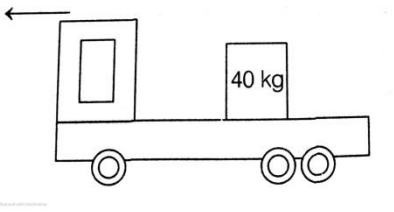
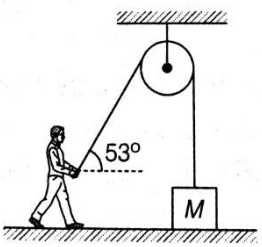
1. The rear side of a truck is open and box 40 kg mass is placed 5m away from open end as shown in figure. The coefficient of friction between the box and the surface below it is 0.15. on the straight road, the truck starts from rest and accelerates with ms $^{-2}$. Find the distance (in m) travelled by the time box falls from the truck. (Ignore the size of box)



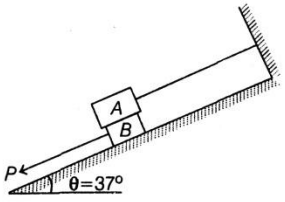
2. A block of mass m is resting on a rough horizontal ground. Minimum force required to move the block is $\frac{3mg}{5}$ find the coefficient of friction between the block and the ground.

3. A thin rod of length 1 m is fixed in a vertical position inside a train, which is moving horizontally with constant acceleration 4 m/s^2. A bead can slide on the rod. And friction coefficient between them is 1/2 . if the bead is released from rest the top of the rod. Find the time (in s) when is will it will reach at the bottom.

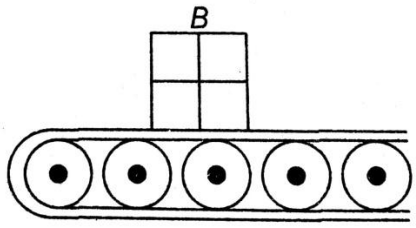
4. A man of mass 63 kg is pulling a mass M by an inextensible light rope passing thought a smooth and massless pulley as shown in figure. The coefficient of friction between the man and the ground is μ= 3/5. Find the maximum value of M (in kg) that can be lifted by the man without slipping on the ground.



5. Blocks A and B shown each has mass 10 kg. if coefficient of static friction between A and B is 0.3 and that between B and incline is 0.4 then what is the value of force P (in N) to just start the motion of B? (g=10 m/s^2)

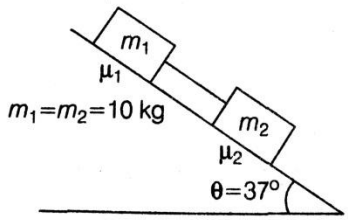


6. The conveyor belt is moving at 4 m/s. The coefficient of static friction between the conveyor belt and the 10 kg package B is μ_s =0. Determine the short

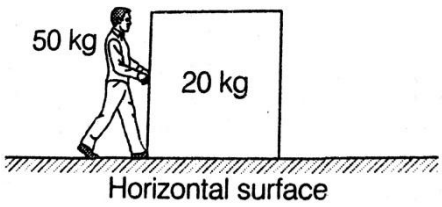


7. A box of mass 1 kg is lying on a rough horizontal floor and a horizontal force acting on box has a magnitude of $F = 3t^2N$, where t is in seconds. If the box starts from rest, determine its speed (in m/s) when t = 3s. The coefficient of static and kinetic friction between the box and horizontal floor are $\mu_s = 0.3$ and μ_k 0.2.

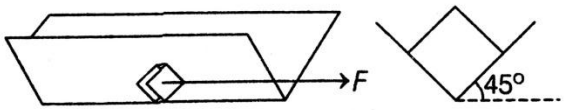
8. Two blocks of same mass are sliding on an incline. The coefficients of kinetic friction between the blocks and the incline are different, $\mu_1 = 0.5$ and $\mu_2 = 0.4$, respectively. Find the tension (in newton) in string. ($g = 10\ m/s^2$)



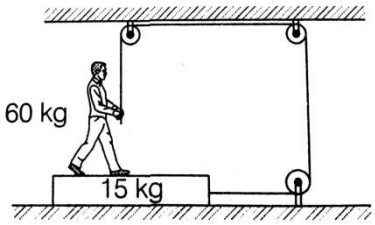
9. A boy of mass 50 kg produces and acceleration of 2 m/s^2 in a block of mass 20 kg by pushing it in horizontal direction. The boy moves with the block such that boy and the block have same acceleration. There is no friction between the block and fixed horizontal surface but there is friction between foot of the boy and horizontal surface. Find the friction force (in N) exerted by the horizontal surface on the boy.



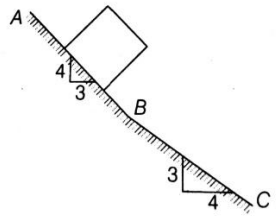
10. A crate of mass 1 kg is pulled with a force F along a fixed right angled horizontal trough as in figure. The coefficient of kinetic friction between the crate and the trough is $\mu = \sqrt{2}$. Find the value of force F (in N) required to pull it along the trough with constant velocity.



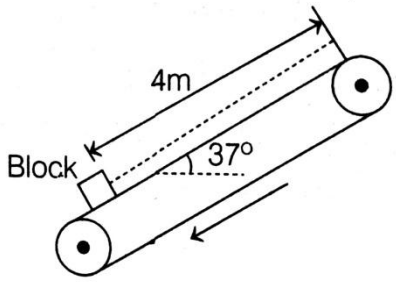
11. The friction coefficient between the board and the floor shown in figure is 0.5. Find the maximum force (in newton) that the man can exert on the rope, so that the board does not slip on the floor.



12. The acceleration of a package sliding down section AB of incline ABC is 6 m/s^2. Assuming that the coefficient of kinetic friction is the same for each section, determine the acceleration (in m/s^2) of the package on section BC of the incline. (g = 10 m/s^2)



13. The following figure shows an accelerating conveyor belt inclined at an angle 37° above horizontal. The coefficient of friction between the belt and block is 1. Find the least time (in second) in which block can reach the top, starting from rest at the bottom.



14. A man can just push a box on 37° concrete slope. When he keeps it at the point, where the angle increases to 53°, he can just hold it from sliding back. If the coefficient of friction between the box and the concrete slope is μ, find $\frac{1}{\mu}$. Assume that the man is applying same magnitude of force along the tangent to the curve only.