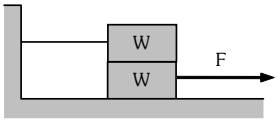
1. A block is pushed with some velocity up a rough inclined plane. It stops after ascending few meters and then reverses its direction and returns back to point from where it started. If angle of inclination is 37° and the time to climb up is one third of the time to return back then coefficient of friction is

(A) $\frac{1}{5}$ (B) $\frac{3}{5}$ (C) $\frac{4}{5}$ (D) $\frac{2}{5}$

2. A block of mass 1kg is resting on a rough horizontal surface where coefficient of friction is $\frac{1}{\sqrt{3}}$. The minimum force required to make the block move, is

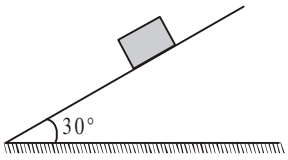
(A) $\frac{5}{\sqrt{3}}$N (B) 5N (C) $5\sqrt{3}$N (D) $\frac{10}{\sqrt{3}}N$

3. Two identical blocks of weight W are placed one on top of the other as shown in figure. The upper block is tied to the wall. The lower block is pulled to the right with a force F. The coefficient of static friction between all surfaces in contact is μ. What is the largest force F that can be exerted before the lower block starts to slip?



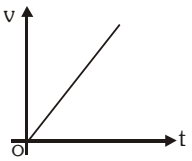
(A) μW (B) 2 μW (C) 3 μW (D) 4 μW

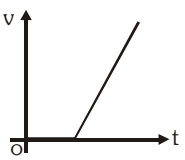
4. Figure shows a block kept on a rough inclined plane. The maximum external force down the incline for which the block remains at rest is 2N while the maximum external force up the incline for which the block is at rest is 10 N. The coefficient of static friction μ is

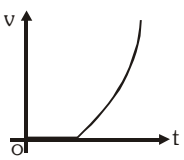


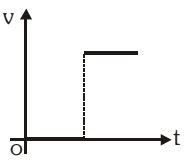
(A) $\frac{\sqrt{3}}{2}$ (B) $\frac{1}{\sqrt{6}}$ (C) $\sqrt{3}$ (D) $\frac{1}{\sqrt{3}}$

5. A metal block is resting on a rough wooden surface. A horizontal force applied to the block is increased uniformly. Which of the following curves correctly represents velocity of the block?

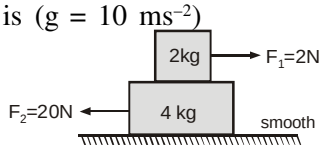
(A) 

(B) 

(C) 

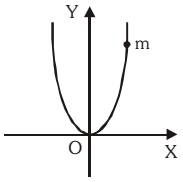
(D) 

6. In the arrangement shown in figure, coefficient of friction between the two blocks is μ = $\frac{1}{2}$. The force of friction acting between the two blocks is (g = 10 ms^{-2})



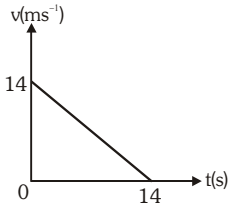
(A) 8 N (B) 10 N (C) 6 N (D) 4 N

7. A bead of mass m is located on a parabolic wire with its axis vertical and vertex directed towards downward as in figure and whose equation is $x^2 = ay$. If the coefficient of friction is μ, the highest distance above the x–axis at which the particle will be in equilibrium is :–



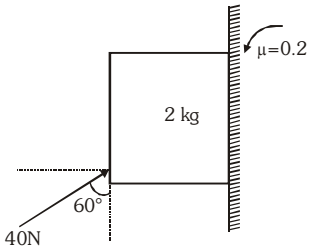
(A) μa (B) $\mu^2 a$ (C) $\frac{1}{4}\mu^2 a$ (D) $\frac{1}{2}\mu a$

8. The v–t graph of the motion of a wooden block of mass 1 kg is shown in figure. It is given an initial push at t = 0, along a horizontal table. The coefficient of friction between the block and table is (g= 10 ms^{-2})



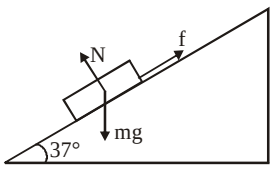
(A) 0.2 (B) 0.1 (C) 0.4 (D) 0.5

9. A block of mass 2 kg is pressed against the vertical wall of coefficient of friction μ = 0.2. The value of friction force acting on the wall



(A) $40\sqrt{3}$ N in upward direction (B) $40\sqrt{3}$ N in downward direction
(C) 20N in upward direction (D) No friction force acts on the block

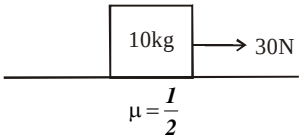
10. A block slides down an incline of angle 37° with an acceleration $\frac{g}{4}$. Find the kinetic friction coefficient.



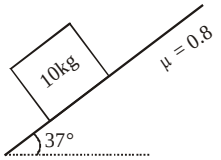
(A) $\frac{9}{16}$ (B) $\frac{1}{4}$ (C) $\frac{3}{4}$ (D) $\frac{7}{16}$

11. Find the friction on the block in the following cases

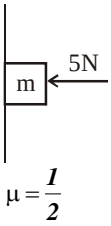
(A)



(B)

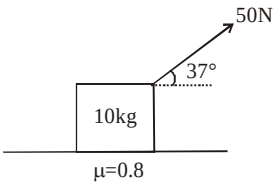


(C)

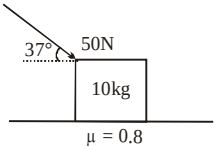


If (i) m = 0.1 kg and (ii) m = 1 kg

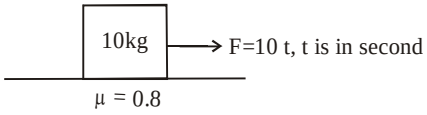
(D)



(E)

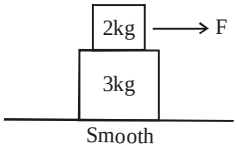


12. Find the friction on the block in the following cases

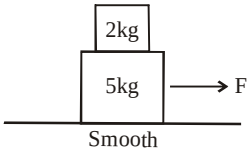


If (i) t = 4 and (ii) t = 9s

13. The friction coefficient between the blocks is 0.5. Find the acceleration of each block if F is equal to (a) 5 N and (b) 20N.



14. The coefficient of friction betwen the blocks is 0.5. Find the acceleration of each block if F is (a) 21N, (b) 35N and (c) 40N.



Answers

1. (2) **2.** (2) **3.** (3) **4.** (1) **5.** (3) **6**. (1) **7.** (3) **8.** (4) **9.** (4)

10. (A)-30N (B)-60N (C) (i)-1N, (ii) 2.5N (D) 40N (E) 40N **11.** (i) 40N (ii) 80N

12. (a) $1m/s^2$, $1m/s^2$ (b) $5m/s^2$, $10/3m/s^2$ **13.** (a) $3m/s^2$, $3m/s^2$ (b) $5m/s^2$, $5\ m/s^2$ (c) $5\ m/s^2$, $6m/s^2$