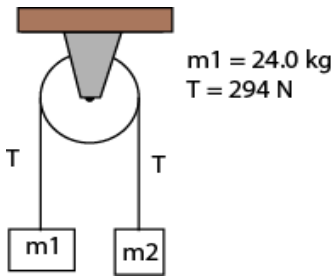
Old Exam Question Ch. 5

T072

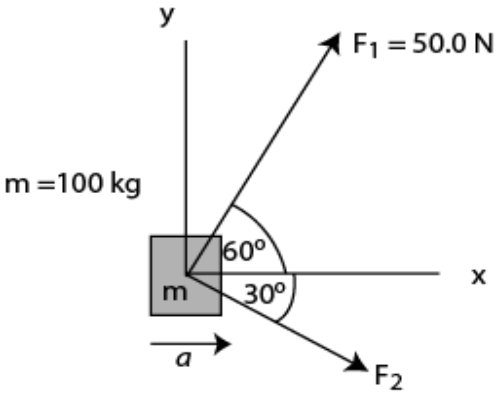
Q13. Two blocks of mass m_1= 24.0 kg and m_2, respectively, are connected by a light string that passes over a massless pulley as shown in Fig. 2. If the tension in the string is T = 294 N. Find the value of m_2. (Ignore friction) (40.0 kg)



Q14.Two horizontal forces of equal magnitudes are acting on a box sliding on a smooth horizontal table. The direction of one force is the north direction; the other is in the west direction. What is the direction of the acceleration of the box?(45° west of north)

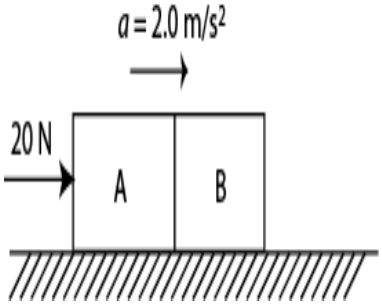
Q16.: A 5.0 kg block is lowered with a downward acceleration of 2.8 m/s^2 by means of a rope. The force of the block on the rope is:(35 N, down)

Q17.:Two students are dragging a box (m=100 kg) across a horizontal frozen lake. The first student pulls with force F_1=50.0 N, while the second pulls with force F_2. The box is moving in the x-direction with acceleration a (see Fig. 3). Assuming that friction is negligible, what is F_2?



T071

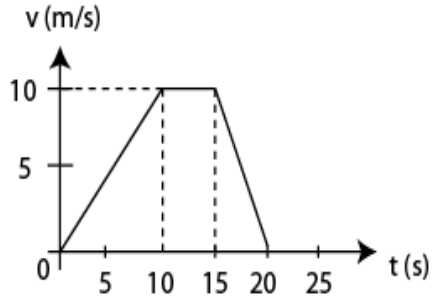
Q13. A constant force *F* of magnitude 20 N is applied to block *A* of mass *m* = 4.0 kg, which pushes block *B* as shown in Fig. 5. The block slides over a frictionless flat surface with an acceleration of 2.0 m/s^2. What is the net force on block *B*? (12 N)



Q14. Only two forces act upon a 5.0 kg box. One of the forces is $\vec{F}_1 = \left(6.0\hat{i} + 8.0\hat{j}\right)\text{N}$. If the box moves at a constant velocity of $\left(1.6\hat{i} + 1.2\hat{j}\right)\text{m/s}$, what is the magnitude of the second force?(10. N)

Q15. An elevator of mass 480 kg is designed to carry a maximum load of 3000 N. What is the tension in the elevator cable at maximum load when the elevator moves down accelerating at 9.8 m/s^2? (0)

Q16.: A car of mass 1000 kg is initially at rest. It moves along a straight road for 20 s and then comes to rest again. The velocity – time graph for the movement is given in Fig.6. The magnitude of the net force that acts on the car while it is slowing down to stop from t = 15 s to t = 20 s is: (2000N)



T062

Q15.: Two blocks of masses m_1 = 4.00 *kg* and m_2 = 2.00 *kg* are connected by a string passing over a massless and frictionless pulley and placed on a frictionless horizontal table as shown in Fig. 3. A force of F = 10.0 N at an angle of 60.0° with the horizontal is applied to m_1. The magnitude of acceleration of the system is: (2.43 m/s^2)

