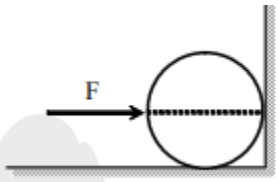
DPP -01

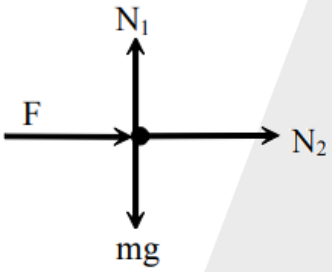
1. A force F applied to an object of mass m_1 produces an acceleration of 3.00 m/s^2. The same force applied to a second object of mass m_2 produces an acceleration of 1.00 m/s^2.

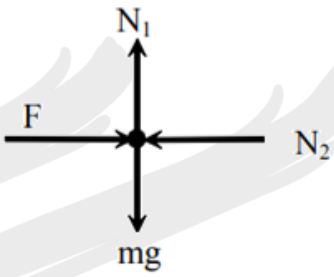
(i) What is the value of the ratio m_1/m_2 ?

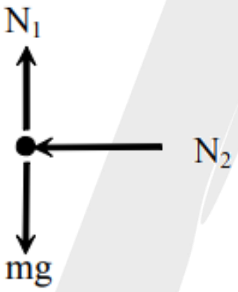
(ii) If m_1 and m_2 are combined, find their acceleration under the action of the force F.

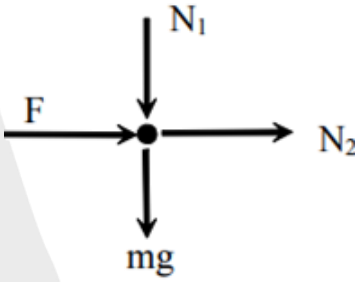
2. A ball of mass m kept at the corner as shown in the figure, is acted by a horizontal force F. The correct free body diagram of ball is



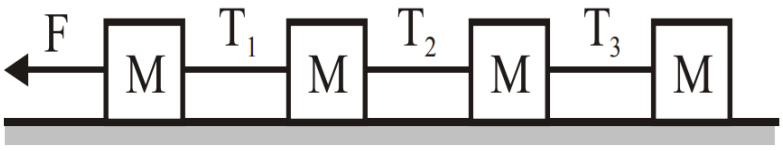
(A)


(B)


(C)


(D)


3. Four blocks of same mass connected by cords are pulled by force F on a smooth horizontal surface, as in figure. The tension T_1, T_2 and T_3 will be



(A) $T_1 = F/4,\ T_2 = 3\,F/2,\ T_3 = F/4$

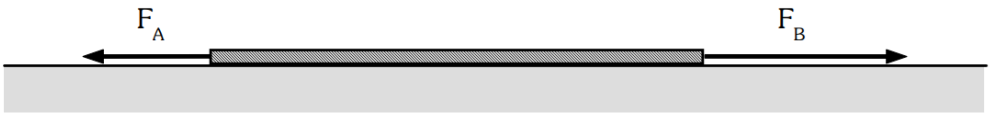
(B) $T_1 = F/4,\ T_2 = F/2,\ T_3 = F/2$

(C) $T_1 = 3\,F/4,\ T_2 = F/2,\ T_3 = F/4$

(D) $T_1 = 3\,F/4,\ T_2 = F/2,\ T_3 = F/2$

Paragraph for Question No. 4 to 7

A uniform rope of mass (m) and length (L) placed on frictionless horizontal ground is being pulled by two forces F_A and F_B at its ends as shown in the figure. As a result, the rope accelerates toward the right.



4. Acceleration (A) of the rope is

(A) zero (B) $a = \frac{F_A+F_B}{m}$ (C) $a = \frac{F_A-F_B}{m}$ (D) $a = \frac{F_B-F_A}{m}$

5. Tension (T) at the mid point of the rope is

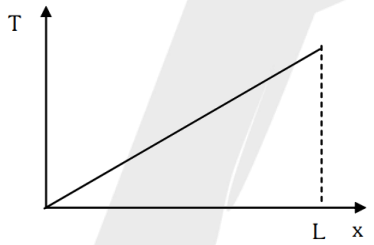
(A) $T = F_B - F_A$ (B) $T = F_A + F_B$ (C) $T = \frac{1}{2}(F_B - F_A)$ (D) $T = \frac{1}{2}(F_A + F_B)$

