DPP - Daily Practice Problems

Name :

Date :

Start Time :

End Time :

PHYSICS 10

SYLLABUS : LAWS OF MOTION-2 (Blocks in contact, connected by string, pulley arrangement)

Max. Marks : 112 **Time : 60 min.**

GENERAL INSTRUCTIONS

- The Daily Practice Problem Sheet contains 28 MCQ's. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.
- You have to evaluate your Response Grids yourself with the help of solution booklet.
- Each correct answer will get you 4 marks and 1 mark shall be deduced for each incorrect answer. No mark will be given/ deducted if no bubble is filled. Keep a timer in front of you and stop immediately at the end of 60 min.
- The sheet follows a particular syllabus. Do not attempt the sheet before you have completed your preparation for that syllabus. Refer syllabus sheet in the starting of the book for the syllabus of all the DPP sheets.
- After completing the sheet check your answers with the solution booklet and complete the Result Grid. Finally spend time to analyse your performance and revise the areas which emerge out as weak in your evaluation.

DIRECTIONS (Q.1-Q.20) : There are **20** multiple choice questions. Each question has 4 choices (a), (b), (c) and (d), out of which **ONLY ONE** choice is correct.

Q.1 A block of mass M is pulled along a horizontal frictionless surface by a rope of mass m. If a force P is applied at the free end of the rope, the force exerted by the rope on the block will be -

(a) P (b) $\frac{Pm}{M+m}$ (c) $\frac{MP}{M+m}$ (d) $\frac{mP}{M+m}$

Q.2 A body of mass 50 kg is pulled by a rope of length 8 m on a surface by a force of 108N applied at the other end. The force that is acting on 50 kg mass, if the linear density of rope is 0.5 kg/m will be -

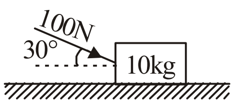
(a) 108 N (b) 100 N (c) 116 N (d) 92 N

Q.3 A rope of length 15 m and linear density 2 kg/m is lying length wise on a horizontal smooth table. It is pulled by a force of 25 N. The tension in the rope at the point 7 m away from the point of application, will be -

(a) 11.67 N (b) 13.33 N
(c) 36.67 N (d) None of these

Q.4 A force of 100 N acts in the direction as shown in figure on a block of mass 10 kg resting on a smooth horizontal table. The speed acquired by the block after it has .moved a distance of 10 m, will be -
(in m/sec) (g = 10 m/sec^2)

(a) 17 m/sec
(b) 13.17 m/sec
(c) 1.3 m/sec
(d) 1.7 m/sec



Q.5 In the above example, the velocity after 2 sec will be - (in m/sec)

(a) $10\sqrt{3}$ (b) $5\sqrt{3}$ (c) 10 (d) 5

RESPONSE GRID	1. ⓐⓑⓒⓓ	2. ⓐⓑⓒⓓ	3. ⓐⓑⓒⓓ	4. ⓐⓑⓒⓓ	5. ⓐⓑⓒⓓ

Space for Rough Work

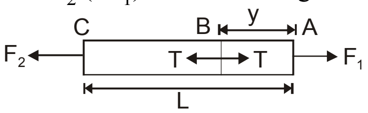
Q.6 Two blocks of mass m = 1 kg and M = 2 kg are in contact on a frictionless table. A horizontal force F(= 3N) is applied to m. The force of contact between the blocks, will be-

(a) 2 N (b) 1 N (c) 4 N (d) 5 N

Q.7 A force produces an acceleration of 5 m/s^2 in a body and same force an acceleration of 15 m/s^2 in another body. The acceleration produced by the same force when applied to the combination of two bodies will be -

(a) 3.75 m/s^2 (b) 20 m/s^2
(c) 10 m/s^2 (d) 0.667 m/s^2

Q.8 What is the tension in a rod of length L and mass M at a distance y from F_1 when the rod is acted on by two unequal forces F_1 and F_2 ($<F_1$) as shown in fig



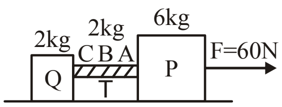
(a) $F_1\left(1-\frac{y}{L}\right)+F_2\left(\frac{y}{L}\right)$ (b) $\frac{M}{L}y\left(\frac{F_1-F_2}{M}\right)$

(c) $F_1\left(1+\frac{y}{L}\right)+F_2\left(\frac{y}{L}\right)$ (d) $\frac{M}{L}y\left(\frac{F_1+F_2}{M}\right)$

Q.9 A force produces acceleration 1, $\frac{1}{2},\frac{1}{3},\frac{1}{4}$, ... (all in m/s^2), applied separetly to n bodies. If these bodies are combined to form single one, then the acceleration of the system will be, if same force is taken into account.

