St. Lawrence High School

A Jesuit Christian Minority Institution

Term : 1st

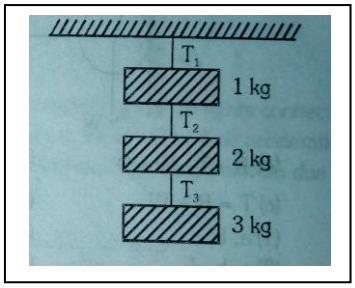
Solution of Work Sheet – 15

Class – XI | Subject – Physics | Date – 01.07.20

Chapter – Laws of motion | Topic – Dynamic system and FBD

Choose the correct option for the following questions. $1 \times 15 = 15$

1. Find the tension T_2 as shown in the figure. ($g = 10m/s^2$)



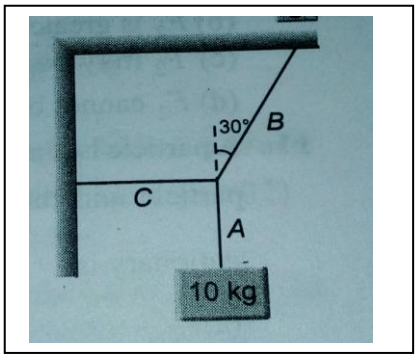
   a. 10N
   b. 20N
   c. 50N
   d. 60N

   Ans: c. 50N

2. A spherical ball of mass m is hung from the ceiling of a lift (of mass M) with the help of a mass less inextensible string. The tension in the string is T_1 when lift goes up with acceleration a $(a < g)$ and its T_2 when the lift comes down with same acceleration. The ratio of $T_1 : T_2$ will be –
   a. $m(g-a) : M(g+a)$
   b. $(g+a) : (g-a)$
   c. $m(g+a) : M(g-a)$
   d. $(g-a) : (g+a)$

   Ans: b. $(g+a) : (g-a)$

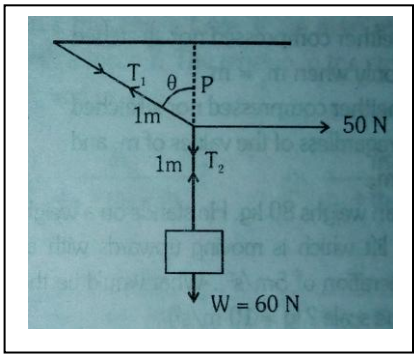
3. In the figure ($g = 10m/s^2$), the tension on the string C is –



   a. Zero
   b. $\frac{200}{\sqrt{3}}$ N
   c. $\frac{100}{\sqrt{3}}$ N
   d. 100N

   Ans: c. $\frac{100}{\sqrt{3}}$ N

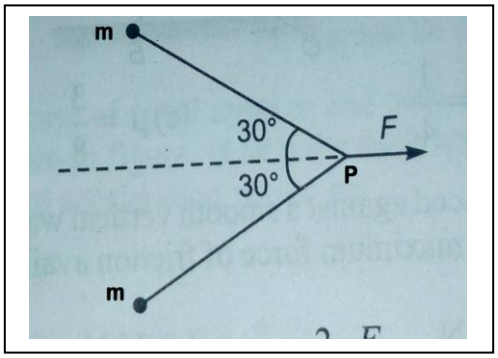
4. As shown in the figure, a constant 50N force is needed to keep the mass in static condition. What is the measure of the angle θ?



   a. $\tan^{-1}\left(\frac{4}{5}\right)$
   b. $\tan^{-1}\left(\frac{5}{4}\right)$
   c. $\tan^{-1}\left(\frac{5}{6}\right)$
   d. $\tan^{-1}\left(\frac{6}{5}\right)$

   Ans: c. $\tan^{-1}\left(\frac{5}{6}\right)$

5. In the figure, two identical particles each of mass m are tied together with mass less inextensible string at point P and the whole system then lies on a smooth horizontal plane . The system is then pulled by applying a force F at P. Then the acceleration of each particle towards each other is –



a. $\frac{\sqrt{3}}{2}\frac{F}{m}$

b. $\frac{1}{2\sqrt{3}}\frac{F}{m}$

c. $\frac{2}{\sqrt{3}}\frac{F}{m}$

d. $\frac{\sqrt{3}}{1}\frac{F}{m}$

$Ans: b. \frac{1}{2\sqrt{3}}\frac{F}{m}$

6. At what maximum acceleration should a monkey slide up a vertical rope (mass less and inextensible) whose breaking strength is $\frac{4}{3}$ rd of the weight of the monkey?

