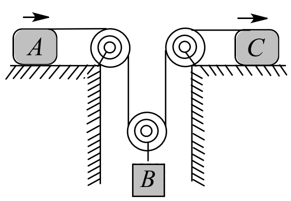
DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth **SUBJECT : PHYSICS**
Date : **DPP No. : 7**

Topic :- LAWS OF MOTION

1. Blocks A and C stat from rest and move to the right with acceleration $a_A = 12\ t\ ms^{-2}$ and$a_c = 3$ ms^{-2}. Here t is in seconds. The time when block B again comes to rest is

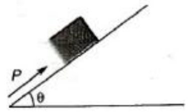


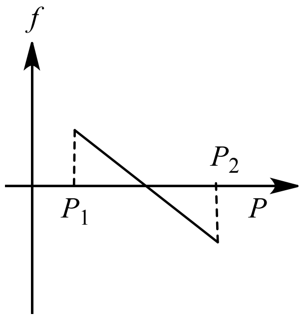
a) 2 s b) 1 s c) 3/2 s d) 1/2 s

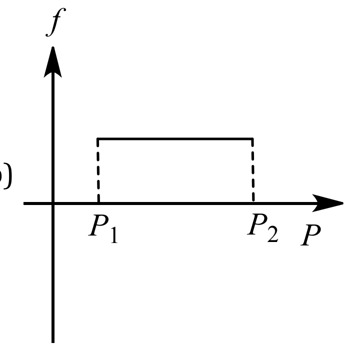
2. A passenger is travelling a train moving at40 ms^{-1}. His suitcase is kept on the berth. The driver of train applies breaks such that the speed of the train decreases at a constant rate to 20 ms^{-1} in 5 s. What should be the minimum coefficient of friction between the suitcase and the berth if the suitcase is not to slide during retardation of the train?

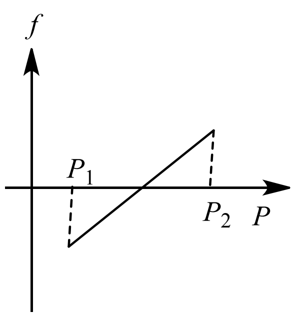
a) 0.3 b) 0.5 c) 0.1 d) 0.2

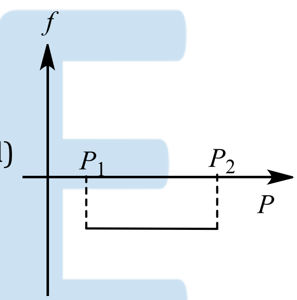
3. A block of mass m is on an inclined plane of angle θ. The coefficient of friction between the block and the plane is μ and $\tan\theta > \mu$. The block is held stationary by applying a force E parallel to the plane. The direction of force pointing up the plane is taken to be positive. As P is varied from $P_1 = mg(\sin\theta - \mu\cos\theta)$ to $P_2 = mg(\sin\theta + \mu\cos\theta)$, the frictional force f *versus* P graph will look like



a) 

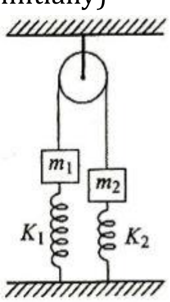
b) 

c) 

d) 

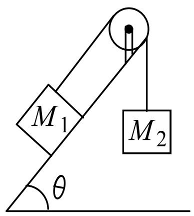
4. Which of the following is correct, when a person walks on a rough surface
a) The frictional force exerted by the surface keeps him moving
b) The force which the man exerts on the floor keeps him moving
c) The reaction of the force which the man exerts on floor keeps him moving
d) None of the above

5. The system shown in figure is in equilibrium. Masses m_1 and m_2 are 2 kg and 8 kg, respectively. Spring constants k_1 and k_2 are 50 Nm^{-1} and70 Nm^{-1}, respectively. If the compression in second spring is 0.5 m. What is the compression in first spring? (Both springs have natural length initially)



a) 1.3 m b) - 0.5 m c) 0.5 m d) 0.9 m

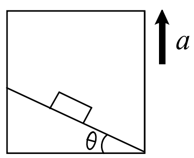
6. Two blocks of masses M_1 and M_2 are connected with a string which passes over a smooth pulley. The mass M_1 is placed on a rough incline plane as shown in the figure. The coefficient of friction between the block and the inclined plane is μ. What should be the minimum mass M_2 so that the block M_1 slides upwards?



a) $M_2 = M_1(\sin\theta + \mu\cos\theta)$ b) $M_2 = M_1(\sin\theta + \mu\cos\theta)$

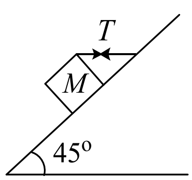
c) $M_2 = \dfrac{M_1}{\sin\theta + \mu\cos\theta}$ d) $M_2 = \dfrac{M_1}{\sin\theta - \mu\cos\theta}$

7. A block of mass m is at rest with respect to a rough incline kept in elevator moving up with acceleration a. Which of following statements is correct?