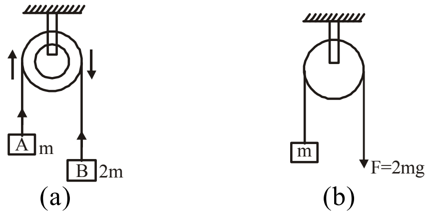
(a) $\frac{n}{2}$ (b) $\frac{2}{n(n+1)}$ (c) $\frac{n^2}{2}$ (d) $\frac{n^2(n+1)}{2}$

Q.10 Two blocks of masses 6 kg and 4 kg connected by a rope of mass 2 kg are resting on frictionless floor as shown in fig. If a constant force of 60 N is applied to 6 kg block, tension in the rope at A, B, and C will respectively be -



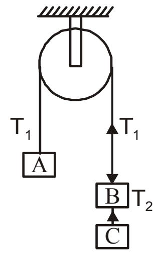
(a) 30 N, 25 N, 20 N (b) 25 N, 30 N, 20 N
(c) 20 N, 30 N, 25 N (d) 30 N, 20 N, 25 N

Q.11 The pulley arrangements of fig (a) and (b) are identical. The mass of the rope is negligible. In (a) the mass m is lifted up by attaching a mass 2 m to the other end of the rope. In (b) m is lifted up by pulling the other end of the rope with a constant downward force F = 2 mg. Which of the following is correct?



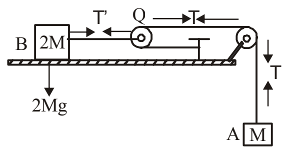
(a) Acceleration in case (b) is 3 times more than that in case (a)
(b) In case (a) acceleration is g, while in case (b) it is 2g
(c) In both the cases, acceleration is same
(d) None of the above

Q.12 Three equal weights of mass m each are hanging on a string passing over a fixed pulley as shown in fig. The tensions in the string connecting weights A to B and B to C will respectively be -



(a) $\frac{2}{3}$ mg, $\frac{2}{3}$ mg
(b) $\frac{2}{3}$ mg, $\frac{4}{3}$ mg
(c) $\frac{4}{3}$ mg, $\frac{2}{3}$ mg
(d) $\frac{3}{2}$ mg, $\frac{3}{4}$ mg

Q.13 In the situation shown in figure, both the pulleys and the strings are light and all the surfaces are frictionless. The acceleration of mass M, tension in the string PQ and force exerted by the clamp on the pulley, will respectively be -



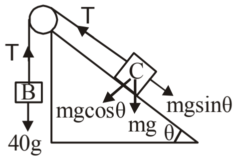
(a) (2/3)g, (1/3)Mg, ($\sqrt{2}$/3)Mg
(b) (1/3)g, (1/3)Mg, ($\sqrt{2}$/3)Mg
(c) (1/3)g, (2/3)Mg, $\sqrt{3}$ Mg
(d) 2g, (1/2)g, $\sqrt{2}$ Mg

RESPONSE GRID					
	6. ⓐⓑⓒⓓ	7. ⓐⓑⓒⓓ	8. ⓐⓑⓒⓓ	9. ⓐⓑⓒⓓ	10. ⓐⓑⓒⓓ
	11. ⓐⓑⓒⓓ	12. ⓐⓑⓒⓓ	13. ⓐⓑⓒⓓ		

Space for Rough Work

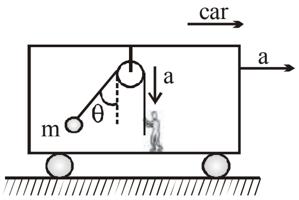
Q.14 A body of mass 50kg resting on a smooth inclined plane is connected by a massless inextensible string passing over a smooth pulley, at the top of the inclined plane have another mass of 40 kg as shown in the figure. The distance through which 50 kg mass fall in 4 sec will be -
(The angle of the inclined plane is 30º)

