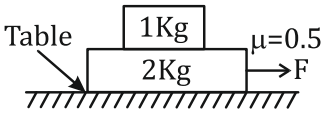
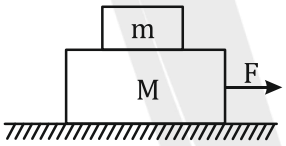
DPP 02

1. The coefficient of static friction between two blocks is 0.5 and the table is smooth. The maximum horizontal force that can be applied to move the blocks together is ___ N.



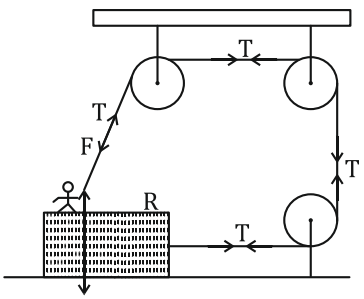
2. A body of mass ' m ' is launched up on a rough inclined plane making an angle of 30° with the horizontal. The coefficient of friction between the body and plane is $\frac{\sqrt{x}}{5}$ if the time of ascent is half of the time of descent. The value of x is _____.

3. Two blocks (m = 0.5 kg and M = 4.5 kg) are arranged on a horizontal frictionless table as shown in figure. The coefficient of static friction between the two blocks is $\frac{3}{7}$. Then the maximum horizontal force that can be applied on the larger block so that the blocks move together is ___ N. (Round off to the nearest integer) [Take g as 9.8 m s^{-2}]



4. A boy of mass 4 kg is standing on a piece of wood having mass 5 kg. If the coefficient of friction between the wood and the floor is 0.5 , maximum force that the boy can exert on the rope so that the piece of wood does not move from its place is _____ N. (Round off to the nearest integer)

[Take g = 10 m s^{-2}]

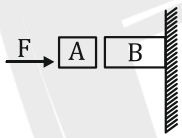


5. An inclined plane is bent in such a way that the vertical cross-section is given by $y = \frac{x^2}{4}$ where y is in vertical and x in horizontal direction. If the upper surface of this curved plane is rough with coefficient of friction $\mu = 0.5$, the maximum height in cm at which a stationary block will not slip downward is ___ cm.

6. A rocket is fired vertically from the earth with an acceleration of 2g, where g is the gravitational acceleration. On an inclined plane inside the rocket, making an angle θ with the horizontal, a point object of mass m is kept. The minimum coefficient of friction μ_{min} between the mass and the inclined surface such that the mass does not move is

(A) $\tan 2\theta$ (B) $\tan \theta$ (C) $3\tan \theta$ (D) $2\tan \theta$

7. Given in the figure are two blocks A and B of weight 20 N and 100 N, respectively. These are being pressed against a wall by a force F as shown. If the coefficient of friction between the blocks is 0.1 and between block B and the wall is 0.15, the frictional force applied by the wall on block B is

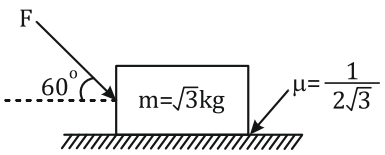


(A) 120 N (B) 150 N (C) 100 N (D) 80 N

8. A smooth block is released at rest on a 45° incline and then slides a distance d. The time taken to slide is n times as much to slide on rough incline than on a smooth incline. The coefficient of friction is

(A) $\mu_s = 1 - \frac{1}{n^2}$ (B) $\mu_s = \sqrt{1 - \frac{1}{n^2}}$ (C) $\mu_k = 1 - \frac{1}{n^2}$ (D) $\mu_k = \sqrt{1 - \frac{1}{n^2}}$

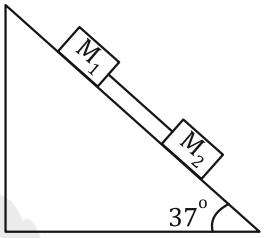
9. What is the maximum value of the force F such that the block shown in the arrangement, does not move?



(A) 20 N (B) 10 N (C) 12 N (D) 15 N

10. Two blocks connected by a massless string slides down an inclined plane having an angle of inclination of 37°. The masses of the two blocks are $M_1 = 4$ kg and $M_2 = 2$ kg respectively and the coefficients of friction of M_1 and M_2 with the inclined plane are 0.75 and 0.25 respectively. Assuming the string to be taut, find he common acceleration of two masses.

$(\sin 37° = 0.6, \cos 37° = 0.8)$.[Take $g = 9.8\ m\ s^{-2}$]



(A) $1.3\frac{m}{s^2}$ (B) $2\ \frac{m}{s^2}$ (C) $12\ \frac{m}{s^2}$ (D) $15\frac{m}{s^2}$

ANSWER KEY

1. 15 **2.** 3 **3.** 21 **4.** 30 **5.** 25 **6.** (B) **7.** (A)

8. (C) **9.** (A) **10.** (A)