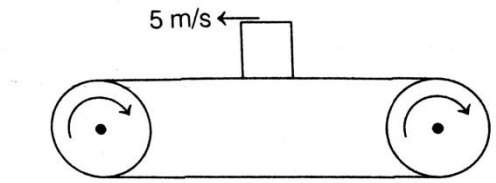
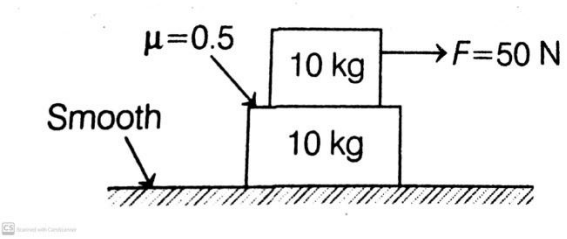
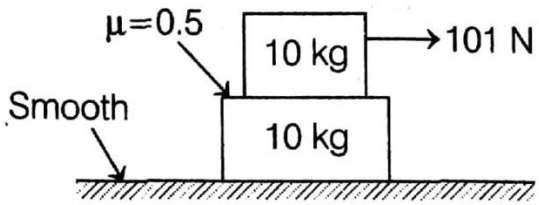
1. A block lying on a long horizontal conveyor belt moving at a constant velocity receives a velocity 5 m/s at $t = 0$ relative to the ground in the direction opposite to the direction of motion of the conveyor. At t = 4 s, the relative motion between the block and the belt stops. The coefficient of friction between the block and the belt is 0.2. Find the velocity of the conveyor belt. ($g = 10\ m/s^2$)



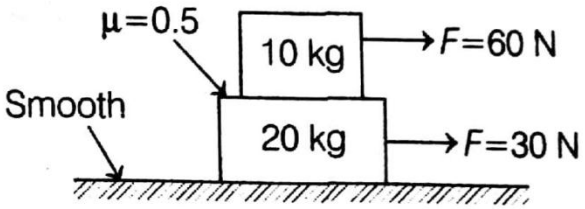
2. Find acceleration of both the blocks in the following problems.



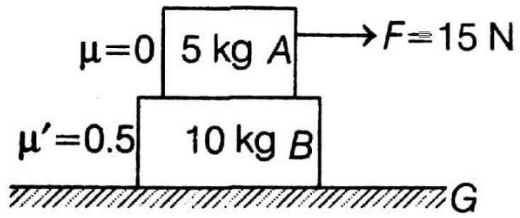
3. Find acceleration of both the blocks in the following problems.



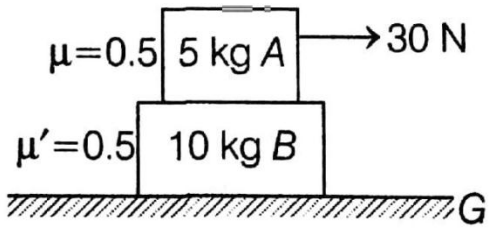
4. Find acceleration of both the blocks in the following problems.



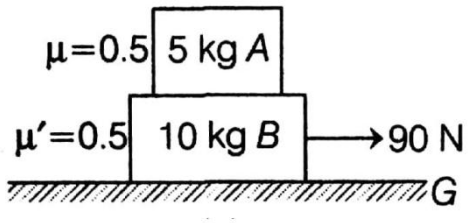
5. Find acceleration of both the blocks in the following problems.



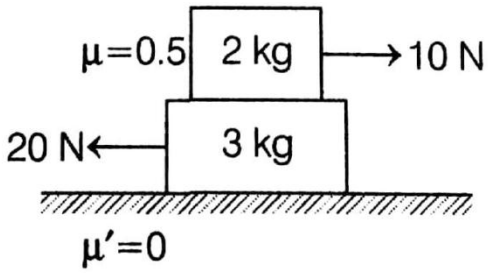
6. Find acceleration of both the blocks in the following problems.



7. Find acceleration of both the blocks in the following problems.



8 Find acceleration of both the blocks in the following problems.



9. A smooth block is released from rest on a 45° incline and then slides a distance d. The time taken to slide is n times as much to slide on rough incline than on a smooth incline. The coefficient of friction is

10. The upper half of an incline plane with inclination θ is perfectly smooth while the lower half is rough. A body starting from rest at the top will again come to rest at the bottom, if the coefficient of friction for the lower half is given by

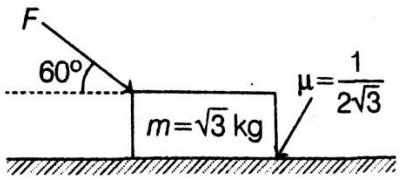
(a) $2\tan\theta$ (b) $\tan\theta$ (c) $2\cot\theta$ (d) $\cot\theta$