(a) 13.04 m
(b) 1.63m
(c) 1.304 m
(d) 16.3m

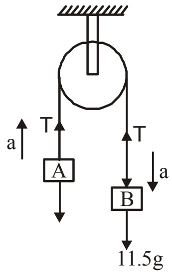


Q.15 A bob is hanging over a pulley inside a car through a string. The second end of the string is in the hand of a person standing in the car. The car is moving with constant acceleration 'a' directed horizontally as shown in figure. Other end of the string is pulled with constant acceleration 'a' vertically. The tension in the string is –

(a) $m\sqrt{g^2+a^2}$
(b) $m\sqrt{g^2+a^2}-ma$
(c) $m\sqrt{g^2+a^2}+ma$
(d) m (g + a)



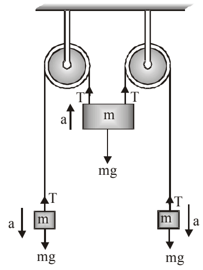
Q.16 In the fig shown, the velocity of each particle at the end of 4 sec will be -
(a) 0.872 m/s
(b) 8.72 m/s
(c) 0.218 m/s
(d) 2.18 m/s



Q.17 In the above example, the height ascended or descended, as the case may be, during that time i.e. 4 sec will be -
(a) 1.744 m (b) 17.44 m
(c) 0.1744 m (d) None of these

Q.18 In the above question, if at the end of 4 sec, the string be cut, the position of each particle in next 2 seconds will respectively be -
(a) 17.856 m, 21.344 m (b) –21.344 m, 17.856 m
(c) –17.856 m, 21.344 m (d) –17.856 m, –21.344 m

Q.19 Consider the double Atwood's machine as shown in the figure. What is acceleration of the masses ?
(a) g/3
(b) g/2
(c) g
(d) g/4



Q.20 In above question, what is the tension in each string ?
(a) mg/3 (b) 4mg/3 (c) 2mg/3 (d) 5mg/3

DIRECTIONS (Q.21-Q.22) : In the following questions, more than one of the answers given are correct. Select the correct answers and mark it according to the following codes:

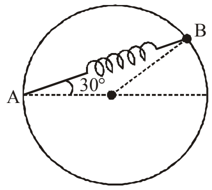
Codes :
(a) 1, 2 and 3 are correct **(b)** 1 and 2 are correct
(c) 2 and 4 are correct **(d)** 1 and 3 are correct

Q.21 Choose the correct options –
(1) Inertia ∝ mass (2) 1 newton = 10^5 dyne
(3) Thrust on rocket $\vec{F} = \frac{\Delta M}{\Delta t}\vec{v} - M\vec{g}$
(4) Apparent weight of a body in the accelerated lift is W = m (g + a).

Q.22 Choose the correct statements –
(1) For equilibrium of a body under the action of concurrent forces $\vec{F_1}+\vec{F_2}+\vec{F_3}+.....\vec{F_n} = 0$
(2) If the downward acceleration of the lift is a = g, then the body will experience weightlessness.
(3) If the downward acceleration of the body is a > g, then the body will rise up to the ceiling of lift
(4) If the downward acceleration of the lift is a > g, then the body will experience weightlessness.

DIRECTIONS (Q.23-Q.25) : Read the passage given below and answer the questions that follows :

A bead of mass m is attached to one end of a spring of natural length R and spring constant $K = \frac{(\sqrt{3}+1)\,mg}{R}$. The other end of the spring is fixed at point A on a smooth ring of radius R as shown in figure. When bead is released to move then



RESPONSE GRID					
	14. ⓐⓑⓒⓓ	15. ⓐⓑⓒⓓ	16. ⓐⓑⓒⓓ	17. ⓐⓑⓒⓓ	18. ⓐⓑⓒⓓ
	19. ⓐⓑⓒⓓ	20. ⓐⓑⓒⓓ	21. ⓐⓑⓒⓓ	22. ⓐⓑⓒⓓ	

Space for Rough Work

Q.23 Initial elongation in the spring is –

(a) R (b) 2R (c) $\sqrt{2}$R (d) $\sqrt{3}$R

Q.24 The normal reaction force at B is –

(a) $\frac{mg}{2}$ (b) $\sqrt{3}mg$ (c) $3\sqrt{3}mg$ (d) $\frac{3\sqrt{3}mg}{2}$

Q.25 Tangential acceleration of bead just after it is released.

