

**O'ZBEKISTON RESPUBLIKASI RAQAMLI TEXNOLOGIYALAR VAZIRLIGI**

**MUHAMMAD AL-XORAZMIY NOMIDAGI TOSHKENT AXBOROT  
TEXNOLOGIYALAR UNIVERSITETI**



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# **MUSTAQIL ISH**

**MAVZU: O'tilgan mavzularga doir masalalar**

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Fizika (amaliyot)  
Mustaqil ish  
Masalalar yechish

1.1.

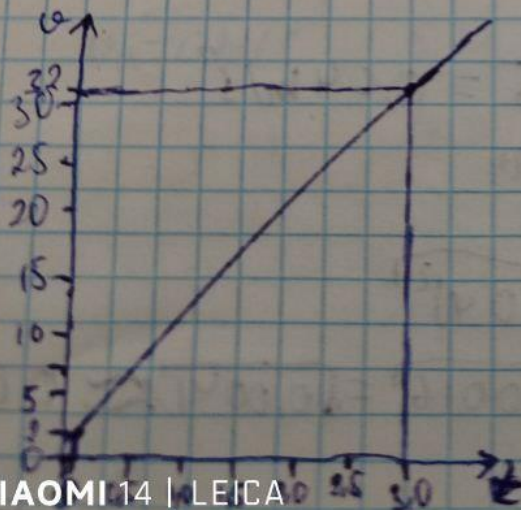
$$\begin{array}{lcl}
 17) & v_1 = 980 \text{ m/s} & x_1 = v_1 \cdot t \\
 & v_0 = 980 \text{ m/s} & x_2 = \frac{1}{2} a_2 \cdot t^2 \\
 & a_1 = 0 & x_1 = x_2 \\
 & v_0 = 0 \text{ m/s} & v_1 \cdot t = \frac{1}{2} a_2 \cdot t^2 \\
 & a_2 = 9,88 \text{ m/s}^2 = 9,098 \text{ m/s}^2 & v_1 = \frac{1}{2} a_2 \cdot t \\
 & & t = \frac{2v_1}{a_2}
 \end{array}$$

$$\begin{aligned}
 t &= 200000 \text{ s} = \\
 &= 5,15 \text{ soat.}
 \end{aligned}$$

$$t = \frac{2 \cdot 980}{9,098} = \frac{2 \cdot 98 \cdot 10^1}{98 \cdot 10^{-3}}$$

$$\begin{aligned}
 44) \quad S &= 4 + 2t + 5t^2 \\
 S' &= 2 + 10t
 \end{aligned}$$

$$\begin{aligned}
 t=0, \quad v &= 2 \text{ m/s} \\
 t &= 3,32 \text{ m/s}
 \end{aligned}$$





1.2.

$$\begin{array}{l} 17) \quad R = 45 \text{ m} \\ \quad \quad t = 10 \text{ s} \\ \quad \quad S = 25 \text{ m} \end{array} \quad \begin{array}{l} S = \frac{1}{2} a_t t^2 \\ a_t = \frac{2S}{t^2} \end{array}$$

$$a_t = \frac{2 \cdot 25}{10^2} = \frac{50}{100} = 0,5 \text{ m/s}^2$$

$$v = a_t \cdot t$$

$$v = 0,5 \cdot 10 = 5 \text{ m/s}$$

$$a_n = \frac{v^2}{R}$$

$$a_n = \frac{5^2}{45} = \frac{25}{45} = 0,33 \text{ m/s}^2$$

jawab:  $a_t = 0,5 \text{ m/s}^2$  dan  $a_n = 0,33 \text{ m/s}^2$

$$44) \quad \varepsilon = 0,1 \text{ rad/s}^2 \quad a_t = \varepsilon \cdot r$$

$$t = 2 \text{ s}$$

$$a_t = 0,1 \text{ rad/s}^2 \cdot 0,5 \text{ m} =$$

$$r = 50 \text{ cm} = 0,5 \text{ m} \quad = 0,05 \text{ m/s}^2$$

$$\omega = \varepsilon \cdot t$$

$$\omega = 0,1 \cdot 2 = 0,2 \text{ rad/s}$$

$$a_n = \omega^2 \cdot r$$

$$a_n = (0,2)^2 \cdot 0,5 = 0,04 \text{ m/s}^2$$

$$a = \sqrt{a_t^2 + a_n^2}$$

$$a = \sqrt{(0,05)^2 + (0,04)^2}$$

$$a = \sqrt{0,0025 + 0,0016} = \sqrt{0,0041} \approx 0,064 \text{ m/s}^2$$



Jawab:

$$a_t = 0,05 \text{ m/s}^2, a_n = 0,04 \text{ m/s}^2, a \approx 0,064 \text{ m/s}^2$$

1.3.