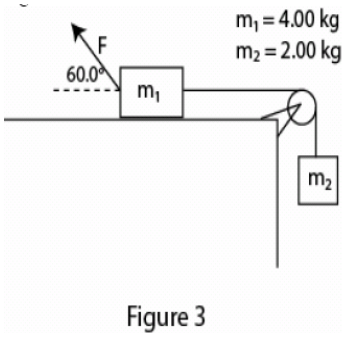


Figure 3

Q18. Two boxes *A* and *B* (m_A = 3.0 *kg* and m_B =1.0 *kg*) are in contact on a horizontal frictionless surface and move along the x-axis (see Fig. 4). A horizontal force is applied on Box *A*. The net force acting on *A* is F_1 and on *B* is F_2. Which one of the following statements is correct? (F_1 = 7.5 i N, F_2 = 2.5 i N)

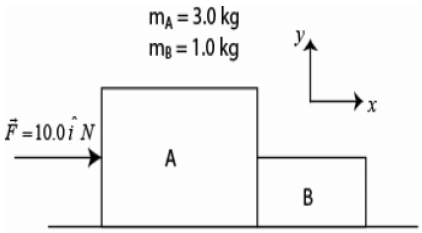


Figure 4

Q19. Two boxes, one of mass m = 5.00 *kg* and the other with an unknown mass M are connected with a string passing over a massless frictionless pulley and are placed on frictionless planes as shown in Fig. 5.What must be the mass M, if it goes down the plane with an acceleration of a = 2.45 m/s^2? (19.1 *kg*)

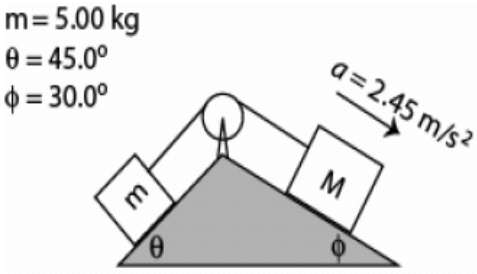


Figure 5

Q20: A 2.00-*kg* mass is hanging from the ceiling of an elevator accelerating upward at a = 2.50 m/s^2 (see Fig. 6). What is the tension T in the string? (24.6 *N)*

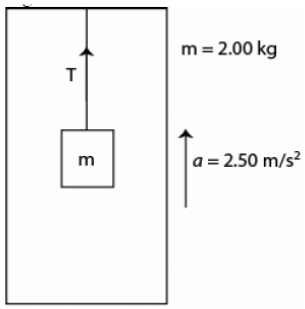


Figure 6

<u>T061</u>

Q13. A 4.0 kg block is pushed upward a 30° inclined frictionless plane with a constant horizontal force F (Fig 4). If the block moves with a constant speed find the magnitude of the force F. *(*23 N)

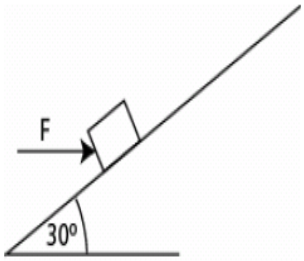


Figure 4

Q14. An elevator cab with a total mass of 2000 kg is pulled upward by a cable. If the elevator accelerates at 2.00 m/s^2 upward, find the tension in the cable. (2.36×10^4 N)

Q16. A 7.0 kg block and a 3.0 kg block are connected by a string as shown in Fig 5. If the pulley is massless and the surface is frictionless, the magnitude of the acceleration of the 3.0 kg block is: (2.9 m/s^2)

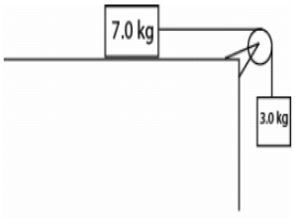


Figure 5

T052

Q13. A 5.0-kg mass is suspended by a string from the ceiling of an elevator that is moving downward with constant acceleration of 2.8 m/s^2. The tension in the string is: (35 N)

Q14. A 3.0-kg block slides on a frictionless 37° incline plane. A vertical force of 15 N is applied to the block (see Fig 4). The acceleration of the block is: (2.9 m/s 2 down the incline)

