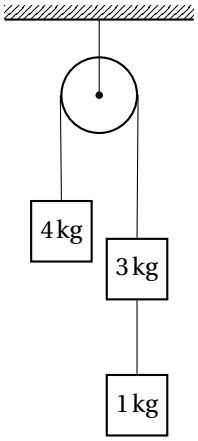
Module-Test-5
(Physics-NEET)

December 17, 2022

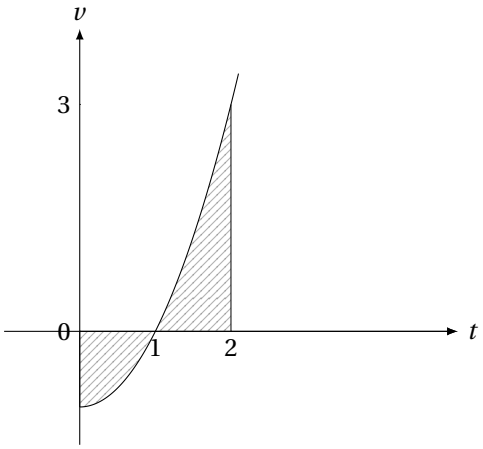
Section-A

1. In the arrangement shown in figure, the ratio of tensions in the strings attached with 4 kg block and that with 1 kg block is



a) 2 : 1
b) 4 : 1 *Ans.*
c) 1 : 2
d) 1 : 4

2. A particle is moving with a velocity $v = t^2 - 1$, then the distance covered from 0 to 2 s is

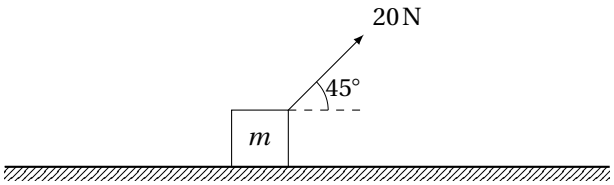


a) 2 m *Ans.*
b) $\frac{2}{3}$ m
c) $\frac{4}{3}$ m
d) $\frac{-2}{3}$ m

3. Two particles are moving towards each other with equal speed of 5 m s^{-1}, then their relative displacement in 0 to 5 s is

a) 50 m *Ans.*
b) 25 m
c) 0 m
d) None of these

4. For the given figure, force on the block in the component form is



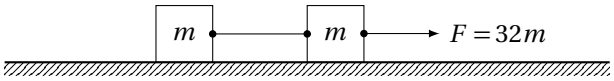
a) $\frac{10}{\sqrt{2}}\hat{i}+\frac{10}{\sqrt{2}}\hat{j}$

b) $20\sqrt{2}\hat{i}+20\sqrt{2}\hat{j}$

c) $\frac{20}{\sqrt{2}}\hat{i}+\frac{20}{\sqrt{2}}\hat{j}$ *Ans.*

d) $10\sqrt{2}\hat{i}+10\sqrt{2}\hat{j}$ *Ans.*

5. For the given figure, acceleration of the block of mass m is



a) 4

b) 8

c) 16 *Ans.*

d) 32

6. What is the angle between $(\vec{P}+\vec{Q})$ and $(\vec{P}\times\vec{Q})$?

a) zero

b) $\frac{\pi}{2}$ *Ans.*

c) $\frac{\pi}{4}$

d) π

7. The displacement (in metre) of a particle moving along x-axis is given by $x=18t+5t^2$. The average acceleration during the interval $t_1=2s$ and $t_2=4s$ is

