

1. Bola kitobni vertikal devorga bosib turibdi. Devor va kitob orasidagi ishqalanish koefitsiyenti 0,2 ga, kitobning massasi 2 kg ga teng. Kitob sirpanib ketmasligi uchun bola kitobni qanday minimal kuch bilan (N) bosib turishi kerak? $g = 10 \frac{m}{s^2}$

Yechim:

Berilgan:

$$\mu = 0,2$$

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

$$g = 10 \frac{m}{s^2}$$

$$F=?$$

Chizmaga ko'ra

Ikki o'q boyicha ikkita proyeksiya olamiz

$$X \text{ o'qi boyicha: } 0 = F - N$$

$$Y \text{ o'qi bo'yicha: } 0 = mg - F_{ISH}$$

$$\text{Ishqalanish kuchi ifodas esa: } F_{ISH} = \mu N$$

$$\text{Birinchi tenglamadan: } N=F$$

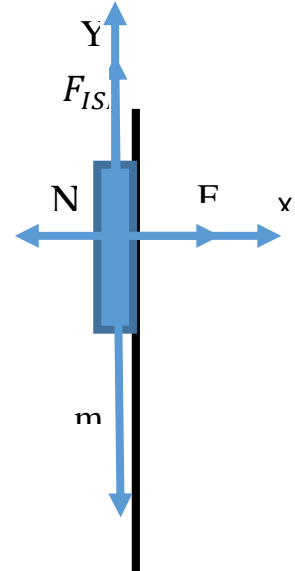
$$F_{ISH} = \mu N = \mu F$$

$$mg = F_{ISH} = \mu F$$

$$F = \frac{mg}{\mu}$$

$$F = \frac{2 \text{ kg} * 10 \frac{m}{s^2}}{0,2} = 100 \text{ N}$$

$$\text{Javob: } F = 100 \text{ N}$$



2. 10 m balandlikdan tushayotgan 3 kg massali jismning yerga urilish vaqtidagi tezligi 12 m/s bo'lsa, u ishqalanish natijasida havoga necha J issiqlik miqdori ajratib chiqargan?

Yechim:

Berilgan :

Energiyaning saqlanish qonuniga ko'ra

$h=10$ m

$m= 3$ kg

$$mgh = \frac{mv^2}{2} + Q$$

$v = 12 \frac{m}{s}$

$$Q = mgh - \frac{mv^2}{2}$$

$Q=?$

$$Q = 3 \text{ kg} * 10 \frac{m}{s^2} * 10 \text{ m} - \frac{3 \text{ kg}}{2} * 144 \frac{m^2}{s^2} = 84 \text{ J}$$

Javob: $Q = 84 \text{ J}$

3. Mis va kumush qotishmasidan tayyorlangan buyumning havodagi og'irligi 2,5 N, suvdagi og'irligi 2,25 N. Qotishmaning o'rtacha zichligini (g/sm^3) toping.

Yechim:

Berilgan:

$$mg = 2,5 \text{ N}$$

$$N = mg - F_A = 2,25 \text{ N}$$

$\rho_j = ?$

$$mg = \rho_j * V_j * g$$

$$F_A = \rho_s * V_j * g$$

$$N = \rho_j * V_j * g - \rho_s * V_j * g$$

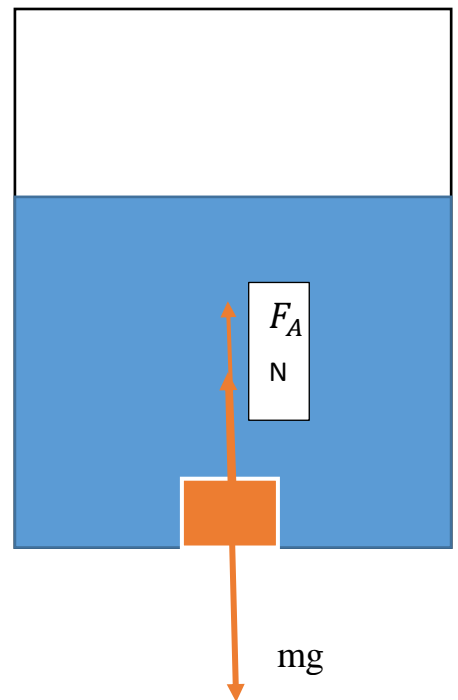
$$N = V_j * g * (\rho_j - \rho_s)$$

$$\frac{mg}{N} = \frac{\rho_j * V_j * g}{V_j * g * (\rho_j - \rho_s)} = \frac{\rho_j}{\rho_j - \rho_s}$$

