DPP - Daily Practice Problems

Name :

Date :

Start Time :

End Time :

PHYSICS 09

SYLLABUS : LAWS OF MOTION-1 (Newton's laws, momentum, pseudo force concept)

Max. Marks : 116 **Time : 60 min.**

GENERAL INSTRUCTIONS

- The Daily Practice Problem Sheet contains 29 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 boy standing on a weighing machine observes his weight as 200 N. When he suddenly jumpes upwards, his friend notices that the reading increased to 400 N. The acceleration by which the boy jumped will be-

(a) 9.8 m/s^2 (b) 29.4 m/s^2
(c) 4.9 m/s^2 (d) 14.7 m/s^2

Q.2 A force of $(6\hat{i} + 8\hat{j})$ N acted on a body of mass 10 kg. The displacement after 10 sec, if it starts from rest, will be -

(a) 50 m along $\tan^{-1}$ 4/3 with x axis
(b) 70 m along $\tan^{-1}$ 3/4 with x axis
(c) 10 m along $\tan^{-1}$ 4/3 with x axis
(d) None

Q.3 A boat of mass 1000 kg is moving with a velocity of 5 m/s. A person of mass 60 kg jumps into the boat. The velocity of the boat with the person will be -

(a) 4.71 m/s (b) 4.71 cm/s
(c) 47.1 m/s (d) 47.1 cm/s

Q.4 A disc of mass 10 gm is kept horizontally in air by firing bullets of mass 5 g each at the rate of 10/s. If the bullets rebound with same speed. The velocity with which the bullets are fired is -

(a) 49 cm/s (b) 98 cm/s (c) 147 cm/s (d) 196 cm/s

Q.5 A fire man has to carry an injured person of mass 40 kg from the top of a building with the help of the rope which can withstand a load of 100 kg. The acceleration of the fireman if his mass is 80 kg, will be-

(a) 8.17 m/s^2 (b) 9.8 m/s^2
(c) 1.63 m/s^2 (d) 17.97 m/s^2

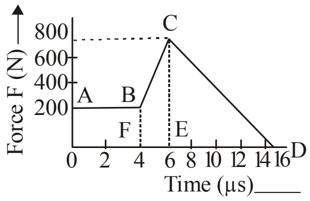
RESPONSE GRID	1. ⓐⓑⓒⓓ	2. ⓐⓑⓒⓓ	3. ⓐⓑⓒⓓ	4. ⓐⓑⓒⓓ	5. ⓐⓑⓒⓓ

Space for Rough Work

Q.6 A body of mass 0.02 kg falls from a height of 5 metre into a pile of sand. The body penetrates the sand a distance of 5 cm before stoping. What force has the sand exerted on the body ?

(a) 1.96 N (b) –19.6 N
(c) –0.196 N (d) 0.0196 N

Q.7 The magnitude of the force (in newton) acting on a body varies with time t (in microsecond) as shown in fig. AB, BC, and CD are straight line segments. The magnitude of the total impulse of the force on the body from t = 4 μs to t = 16 μs is

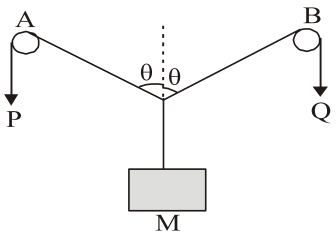


(a) 5×10^{-4} N.s
(b) 5×10^{-3} N.s
(c) 5×10^{-5} N.s
(d) 5×10^{-2} N.s

Q.8 The total mass of an elevator with a 80 kg man in it is 1000 kg. This elevator moving upward with a speed of 8 m/sec, is brought to rest over a distance of 16m. The tension T in the cables supporting the elevator and the force exerted on the man by the elevator floor will respectively be-

(a) 7800 N, 624 N (b) 624 N, 7800 N
(c) 78 N, 624 N (d) 624 N, 78 N

Q.9 In the arrangement shown in fig. the ends P and Q of an unstretchable string move downwards with a uniform speed U. Pulleys A and B are fixed. Mass M moves upwards with a speed of



