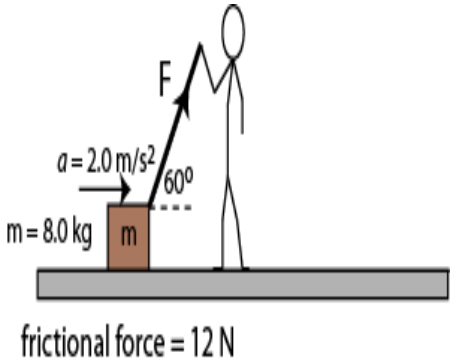
Old Exam-Chapter 6

T072:

Q15.A constant horizontal force of 36 N is acting on a block of mass 4.0 kg, another block of mass 2.0 kg sits on the 4.0 kg block. The 4.0 kg block moves on a frictionless horizontal floor. Find the magnitude of the frictional force maintaining the 2.0 kg block in its position above the 4.0 kg block during the motion.(12 N)

Q18. In Fig. 4, a boy is dragging a box (mass =8.0 kg) attached to a string. The box is moving horizontally with an acceleration a = 2.0 m/s^2. If the frictional force is 12 N, calculate the applied force F at an angle θ=60° (56 N)



Q19.At what angle should the circular roadway of 50 m radius, be banked to allow cars to round the curve without slipping at 12 m/s? (Ignore friction) (16°)

Q20. A 1000 kg airplane moves in straight horizontal flight at constant speed. The force of air resistance is 1800 N. The net force on the plane is: (zero)

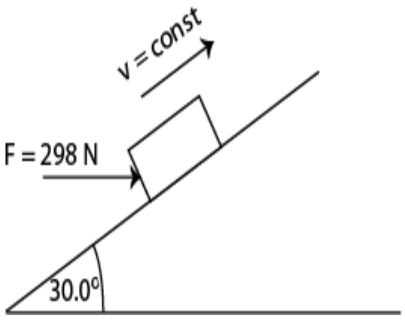
T071:

Q17.: A 5.0 kg block is moving with constant velocity down a rough incline plane. The coefficients of static and kinetic friction between the block and the incline are 0.25 and 0.20, respectively. What is the inclination angle of the incline plane? (11°)

Q18. A car rounds a flat curved road (radius = 92 m) at a speed of 26 m/s and is on the verge of sliding at this speed. What is the coefficient of static friction between the tires of the car and the road? (0.75)

Q19.: A box of mass 40.0 kg is pushed across a rough flat floor at the constant speed of 1.50 m/s. When the force is removed, the box slides a further distance of 1.20 m before coming to rest. Calculate the friction force acting on the box when it slides.(37.5 N)

Q20. A 10.0 kg box is pushed up an incline (θ= 30.0°) by a horizontal force of 298 N. The box then moves at a constant velocity as shown in Fig. 7. What is the frictional force on the box? (209 N)



T062

Q16. A car takes a round turn on a flat circular track at a speed of 8.00 *m/s*. The coefficient of static friction between its tires and the track is 0.300. If the car is at the verge of slipping out of the track at this speed, the radius of the track is: (21.8 m)

Q17: A box of mass *M* is placed on a 30° inclined plane. The box is sliding with an acceleration equals g/2 (g is the free fall acceleration). What is the magnitude of the force of friction between the box and the plane? (zero)

T061:

Q17. A box with a weight of 50 N rests on a horizontal surface with $\mu_s = 0.40$. A person pulls horizontally on it with a force of F_2=10 N and it does not move. To start it moving, a second person pulls vertically upward on the box with a force F_1 (see Fig 6). What is the smallest vertical force (F_1) for which the box starts moving? (25 N)

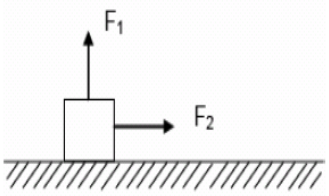
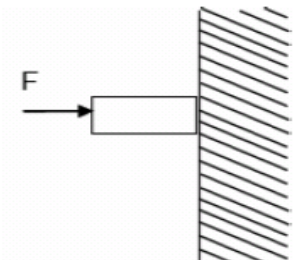
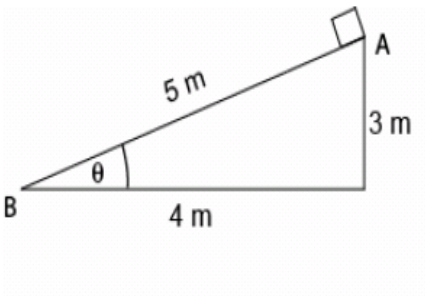


Figure 6

Q18. : An 8.0 kg block is pushed against a vertical wall by a horizontal force *F* as shown in Fig 7. If the coefficients of friction between the block and the wall are $\mu_s = 0.60$ and $\mu_k = 0.30$ then the minimum value for (*F*) that will prevent the block from slipping is: (130 N)



Q19: A 2.0 kg block is released from rest the top of a ramp (point A) as shown in Fig 8. The coefficient



of kinetic friction between the block and the inclined surface is 0.20. The speed by which the block hits the bottom (point B) is: (6.6 m/s)

Q20. A 1000 kg car moves on a level horizontal circular road of radius 50 m. The coefficient of static friction between the tires and the road is 0.50. The maximum speed with which this car can round this curve without slipping is: (16 m/s)

T052

Q17. A block rests on a rough incline and has coefficients of friction μ_k= 0.20 and μ_s= 0.30. If the incline angle increases, at what angle does the block start moving? (16.7°)

