

DPP – 1 (Friction)

Video Solution on Website:-

<https://physicsaholics.com/home/courseDetails/40>

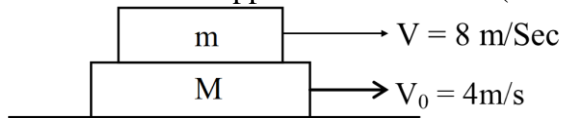
Video Solution on YouTube:-

<https://youtu.be/uLexfX0L3Vw>

Written Solution on Website:-

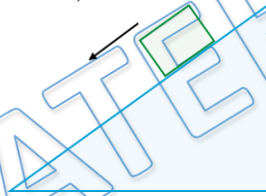
<https://physicsaholics.com/note/notesDetails/41>

Q 1. Direction of friction on upper surface of M is (all surfaces are rough)



- (a) Towards right (b) Towards left
(c) Friction is zero (d) None of above

Q 2. A block of mass 0.5kg has an initial velocity of 10m/s down an inclined plane of inclination 30° , the coefficient of friction between the block and the inclined surface is 0.2. The velocity of the block after it travel a distance of 10m along the incline is nearly: ($g = 10 \text{ m/s}^2$)

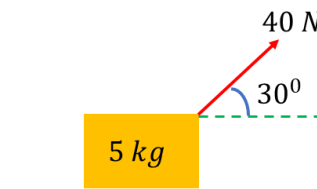


- (a) 13 m/s (b) 17 m/s
(c) 24 m/s (d) 8 m/s

Q 3. A box is projected along a line of greatest slope up a rough plane inclined at an angle of 45° with the horizontal. If the coefficients of friction is $1/2$, then the retardation is:-

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

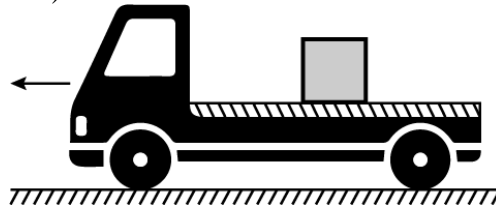
Q 4. A block of mass $M = 5 \text{ kg}$ is resting on a rough horizontal surface for which the coefficient of friction is 0.2. When a force $F = 40\text{N}$ is applied as shown, the acceleration of the block will be then ($g = 10\text{m/s}^2$).



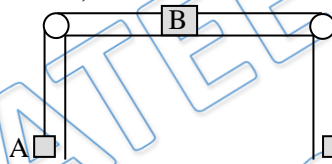
- (a) 5.73 m/s^2 (b) 8.0 m/s^2
(c) 3.17m/s^2 (d) 10.0 m/s^2



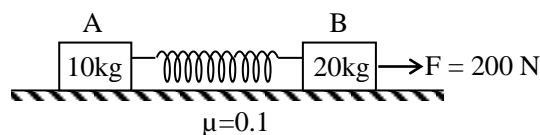
- Q 5. The rear side of a truck is open and a box of 40kg mass is placed 5m away from the open end as shown in figure. The coefficient of friction between the box and the surface below it is 0.15. On a straight road, the truck starts from rest and accelerates with 2 m/s^2 . At what distance from its starting point does the box fall off the truck? (Ignore the size of the box)



- (a) 25 m (b) 15 m
(c) 20 m (d) 10 m
- Q 6. A 500 kg horse pulls a block of mass 100 kg along a horizontal rough road with an acceleration of 1 m/Sec^2 , $\mu = 0.8$. The forward force on the horse is [Take $g = 10 \text{ m/Sec}^2$]
- (a) zero (b) 2000 N
(c) 1400 N (d) 600 N
- Q 7. Block A has a mass of 2kg and block B has 20 kg. If the coefficient of kinetic friction between block B and the horizontal surface is 0.1, and B is accelerating towards the right with $a = 2 \text{ m/s}^2$, then the mass of the block C will be-



- (a) 15 kg (b) 12.5 kg
(c) 5.7 kg (d) 10.5 kg
- Q 8. An object is placed on the surface of a smooth inclined plane of inclination θ . It takes time t to reach to bottom. If the same object is allowed to slide down a rough inclined plane of same inclination θ , it takes time nt to reach the bottom where n is a number greater than 1. The coefficient of friction μ is given by –
- (a) $\mu = \tan \theta (1 - 1/n^2)$ (b) $\mu = \cot \theta (1 - 1/n^2)$
(c) $\mu = \tan \theta (1 - 1/n^2)^{1/2}$ (d) $\mu = \cot \theta (1 - 1/n^2)^{1/2}$
- Q 9. Two blocks A and B attached to each other by a massless spring, are kept on a rough horizontal surface ($\mu = 0.1$) and pulled by a force $F = 200 \text{ N}$ as shown in figure. If at some instant the 10 kg mass has acceleration of 12 m/s^2 , what is the acceleration of 20 kg mass?



- (a) 2.5 m/s^2 (b) 4.0 m/s^2
(c) 3.6 m/s^2 (d) 1.2 m/s^2

