Fizika, 8-sinf

1. Tinch holatdan tekis tezlanuvchan harakatlana boshlagan poyezdning ikkinchi vagoni biror ustun oldidan t_0 vaqtda o'tib ketsa, oltinchi vagoni shu ustun oldidan qancha vaqtda o'tadi ?

Yechim:

$$l = \frac{at_1{}^2}{2}$$

$$2l = \frac{at_2{}^2}{2}$$

$$t_0 = t_2 - t_1$$

$$t_1 = \sqrt{\frac{2l}{a}}$$

$$t_2 = \sqrt{\frac{4l}{a}} \quad bundan\ t_2 = \sqrt{2}t_1$$

$$t_0 = t_2 - t_1 = (\sqrt{2} - 1)t_1$$

$$5l = \frac{at_5{}^2}{2}$$

$$6l = \frac{at_6{}^2}{2}$$

$$t_5 = \sqrt{\frac{10l}{a}} = \sqrt{5}t_1$$

$$t_6 = \sqrt{\frac{12l}{a}} = \sqrt{6}t_1$$

$$t_x = t_6 - t_5 = \sqrt{6}t_1 - \sqrt{5}t_1 = (\sqrt{6} - \sqrt{5})t_1$$

$$\frac{t_x}{t_0} = \frac{(\sqrt{6}-\sqrt{5})t_1}{(\sqrt{2}-1)t_1} = \frac{(\sqrt{6}-\sqrt{5})}{(\sqrt{2}-1)}$$

$$t_x = \frac{(\sqrt{6} - \sqrt{5})}{(\sqrt{2} - 1)} * t_0$$

Javob: $t_x = \frac{(\sqrt{6} - \sqrt{5})}{(\sqrt{2} - 1)} * t_0$

2. Akbar 2 kg mssali qoziqni yerga qoqish uchun 1 kg massali bolg'ani har safar 45 sm balandlikka ko'tarib erkin tashlaydi va bolg'a qoziqqa noelastik uriladi. Necha marta urilgach qoziq yerga 60 sm kiradi? Yerning qoziqqa qarshilik kuchi 50 N.

Yechim:

Berilgan

$m_q = 2kg$

$m_b = 1kg$

$h = 0{,}45\ m$

$F_q = 50\ N$

H=0,6 m

N=?

$$m_b v_b = (m_q + m_b)v_x$$

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

$$\frac{(m_q+m_b){v_x}^2}{2} = \left(F_q - \left(m_q + m_b\right)g\right)h_x$$

$$v_x = \frac{m_b v_b}{m_q+m_b} = \frac{m_b\sqrt{2gh}}{m_q+m_b}$$

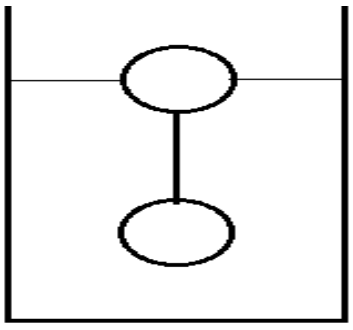
$${m_b}^2 * \frac{gh}{m_q+m_b} = \left(F_q - \left(m_q + m_b\right)g\right)h_x$$

$$h_x = {m_b}^2 * \frac{\frac{gh}{m_q + m_b}}{F_q - \left(m_q + m_b\right)g} = 1 * \frac{1{,}5}{20} = 0{,}075m$$

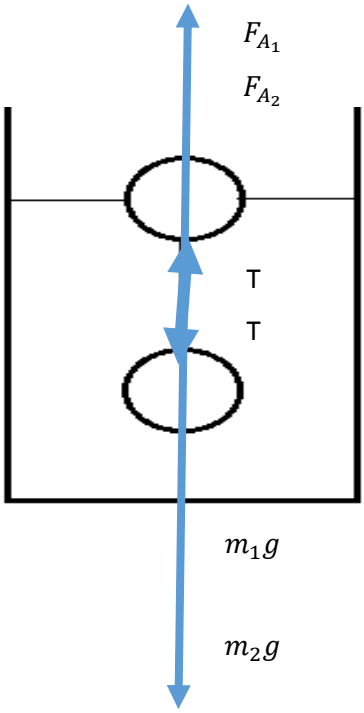
$$N = \frac{\mathrm{H}}{h_x} = \frac{0{,}6}{0{,}075} = 8$$

Javob: $8\ marta$

3. 2 ta hajmlari teng, zichliklari 3 marta farq qiluvchi sharlar rasmdagidek ipga bog'langan holda suvda turibdi. Agar sharlarning hajmlari 10 sm^3 dan bo'lsa va ip uzib yuborilsa, yuqoridagi sharchaga ta'sir qilayotgan arximed kuchi qanday o'zgaradi? Yuqoridagi sharchaning yarmi suvga botib turibdi.



