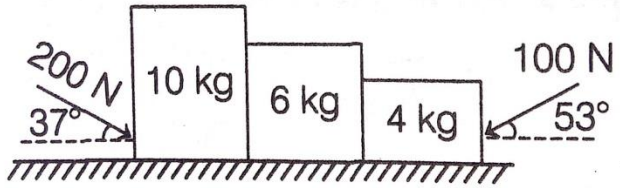
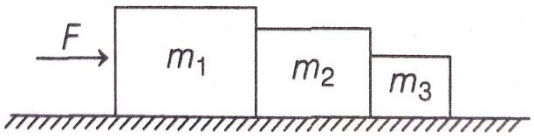
1. Find normal force between 6kg and 4kg.



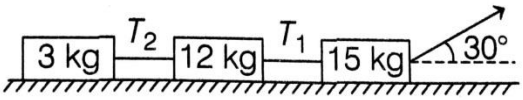
(a) 40N (b) 50N (c) 60N (d) 80N

2. Three blocks of masses m_1, m_2 and m_3 kg are placed in contact with each other on a frictionless table. A force F is applied on the heaviest mass m_1. Find net force experienced by m_2.



(a) F (b) $\frac{F_1}{m_2+m_3}$ (c) $\frac{Fm_2}{m_1+m_2+m_3}$ (d) $\frac{F(m_{2+m_3})}{m_1+m_2+m_3}$

3. The surfaces are frictionless, the ration of T_1 and T_2 is

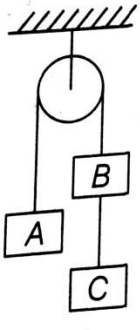


(a) $\sqrt{3}:2$ (b) $1:\sqrt{3}$ (c) 1 : 5 (d) 5 : 1

4. In a hemispherical shell of radius R, a rod mass $\frac{\sqrt{3}}{2}$ kg is placed horizontally. The length of rod is R. Find the normal reaction at any end of the rod.

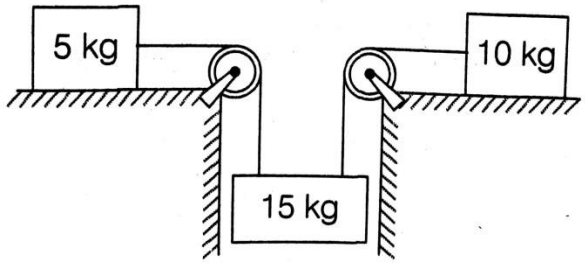
(a) 5N (b) $5\sqrt{3}N$ (c) $\frac{5}{\sqrt{3}}$ N (d) 2.5 N

5. Three equal weights of mass 2 kg each are hanging by a string passing over a fixed pulley. The tension in the string (in N) connecting B and C is



(a) $\frac{4g}{3}$ (b) $\frac{g}{3}$ (c) $\frac{2g}{3}$ (d) $\frac{g}{2}$

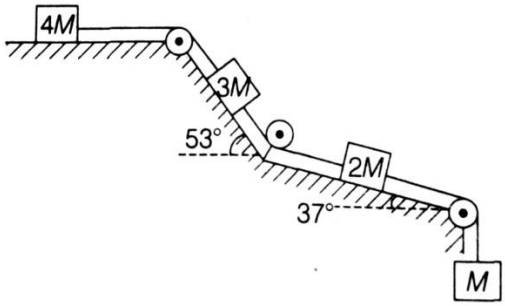
6. Find tension acting on 10kg block.



(a) 30N (b) 40N (c) 50N (d) 60N

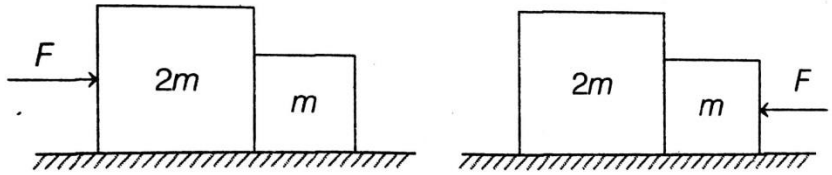
7. Find acceleration of each block.

(a) 3.6 m/s² (b) 4.6 m/s² (c) 5.6 m/s² (d) 6.6 m/s²



8. Two blocks are in contact on a frictionless table. One has mass m and the other 2m. A force F is applied on 2m as shown in the figure. Now, the same force F is applied from the right on m. In the two cases respectively, the ratio of force of contact between the two blocks will be

(a) Same (b) 1 : 2 (c) 2 : 1 (d) 1 : 3

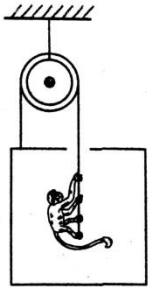


9. An empty plastic box of mass m is found to accelerate up at the rate of $\frac{g}{6}$ when placed deep inside water. How much mass of sand be filled in it, so that it may accelerate down at the rate of $\frac{g}{6}$?