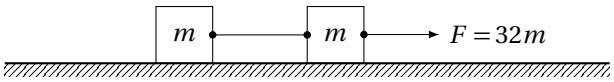
a) $13m/s^2$

b) $10m/s^2$ *Ans.*

c) $27m/s^2$

d) $37m/s^2$

8. For the given figure, tension in the string connecting the blocks of masses m is



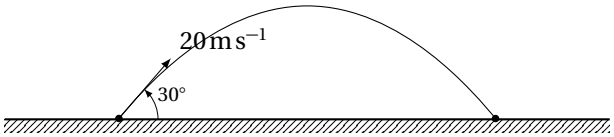
a) $4m$

b) $8m$

c) $16m$ *Ans.*

d) $32m$

9. A body is projected with a velocity $20\,\mathrm{m\,s^{-1}}$ at an angle of 30°, then the time of flight of this projectile is



a) 4 s

b) 2 s *Ans.*

c) 3 s

d) 1 s

10. Component of the vector $\vec{A}=2\hat{i}+3\hat{j}$ along the vector $\vec{B}=(\hat{i}+\hat{j})$ is

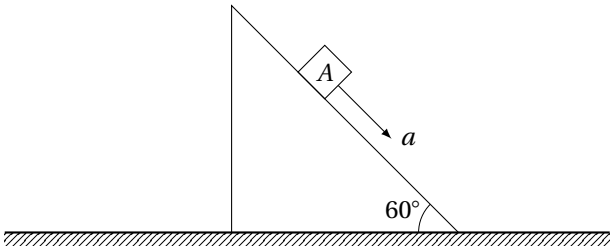
a) $\frac{2}{\sqrt{2}}$

b) $4\sqrt{2}$

c) $\frac{\sqrt{2}}{3}$

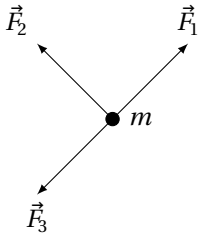
d) None of these *Ans.*

11. For the given figure, the acceleration of the block along the inclined plane is



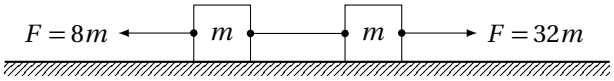
a) $g\cos 60°$
b) $g\sin 60°$ *Ans.*
c) $g\tan 60°$
d) None of these

12. Three forces $\vec{F}_1$, $\vec{F}_2$ and $\vec{F}_3$ are acting on a particle of mass m and vector sum of all these forces is zero. Then the acceleration of the particle is



a) zero *Ans.*
b) Non-zero
c) Can't say anything
d) None of these

13. For the given figure, acceleration of the block of mass m is

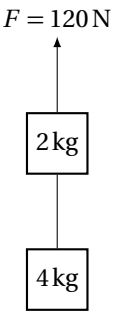


a) 4
b) 8
c) 12 *Ans.*
d) 16

14. The speed of boat is $5\,\mathrm{km\,h^{-1}}$ in still water. It crosses a river of width 1 km along the shortest possible path in 15 min. Then, velocity of river will be

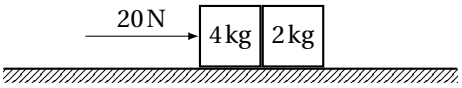
a) $4.5\,\mathrm{km\,h^{-1}}$
b) $4\,\mathrm{km\,h^{-1}}$
c) $1.5\,\mathrm{km\,h^{-1}}$
d) $3\,\mathrm{km\,h^{-1}}$ *Ans.*

15. Two blocks of masses 4 kg and 2 kg are attached by an inextensible light string as shown in figure. Both the blocks are pulled vertically upwards by a force $F = 120\,\mathrm{N}$. Then, the tension in the string connecting the blocks is



a) 60 N
b) 80 N *Ans.*
c) 100 N
d) 120 N

16. Two blocks of masses 4 kg and 2 kg are placed side by side on a smooth horizontal surface as shown in the figure. A horizontal force of 20 N is applied on 4 kg block. Then, the normal reaction between them is



a) $\frac{20}{3}$ N *Ans.*

b) $\frac{30}{3}$ N

c) $\frac{10}{3}$ N

d) $\frac{40}{3}$ N

17. Three blocks of masses 3 kg, 2 kg and 1 kg are placed side by side on a smooth surface as shown in figure. A horizontal force of 12 N is applied on 3 kg block. The net force on 2 kg block is

