DPP

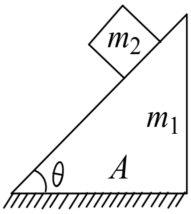
DAILY PRACTICE PROBLEMS

CLASS : XIth **SUBJECT : PHYSICS**

Date : **DPP No. : 4**

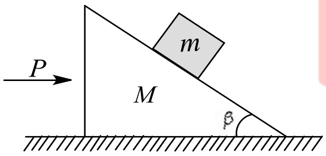
Topic :- LAWS OF MOTION

1. In the given figure, the mass m_2 starts with velocity v_0 and moves with constant velocity on the surface. During motion the normal reaction between the horizontal surface and fixed triangle block m_1 is N. Then during motion



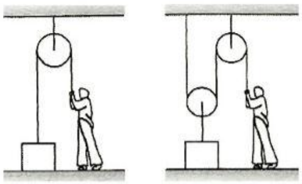
a) $N = (m_1 + m_2)g$ b) $N = m_1 g$ c) $N < (m_1 + m_2)g$ d) $N > (m_1 + m_2)g$

2. Two wooden blocks are moving on a smooth horizontal surface such that the mass m remains stationary with respect to block of mass M as shown in the figure. The magnitude of force P is



a) $(M + m)g \tan\beta$ b) $g \tan\beta$ c) $mg \cos\beta$ d) $(M + m)g \text{ cosec } \beta$

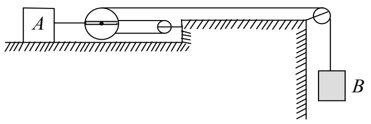
3. In the figure shown, a person wants to rise a block lying on the ground to a height h. In both the cases, if time required is same then in which case he has to exert more force. Assume pulleys and strings light



a) (i) b) (ii)

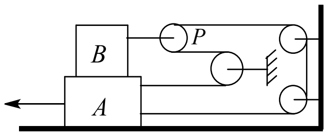
c) Same in both d) Cannot be determined

4. A block A has a velocity of 0.6 ms^{-1} to the right, determine the velocity of cylinder B



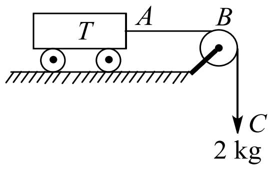
a) 1.2 ms^{-1} b) 2.4 ms^{-1} c) 1.8 ms^{-1} d) 3.6 ms^{-1}

5. In the figure, the string does not slip on pulley P, but pulley P is free to rotate about its own axis. Block A is displaced towards left, then pulley P



a) Rotates clockwise and translates
b) Rotates anticlockwise and translates
c) Only translates
d) Only rotates (clockwise or anticlockwise)

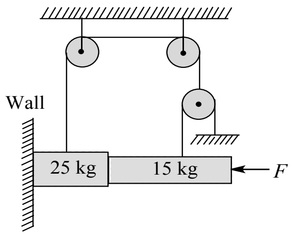
6. A trolley T of mass 5 kg on a horizontal smooth surface is pulled by a load of 2 kg through a uniform rope ABC of length 2 m and mass 1 kg. as the load falls from $BC = 0$ to $BC = 2$ m, its acceleration (in ms^{-2}) changes from



a) $\frac{20}{6}$ to $\frac{30}{6}$ b) $\frac{20}{8}$ to $\frac{30}{8}$ c) $\frac{20}{5}$ to $\frac{30}{6}$ d) None of these

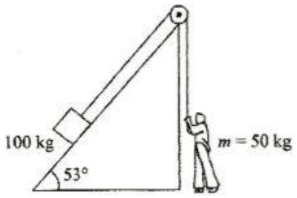
7. In the above problem, contact force between man and the crate is
a) 2250 N b) 1125 N c) 750 N d) 375 N

8. If the coefficient of friction between all surfaces (for the shown diagram) is 0.4, then find the minimum force F to have equilibrium of the system



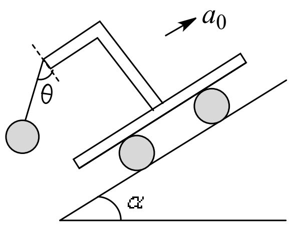
a) 62.5 N b) 150 N c) 31.25 N d) 50 N

9. In the arrangement shown, by what acceleration the boy must go up so that 100 kg block remains stationary on the wedge? The wedge is fixed and friction is absent everywhere (take g = 10 ms^{-2})



a) 2 ms^{-1} b) 4 ms^{-2} c) 6 ms^{-2} d) 8 ms^{-2}

10. A pendulum of mass m hangs from a support fixed to a trolley. The direction of the string when the trolley rolls up a plane of inclination α with acceleration a_0 is



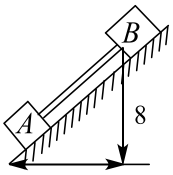
a) $\theta = \tan^{-1}\alpha$

b) $\theta = \tan^{-1}\left(\frac{a_0}{g}\right)$

c) $\theta = \tan^{-1}\left(\frac{g}{a_0}\right)$

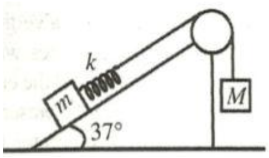
d) $\theta = \tan^{-1}\left(\frac{a_0 + g\sin\alpha}{g\cos\alpha}\right)$

11. Blocks A and B in the figure are connected by a bar of negligible weight. Mass of each block is 17 kg and $\mu_A = 0.2$ and $\mu_B = 0.4$, where μ_A and μ_B are the coefficients of limiting friction between blocks and plane, calculate the force developed in the bar (g=10 ms^{-2})