(a) 2U cos θ (b) U cos θ
(c) 2U/cos θ (d) U/cos θ

Q.10 An engine of mass 5×10^4 kg pulls a coach of mass 4×10^4 kg. Suppose that there is a resistance of 1 N per 100 kg acting on both coach and engine, and that the driving force of engine is 4500 N. The acceleration of the engine and tension in the coupling will respectively be-

(a) 0.04 m/s^2, 2000 N (b) 0.4 m/s^2, 200 N
(c) 0.4 m/s^2, 20 N (d) 4 m/s^2, 200 N

Q.11 A body whose mass 6 kg is acted upon by two forces $(8\hat{i}+10\hat{j})$ N and $(4\hat{i}+8\hat{j})$ N. The acceleration produced will be (in m/s^2) –

(a) $(3\hat{i}+2\hat{j})$ (b) $12\hat{i}+18\hat{j}$
(c) $\frac{1}{3}(\hat{i}+\hat{j})$ (d) $2\hat{i}+3\hat{j}$

Q.12 A car of 1000 kg moving with a velocity of 18 km/hr is stopped by the brake force of 1000 N. The distance covered by it before coming to rest is -

(a) 1 m (b) 162 m (c) 12.5 m (d) 144 m

Q.13 A block of metal weighing 2 kg is resting on a frictionless plane. It is struck by a jet releasing water at a rate of 1 kg/s and at a speed of 5 m/s. The initial acceleration of the block will be –

(a) 2.5 m/s^2 (b) 5 m/s^2 (c) 0.4 m/s^2 (d) 0

Q.14 A man fires the bullets of mass m each with the velocity v with the help of machine gun, if he fires n bullets every sec, the reaction force per second on the man will be -

(a) $\frac{m}{v}n$ (b) m n v (c) $\frac{mv}{n}$ (d) $\frac{vn}{m}$

Q.15 A body of mass 15 kg moving with a velocity of 10 m/s is to be stopped by a resistive force in 15 sec, the force will be -

(a) 10 N (b) 5 N
(c) 100 N (d) 50 N

Q.16 A cricket ball of mass 250 gm moving with a velocity of 24 m/s is hit by a bat so that it acquires a velocity of 28 m/s in the opposite direction. The force acting on the ball, if the contact time is 1/100 of a second, will be -

(a) 1300 N in the final direction of ball
(b) 13 N in the initial direction of ball
(c) 130 N in the final direction of ball
(d) 1.3 N in the initial direction of ball

RESPONSE GRID					
	6. ⓐⓑⓒⓓ	7. ⓐⓑⓒⓓ	8. ⓐⓑⓒⓓ	9. ⓐⓑⓒⓓ	10. ⓐⓑⓒⓓ
	11. ⓐⓑⓒⓓ	12. ⓐⓑⓒⓓ	13. ⓐⓑⓒⓓ	14. ⓐⓑⓒⓓ	15. ⓐⓑⓒⓓ
	16. ⓐⓑⓒⓓ				

Q.17 A force of 2 N is applied on a particle for 2 sec, the change in momentum will be -
(a) 2 Ns (b) 4 Ns (c) 6 Ns (d) 3 Ns

Q.18 A body of mass 2 kg is moving along x-direction with a velocity of 2 m/sec. If a force of 4 N is applied on it along y-direction for 1 sec, the final velocity of particle will be -
(a) $2\sqrt{2}$ m/s (b) $\sqrt{2}$ m/s
(c) $1/\sqrt{2}$ m/s (d) $1/2\sqrt{2}$ m/s

Q.19 A cricket ball of mass 150 g is moving with a velocity of 12m/sec and is hit by a bat so that the ball is turned back with a velocity of 20 m/sec, the force on the ball acts for 0.01 sec, then the average force exerted by the bat on the ball will be
(a) 48 N (b) 40 N (c) 480 N (d) 400 N

Q.20 A body of mass 20 kg moving with a velocity of 3 m/s, rebounds on a wall with same velocity. The impulse on the body is -
(a) 60 Ns (b) 120 Ns (c) 30 Ns (d) 180 Ns