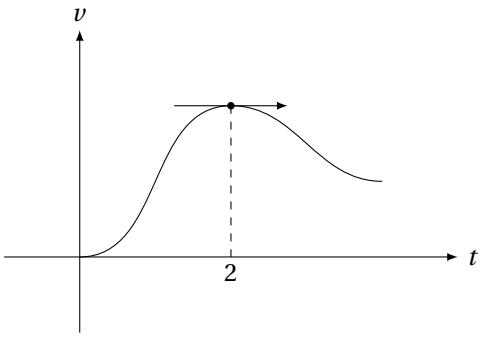
a) 2 N

b) 3 N

c) 4 N *Ans.*

d) 5 N

18. For the given $v-t$ graph, the acceleration at $t=2s$ is



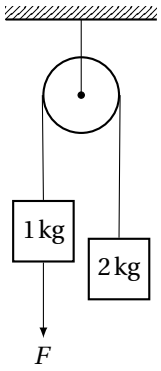
a) $1m/s^2$

b) $-1m/s^2$

c) $0m/s^2$ *Ans.*

d) none of these

19. Two unequal masses of 1 kg and 2 kg are connected by an inextensible light string passing over a smooth pulley as shown in figure. A force $F=20$ N is applied on 1 kg block. The acceleration of the either block is



a) $\frac{10}{3}\,\mathrm{m\,s^{-2}}$ *Ans.*

b) $\frac{20}{3}\,\mathrm{m\,s^{-2}}$

c) $\frac{30}{3}\,\mathrm{m\,s^{-2}}$

d) $\frac{40}{3}\,\mathrm{m\,s^{-2}}$

20. Two trains are moving with velocities $v_1=10\,\mathrm{m\,s^{-1}}$ and $v_2=20\,\mathrm{m\,s^{-1}}$ on the same track in opposite directions. After the application of brakes if their retarding rates are $a_1=2\,\mathrm{m\,s^{-2}}$ and $a_2=1\,\mathrm{m\,s^{-2}}$ respectively, then the minimum distance of separation between the trains to avoid collision is

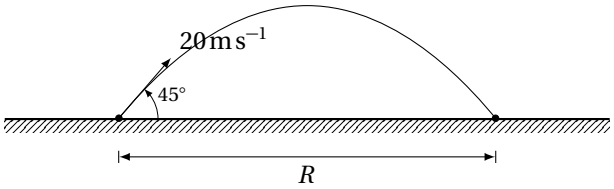
a) 150 m

b) 225 m *Ans.*

c) 450 m

d) 300 m

21. A body is projected with a velocity $20\,\mathrm{m\,s^{-1}}$ at an angle of 45°, then the range of this projectile is



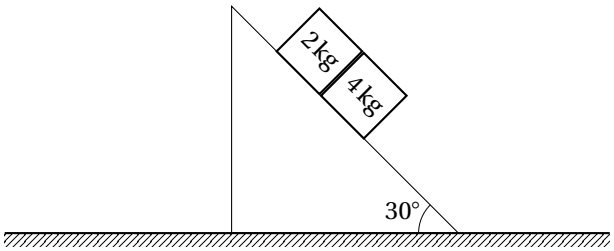
a) 40 m *Ans.*

b) 20 m

c) 80 m

d) $20\sqrt{2}$ m

22. Two blocks of masses 2 kg and 4 kg are released from rest over a smooth inclined plane of inclination 30° as shown in figure. What is the normal force between the two blocks?



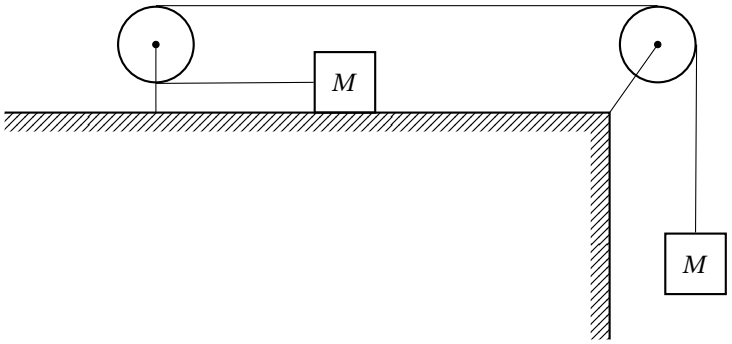
a) 10 N

b) 20 N

c) 5 N

d) Zero *Ans.*

23. Which of the following is the correct pair for the acceleration of either blocks and the tension in the string shown in figure. The pulley and the string are light and all surfaces are smooth.