$$\text{17)} \quad m_1 = 2 \text{ kg} \quad \left| \quad m_1 v_1 + m_2 v_2 = (m_1 + m_2) v\right.$$

$$v_1 = 300 \text{ m/s}$$

$$m_2 = 100 \text{ kg}$$

$$v_2 = 72 \text{ km/h} = 20 \text{ m/s} \quad \left| \quad v = \frac{m_1 v_1 + m_2 v_2}{m_1 + m_2} = \frac{2 \cdot 300 + (100 \cdot 20)}{2 + 100}\right.$$

$$v = \frac{600 + 2000}{102} = \frac{2600}{102} \approx \boxed{25,49 \text{ m/s}}$$

Jawab:  $v \approx \boxed{25,5 \text{ m/s}}$

$$\text{44)} \quad m_1 = 9 \text{ kg}$$

$$m_2 = 1 \text{ kg}$$

$$v_1 = 6 \text{ m/s}$$

$$h = 10 \text{ m}$$

$$v_0 = 0 \text{ m/s}$$

$$v_2 = \sqrt{2gh}$$

$$v_2 = \sqrt{2 \cdot 9,8 \cdot 10} = 14 \text{ m/s}$$

$$m_1 v_1 + m_2 v_2 = (m_1 + m_2) v$$

$$(9 \cdot 6) + (1 \cdot 14) = (9 + 1) \cdot v$$

$$54 + 14 = 10v$$

$$v = \frac{68}{10} = \boxed{6,8 \text{ m/s}}$$



2.1.

17)  $m = 0,5 \text{ kg}$

$t = 17^\circ\text{C} \rightarrow T = 273 + 17 = 290 \text{ K}$

$p = 93,3 \text{ kPa} = 93,3 \cdot 10^3 \text{ Pa}$

$pV = mRT/M$

$V_{\text{normal}} = 0,255 \text{ m}^3$

$m' = \frac{pVM}{RT}$

$m' = 0,435 \text{ kg}$

$m' = \frac{93,3 \cdot 10^3 \cdot 0,255 \cdot 0,044}{8,31 \cdot 290} = \boxed{0,435 \text{ kg}}$

44)  $\rho = 1,25 \text{ kg/m}^3$

$\gamma = \frac{C_p}{C_v}, C_p - C_v = R$

$\gamma = 1,4$

$R = \frac{p}{\rho T}$

$p = 1,01 \cdot 10^5 \text{ Pa}$

$T = 273 \text{ K}$

$R = \frac{1,01 \cdot 10^5}{1,25 \cdot 273} = \boxed{295,97}$

$C_p \text{ and } C_v = ?$

$C_v = \frac{R}{\gamma - 1} = \frac{295,97}{1,4 - 1} = \boxed{739,93}$

$C_p = \gamma C_v = 1,4 \cdot 739,93 = \boxed{1035,9}$



2.2.

17)  $m = 1g$

$p = 0,2 \text{ mol}$

$N_A = 6,022 \cdot 10^{23} \text{ atom/mol}$

$N = p \cdot N_A$

$N = 0,2 \cdot 6,022 \cdot 10^{23}$

$= 1,2044 \cdot 10^{23}$

44)  $t = 7^\circ\text{C}$

$v_1 = 500 \text{ m/s}$

$v_2 = 510 \text{ m/s}$

$f(v) = 4\pi \left( \frac{m}{2\pi kT} \right)^{\frac{3}{2}} \cdot v^2 e^{-\frac{mv^2}{2kT}}$

$\Delta N = \frac{\Delta v}{v_{rms}} \cdot N$

$v_{rms} = \sqrt{\frac{3kT}{m}} = \sqrt{\frac{3 \cdot 1,38 \cdot 10^{-25} \cdot 280}{4,65 \cdot 10^{-26}}} =$

$= 499,3 \text{ m/s}$

$\frac{\Delta N}{N} = \frac{\Delta v}{v_{rms}} = \frac{510 - 500}{499,3} \approx 0,02 = 2\%$

3.1.

17)  $N = 5 \cdot 10^5$  ta otigcha elektron  $Q_1 = N \cdot q$

$e = 1,6 \cdot 10^{-19} \text{ C}$

$q = 13,2 \cdot 10^{-14} \text{ C}$

$r = 1 \text{ m}$

$Q_1 = (5 \cdot 10^5) \cdot (1,6 \cdot 10^{-19})$

$Q_1 = 8 \cdot 10^{-14} \text{ C}$

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

$= 9 \cdot 10^9 \cdot \frac{(8 \cdot 10^{-14}) \cdot (13,2 \cdot 10^{-14})}{1^2} = 9 \cdot 10^9 \cdot 105,6 \cdot 10^{-28}$



$$F = 950,4 \cdot 10^{-19} \text{ N} \approx \boxed{9,5 \cdot 10^{-17} \text{ N}}$$

$$Q_{\text{umumiy}} = Q_1 + Q_2$$

$$Q_{\text{umumiy}} = 8 \cdot 10^{-14} + 13,2 \cdot 10^{-14} = 21,2 \cdot 10^{-14} \text{ C}$$

$$Q_{\text{yangi}} = \frac{Q_{\text{umumiy}}}{2} = \frac{21,2 \cdot 10^{-14}}{2} = 10,6 \cdot 10^{-14} \text{ C}$$