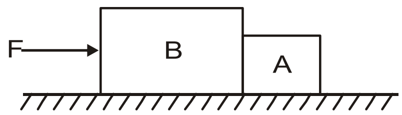
(a) $\frac{g}{2}$ (b) $\frac{3}{4}g$ (c) $\frac{g}{4}$ (d) $\frac{2}{3}g$

DIRECTIONS (Qs. 26-Q.28) : Each of these questions contains two statements: Statement-1 (Assertion) and Statement-2 (Reason). Each of these questions has four alternative choices, only one of which is the correct answer. You have to select the correct choice.

(a) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
(b) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1.
(c) Statement -1 is False, Statement-2 is True.
(d) Statement -1 is True, Statement-2 is False.

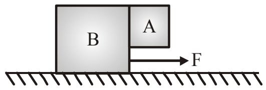
Q.26 Statement–1 In fig the ground is smooth and the masses of both the blocks are different. Net force acting on each of block is not same.

Statement– 2 Acceleration of the both blocks will be different.



Q.27 Statement– 1 Block A is moving on horizontal surface towards right under the action of force F. All surfaces are smooth. At the instant shown the force exerted by block A on block B is equal to net force on block B.

Statement– 2 From Newton's third law of motion, the force exerted by block A on B is equal in magnitude to force exerted by block B on A.

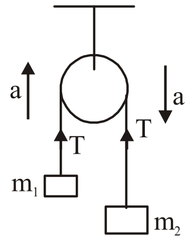


Q.28 Statement– 1 : In the given fig.

$$a = \left(\frac{m_2 - m_1}{m_1 + m_2}\right)g$$

Statement– 2 : In the given fig.,

$$T = \frac{m_1 + m_2}{2m_1 m_2}g$$



RESPONSE GRID	
	23. ⓐⓑⓒⓓ 24. ⓐⓑⓒⓓ 25. ⓐⓑⓒⓓ 26. ⓐⓑⓒⓓ 27. ⓐⓑⓒⓓ
	28. ⓐⓑⓒⓓ

DAILY PRACTICE PROBLEM SHEET 10 - PHYSICS			
Total Questions	28	Total Marks	112
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	28	Qualifying Score	42
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct × 4) – (Incorrect × 1)			

Space for Rough Work

DAILY PRACTICE PROBLEMS — PHYSICS SOLUTIONS 10

(1) **(c)** Force on the block
= Mass of the block × acceleration of the system

$$= M \times \frac{P}{M+m}$$

(2) **(b)** Mass of the rope $= 8 \times \frac{1}{2} = 4$ kg

Total mass = 50 + 4 = 54 kg

$$\therefore \quad a = \frac{F}{m} = \frac{108}{54} = 2 \text{ m/s}^2$$

Force utilised in pulling the rope = 4×2 = 8 N
Force applied on mass = 108 – 8 = 100 N

(3) **(b)** Mass of the rope = 15 × 2 = 30 kg

$$\text{acceleration} = \frac{F}{m} = \frac{25}{30} = \frac{5}{6} \text{ m/s}^2$$

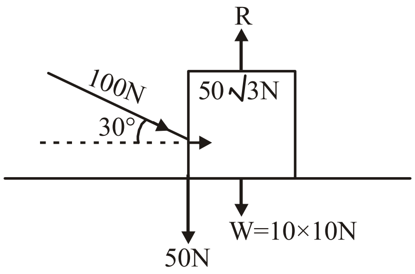
At the point 7 m away from point of application the mass of first part of rope = 14 kg

$$\therefore \quad \text{Force used in pulling 14 kg} = 14 \times \frac{5}{6} = 11.67 \text{ N}$$