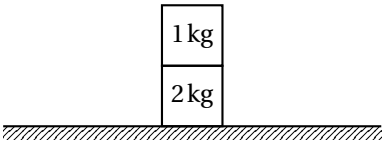
a) $\frac{g}{2}, \frac{Mg}{2}$ *Ans.*

b) $\frac{g}{3}, \frac{Mg}{3}$

c) $\frac{g}{2}, \frac{Mg}{3}$

d) $\frac{g}{3}, \frac{Mg}{2}$

24. What would be the normal reaction between the block of mass 2 kg and 1 kg in the given figure?



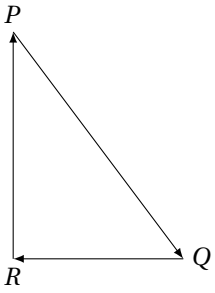
a) 20 N

b) 30 N

c) 10 N *Ans.*

d) None of these

25. A particle moving with velocity $\vec{v}$ is acted by the resultant of three forces shown by the vector triangle PQR. The velocity of the particle will

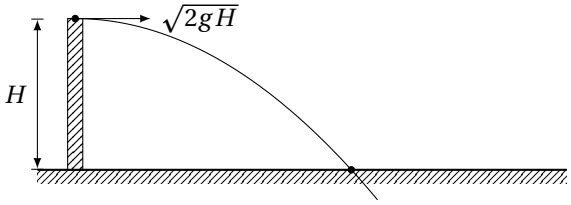


a) decrease
b) remain constant *Ans.*
c) change according to smallest force QR
d) increase

26. An object of mass 3 kg is at rest. If a force $\vec{F} = (6t^2\hat{i} + 4t\,\hat{j})$ N is applied on the object, then the velocity of the object at $t = 3$ s is

a) $18\hat{i} + 3\hat{j}$
b) $18\hat{i} + 6\hat{j}$ *Ans.*
c) $3\hat{i} + 18\hat{j}$
d) $18\hat{i} + 4\hat{j}$

27. An object is thrown horizontally from a tower H meter high with a velocity of $\sqrt{2gH}\,\mathrm{m\,s^{-1}}$. Its speed on striking the ground will be :

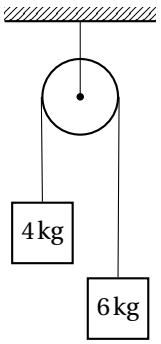


a) $\sqrt{2gH}$
b) $\sqrt{6gH}$
c) $2\sqrt{gH}$ *Ans.*
d) $2\sqrt{2gH}$

28. A body, under the action of a force $\vec{F} = 6\hat{i} - 8\hat{j} + 10\hat{k}$, acquires an acceleration of $1\,\mathrm{m\,s^{-2}}$. The mass of this body must be

a) $2\sqrt{10}$ kg
b) 10 kg
c) 20 kg
d) $10\sqrt{2}$ kg *Ans.*

29. Two bodies of mass 4 kg and 6 kg are tied to the ends of a massless string. The string passes over a pulley which is frictionless(see figure). The acceleration of the system in terms of acceleration due to gravity g is