11. The force (along incline) required to just move a body up the inclined plane is double the force required to just prevent the body from sliding down the plane. The coefficient of friction is μ. The inclination θ of the plane is

(a) $\tan^{-1}(\mu)$ (b) $\tan^{-1}(\mu/2)$ (c) $\tan^{-1}(2\mu)$ (d) $\tan^{-1}(3\mu)$

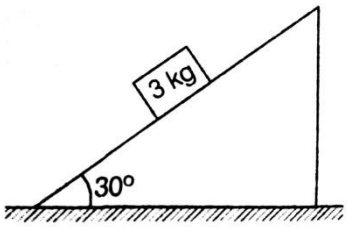
12. What is the maximum value of the force F such that the block shown in the arrangement, does not move?

(a) 20N (b) 10 N (c) 12 N (d) 15N



13. A block of mass 3 kg is at rest on a rough fixed inclined plane as shown in the figure. The magnitude of net force exerted by the surface on the block will be ($g = 10\ m/s^2$)

(a) 26N (b) $15\sqrt{3}$ N (c) 15 N (d) 30 N

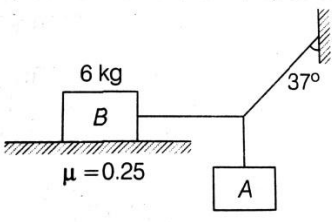


14. A block of mass 1 kg lies on a horizontal surface in a truck. The coefficient of static friction between the block and the surface is 0.6. If the acceleration of the truck is 5 m/s^2, the frictional force acting on the block is

(a) 5 N (b) 6 N (c) 10 N (d) 15 N

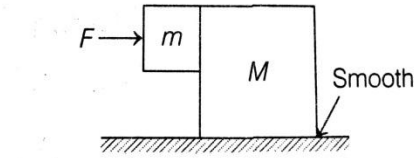
15. What is the minimum value of mass of block A, so that B starts moving on rough horizontal surface?

(a) 1 kg (b) 1.5 kg (c) 2 kg (d) 2.5 kg



16. The two blocks, m = 10 kg and M = 50 kg are free to move as shown in the figure. The coefficient of static friction between the blocks is 0.5 and there is o friction between M and the ground. Find the minimum horizontal force F to be applied to prevent 10 kg block from falling down.

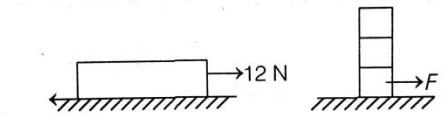
(a) 100 N (b) 50 N (c) 240 N (d) 180 N



17. A force of 12 N is required to start a uniform block of wood sliding on a bench for which coefficient of friction is constant. The plank is cut into three pieces and these pieces are stacked one above the other. The force F now needed to start motion will be

(a) F > 12N (b) F < 12N (c) F = 12N

(d) depends on co-efficient of friction between wooden blocks



18. A block of mass 2 kg rests on a rough inclined plane making an angle of 30° with the horizontal. The coefficient of static friction between the block and the plane is 0.7. The frictional force on the block is

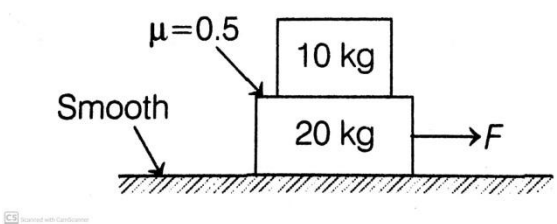
(a) 9.8N (b) $0.7 \times 9.8 \times \sqrt{3}$ N (c) $9.8 \times$ N (d) 0.8×9.8 N

19. A uniform chain of mass M and length L is lying on a table in such a manner that a part of it is hanging down from an edge of the table. If coefficient of friction is μ, then the maximum length of the chain that can hang without sliding is

(a) $\frac{L}{\mu}$ (b) $\frac{L}{1-\mu}$ (c) $\frac{\mu L}{1-\mu}$ (d) $\frac{\mu L}{1+\mu}$

20. Initially the system is at rest, find out minimum value of F for which sliding starts between the two blocks.

(a) 50N (b) 100N (c) 150N (d) 200 N



21. A bead of mass m is located on a parabolic wire with its axis vertical and vertex directed downward as in figure and whose equation is $x^2 = ay$. If the coefficient of friction is μ, the highest distance above the

(a) μa (b) $\mu^2 a$ (c) $\frac{1}{4}\mu^2 a$ (d) $\frac{1}{2}\mu^2 a$