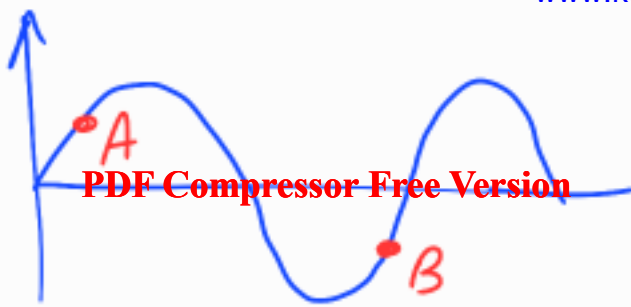
$$2.0 = 1.0 \cdot T$$

$$T = \frac{2}{1.0} \text{ s}$$

$$\Delta t = \frac{9}{4.0}$$

$$\Rightarrow \frac{\Delta t}{T} = \frac{9T}{8} = T + \frac{T}{8} = 2\pi + \frac{\pi}{4}$$

$$T = \frac{2}{1.0}$$



A : تندتونده

B : کندتونده

$$x = -\frac{A}{2} \Rightarrow \phi \begin{cases} \pi - \frac{\pi}{3} \\ \pi + \frac{\pi}{3} \end{cases}$$

167. گزینه 2
از مرکز بزرگتر

به مرکز نزدیک ✓

$$\Delta\phi = \frac{4\pi}{3} \Rightarrow \Delta t = \frac{4T}{6} = \frac{2T}{3} = \frac{2}{15} \Rightarrow T = \frac{1}{5} \text{ s}$$

$$\omega = \frac{2\pi}{T} = \frac{2\pi}{\frac{1}{5}} = 10\pi \text{ rad/s}$$

$$E = \frac{1}{2} mA^2\omega^2 = \frac{1}{2} \times 50 \times 10^{-3} \times (4 \times 10^{-2})^2 \times (10\pi)^2 = \frac{1}{25} \text{ J}$$

168 - گزینه 1

$$\beta_2 - \beta_1 = 10 \lg \frac{I_2}{I_1} \Rightarrow 6,4 = \lg \frac{I_2}{I_1}$$

$$7 - 2 \times 0,3 = \lg 10^7 - \lg 2^2$$

$$\lg \frac{10^7}{4} = \lg \frac{I_2}{I_1} \Rightarrow \frac{I_2}{I_1} = 2,5 \times 10^6 \text{ W/m}^2$$

$$f_1 + f_2 = f_1 + 2f_1 = 3f_1 = 375 \Rightarrow f_1 = 125 \text{ Hz}$$

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$$f_n = \frac{nv}{2L} \Rightarrow f_1 = \frac{1 \times v}{2L} \Rightarrow 125 = \frac{1 \times v}{2 \times 0.8} \Rightarrow v = 100 \text{ m/s}$$

$$v = \sqrt{\frac{F \cdot L}{m}} \Rightarrow 100 = \sqrt{\frac{F \cdot (0.19)}{1.0 \times 10^{-3}}} \Rightarrow F = 250 \text{ N}$$



$$\frac{\sin \theta_2}{\sin \theta_1} = \frac{\lambda_2}{\lambda_1} = \frac{3}{4}$$

$$\begin{cases} \lambda_1 - \lambda_2 = \frac{1}{8} \times 10^{-6} \\ \lambda_2 = \frac{3}{4} \lambda_1 \end{cases}$$

$$\Rightarrow \lambda_1 = \frac{1}{2} \times 10^{-6} \text{ m}$$

$$f = \frac{c}{\lambda} \Rightarrow f = \frac{3 \times 10^8}{\frac{1}{2} \times 10^{-6}} = 6 \times 10^{14} \text{ Hz}$$

3 - نرینه : 171

$$n_1 \sin \theta_1 = n_2 \sin \theta_2 \Rightarrow 1 \times \frac{\sqrt{2}}{2} = \sqrt{2} \times \sin \theta_2$$

$$\theta_2 = 30^\circ$$

$$\cos 30^\circ = \frac{15\sqrt{2}}{AB} \Rightarrow AB = 3 \text{ cm}$$

$$\frac{v_2}{v_1} = \frac{n_1}{n_2} \Rightarrow \frac{v_2}{3 \times 1.8} = \frac{1}{\sqrt{2}} \Rightarrow v_2 = \frac{3}{\sqrt{2}} \times 1.8$$