a) $\frac{g}{2}$
b) $\frac{g}{5}$ *Ans.*
c) $\frac{g}{10}$
d) g

30. Displacement-time equation of a particle moving along x-axis is

$$x = 20 + t^3 - 12t \quad \text{(SI units)}$$

velocity at $t = 0s$ is

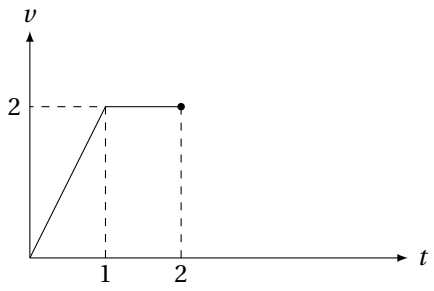
a) $-12m/s$ *Ans.*

b) $0m/s$

c) $+12m/s$

d) none of these

31. The variation of velocity of a particle with time moving along a straight line is illustrated in the adjoining figure. The distance travelled by the particle in $2s$ is



a) $2m$

b) $3m$ *Ans.*

c) $5m$

d) None of these

32. The motion of a particle is described by the equation $v = \alpha t$. α is a $+ve$ constant. The distance travelled by the particle in the first $4s$ is

a) 4α

b) 12α

c) 6α

d) 8α *Ans.*

33. A body starting from rest has an acceleration of $4m/s^2$. Calculate distance travelled by it in 5^{th} second.

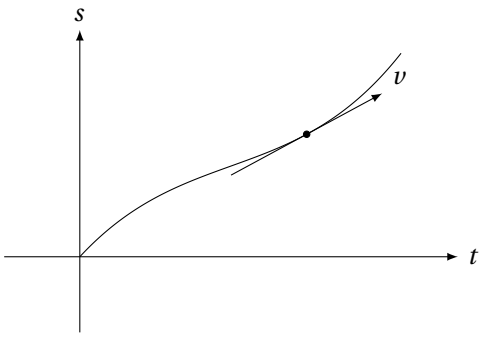
a) $18m$ *Ans.*

b) $16m$

c) $14m$

d) $12m$

34. A particle is moving such that $s = t^3 - 6t^2 + 18t$, where s is in metre and t is in second. The minimum velocity attained by the particle is



a) $29m/s$

b) $5m/s$

c) $6m/s$ *Ans.*

d) $12m/s$

35. A car starts from rest, attains a velocity of $8m/s$ with an acceleration of $4m/s^2$, then it travels $16m$ with this uniform velocity and then comes to rest with a uniform deceleration of $4m/s^2$. Calculate the total time of travel of the car.

a) $4s$

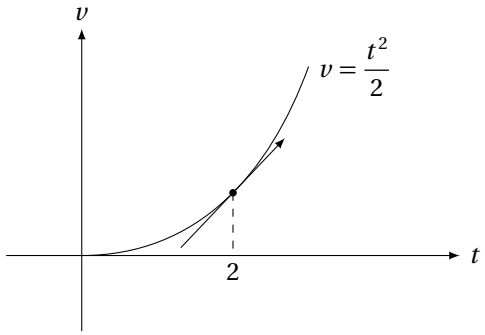
b) $8s$

c) $12s$

d) None of these *Ans.*

Section-B

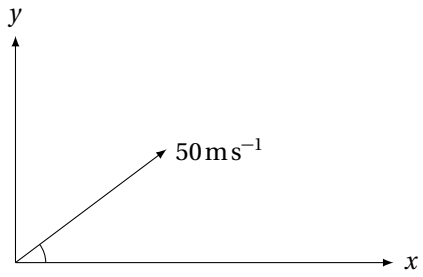
1. For the given $v-t$ graph, the acceleration at $t=2s$ is



a) $4m/s^2$ b) $-4m/s^2$

c) $-2m/s^2$ d) $2m/s^2$ *Ans.*

2. A particle is projected with a velocity of $50\,\mathrm{m\,s^{-1}}$ at 37° with horizontal. Find the horizontal velocity at $t=2\,\mathrm{s}$.