The remaining force = (25 – 11.67)N = 13.33 N

(4) **(b)** The various forces acting are shown in fig.
The force of 100N has

(i) horizontal component of 100 cos 30° = $50\sqrt{3}$ N
and (ii) A vertical component = 100 sin 30° = 50N



Since the block is always in contact with the table, the net vertical force
$R = mg + F \sin\theta = (10 \times 10 + 50)$ N = 150N
When the block moves along the table, work is done by the horizontal component of the force. Since the distance moves is 10 m, the work done is

$$50\sqrt{3} \times 10 = 500\sqrt{3} \text{ Joule.}$$

If v is the speed acquired by the block, the work done must be equal to the kinetic energy of the block. Therefore, we have

$$500\sqrt{3} = \frac{1}{2} \times 10 \times v^2 \Rightarrow v^2 = 100\sqrt{3} \Rightarrow v = 13.17 \text{ m/sec}$$

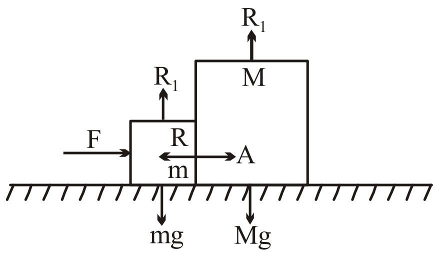
(5) **(a)** We have acceleration

$$a = \frac{F\cos\theta}{m} = \frac{50\sqrt{3}}{10} = 5\sqrt{3} \text{ m/sec}^2$$

The velocity after 2 sec, $v = u + at$

$$\Rightarrow \quad v = 0 + 5\sqrt{3} \times 2 = 10\sqrt{3} \text{ m/sec}$$

(6) **(a)** All the forces acting on the two blocks are shown in fig. As the blocks are rigid under the action of a force F, both will move together with same acceleration.



$a = F/(m+M) = 3/(1+2) = 1 \text{ m/s}^2$
Now as the mass of larger block is m and its acceleration a so force of contact i.e. action on it.

$$f = Ma = \frac{MF}{M+m} = \frac{2 \times 3}{2+1} = 2\text{N}$$

(7) **(a)** As the same force is applied to the combined mass, we have

$$\frac{1}{a} = \frac{1}{a_1} + \frac{1}{a_2} \quad \text{or} \quad a = \frac{a_1 a_2}{a_1 + a_2} = \frac{5 \times 15}{5+15} = 3.75 \text{ m/s}^2$$

(8) **(a)** As net force on the rod = $F_1 - F_2$ and its mass is M so acceleration of the rod will be
$a = (F_1 - F_2)/M$ ...(i)
Now considering the motion of part AB of the rod, which has mass (M/L)y,
Acceleration a given by
(i) Assuming that tension at B is T

$$F_1 - T = \frac{M}{L} y \times a \qquad (\text{from } F = ma)$$

$$\Rightarrow \quad F_1 - T = \frac{M}{L} y \frac{F_1 - F_2}{M} \qquad (\text{using eq. (1)})$$

$$\Rightarrow \quad T = F_1\left(1 - \frac{y}{L}\right) + F_2\left(\frac{y}{L}\right)$$

(9) **(b)** The net acceleration of the system is given by

$$\frac{1}{a} = \frac{1}{a_1} + \frac{1}{a_2}$$

$$\frac{1}{a} = \frac{1}{a_1} + \frac{1}{a_2} + \ldots\ldots \frac{1}{a_n} = 1 + 2 + 3 + \ldots\ldots\ldots + n$$

$$= \frac{n}{2}[2 + (n-1)1] = \frac{n}{2}[n+1] = \frac{2}{n(n+1)}$$

(10) (a) As the mass of the system is 6 + 4 + 2 = 12 kg and applied force is 60 N, the acceleration of the system

$$a = \frac{F}{m} = \frac{60}{12} = 5\ m/s^2$$

Now at point A as tension in pulling the rope of mass 2kg and block Q of mass 4kg.