DIRECTIONS (Q.21-Q.23) : 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 A mass of 60 kg is on the floor of a lift moving down. The lift moves at first with an acceleration of 3 m/sec^2, then with constant velocity and finally with a retardation of 3m/sec^2. Choose the correct options related to possible reactions exerted by the lift on the body in each part of the motion –
(1) 408 N (2) 588 N (3) 768 N (4) 508 N

Q.22 A mass of 10 kg is hung to a spring balance in lift. If the lift is moving with an acceleration g/3 in upward & downward directions, choose the correct options related to the reading of the spring balance.
(1) 13.3 kg (2) 6.67 kg (3) 32.6 kg (4) 0

Q.23 Choose the correct options
(1) A reference frame in which Newton's first law is valid is called an inertial reference frame.
(2) Frame moving at constant velocity relative to a known inertial frame is also an inertial frame.
(3) Idealy, no inertial frame exists in the universe for practical purpose, a frame of reference may be considered as inertial if its acceleration is negligible with respect to the acceleration of the object to be observed.
(4) To measure the acceleration of a falling apple, earth cannot be considered as an inertial frame.

DIRECTIONS (Q.24-Q.26) : Read the passage given below and answer the questions that follows :

Pseudo force is an imaginary force which is recognised only by a non-inertial observer to explain the physical situation according to newton's laws. Magnitude of pseudo force F_p is equal to the product of the mass m of the object and the acceleration a of the frame of reference. The direction of the force is opposite to the direction of acceleration, $F_p = -ma$

Q.24 A spring weighing machine inside a stationary lift reads 50 kg when a man stand on it. What would happen to the scale reading if the lift is moving upward with (i) constant velocity (ii) constant acceleratioin ?
(a) 50 kg wt, $\left(50+\frac{50a}{g}\right)$ kg wt
(b) 50 kg wt, $\left(50+\frac{50g}{a}\right)$ kg wt
(c) 50 kg wt, $\left(\frac{50a}{g}\right)$ kg wt
(d) 50 kg wt, $\left(\frac{50g}{a}\right)$ kg wt

Q.25 A 25 kg lift is supported by a cable. The acceleration of the lift when the tension in the cable is 175 N, will be -
(a) 2.8 m/s^2 (b) 16.8 m/s^2
(c) – 9.8 m/s^2 (d) 14 m/s^2

RESPONSE GRID					
	17. ⓐⓑⓒⓓ	18. ⓐⓑⓒⓓ	19. ⓐⓑⓒⓓ	20. ⓐⓑⓒⓓ	21. ⓐⓑⓒⓓ
	22. ⓐⓑⓒⓓ	23. ⓐⓑⓒⓓ	24. ⓐⓑⓒⓓ	25. ⓐⓑⓒⓓ	

Space for Rough Work

Q.26 A body is suspended by a string from the ceiling of an elevator. It is observed that the tension in the string is doubled when the elevator is accelerated. The acceleration will be -

(a) 4.9 m/s^2 (b) 9.8 m/s^2
(c) 19.6 m/s^2 (d) 2.45 m/s^2

DIRECTIONS (Q. 27-Q.29) : 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.27 **Statement-1 :** A cloth covers a table. Some dishes are kept on it. The cloth can be pulled out without dislodging the dishes from the table.
Statement-2 : To every action there is an equal and opposite reaction.

Q.28 **Statement-1 :** If the net external force on the body is zero then its acceleration is zero.
Statement-2 : Acceleration does not depend on force.

Q.29 **Statement-1 :** The slope of momentum versus time graph give us the acceleration.
Statement-2 : Force is given by the rate of change of momentum.

RESPONSE GRID	26. ⓐⓑⓒⓓ	27. ⓐⓑⓒⓓ	28. ⓐⓑⓒⓓ	29. ⓐⓑⓒⓓ

DAILY PRACTICE PROBLEM SHEET 9 - PHYSICS			
Total Questions	29	Total Marks	116
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	30	Qualifying Score	44
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct × 4) – (Incorrect × 1)			