a) $30\,\mathrm{m\,s^{-1}}$ b) $40\,\mathrm{m\,s^{-1}}$ *Ans.*

c) $50\,\mathrm{m\,s^{-1}}$ d) none of these

3. Two trains are moving with velocities $v_1=10\,\mathrm{m\,s^{-1}}$ and $v_2=20\,\mathrm{m\,s^{-1}}$ on the same track in opposite directions. After the application of brakes if their retarding rates are $a_1=2\,\mathrm{m\,s^{-2}}$ and $a_2=1\,\mathrm{m\,s^{-2}}$ respectively, then the minimum distance of separation between the trains to avoid collision is

a) 150 m b) 225 m *Ans.*

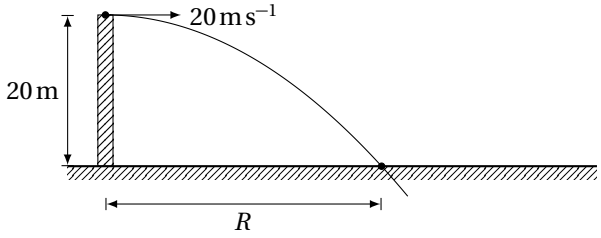
c) 450 m d) 300 m

4. A girl is walking on a horizontal road with a speed of $3\,\mathrm{m\,s^{-1}}$. Raindrops are falling vertically downward with speed of $4\,\mathrm{m\,s^{-1}}$ w.r.t. ground. In which direction the girl should hold her umbrella to keep the rain away ?

a) $\frac{3}{5}\hat{i}+\frac{4}{5}\hat{j}$ *Ans.* b) $\frac{5}{3}\hat{i}+\frac{5}{4}\hat{j}$

c) $\frac{4}{5}\hat{i}+\frac{3}{5}\hat{j}$ d) none of these

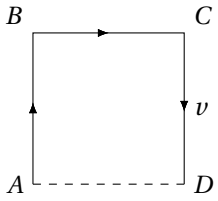
5. In the figure shown, time of flight and range is



a) 2 s and 40 m *Ans.* b) 1 s and 20 m

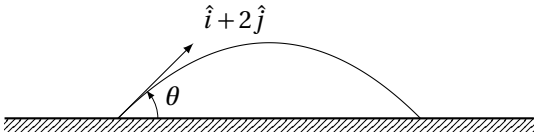
c) 3 s and 60 m d) None of these

6. A particle moves along the sides AB, BC, CD of a square of side 25 m with a velocity of $15\,\mathrm{m\,s^{-1}}$. Its average velocity is



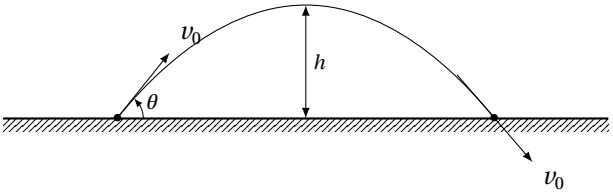
a) $5\,\mathrm{m\,s^{-1}}$ *Ans.*
b) $7.5\,\mathrm{m\,s^{-1}}$
c) $10\,\mathrm{m\,s^{-1}}$
d) $15\,\mathrm{m\,s^{-1}}$

7. A projectile is given an initial velocity of $(\hat{i}+2\hat{j})\,\mathrm{m\,s^{-1}}$ where, $\hat{i}$ is along the ground and $\hat{j}$ is along the vertical. If $g = 10\,\mathrm{m\,s^{-2}}$, the equation of its trajectory is



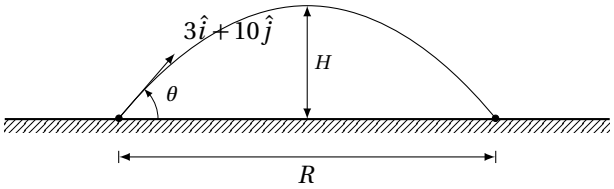
a) $y = x - 5x^2$
b) $y = 2x - 5x^2$ *Ans.*
c) $4y = 2x - 5x^2$
d) $4y = 2x - 25x^2$

8. A body is projected with an angle θ. The maximum height reached is h. If the time of flight is 4 s and $g = 10\,\mathrm{m\,s^{-2}}$, then value of h is