$$\rho_j = \frac{mg * \rho_s}{mg - N}$$

$$\rho_j = \frac{mg * \rho_s}{mg - N} = 2,5 \text{ N} * \frac{1000 \frac{\text{kg}}{\text{m}^3}}{0,25 \text{ N}} = 10000 \frac{\text{kg}}{\text{m}^3}$$

Javob: $\rho_j = 10000 \frac{\text{kg}}{\text{m}^3}$



4. Buyumning fokus masofasi 10 sm bo'lgan linzadan qanday masofaga joylashtirilsa, uning 5 marta kattalashgan tasviri hosil bo'ladi (sm)?

$$\frac{1}{F} = \frac{1}{d} \pm \frac{1}{f}$$

$$F=0,1 \text{ m}$$

$$K=5$$

$$d=?$$

$$k = \frac{f}{d}$$

$$f = kd$$

$$\frac{1}{F} = \frac{1}{d} \pm \frac{1}{kd} = \frac{k \pm 1}{kd}$$

$$d = \frac{(k \pm 1)F}{k}$$

$$d_1 = 0,12 \text{ m}$$

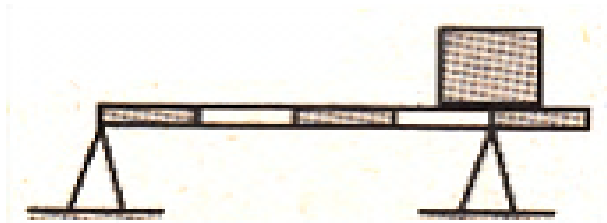
$$d_2 = 0,8 \text{ m}$$

javob:

$$d_1 = 0,12 \text{ m}$$

$$d_2 = 0,8 \text{ m}$$

5. 40 kg massali balka ustiga 10 kg massali yuk qo'yilgan. O'ng tayanchda qanday reaksiya kuchi (N) hosil bo'ladi?



Yechim:

$$m_b = 40 \text{ kg}$$

$$m_y = 10 \text{ kg}$$

$$N=?$$

$$m_y g l_1 + m_b g l_2 = N l_1$$

$$l_1 = 4l$$

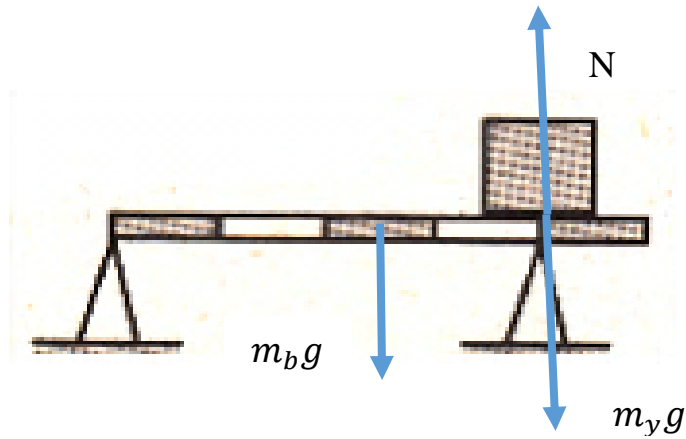
$$l_2 = 2,5 l \text{ bularni yuqoridagi tenglamaga qo'ysak.}$$

$$m_y g 4l + m_b g 2,5 l = 4lN$$

$$N = \frac{m_y g 4 + m_b g 2,5}{4} = \frac{1400 N}{4} = 350 N$$

Javob:

$$N = 350 N$$



@olimpdep



Fan olimpiadalari bo'yicha
iqtidorli o'quvchilar bilan ishlash
DEPARTAMENTI