Space for Rough Work

DAILY PRACTICE PROBLEMS

PHYSICS SOLUTIONS 09

(1) **(a)** Force causing the acceleration = 400 – 200 = 200N
mass of the boy = 200/9.8

hence acceleration $= F/m = \frac{200}{200} \times 9.8 = 9.8\ m/s^2$

(2) **(a)** Acceleration $= \frac{\vec{F}}{m} = \frac{6\hat{i} + 8\hat{j}}{10}$ in the direction of force

and displacement

$$\vec{S} = \vec{u}t + \frac{1}{2}\vec{a}t^2 = 0 + \frac{1}{2}\left(\frac{6\hat{i} + 8\hat{j}}{10}\right)100 = 30\hat{i} + 40\hat{j}$$

So the displacement is 50 m along $\tan^{-1}\frac{4}{3}$ with x-axis

(3) **(a)** From the law of conservation of momentum
$1000 \times 5 + 0 = (1000 + 60)\ v$

$\Rightarrow v = \frac{1000 \times 5}{1060} = 4.71\ m/s$

(4) **(b)** Weight of disc $= \frac{10}{1000}\ kg$,
Let speed of the bullet = v
So rate of change of momentum of the bullets

$$= \frac{2 \times 10 \times 5}{1000}$$

v = applied force on the disc

Now $\frac{2 \times 10 \times 5}{1000} \times v = \frac{10 \times g}{1000}$

$\Rightarrow v = 0.98\ m/s^2 = 98\ cm/s^2$

(5) **(c)** Total mass = 80 + 40 = 120 kg
The rope cannot with stand this load so the fire man should slide down the rope with some acceleration
$\therefore$ The maximum tension = 100×9.8 N
m (g – a) = tension ,
$120\ (9.8 - a) = 100 \times 9.8 \Rightarrow a = 1.63\ m/s^2$

(6) **(b)** Suppose the velocity of the body at the instant when it reaches the pile of sand be v. Then
$v^2 = 0 + 2\ (9.8) \times (5\ metre) = 98 (\because v^2 = u^2 + 2as)$

$$a = -\frac{98}{2 \times (0.05)} = -980\ m/sec^2$$

Now, retarding force
F = mass × acceleration = 0.02 kg × (– 980 m/sec^2) = –19.6 N

(7) **(b)** Impulse = F . t = Area under F-t curve from 4 μs to 16 μs = Area under BCDFB
= Area of trapizium BCEF + area of ΔCDE

$$= \frac{1}{2}(200+800)(2\times10^{-6}) + \frac{1}{2}\times10\times10^{-6}\times800$$

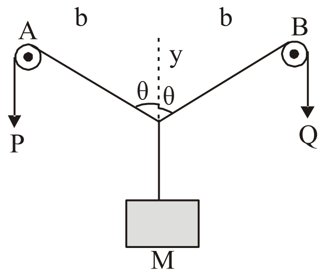
$= 10 \times 10^{-4} + 40 \times 10^{-4}$ N–s $= 50 \times 10^{-4}$
$= 5.0 \times 10^{-3}$ N-s

(8) **(a)** (a) The elevator having an initial upward speed of 8 m/sec is brought to rest within a distance of 16 m
Hence, $0 = (8)^2 + 2a\ (16)\ (\because v^2 = u^2 + 2as)$,

$$a = -\frac{8 \times 8}{2 \times 16} = -2\ m/sec^2$$

Resultant upward force on elevator = T – mg. According to Newton's law.
T – mg = ma
or T = mg + ma = m (g + a) = 1000 (9.8 – 2) = 7800 N
(b) Let P be the upward force exerted on the man by the elevator floor. If m' be the mass of the man, then, weight of the man acting downward = m' g ,
Upward force on the man = P – m'g
According to Newton's law. P–m' g = m' a or
P = m' (a + g) = (–2 + 9.8) = 624 N

(9) **(d)** As P and Q move down, the length ℓ decreases at the rate of U m/s

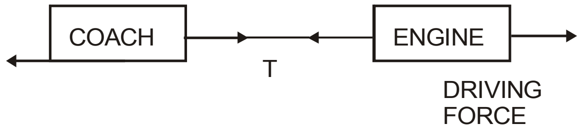


From figure, $\ell^2 = b^2 + y^2$
Differentiating with respect to time

$$2\ell\frac{d\ell}{dt} = 2y\frac{dy}{dt} \qquad (\because \text{ b is constant})$$

$$\therefore \frac{dy}{dt} = \frac{\ell}{y}.\frac{d\ell}{dt} = \frac{1}{\cos\theta}.\frac{d\ell}{dt} = \frac{U}{\cos\theta}$$

(10) **(a)** The engine, coach, coupling and resistance are, shown in figure.