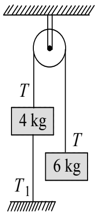
a) 150 N b) 75 N c) 200 N d) 250 N

12. A block of mass m is attached with a massless spring of force constant$k$. The block is placed over a rough inclined surface for which the coefficient of friction is 0.5 M is released from rest when the spring was unstretched. The minimum value of M required to move the block m up the plane is (neglect mass of string and pulley and friction in pulley)



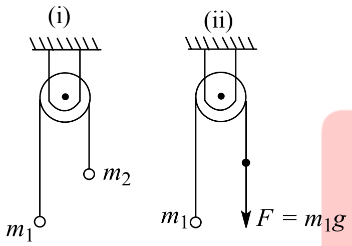
a) $m/2$ b) $m/3$ c) $m/4$ d) None of these

13. Two bodies of masses 4 kg and 6 kg are attached to the ends of a string passing over a pulley. The 4 kg mass is attached to the table top by another string. The tension in this string T_1 is equal to (take g = 10 ms^{-2})



a) 20 N　　b) 25 N　　c) 10.6 N　　d) 10 N

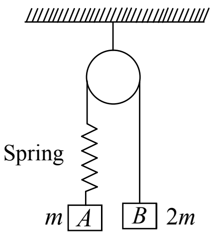
14. In two pulley-particle systems (i) and (ii), the acceleration and force imparted by the string on the pulley and tension in the strings are (a_1,a_2), (N_1,N_2) and (T_1,T_2), respectively. Ignoring friction in all contacting surfaces
Study the following statements :



I. $\frac{a_1}{a_2} = 1$ (ii) $\frac{T_1}{T_2} < 1$ (iii) $\frac{N_1}{N_2} > 1$ (iv) $\frac{a_1}{a_2} < 1$

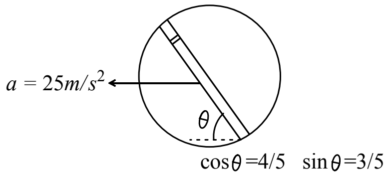
Now mark correct answer:
a) Relations (ii) and (iii) always follow
b) Relations (ii) and (iv) always follow
c) Only relation (i) always follows
d) Only relation (iv) always follows

15. Two blocks A and B of masses m and2 m, respectively, are held at rest such that the spring is in natural length. Find out the accelerations of both the blocks just after release



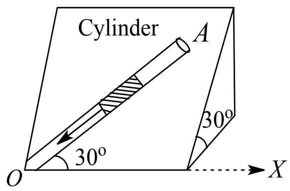
a) g↓, g↓　　b) $\frac{g}{3}\downarrow, \frac{g}{3}\uparrow$　　c) 0, 0　　d) g↓, c

16. A circular disc with a groove along its diameter is placed horizontally. A block of mass $1kg$ is placed as shown. The co-efficient of friction between the block and all surfaces of groove in contact is $\mu = 2/5$. The disc has an acceleration of 25 m/s^2. Find the acceleration of the block with respect to disc



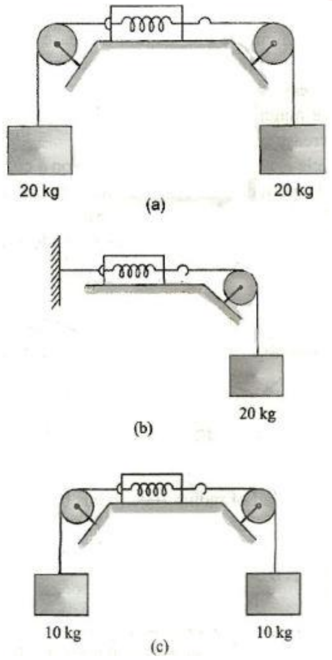
a) 10 m/s^2 b) 5 m/s^2 c) 20 m/s^2 d) 1 m/s^2

17. An inclined plane makes an angle 30° with the horizontal. A groove (OA) of length = 5m cut in the plane makes an angle 30° withOX. A short smooth cylinder is free to slide down under the influence of gravity. The time taken by the cylinder to reach from A to O is $(g = 10\ ms^{-2})$



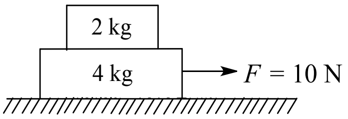
a) 4 s b) 2 s c) 3 s d) 1 s

18. Three arrangement of a light spring balance are shown in the following figure. The reading of the spring scales in three arrangements are, respectively,



a) 20 g, 20 g, 10 g b) 20 g, 20 g, $\frac{40}{3}$ g c) Zero, 20 g, 10 g d) Zero, 20 g, $\frac{40\ g}{3}$

19. In the given figure, the blocks are at rest and a force 10 N act on the block of 4 kg mass. The coefficient of static friction and the coefficient of kinetic friction are $\mu_s = 0.2$ and $\mu_k = 0.15$ for both the surface in contact. The magnitude of friction force acting between the surface of contact between the 2 kg and 4 kg block in this situation is



a) 3 N   b) 4 N   c) 3.33 N   d) Zero

20. A flat plate moves normally with a speed v_1 towards a horizontal jet of water of uniform area of cross-section. The jet discharges water at the rate of volume V per second at a speed of v_2. The density of water is ρ. Assume that water splashes along the surface of the plate at right angles to the original motion. The magnitude of the force acting on the plate due to the jet of water is

a) $\rho V v_1$ b) $\rho V(v_1 + v_2)$ c) $\frac{\rho V}{v_1 + v_2} v_1^2$ d) $\rho\left[\frac{V}{v_2}\right](v_1 + v_2)^2$