$T_A = (2+4) \times 5 = 30N$

Similarly for B and C,

$T_B = (1+4) \times 5 = 25N$

and $T_C = (0+4) \times 5 = 20N$

(11) (a) In case (a), the pulling force = 2mg – mg = mg and the mass is 2m + m = 3m

so acceleration a = mg/3m = g/3

While in case (b), the pulling force = 2mg – mg = mg but, the mass in motion = m + 0 = m

Acceleration, a = mg/m = g

(12) (c) It this problem as the pulling force is 2mg while opposing force is mg, so net force

F= 2mg – mg = mg,

and as the mass in motion = m + m + m = 3m

So the acceleration $= \frac{force}{mass} = \frac{mg}{3m} = \frac{g}{3}$

Now as A is accelerated up while B and C down. so tension T_1, is such that $mg < T_1 < 2mg$

Actually for the motion of A,

$$T_1 = m(g + a) = m(g + g/3) = \frac{4}{3} mg$$

Now to calculate tension in the string BC we consider the downward motion of C,

i.e. $T_2 = m(g - a) = m(g - g/3) = (2/3)\ mg$

(13) (a) As pulley Q is not fixed so if it moves a distance d the length of string between P and Q will changes by 2d (d from above and d from below) i.e. M will move 2d. This in turn implies that if a (→2d) is the acceleration of M, the acceleration of Q and so 2M will be of (a/2)

Now if we consider the motion of mass M, it is accelerated down so $T = M(g - a)$ ...(1)

And for the motion of Q,

$2T - T' = 0 \times (a/2) = 0 \Rightarrow T' = 2T$ ...(2)

And for the motion of mass 2M,

$T' = 2M\,(a/2) \Rightarrow T' = Ma$ ...(3)

From equation (2) and (3) $T = \frac{1}{2}$ Ma, so eq. (1) reduces

$$\left(\frac{1}{2}\right) Ma = M(g - a) \Rightarrow a = \frac{2}{3} g$$

(14) (a) The tension is same in two segments

For B the equation is

$(40 \times 9.8 - T) = 40a$ ...(1)

For C the equation is

$(T - 50 \times 9.8 \times \frac{1}{2}) = 50a$ ...(2)

From equation (1) and (2) $a = 1.63\ m/s^2$

distance of fall

$$S = \frac{1}{2} at^2 = \frac{1}{2} \times 1.63 \times 4^2 = 13.04\ m$$

(15) (b) The string is massless and inextensible the tension T is same. Let mass B move down the inclined plane.

For B the equation of motion $m_1 g \sin\theta - T = m_1 a$

$30 \times 9.8 \times \sin 53° - T = 30a$

$\Rightarrow 235.2 - T = 30\,a$ ...(1)

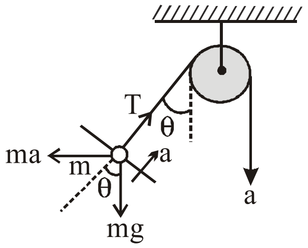
and for A the equation of motion

$T - 20 \times 9.8 \times \sin 37° = 20a$

$T - 117.6 = 20a$ ...(2)

From (1) & (2) T = 164.64 N

(16) (c)



(Force diagram in the frame of the car)

Applying Newton's law perpendicular to string

$$mg \sin\theta = ma \cos\theta$$

$$\tan\theta = \frac{a}{g}$$

Applying Newton's law along string

$$\Rightarrow\ T - m\sqrt{g^2 + a^2} = ma$$

or $$T = m\sqrt{g^2 + a^2} + ma$$

(17) (a) As A moves up and B moves down with acceleration a for the motion of A,

$T - 11\,g = 11\,a$ ... (i)

for the motion of B,

$11.5\,g - T = 11.5\,a$ ...(ii)

From (i) & (ii),

$$a = \frac{m_1 - m_2}{m_1 + m_2}$$

$$g = \frac{(11.5 - 11)9.8}{11.5 + 11} = 0.218\ m/sec^2$$

Assuming that the particles are initially at rest, their velocity at the end of 4 sec will be

$v = u + at = 0 + 0.218 \times 4 = 0.872\ m/s$

(18) (a) The height ascended by A in 4 sec

$$h = ut + \frac{1}{2} at^2 = 0 + \frac{1}{2}(0.218)\,4^2 = 1.744\ m$$

This is also the height descended by B in that time.