(a) $\frac{m}{6}$ (b) $\frac{5m}{6}$ (c) $\frac{2m}{5}$ (d) $\frac{3m}{5}$

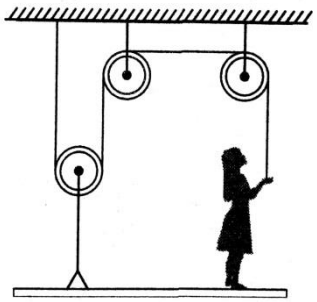
10. A monkey of mass 20 kg is climbing up on the rope to balance the cage of 25. What is the acceleration of monkey?[g = 10ms^{-2}]

(a) 5 m/s² (b) 11.5 m/s² (c) 22.5 m/s² (d) 2.5 m/s²



11. A 50 kg person stands on a 25 kg platform. She pulls massless rope which is attached to the platform via the frictionless, massless pulleys as shown in the figure. The platform moves upwards at a steady velocity if the force with which the person pulls the rope is

(a) 500N (b) 250N (c) 25N (d) 50N



12. A 10kg wagon is pushed with a force of 7 N for 1.5 s, then with a force of 5N for 1.7s, and then with a force of 10 N for 3s in the same direction. What is the change in velocity brought about?

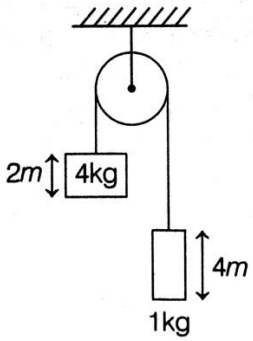
(a) 9.8 m/s (b) 19.6 m/s (c) 4.9 m/s (d) 10 m/s

13. A balloon has 5 g of air. A small hole is pierced into it. The air escapes at a uniform rate with a velocity of 4 cm/s. If the balloon shrinks completely in 2.5 s, then the mean force acting on the balloon is

(a) 5 dyne (b) 8 dyne (c) 10 dyne (d) 20 dyne

14. In figure shown, both blocks are released from rest. Find the time to cross each other?

(a) 1s (b) 2s (c) 3s (d) 4s

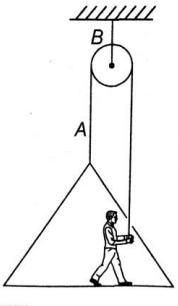


15. A block slides down a frictionless incline making an angle θ with the floor at an elevator. The elevator is descending with an acceleration a. the value of normal reaction acting on the block is

(a) mg sin θ (b) m(g-a) cos θ (c) mg cos θ (d) m(g-a) sin θ

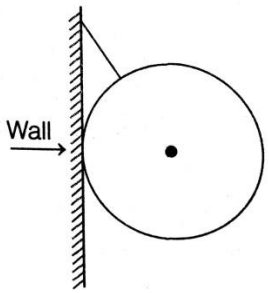
16. To paint the side of a building, painter normally hoists himself up by pulling on the rope A as in figure. The masses of painter and platform are 60 kg and 20 kg, respectively. The rope B can withstand 1000 N. Find the maximum acceleration of the painter.

(a) 3 ms^{-2} (b) 2.5 ms^{-2} (c) 5 ms^{-2} (d) zero



17. A uniform sphere of weight w and radius 3m is being held by a string of length 2 m attached to a frictionless wall as shown in the figure. Normal reaction by wall will be

(a) $\frac{5w}{4}$ (b) $\frac{15w}{4}$ (c) $\frac{15w}{16}$ (d) $\frac{3w}{4}$

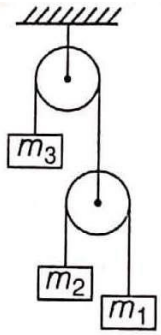


18. A spring has length l and spring constant k. It is cut into two pieces of length l_1 and l_2 such that $l_1 = nl_2$. The force constant of spring of length l_1 is

(a) k(l+n) (b) $\left(\frac{k(l+n)}{n}\right)$ (c) k (d) $\frac{k}{(l+n)}$

19. Three masses m_1, m_2 and m_3 are attached to a string-pulley system as shown. All the three masses are held at rest and then released. To keep m_3 at rest, m_3 should be

(a) $\frac{4m_1m_2}{m_1+m_2}$ (b) $2(m_1+m_2)$ (c) (m_1+m_2) (d) $\frac{2m_1m_2}{m_1+m_2}$



20. A pendulum of mass m hangs from a support fixed to a trolley. The direction of the string when the trolley rolls up a plane of inclination

(a) $\theta = \tan^{-1} a_0$ (b) $\theta = \tan^{-1} \frac{a_0}{g}$ (c) $\theta = \tan^{-1} \frac{g}{a_0}$ (d) $\theta = \tan^{-1} \frac{a_0 + g\sin\alpha}{g\cos\alpha}$