$$N_{\text{yangi}} = \frac{Q_{\text{yangi}}}{e} = \frac{10,6 \cdot 10^{-14}}{1,6 \cdot 10^{-19}} = \boxed{6,625 \cdot 10^5}$$

$$\text{Javob: } F \approx 9,5 \cdot 10^{-17} \text{ N}, N_{\text{yangi}} \approx 6,6 \cdot 10^5 \text{ ta}$$

$$44) \quad Q_{\text{umumiy}} = 5 \cdot 10^{-5} \text{ C} \quad F = k \frac{q_1 q_2}{r^2}$$

$$r = 2 \text{ m}$$

$$F = 1 \text{ N}$$

$$q_1 + q_2 = Q_{\text{umumiy}}$$

$$q_1 = 1,16 \cdot 10^{-5} \text{ C}$$

$$q_2 = 3,84 \cdot 10^{-5} \text{ C}$$

3.2.

$$17) \quad R = 0,08 \text{ m} \quad B_{\text{halqa}} = \frac{\mu_0 I}{2R}$$

$$I = 2 \text{ A}$$

$$B_{\text{otkorsich}} = \frac{\mu_0 I}{2\pi R}$$

$$B = \sqrt{B_{\text{halqa}}^2 + B_{\text{otkorsich}}^2}$$

$$B_{\text{halqa}} = \frac{\mu_0 I}{2R}$$

$$B_{\text{halqa}} = \frac{4\pi \cdot 10^{-7} \cdot 2}{2 \cdot 0,08} = \frac{8\pi \cdot 10^{-7}}{0,16}$$



$$B_{\text{halqa}} \approx 1,57 \cdot 10^{-5} \text{ T}, \quad B_{\text{Böhrersgich}} = \frac{\mu_0 I}{2\pi R}$$

$$B_{\text{Böhrersgich}} = \frac{4\pi \cdot 10^{-7} \cdot 2}{2\pi \cdot 0,08} = \frac{8 \cdot 10^{-7}}{0,16} \approx 5 \cdot 10^{-6} \text{ T}$$

$$B = \sqrt{B_{\text{halqa}}^2 + B_{\text{Böhrersgich}}^2} = \sqrt{(1,57 \cdot 10^{-5})^2 + (5 \cdot 10^{-6})^2} =$$

$$= \sqrt{(2,46 \cdot 10^{-10}) + (2,5 \cdot 10^{-11})}$$

$$B \approx \sqrt{2,71 \cdot 10^{-10}} \approx \boxed{1,65 \cdot 10^{-5} \text{ T}}$$

$$\underline{44)} \quad \left. \begin{array}{l} I = 5 \text{ A} \\ a = 0,1 \text{ m} \end{array} \right\}$$

$$B_{\text{Lamora}} = \frac{\mu_0 I}{4\pi R} \sin \alpha$$

$$R = \frac{a}{\sqrt{2}}, \quad \sin 45^\circ = \frac{\sqrt{2}}{2}$$

$$B_{\text{Lamora}} = \frac{\mu_0 I}{4\pi R} \sin \alpha \cdot \frac{\sqrt{2}}{2} = \boxed{2 \cdot 10^{-5} \text{ T}} = \boxed{20 \mu\text{T}}$$

3.3.

$$\underline{17)} \quad \left. \begin{array}{l} l = 10 \text{ m} \\ U = 6 \text{ V} \end{array} \right\} R = \rho \cdot \frac{l}{S}$$

$$\left. \begin{array}{l} \rho = 9,8 \cdot 10^{-8} \Omega \cdot \text{m} \\ j = ? \end{array} \right\} I = \frac{U}{R} = \frac{U \cdot S}{\rho \cdot l}$$

$$j = \frac{I}{S} = \frac{U}{\rho \cdot l} =$$

$$= \frac{6}{(9,8 \cdot 10^{-8}) \cdot 10}$$

$$\boxed{j \approx 6,12 \cdot 10^6 \text{ A/m}^2}$$



44)  $\mathcal{E} = 200 \text{ V}$

$R_V = 1 \text{ k}\Omega = 1000 \Omega$

$R_1 = R_2 = 600 \Omega$

$R_{\text{parallel}} = \frac{R_2 \cdot R_V}{R_2 + R_V} =$

$= \frac{600 \cdot 1000}{600 + 1000} =$

$= \frac{600000}{1600} = \boxed{375 \Omega}$

$R_{\text{total}} = R_1 + R_{\text{parallel}}$

$R_{\text{total}} = 600 + 375 = \boxed{975 \Omega}$

$I = \frac{\mathcal{E}}{R_{\text{total}}} = \frac{200 \text{ V}}{975} \approx \boxed{0,205 \text{ A}}$

$U_V = I \cdot R_{\text{parallel}} = 0,205 \cdot 375 \approx \boxed{76,9 \text{ V}}$

jawab:  $I \approx 0,205 \text{ A}$  dan  $U_V \approx 76,9 \text{ V}$