(19) (c) At the end of 4 sec the string is cut. Now A and B are no longer connected bodies but become free ones, falling under gravity.

Velocity of A, when the string was cut

= 0.872 m/s upwards.

Acceleration a = – g (acting downwards),

displacement from this position in the subsequent 2 sec

$h = ut + \frac{1}{2}at^2 = (0.872) \times 2 + \frac{1}{2}(-9.8)2^2$

$= 1.744 - 4.9 \times 4 = -17.856m$

A descends down by a distance of 17.856 m from the position it occupied at the end of 4 sec from its start. B has a free fall. Its position is given by

So the acceleration of mass M is (2/3)g

while tension in the string PQ will be

$T = M(g - (2/3)g) = (1/3)Mg$

The force exerted by clamp on the pulley

$= \sqrt{T^2 + T^2} = \frac{\sqrt{2}}{3}Mg$

(20) (a) Here the system behaves as a rigid system, therefore every part of the system will move with same acceleration. Thus applying newton's law

$mg - T = ma$ .... (i)

$2T - mg = ma$ .... (ii)

Doubling the first equation and adding

$mg = 3ma$ or acceleration $a = \frac{1}{3}g$

(21) (c) Tension in the string

$T = m(g - a) = m\left(g - \frac{g}{3}\right)$

$T = \frac{2}{3}mg$

(22) (a)

(1) Inertia $\propto$ mass

(2) 1 Newton = 10^5 dyne

(3) Thrust on rocket $\vec{F} = \frac{\Delta M}{\Delta t}\vec{v} - M\vec{g}$

(4) Apparent weight of a body in the lift accelerated up is $W = m(g + a)$.

(23) (b)

(1) If $a_1, a_2, \ldots a_n$ be the accelerations produced in n different bodies on applying the same force, the acceleration produced in their combination due to the same force will be $\frac{1}{a} = \frac{1}{a_1} + \frac{1}{a_2} + \ldots\ldots \frac{1}{a_n}$

(2) Newton's I[st] and III[rd] law can be derived from second law therefore II[nd] law is the most fundamental law out of the three law.

(24) (a)

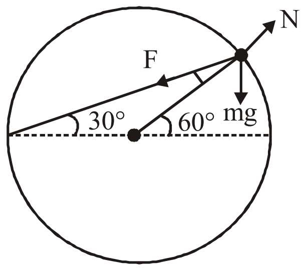
(1) For equilibrium of a body under the action of concurrent forces $\vec{F_1} + \vec{F_2} + \vec{F_3} + \ldots . \vec{F_n} = 0$

(2) If the downward acceleration of the lift is $a = g$, then the body will enjoy weightlessness.

(3) If the downward acceleration of the body is $a > g$, then the body will rise up to the ceiling of lift

(25) (d), (26) (d), (27) (a).

Initial elongation $= 2R\cos 30° = \sqrt{3}R$



Extension in the spring is

$x = AB - R = 2R\cos 30° - R = (\sqrt{3} - 1)R$

$\therefore$ Spring force

$F = kx = \frac{(\sqrt{3} - 1)mg}{R}(\sqrt{3} - 1)R = 2mg$

FBD of bead is

$N = F(mg\cos 30°) = (2mg + mg)\frac{\sqrt{3}}{2} = \frac{3\sqrt{3}}{2}mg$

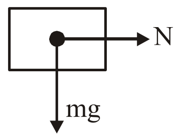
Tangential force $F_1 = F\sin 30° - mg\sin 30°$

$= (2mg - mg)\sin 30° = \frac{mg}{2}$

$\therefore$ tangential acceleration = g/2

28. (d) Here the acceleration of both will be same, but their masses are different. Hence, the net force acting on each of them will not be same.

29. (c) The FBD of block A in Figure is



The force exerted by B on A is N (normal reaction). The force acting on A are N (horizontal) and mg (weight downwards). Hence statement I is false.

30. (d) $T - m_1g = m_1a$ – .... (1)

$m_2g - T = m_2a$ – .... (2)

Solving (1) and (2), $T_1 = \left(\frac{2m_1m_2}{m_1 + m_2}\right)g \quad a = \left(\frac{m_2 - m_1}{m_1 + m_2}\right)g$