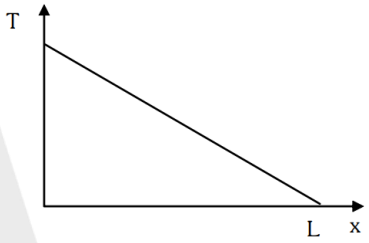
6. Expression (T_x) of tension at a point at distance x from the end A is

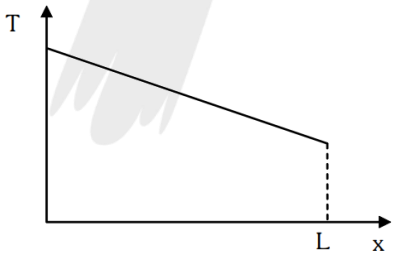
(A) $T_x = \left(\frac{F_B-F_A}{L}\right)x + F_A$ (B) $T_x = \left(\frac{F_B-F_A}{L}\right)x - F_A$

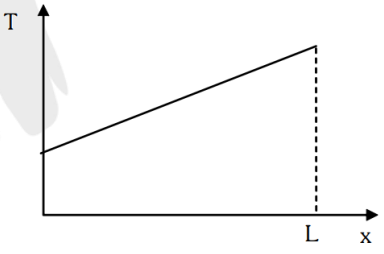
(C) $T_x = \left(\frac{F_B-F_A}{L}\right)x + F_B$ (D) $T_x = \left(\frac{F_B-F_A}{L}\right)x - F_B$

7. Which of the following graph best represents variation in tension at a point on the rope with distance x of the point from the end A ?

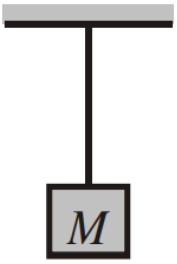
(A)


(B)


(C)


(D)


8. Consider a block suspended from a light string as shown in the figure. Which of the following pairs of forces constitute Newton's third law pair?



(A) Force with which string pulls on the ceiling and the force with which string pulls on block

(B) Force with which string pulls on the block and weight of the block

(C) Force acting on block due to the earth and force the block exerts on the earth

(D) Force with which block pulls on string and force with which the string pulls on the block.

9. A particle of mass M originally at rest is subjected to a force whose direction is constant but magnitude varies with time according to the relation

$$F = F_0\left[1 - \left(\frac{t - T}{T}\right)^2\right]$$

where F_0 and T are constants. The force acts only for the time interval 2 T. The velocity v of the particle after time 2 T is

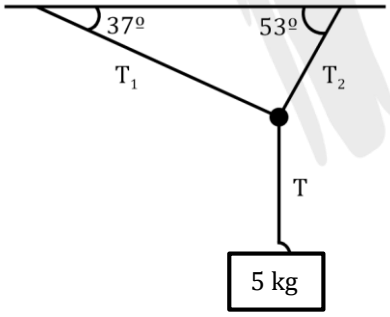
(A) 4 F_0 T/3M

(b) F_0 T/3M

(c) F_0 T/2M

(d) 2 F_0 T/M

10. If the given system is if equilibrium, find T, T_1 and T_2 Respectively.



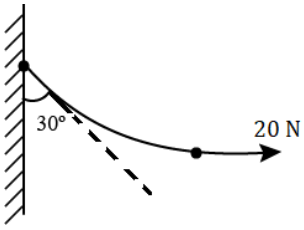
(A) 50 N, 40 N, 30 N

(B) 30 N, 40 N, 50 N

(C) 50 N, 30 N, 40 N

(D) 25 N, 15 N, 10 N

Q.11 One end of the rope is fixed to vertical wall and other end is pulled by horizontal force of 20 N. The shape of flexible rope is shown in figure. The mass of rope is



(A) 2 kg (B) 3 kg (C) 3.5 kg (D) 4.5 kg

ANSWER KEY

1. (i) $\frac{m_1}{m_2} = \frac{1}{3}$ (ii) $a = 3/4\ m/s^2$ **2.** (B) **3.** (C) **4.** (D) **5.** (D) **6.** (A)

7. (D) **8.** (C, D) **9.** (A) 10. (C) 11. (c)