a. $\frac{2}{3}g$

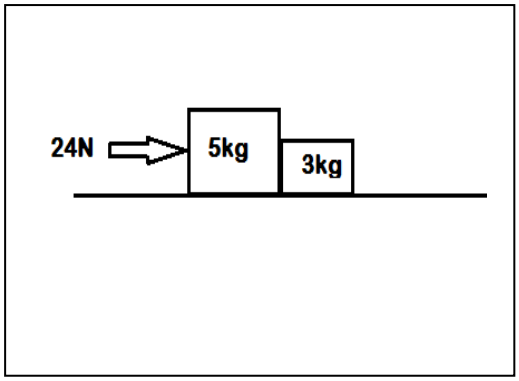
b. g

c. $\frac{g}{3}$

d. Zero

Ans: c. $\frac{g}{3}$

7. Two blocks of mass 5kg and 3kg are placed in contact on a smooth horizontal plane as shown in the figure. A horizontal force of magnitude 24N is applied as shown. What will be the ratio of acceleration of the masses ?



a. 3: 5

b. 5: 3

c. 8: 1

d. 1: 1

Ans: d. 1:1

8. In the above case, the reaction force exerted by 3kg mass on 5kg mass will be –

a. 24N

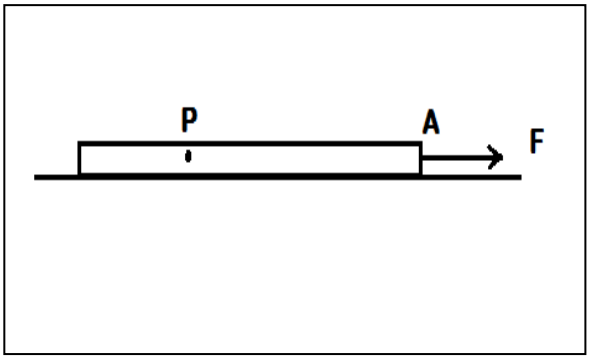
b. 15N

c. 9N

d. Zero

Ans: c. 9N

9. A uniform rod of length l and mass m is kept on a smooth horizontal plane. If a horizontal force F is applied on the road along its length, then what will be the force on the rod at point P? (AP = x)



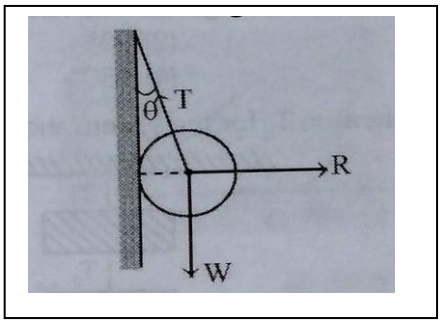
   a. F
   b. Zero
   c. $F\left(1-\frac{x}{l}\right)$
   d. $Fm\left(1-\frac{l}{x}\right)$

   Ans: c. $F\left(1-\frac{x}{l}\right)$

10. A person of mass 60kg is standing on the floor of a moving lift that is going up with an acceleration 6m/s^2. What will be the ratio of the weight of the person to his mass? ($g = 10m/s^2$)
   a. 16:1
   b. 10:1
   c. 1:1
   d. 1:16

   Ans: a. 16:1

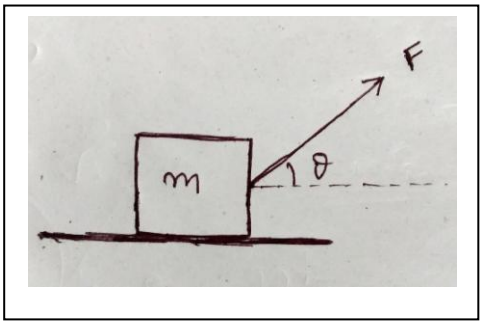
11. A solid sphere of weight W is hung as shown in the figure. What is the reaction force by the wall on the sphere?



   a. T cos θ
   b. T sin θ
   c. W tan θ
   d. Both b. and c.

   Ans: d. Both b. and c.

12. The block kept on the smooth horizontal plane, slides horizontally being in contact with the plane. What will be acceleration of the block?



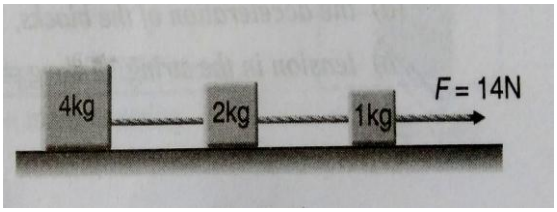
   a. $\frac{F}{m\cos\theta}$
   b. $g\cos\theta$
   c. $F\frac{\cos\theta}{m}$
   d. $F\frac{\sin\theta}{m}$

   .*Ans*: c. $F\frac{\cos\theta}{m}$

13. In the above problem, what will be the net downward force on the block?
   a. mg
   b. Zero
   c. mg + F sin θ
   d. mg – F sin θ

   Ans: d. mg – F sin θ

14. Three masses, tied with a mass less inextensible string are placed on a smooth horizontal surface as shown in the figure. If now 14N horizontal force is applied as shown, then what will be the tension of the string in between 1kg and 2kg mass?



   a. 14N
   b. 12N
   c. 10N
   d. Zero

   Ans: b. 12 N

15. In the above case, what is the tension of the string in between 2kg and 4kg masses?

   a. 8N
   b. 10N
   c. 12N
   d. 2N

   Ans: a. 8N

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