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$$\Delta x = v \cdot \Delta t \Rightarrow AB = \frac{3}{\sqrt{2}} \times 1.8 \times \Delta t$$

$$\Delta t = \sqrt{2} \times 10^{-9} = \sqrt{2} \text{ ns}$$

$$k_{\max} = hf - \omega_0$$

گزینه 2: 172

$$\omega_0 = hf_0 = 4 \times 10^{-15} \times \frac{5}{8} \times 10^{15} = 2.5 \text{ eV} \rightarrow 2.5 \times 1.6 \times 10^{-19} \text{ J}$$

$$hf = 4.125 \times 10^{-19}$$

$$\Rightarrow k_{\max} = 4.125 \times 10^{-19} - 2.5 \times 1.6 \times 10^{-19} = 0.125 \times 10^{-19} \text{ J}$$

$$k_{\max} = \frac{1}{2} m v_{\max}^2 \Rightarrow 0.125 \times 10^{-19} = \frac{1}{2} \times 9 \times 10^{-31} \times v_m^2$$

$$v = \frac{1}{6} \times 10^6 \text{ m/s}$$

گزینه 4: حقیقی 173

$$\frac{1}{\lambda_{\max}} = \left(\frac{1}{4} - \frac{1}{9} \right) \Rightarrow \lambda_{\max} = 72 \text{ nm}$$

$$\frac{1}{\lambda_{\min}} = \left(\frac{1}{4} \right) \Rightarrow \lambda_{\min} = 40 \text{ nm}$$

$$\Delta \lambda = 32 \text{ nm}$$

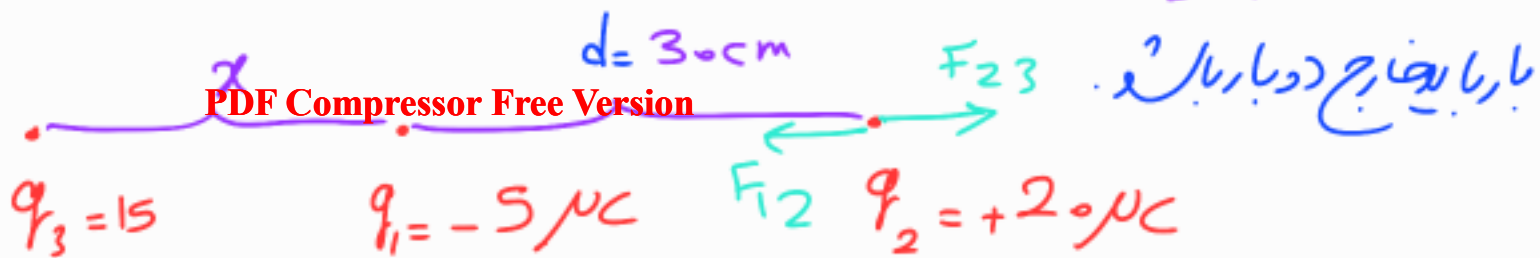
$$\Delta E = E_1 - E_2 = -\frac{E_R}{1^2} - \left(-\frac{E_R}{2^2} \right)$$

$$= -13,6 - 3,4 = 10,2 \text{ eV}$$

$$\Rightarrow 10,2 \text{ eV} \xrightarrow{\times 1,6 \times 10^{-19}} 1,632 \times 10^{-18} \text{ J}$$

$$n = \frac{t}{T} = \frac{22920}{5730} = 4$$

$$N = \left(\frac{1}{2} \right)^n N_0 \Rightarrow N = \frac{1}{16} N_0 \Rightarrow \frac{1}{16} \rightarrow 6,25\%$$