Yechim:



$$m_1 g + m_2 g = F_{A_1} + F_{A_2}$$

$$m_1 g = \rho V g$$

$$m_2 g = 3\rho V g$$

$$F_{A_1} = \frac{\rho_s V g}{2}$$

$$F_{A_2} = \rho_s V g$$

$$\rho V g + 3\rho V g = \frac{\rho_s V g}{2} + \rho_s V g$$

$$4\rho V g = \frac{3\rho_s V g}{2}$$

$$\rho = \frac{3\rho_s}{8}$$

bundan shunday xulosaga kelish mumkinki ip uzib yuborilgandan keyin yuqoridagi birinchi jism suv sirtiga qalqib chiqadi va

$F_{A_1}{}' = m_1 g$ bo'lib qoladi.

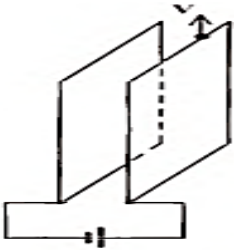
$$F_{A_1}{}' = m_1 g = \rho V g = \frac{3\rho_s}{8} V g$$

$$F_{A_1}{}' = \frac{3}{4} F_{A_1}$$

$bundan\ \frac{4}{3}\ marta\ kamayishi\ kelib\ chiqadi.$

Javob: $\frac{4}{3}\ marta\ kamayadi$

4. Rasmda yuzalari 100 sm^2, oralaridagi masofa 1 sm bo'lgan kvadrat shakldagi kondensator tasvirlangan. Kondensator qoplamalari 1000 V kuchlanishga ulangan, Agar plastinkalardan biri ikkinchisiga nisbatan 10 sm/s tezlik bilan parallel surilsa, zanjirdan qancha tok (nA) oqib o'tadi?



Yechim:

Berilgan

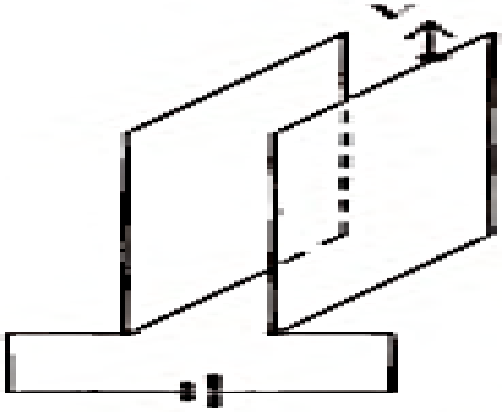
$S = 100$ sm^2

$d = 1sm = 0{,}01\ m$

U=1000 V

$v = 10$ sm/s

I =?



$$S = a^2$$

$$a = \sqrt{S}$$

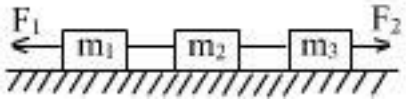
$$t = \frac{a}{v} = \frac{\sqrt{S}}{v}$$

$$I = \frac{q}{t} = \frac{cU}{t} = \frac{\varepsilon_0 SU}{d\,t}$$

$$I = \frac{\varepsilon_0 SU}{d\ t} = \frac{8{,}85 * 10^{-12} * 10^{-2} * 10^{3}}{0{,}01 * \frac{\sqrt{10^{-2}}}{0{,}1}} = 8{,}85 * 10^{-9}\ A = 8{,}85\ nA$$

Javob: 8,85 nA

5. Vaznsiz ip bilan bog‘langan bir-biriga, uchta jism silliq stol ustida turibdi . m_1 massali jismga tekislik bo‘ylab yo‘nalgan F1 kuch qo‘yilgan, massasi m_3 bo‘lgan jismga F2>F1 kuch qarama-qarshi yo‘nalishda ta’sir etmoqda. m_2 va m_3 massali jismlar orasidagi ipning taranglik kuchi topilsin.

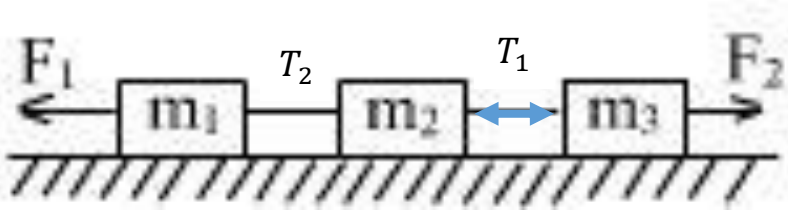


Yechim:

Berilgan

$F_2 > F_1$

T_1 =?



$$(m_1 + m_2 + m_3)a = F_2 - F_1$$

$$a = \frac{F_2 - F_1}{m_1 + m_2 + m_3}$$

$$m_3 a = F_2 - T_1$$

$$T_1 = F_2 - m_3 a$$

$$T_1 = F_2 - m_3 \frac{F_2 - F_1}{m_1 + m_2 + m_3}$$

$$T_1 = \frac{F_2 * (m_1 + m_2 + m_3) - m_3 * (F_2 - F_1)}{m_1 + m_2 + m_3}$$

$$T_1 = \frac{F_2 * m_1 + F_2 * m_2 + F_2 * m_3 - m_3 * F_2 + F_1 * m_3}{m_1 + m_2 + m_3} = \frac{F_2 * m_1 + F_2 * m_2 + F_1 * m_3}{m_1 + m_2 + m_3}$$

Javob: $\frac{F_2 * m_1 + F_2 * m_2 + F_1 * m_3}{m_1 + m_2 + m_3}$