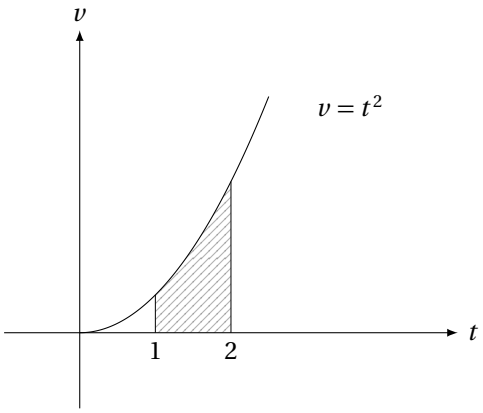
a) 40 m
b) 20 m *Ans.*
c) 5 m
d) 10 m

9. A body is projected from the ground with a velocity $\vec{v} = (3\hat{i}+10\hat{j})\,\mathrm{m\,s^{-1}}$. The maximum height attained and the range of the body respectively are (Take, $g = 10\,\mathrm{m\,s^{-2}}$)



a) 5 m and 6 m *Ans.*
b) 3 m and 10 m
c) 6 m and 5 m
d) 3 m and 5 m

10. For the given $v-t$ graph, the displacement between $t = 1s$ to $t = 2s$ is



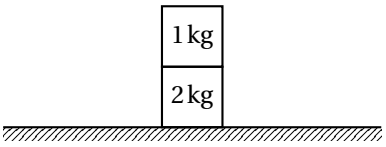
a) $\frac{9}{3}m$

b) $\frac{7}{3}m$ *Ans.*

c) $\frac{8}{3}m$

d) $\frac{1}{3}m$

11. This whole system of blocks is under gravity free space, then the normal reaction between the blocks is



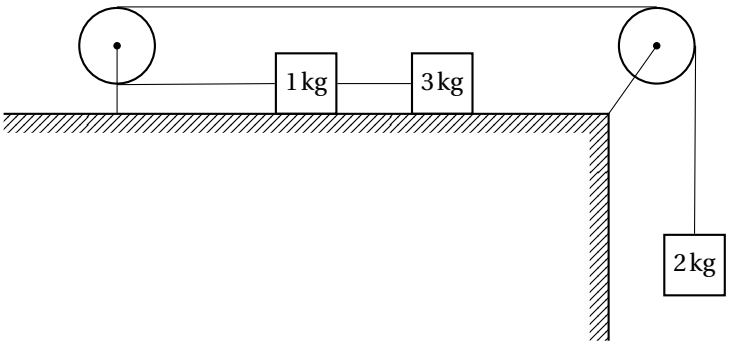
a) zero *Ans.*

b) 10 N

c) 20 N

d) 30 N

12. In the following system of blocks and pulley, the acceleration of the block of mass 2 kg is



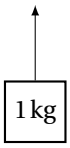
a) $\frac{10}{6}\,\mathrm{m\,s^{-2}}$

b) $\frac{20}{6}\,\mathrm{m\,s^{-2}}$ *Ans.*

c) $\frac{30}{6}\,\mathrm{m\,s^{-2}}$

d) $\frac{40}{6}\,\mathrm{m\,s^{-2}}$

13. A mass of 1 kg is suspended by a thread. It is lifted up with an acceleration of $5\,\mathrm{m\,s^{-2}}$ and then it is lowered down with an acceleration of $5\,\mathrm{m\,s^{-2}}$. Then the ratio of tensions in the string for the both cases is



a) 3 : 1 *Ans.*

b) 1 : 3

c) 1 : 2

d) 2 : 1

14. A batsman is batting from the center in a circular cricket ground of radius R. At what angle he should hit the ball so that the ball goes for the maximum distance ?

a) 0°
b) 30°
c) 45° *Ans.*
d) 60°

15. In the above problem at what angle he should hit the ball so that the ball goes for maximum height ?

a) 45°
b) 60°
c) 75°
d) 90° *Ans.*