$$F_{13} = F_{23} \Rightarrow \frac{kq_1q_3}{x^2} = \frac{kq_2q_3}{(30+x)^2}$$

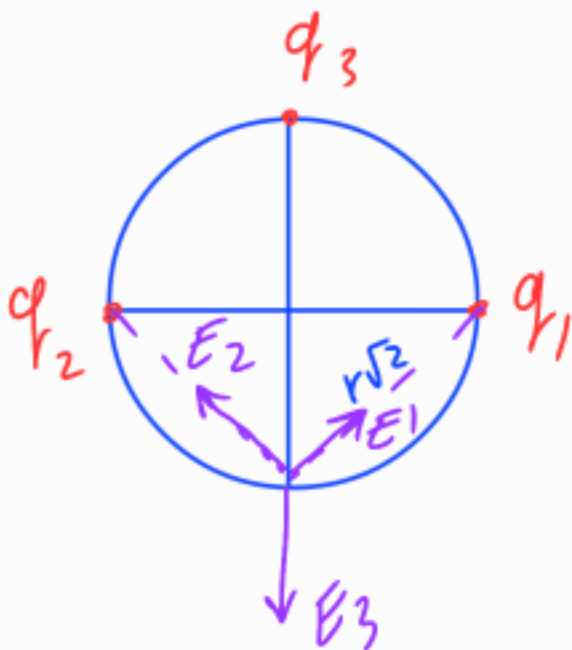
$$\Rightarrow x = 30 \text{ cm}$$

$$F_{12} = \frac{kq_1q_2}{d^2} = 10 \text{ N}$$

$$F_{23} = \frac{kq_2q_3}{(d+x)^2} = 7.5 \text{ N}$$

$$F_T = F_{12} - F_{23} = 2.5 \text{ N}$$

178. گزینه 2



$$E_{12} = \sqrt{E_1^2 + E_2^2}$$

$$\sqrt{E_1^2 + E_2^2} = E_3$$

$$q_1 = q_2 \Rightarrow \sqrt{2} E_1 = E_3$$

$$\sqrt{2} \frac{kq_1}{(\sqrt{2}r)^2} = \frac{kq_3}{(2r)^2}$$

$$\Rightarrow \frac{q_3}{q_1} = 2\sqrt{2}$$

باید دوار برابر بود
تا راستی برآید
1 و 2 با 3
یکی بود

وقتی نیروی دهنی یافته پس 2 بار نا هم چون

$$q_1 > 0$$

$$q_2 < 0$$

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$$F = \frac{kq_1q_2}{r^2}$$

بعداً $q' = \frac{q_1 - q_2}{2}$

$$F' = \frac{k(q_1 - q_2)^2}{4r^2}$$

$$F' = \frac{8}{10} F \Rightarrow \frac{k(q_1 - q_2)^2}{4r^2} = \frac{8}{10} \frac{kq_1q_2}{r^2}$$

$$(q_1 - q_2)^2 = 3,2 q_1 q_2$$

$$q_1 = 1 \rightarrow \text{از گزینه ها} \Rightarrow q_2 = 5$$

$$\Rightarrow (5 - 1)^2 = 3,2 \times 5 \times 1 \quad \text{ok}$$

18 - گزینه 3

$$q' = \frac{q_A + q_B}{2} = 8 \mu\text{C}$$

$$G_A = \frac{q_A}{4\pi r^2} = \frac{20}{4 \times 3 \times (5 \times 10^{-2})^2} \Rightarrow G'_A - G_A = 400 \frac{\mu\text{C}}{\text{m}^2}$$

$$G'_A = \frac{q'}{4\pi r^2} = \frac{8}{4 \times 3 \times (5 \times 10^{-2})^2}$$

181 - گزینہ 1 صحیح

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$$q_1 = q \rightarrow u_1 = \frac{q^2}{2C}$$

182 - گزینہ 2

$$q_2 = q + 3 \rightarrow u_2 = \frac{(q+3)^2}{2C}$$

$$u_2 - u_1 = 4,5 \Rightarrow \frac{(q+3)^2}{5\mu F} - \frac{q^2}{5\mu F} = 4,5 \text{ ج}$$

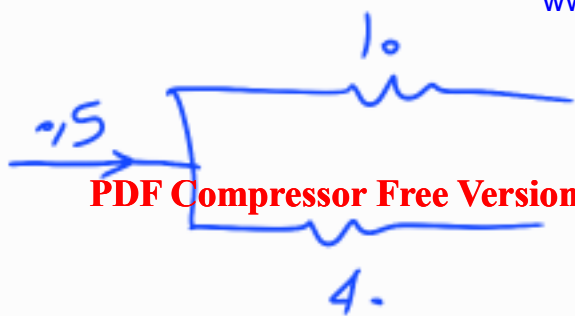
$$\Rightarrow q_2 = 6 \text{ mC}$$

183 - گزینہ 1

$$I = \frac{\mathcal{E}_1 - \mathcal{E}_2}{R_{eq} + r} = \frac{8 - 3}{\frac{4R^2}{R+4R} + 2}$$

$$V_2 = \mathcal{E}_2 + IR \Rightarrow 3,5 = 3 + I \Rightarrow I = 0,5 \text{ A}$$