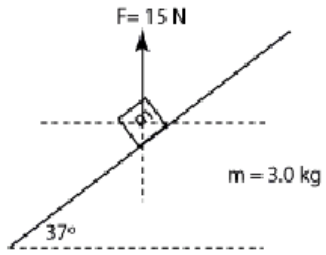


Figure 4

Q15. Two blocks of mass m_1 = 5.0 kg and m_2 = 10 kg are connected by a massless rod and slide on a frictionless 30° incline as shown in Fig 5. The tension in the rod is: (zero)

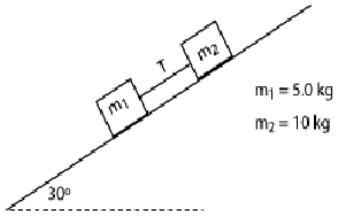
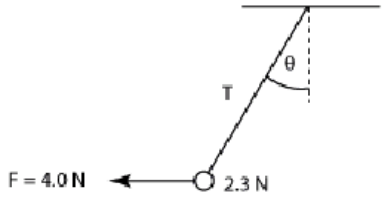


Figure 5

Q16. A 2.3-N weight is suspended by a string from a ceiling and held at an angle θ from the vertical by 4.0-N horizontal force F as shown in Fig 6. The tension in the string is: (4.6 N)



Q20. Three equal mass blocks each of mass =2.0 kg can move together over a horizontal frictionless surface. Two forces, F_1 = 40 ***i*** *N and* F_2 = -10 ***i*** *N* are applied on the three masses system as shown in the Fig 7. The net force on the middle mass is: (*10* ***i*** *N)*

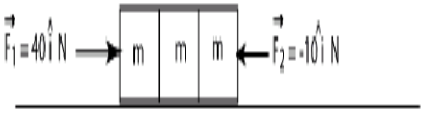


Figure 7

T051

Q14. A block of mass m1=5.7 kg on a frictionless 30° inclined plane is connected by a cord over a massless, frictionless pulley to a second block of mass m2=3.5 kg hanging vertically as shown in Fig 4. The acceleration of m_2 is:(0.69 m/s downward)

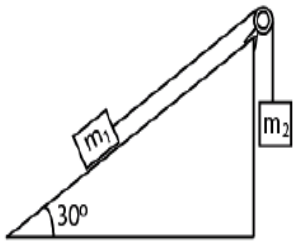


Fig.4

Q15. Fig.5 shows a block A of mass 6.0 kg and block B of 8.0 kg connected by a rigid rod of negligible mass. Force F_a =16 *i N* acts on block A; force F_b =- 30 *i N* acts on block B. The tension (T) in the rod is: (Neglect friction) (22 N)

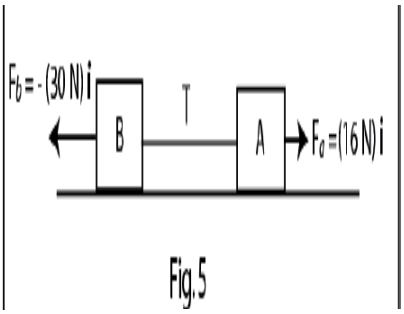


Fig.5

Q16. A 5.0-kg mass is held at an angle θ from the vertical by a horizontal force F=15 N as shown in Fig 6. The tension (T) in the string supporting the mass (in Newton) is: (Ans: 51)

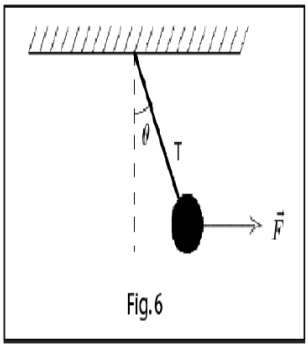


Fig.6

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)

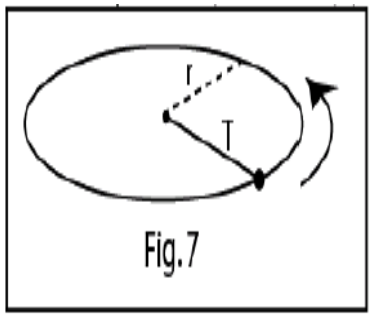


Fig.7