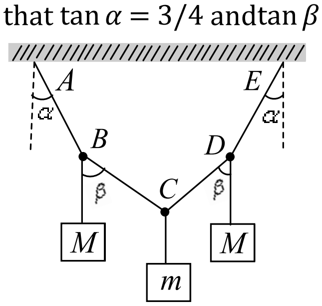
a) The contact force between block and incline is parallel to the incline
b) The contact force between block and incline is of the magnitude $m(g + a)$
c) The contact force between block and incline is perpendicular to the incline
d) The contact force is of magnitude $mg\cos\theta$

8. A block of mass 15 kg is resting on a rough inclined plane as shown in figure. The block is tied by a horizontal string which has a tension of 50 N. The coefficient of friction between the surfaces of contact is



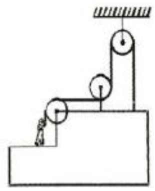
a) 1/2 b) 2/3 c) 3/4 d) 1/4

9. The figure represents a light inextensible string $ABCDE$ in which $AB = BC = CD = DE$ and to which are attached masses M, m and M at the points B, C and D, respectively. The system hangs freely in equilibrium with ends A and E of the string fixed in the same horizontal line. It is given that $\tan\alpha = 3/4$ and $\tan\beta = 12/5$. Then the tension in the string BC is



a) 2 mg b) $(13/10)mg$ c) $(3/10)mg$ d) $(20/11)mg$

10. A system is shown in the figure. A man standing on the block is pulling the rope. String slips through the hands of man with velocity 2 ms^{-1} w.r.t. man. The velocity of the block will be (assume that the block does not rotate)

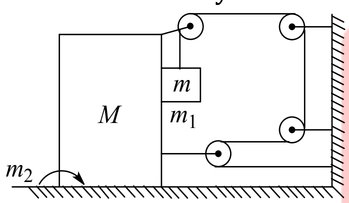


a) 3 ms^{-1} b) 2 ms^{-1} c) 1/2 ms^{-1} d) 1 ms^{-1}

11. A block of mass 0.1 kg is held against a wall by applying a horizontal force of 5 N on the block. If the coefficient of friction between the block and the wall is 0.5, the magnitude of the frictional force acting on the block is

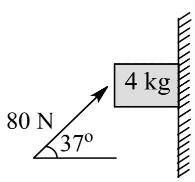
a) 2.5 N b) 0.98 N c) 4.9 N d) 0.49 N

12. Two blocks M and m are arranged as shown in the diagram. The coefficient of friction between the blocks is $\mu_1 = 0.25$ and between the ground and M is $\mu_2 = \frac{1}{3}$. If $M = 8$ kg, then find the value of m so that the system will remain at rest



a) 4/3 kg b) 8/9 kg c) 1 kg d) 8/5 kg

13. A block of mass 4 kg is pressed against the wall by a force of 80 N as shown in the figure. Determine the value of friction force and block's acceleration (take $\mu_s = 0.2$, $\mu_k = 0.15$)



a) 8 N, 0 ms^{-2} b) 32 N, 6 ms^{-2} c) 8 N, 6 ms^{-2} d) 32 N, 2 ms^{-2}

14. A rope of length 4 m having mass 1.5 kg per metre lying on a horizontal friction less surface is pulled at one end by a force of 12 N. What is the tension in the rope at a point 1.6 m from the other end?

a) 5 N b) 4.8 N c) 7.2 N d) 6 N

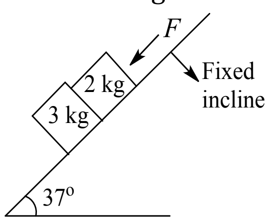
15. A particle of mass 2 kg moves with an initial velocity of $\vec{v} = 4\hat{i} + 4\hat{j}$ ms^{-1}. A constant force of $\vec{F} =$ - $20\hat{j}$ N is applied on the particle. Initially, the particle was at (0, 0). The x-coordinate of the particle when its y-coordinates again becomes zero is given by

a) 1.2 m b) 4.8 m c) 6.0 m d) 3.2 m

16. A body of mass M is resting on a rough horizontal plane surface, the coefficient of friction being equal toμ. At$t=0$, a horizontal force $F=F_0 t$ starts acting on it, where F_0 is a constant. Find the time T at which the motion starts?

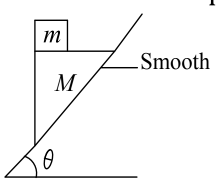
a) $\mu Mg/F_0$ b) $Mg/\mu F_0$ c) $\mu F_0/Mg$ d) None of these

17. Two blocks of masses 3 kg and 2 kg are placed side by side on an incline as shown in the figure. A force $F=20$ N is acting on 2 kg block along the incline. The coefficient of friction between the block and the incline is same and equal to 0.1. find the normal contact force exerted by 2 kg block on 3 kg block



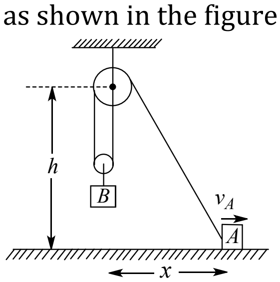
a) 18 N b) 30 N c) 12 N d) 27.6 N

18. A triangular prism of mass M with a block of mass m placed on it is released from rest on a smooth inclined plane of inclination θ. The block does not slip on the prism. Then



a) The acceleration of the prism is $g\cos\theta$
b) The acceleration of the prism is $g\tan\theta$
c) The minimum coefficient of friction between the block and the prism is $\mu_{\min}=\cot\theta$
d) The minimum coefficient of friction between the block and the prism is $\mu_{\min}=\tan\theta$

19. If block A is moving horizontally with velocity v_A, then find the velocity of block B at the instant as shown in the figure



a) $\dfrac{hv_A}{2\sqrt{x^2+h^2}}$ b) $\dfrac{xv_A}{\sqrt{x^2+h^2}}$ c) $\dfrac{xv_A}{2\sqrt{x^2+h^2}}$ d) $\dfrac{hv_A}{\sqrt{x^2+h^2}}$

20. Three forces are acting on a particle of mass m initially in equilibrium. If the first two forces (R_1 and R_2) are perpendicular to each other and suddenly the third force (R_3) is removed, then the acceleration of the particle is

a) $\frac{R_3}{m}$ b) $\frac{R_1 + R_2}{m}$ c) $\frac{R_1 - R_2}{m}$ d) $\frac{R_1}{m}$