$$\Rightarrow 0,5 = \frac{5}{\frac{4R^2}{R+4R} + 2} \Rightarrow R = 10 \Omega$$



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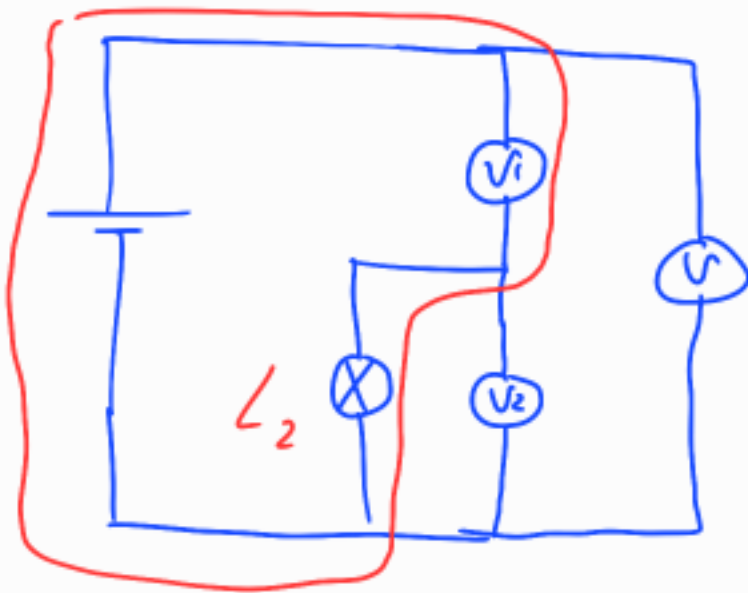
$$I_{10} = \frac{40}{50} \times 0.5$$

$$I_{10} = 0.4$$

$$P = RI^2 = 10 \times (0.4)^2 = 1.6 \text{ W}$$

هیچگاه صریحاً نمود. $V = \mathcal{E}$

184 - گزینه 2

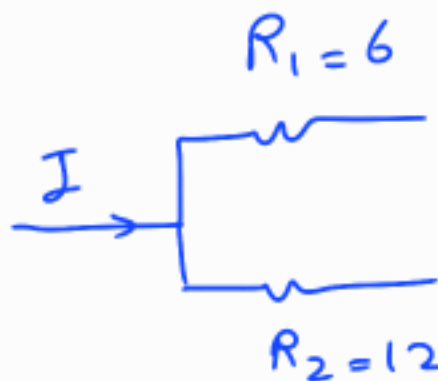


ولت‌سنج V_1 نیز ولتاژ دوسر
باتری را نشان می‌دهد.

$$V_2 = 0 \text{ اما}$$

185 - گزینه 3

$$P_3 = 6P_2$$



$$I_2 = \frac{6}{18} I$$

$$I_2 = \frac{1}{3} I$$

$$R_3 I^2 = 6 R_2 \left(\frac{I}{3}\right)^2 \Rightarrow R_3 = 8 \Omega$$

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$$V_{\text{بائیں}} = 0$$

در حالت ادل انتقال کوٹاہ

در حالت ادوم:

$$R_{eq} = \frac{18 \times 6}{18 + 6} = 4,5 \Omega$$

$$I = \frac{\mathcal{E}}{R_{eq} + r} = \frac{12}{6} = 2 \Rightarrow V = \mathcal{E} - Ir = 9V$$

187 گزینہ 1

$$F = ma$$

$$\Rightarrow ma = qvB \sin \alpha$$

$$F = qvB \sin \alpha$$

$$6,68 \times 10^{-27} \times 4 \times 10^5 = 1,6 \times 10^{-19} \times 50 \times B$$

$$\boxed{B = 1,67 \text{ G}}$$

188 گزینہ 4

اگر میدان میں دیم صفر تو د، جریان ها بايد هم جهت باشند و چون فاصد

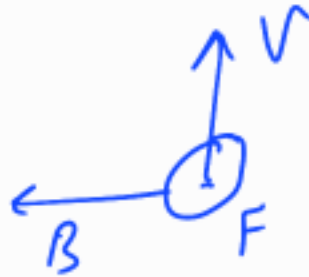
A تا I_2 کمتر است پس بايد $I_2 < I_1$ باشد.

$$Eq = qvB \Rightarrow v = \frac{E}{B}$$

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$$E \odot \Rightarrow F_E \odot \text{ سے بائیں } F_B \odot$$

بامقصد



صاف قانون دست راست

19. گزینہ 4

ہم درکھہ وصل کلید ہم درکھہ افزائیں رنوسا: $I \downarrow$
 و در نتیجہ B بہمت چپ فی ٹور۔
 پس B القای بائیں بہمت راست بالو۔
 پس جریان القای درجہ 2 ہے۔