Q18. A car is moving in a horizontal circular track of radius R=50.0 m. The coefficient of static friction between the car wheels and the track is μ_s= 0.250. What would be the car speed at which the car starts sliding out side the track? (11.1 m/s)

Q19. A 5.0-kg block is at rest on a rough horizontal surface. The coefficient of static friction between the block and the surface is μ_s= 0.4. If a horizontal force of 15.0 N is acted on the block, what would be the magnitude of the friction force? (15.0 N)

T051

Q17. A 0.20-kg stone is attached to a string and whirled in a circle of radius r = 0.60 m on a horizontal frictionless surface as shown in Fig. 7. If the stone makes 150 revolutions per minute, the tension (T) in the string is (30 N)

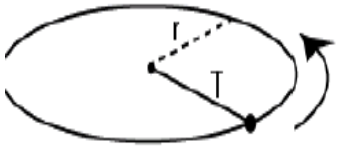


Fig.7

Q19. A box of mass m is sliding down a rough inclined plane (which makes an angle of 30° with the horizontal and has a coefficient of kinetic friction = μ_k) at a constant acceleration g/4 (where g = 9.8 m/s^2). Find μ_k. (0.29)

Q20. A 5.0 kg block is sliding on a rough horizontal plane (μ_k=0.10) under the effect of a horizontal force F. Fig. 8

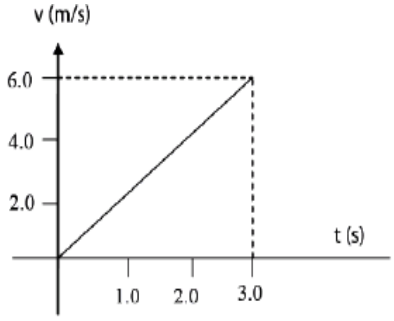


Fig.8

shows the velocity (v) of the block as a function of time (t). Calculate F. (15 N)

T042

Q15 A worker drags a crate across a factory floor by pulling on a rope tied to the crate as shown in Fig.5. The worker exerts a force of 500 N on the rope, which is inclined at 30 degrees to the horizontal, and the floor exerts a frictional force of 150 N. Calculate the magnitude of the acceleration of the crate if its weight is 310 N. (8.9 m/s^2)

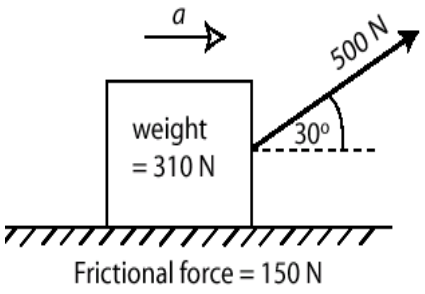
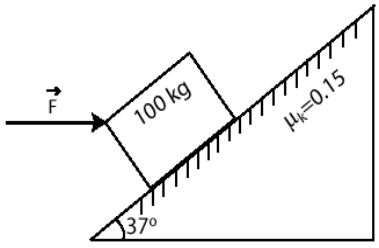


Figure 5

Q16 A 100 kg block is pushed at a constant speed up the rough 37 degrees ramp by a horizontal force F. The coefficient of kinetic friction between block and surface is 0.15. What is the magnitude of force F? (998 N)



Q17 A block m_1 on a rough horizontal plane is connected to a second block m_2 by a cord over a massless pulley. Calculate the coefficient of kinetic friction between the block m_1 and the table if the acceleration of the descending block m_2 is 4.3 m/s^2 (0.50)

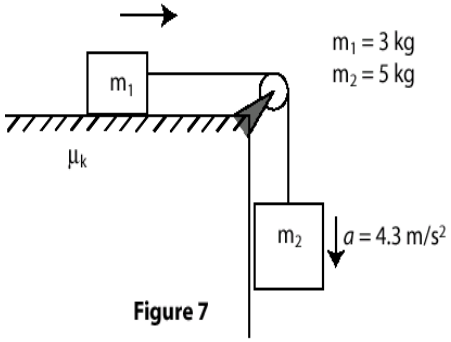
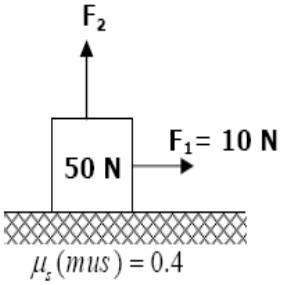


Figure 7

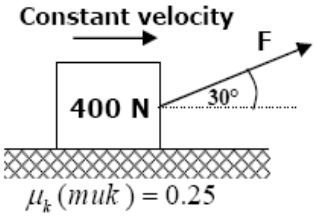
Q18 A car is rounding a flat curve of radius R=220 m with speed v= 94 km/h. What is the magnitude of the force exerted by the seat on the passenger whose mass m is 85 kg. (263 N)

T041

Q18: A box with a weight of 50 N rests on a rough horizontal surface (μ_s = 0.4). Two forces F1 (=10 N) and F2 act on the box as shown in Fig 5. What is the smallest vertical force F2 for which the box just starts sliding horizontally? (25 N)



Q19: A 400-N block is pushed along a rough horizontal surface (μ_k = 0.25) by an applied force F as shown in Fig 6. The block moves at constant velocity. The magnitude of F is: (101 N)



Q20: One end of a 1.0-m long string is fixed, the other end is attached to a 2.0-kg stone. The stone swings in a vertical circle, passing the lowest point at 4.0 m/s (see Fig 7). The tension force (T) of the string at this point is: (52 N)