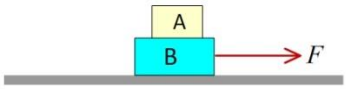
Laws of motion

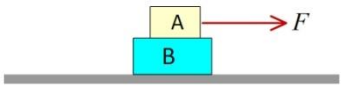
Objective : Understanding the fundamentals of properties and relations from friction

1. A block of mass 12 kg is placed on a rough horizontal surface. Coefficient of static friction on the block is 0.8. Find the frictional force acting on the block
2. A block of mass 10 kg is placed on a rough horizontal surface. Coefficient of static friction on the block is 0.6. Find the minimum horizontal force required to move the block.
3. A body of mass 40kg, moving with a velocity of $20ms^{-1}$ is brought to rest in 5 seconds on a rough horizontal surface. Find the coefficient of kinetic friction between the body and the ground.
4. A body of mass 10kg, moving with a velocity of $10ms^{-1}$ is brought to rest in 10 meters on a rough horizontal surface. Find the coefficient of kinetic friction between the body and the ground.
5. A body of mass 4 kg is initially at rest on a rough horizontal surface. When a force of 20 N is applied on a body for 10 seconds it attains a velocity of $5ms^{-1}$. Find the frictional force acting on the body.
6. A body of mass 2kg is initially at rest on a rough horizontal surface. Coefficient of static friction between it and the ground is 0.8 and the coefficient of kinetic friction is 0.6. The minimum force required to set the body it in motion is continuously applied for 5 seconds. Find the final velocity of the body.
7. A body of mass 1 kg is placed on a rough plank that is moving on a rough horizontal surface with a uniform velocity of $10ms^{-1}$. Find the frictional force on the body. ($\mu_k = 0.2$ and $\mu_s = 0.4$)
8. Spiderman of mass 70kg is stationary on a vertical wall. Find the net frictional force acting on him.
9. A load of mass 2000 kg is placed on a carriage moving at a speed of 72 kmph. Find the minimum distance in which the carriage can be stopped without causing slipping of the load on it. ($\mu_k = 0.4$ and $\mu_s = 0.5$)
10. Find the direction of frictional force on the body labeled **A** in the following cases

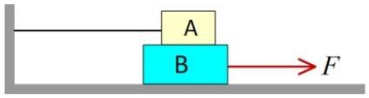
(a)



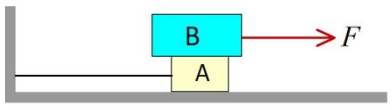
(b)



(c)



(d)



Find direction of frictional force on A due to (a) the upper block (b) due to ground.

(e)

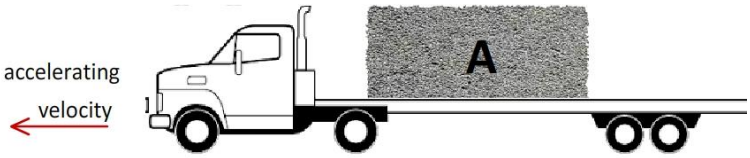
(f)


uniform velocity
A

(g)


breakes applied
velocity
A

(h)


accelerating
velocity
A

Answers

1. Zero
2. 60 N
3. 0.4
4. 0.5
5. 18N
6. $10ms^{-1}$
7. Zero
8. 700N
9. 40 m
10. (a) → (b) ← (c) → (d) →, zero
    (e) → (f) zero (g) ← (h) ←

For detailed solutions mail your request to sigmaprc@gmail.com (mention the class / chapter / assignment number in the mail)