س 19: گزینہ 2

$$\left. \begin{array}{l} l_A = 2l_B \\ N_A = 2N_B \\ L = \frac{kN \cdot N^2 A}{l} \end{array} \right\} \Rightarrow L_A = 2L_B$$

$$u = \frac{1}{2} LI^2 \Rightarrow u_A = 2u_B$$

چون نسبت l و N کی است $B_A = B_B$

$$W_{mg} = -mgh = -60 \times 10^3 \times 10 \times 600 = -3,6 \times 10^8 \text{ J}$$

$$v_2 = 2v_1 \Rightarrow k_2 = 4k_1$$

$$E_1 = k_1 + \underline{u_1} \Rightarrow E_1 = k_1$$

$$E_2 = k_2 + u_2 = 4k_1 + u_2$$

$$\Rightarrow \Delta E = 3k_1 + u_2 = 3 \times \frac{1}{2} \times 60 \times 10^3 \times 80^2 + 60 \times 10^3 \times 10 \times 600$$

$$\underline{\Delta E = 9,36 \times 10^8 \text{ J}}$$

س 193: گزینہ 1

$$P_0 + (\rho_2 g h_2) - (\rho_1 g h_1) = P_{ib}'$$

$$\text{پیمانہ } P_0 = 0 \Rightarrow \text{پیمانہ } P_{ib}' = g(\rho_2 h_2 - \rho_1 h_1)$$

$$\text{پیمانہ } P_{ib}' = 10 \left(1000 \times \frac{90}{100} - 1200 \times \frac{50}{100} \right) = 300 \text{ Pa}$$

$$P = \rho gh + P_0$$

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$$\Rightarrow P_1 = \rho gh_1 + P_0 = 100 \text{ kPa} \Rightarrow P_2 - P_1 = \rho g(h_2 - h_1)$$

$$P_2 = \rho gh_2 + P_1 = 106 \text{ kPa}$$

$$6 \times 10^3 = \rho \times 10 \times 15 \times 10^{-2}$$

$$\Rightarrow \rho = 4000 \text{ kg/m}^3$$

$$\Rightarrow P_1 = 4000 \times 10 \times \frac{5}{100} + P_0 = 100 \times 10^3$$

$$\underline{P_0 = 98 \text{ kPa}}$$

س 195: گزینہ 4

$$F = 5.$$

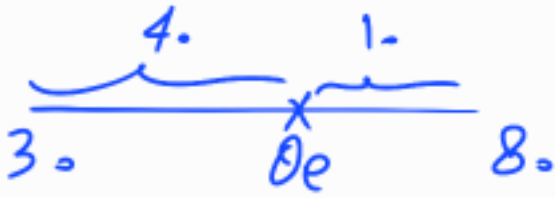
$$F = \frac{9}{5}\theta + 32 \Rightarrow \theta = 1.0^\circ \text{C}$$

$$Q = mL_f + mC\theta$$

$$\Rightarrow 2 \times 336000 + 0.2 \times 4200 \times 10 = \underline{756000 \text{ J}}$$

س 196: گزینه 2

$$H = \frac{kA\Delta T}{L} \Rightarrow H = \frac{100 \times 5 \times 10^{-4} \times 50}{50 \times 10^{-2}} \Rightarrow H = 2.0 \text{ J/s}$$



$$\left(\frac{kA\Delta T}{L}\right)_1 + \left(\frac{kA\Delta T}{L}\right)_2 = \dots$$

$$\frac{\theta_e - 30}{40} + \frac{\theta_e - 80}{10} = \dots$$

$$\theta_e = 70^\circ \text{C}$$

سؤال 197: گزینه 3

$$k = \frac{T_c}{T_c - T_h}$$

$$T_c = 27 + 273 = 300$$

$$T_h = 127 + 273 = 400$$

$$k = \frac{300}{400 - 300} = 3$$

س 198: گزینه 1

$$P_1 = 5 \times 10^4 + 10^5 = 15 \times 10^4 \text{ Pa}$$

$$P_2 = 10^5 + 10^5 = 2 \times 10^5$$

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$$\left\{ \begin{array}{l} \frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2} \\ V_2 = 2V_1 \end{array} \right. \Rightarrow T_2 = \frac{8}{3} T_1 \Rightarrow u_2 = \frac{8}{3} u_1$$

$$u_1 = \frac{8}{3} (600) = 1600 \text{ J}$$

س 200 گزینہ 3

$$\Delta U_{AC} = \frac{5}{2} P \Delta V$$

$$1000 = \frac{5}{2} \times 10^5 \times \Delta V \Rightarrow \Delta V = 4 \text{ lit} \Rightarrow V_C = 7 \text{ lit}$$

$$\Delta U_{AC} = \Delta U_{ABC} = 1000 \text{ J}$$

$$Q_{ABC} + W_{AB} + W_{BC} = 1000 \text{ J}$$

$$Q_{ABC} + \left(-\frac{1}{2} (3 \times 10^5) (4 \times 10^{-3}) \right) = 1000$$

$$\underline{Q_{ABC} = 1600 \text{ J}}$$