DPP
DAILY PRACTICE PROBLEMS

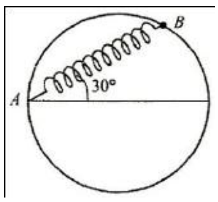
CLASS : XIth **SUBJECT : PHYSICS**
Date : **DPP No. : 6**

Topic :- LAWS OF MOTION

1. A block of base 10 cm × 10 cm and height 15 cm is kept on an inclined plane. The coefficient of friction between them is $\sqrt{3}$. The inclination θ of this inclined plane from the horizontal plane is gradually increased from 0°. Then

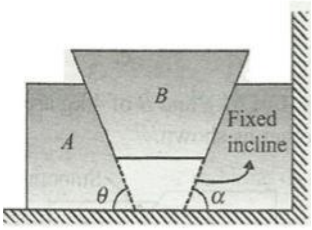
a) At $\theta = 30°$, the block will start sliding down the plane
b) The block will remain at rest on the plane up to certain θ and then it will topple
c) At $\theta = 60°$, the block will start sliding down the plane and continue to do so at higher angles
d) At $\theta = 60°$, the block will start sliding down the plane and on further increasing θ, it will topple at certain θ

2. A bead of mass m is attached to one end of a spring of natural length R and spring constant $K = \frac{(\sqrt{3}+1)mg}{R}$. The other end of the spring is fixed at a point A on a smooth vertical ring of radius R as shown in the figure. The normal reaction at B just after it is released to move is



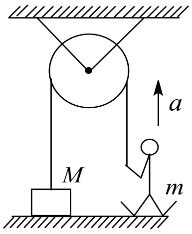
a) $mg/2$ b) $\sqrt{3}\ mg$ c) $3\sqrt{3}\ mg$ d) $\frac{3\sqrt{3}\ mg}{2}$

3. In the shown arrangement below, if acceleration of B is $\vec{a}$, then find the acceleration of A



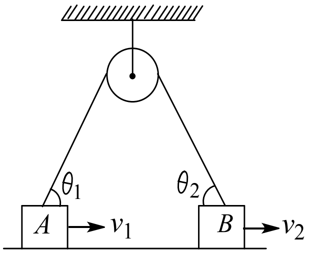
a) $a \sin\alpha$ b) $a \cot\theta$ c) $a \tan\theta$ d) $(\sin\alpha \cot\theta + \cos\alpha)$

4. In the figure, the block of mass M is at rest on the floor. The acceleration with which a boy of mass m should climb along the rope of negligible mass so as to lift the block from the floor is



a) $\left(\frac{M}{m} - 1\right)g$ b) $\left(\frac{M}{m} - 1\right)g$ c) $\frac{M}{m}$ g d) $> \frac{M}{m}$ g

5. In the figure shown, blocks A and B move with velocities v_1 and v_2 along horizontal direction. Find the ratio of v_1/v_2



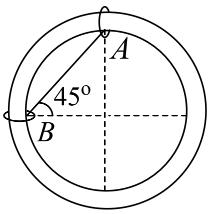
a) $\frac{\sin\theta_1}{\sin\theta_2}$ b) $\frac{\sin\theta_2}{\sin\theta_1}$ c) $\frac{\cos\theta_2}{\cos\theta_1}$ d) $\frac{\cos\theta_1}{\cos\theta_2}$

6. An object moving with constant velocity in a non-inertial; frame of reference
a) Must have non-zero net force acting on it
b) May have zero net force acting on it
c) Must have zero net force acting on it
d) May have non-zero net force acting on it (Consider only the real forces)

7. A heavy uniform chain lies on a horizontal table top. If the coefficient of friction between the chain and the table surface is 0.25, then the maximum fraction of the length of the chain that can hang over one edge of the table is

a) 20 % b) 25 % c) 35 % d) 15 %

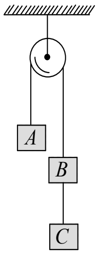
8. Two objects A and$B$, each of mass$m$, are connected by a light inextensible string. They are restricted to move on a frictionless ring of radius R in a vertical plane (as shown in the figure). The objects are released from rest at the position shown. Then the tension in the cord just after release is



a) Zero b) mg c) $\sqrt{2}\, mg$ d) $mg/\sqrt{2}$

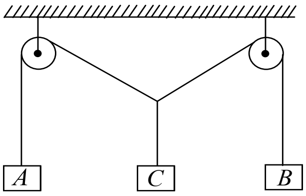
9. Three equal weights A, B, C of mass 2 kg each are hanging on a string passing over a fixed

frictionless pulley as shown in the figure. The tension in the string connecting weights B and C is



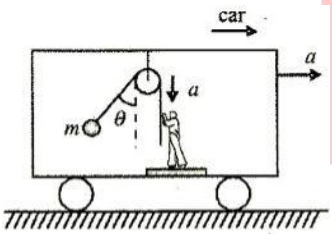
a) Zero　　b) 13 N　　c) 3.3 N　　d) 19.6 N

10. Three blocks A, B and C are suspended as shown in the figure. Mass of each of blocks A and B is$m$. If system is in equilibrium, and mass of C is M, then



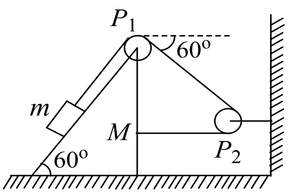
a) $M > 2\,m$　　b) $M = 2\,m$　　c) $M < 2\,m$　　d) None of these

11. A bob is hanging over a pulley inside a car through a string. The second end of the string is in the hands of a person standing in the car. The car is moving with constant acceleration a directed horizontally as shown in the figure. Other end of the string is pulled with constant acceleration a vertically. The tension in the string is equal to



a) $m\sqrt{g^2 + a^2}$　　b) $m\sqrt{g^2 + a^2} - ma$　　c) $m\sqrt{g^2 + a^2} + ma$　　d) $m(g + a)$

12. In the arrangement shown in the figure, the block of mass $m = 2kg$ lies on the wedge of mass $M = 8$ kg. the initial acceleration of the wedge, if the surfaces are smooth, is



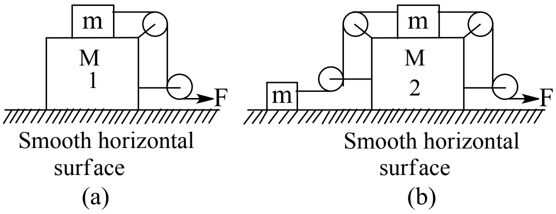
a) $\frac{\sqrt{3}g}{23}$ ms^{-2}　　b) $\frac{3\sqrt{3}g}{23}$ ms^{-2}　　c) $\frac{3g}{23}$ ms^{-2}　　d) $\frac{g}{23}$ ms^{-2}

13. A given object takes n times more time to slide down 45° rough inclined plane as it takes to slide down a perfectly smooth 45° incline. The coefficient of kinetic friction between the object and the incline is

a) $\sqrt{\frac{1}{1 - n^2}}$　　b) $\sqrt{1 - \frac{1}{n^2}}$　　c) $1 - \frac{1}{n^2}$　　d) $\frac{1}{2 - n^2}$

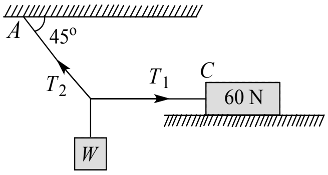
14. In the situation shown in the figure, all the strings are light and inextensible and pullies are

light. There is no friction at any surface and all blocks are of cuboidal shape. A horizontal force of magnitude F is applied to right most free end of string in both cases shown in the figure. At the instant shown, the tension in all strings are non-zero. Let the magnitude of acceleration of large blocks (of mass$M$) in figure (a) and figure (b) be a_1 and a_2, respectively. Then,



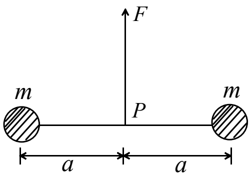
a) $a_1 = a_2 \neq 0$ b) $a_1 = a_2 = 0$ c) $a_1 > a_2$ d) $a_1 < a_2$

15. In the figure, a block of weight 60 N is placed on a rough surface. The coefficient of friction between the block and the surface is 0.5. What minimum can be the weight W such that the block does not slip on the surface?



a) 60 N b) $\frac{60}{\sqrt{2}}$ N c) 30 N d) $\frac{30}{\sqrt{2}}$ N

16. The two particles of mass m each are tied at the ends of a light string of length $2a$. The whole system is kept on a frictionless horizontal surface with the string held tight so that each mass is at a distance 'a' from the center P (as shown in the figure). Now, the mid-point of the string is pulled vertically upwards with a small but constant force F. As a result, the particles move towards each other on the surface. The magnitude of acceleration, when the separation between them becomes $2x$, is



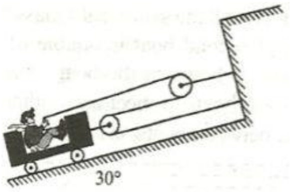
a) $\frac{F}{2m}\frac{a}{\sqrt{a^2 - x^2}}$ b) $\frac{F}{2m}\frac{x}{\sqrt{a^2 - x^2}}$ c) $\frac{F}{2m}\frac{x}{a}$ d) $\frac{F}{2m}\frac{\sqrt{a^2 - x^2}}{x}$

17. n Balls each of mass m impinge elastically each second on a surface with velocity$u$. The average force experienced by the surface will be

a) mnu b) $2\ mnu$ c) $4\ mnu$ d) $mnu/2$

18. A man pulls himself up the 30° incline by the method shown. If the combined mass of the

man and cart is 100 kg, determine the acceleration of the cart if the man exerts a pull of 250 N on the rope. Neglect all friction and the mass of the rope, pulleys, and wheels



a) 4.5 ms^{-2} b) 2.5 ms^{-2} c) 3.5 ms^{-2} d) 1.5 ms^{-2}

19. A block compartment containing gas is moving with some acceleration in horizontal direction. Neglect effect of gravity. Then the pressure in the compartment is
a) Same everywhere b) Lower in front side c) Lower in rear side d) Lower in upper side

20. A particle of mass 2 kg moves with an initial velocity of $(4\hat{i} + 2\hat{j})ms^{-1}$ on the x - y plane. A force $\vec{F} = (2\hat{i} - 8\hat{j})$N acts on the particle. The initial position of the particle is (2 m, 3 m). Then for $y = 3$ m,
a) Possible value of x is only $x = 2$ m
b) Possible value of x is not only $x = 2$ m, but there exists some other value of x also
c) Time taken is 2 s
d) All of the above