Driving force = 4500 N

Opposing force (Resistance) $= \frac{(5+4)10^4}{100} = 900$ N

Resultant force = 4500 – 900 = 3600 N
Mass of engine and coach = 9×10^4 kg
According to Newton's law, F = ma
$\therefore\ 3600 = 9 \times 10^4\ a$
or $a = (3600) / (9 \times 10^4) = 0.04\ m/sec^2$
So acceleration of the train = 0.04 m/sec^2

Now considering the equilibrium of the coach only, we have $(T - R) = 4 \times 10^4 \times 0.04$ ($\because F = ma$)

$$\text{or } T - \frac{4 \times 10^4}{100} = 4 \times 10^4 \times 0.04,$$

$T = 4 \times 10^4 \times 0.04 + 4 \times 10^2 = 1600 + 400 = 2000\text{ N}$

(11) **(d)** Given that $\vec{F_1} = (8\hat{i} + 10\hat{j})$ and $\vec{F_2} = (4\hat{i} + 8\hat{j})$

Then the total force $\vec{F} = 12\hat{i} + 18\hat{j}$

So acceleration $\vec{a} = \dfrac{\vec{F}}{m} = \dfrac{12\hat{i} + 18\hat{j}}{6} = 2\hat{i} + 3\hat{j}\text{ m/sec}^2$

Net acceleration

$$|\vec{a}| = \sqrt{2^2 + 3^2} = \sqrt{4 + 9} = \sqrt{13}\text{ m/sec}^2$$

(12) **(c)** From the relation

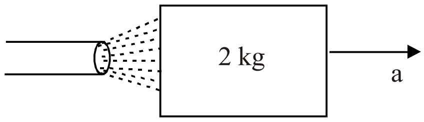
$$F = ma \Rightarrow a = \frac{F}{m} = \frac{1000}{1000} = 1\text{ m/s}^2$$

As the force is brake force, acceleration is -1 m/s^2 using relation $v^2 = u^2 + 2as$, we obtain

$$2as = u^2 \Rightarrow s = \frac{u^2}{2a} = \frac{\left(18 \times \frac{5}{18}\right)^2}{2} = 12.5\text{ m}$$

(13) **(a)** The water jet striking the block at the rate of 1 kg/s at a speed of 5 m/s will exert a force on the block

$$F = v\frac{dm}{dt} = 5 \times 1 = 5\text{ N}$$



And under the action of this force of 5 N, the block of mass 2 kg will move with an acceleration given by,

$F = ma \Rightarrow a = F/m = 5/2 = 2.5\text{ m/s}^2$

(14) **(a)** Relative speed of the ball $= (v + u)$

Speed after rebouncing $= -(v + u)$

$$\text{So, } F = m\frac{\Delta v}{\Delta t} = \frac{m[(v+u) - \{-(v+u)\}]}{t}$$

$$= \frac{2m(v+u)}{t}$$

(15) **(b)** $F = \dfrac{dp}{dt} \Rightarrow F\,dt = dp = p_2 - p_1$

$\Rightarrow F \times 1 = mnv - 0$

$\Rightarrow F = mnv$

(Total mass of the bullets fired in 1 sec = mn)

(16) **(a)** The initial momentum $= 15 \times 10 = 150$ kgm/s and

$$\text{Force} = \frac{\text{change in momentum}}{\text{time}} = \frac{0 - 150}{15} = -10\text{ N}$$

A constant force of 10 N must be acting in opposite direction to the motion of body.

(17) **(a)** The change in momentum in the final direction is equal

$$\text{to the impulse} = \frac{2.50}{1000} \times 28 - \left(-\frac{250}{1000} \times 24\right) = 13\text{ Ns}$$

$$\text{and force} = \frac{\text{impulse}}{\text{time}} = \frac{13}{1/100} = 1300\text{ N}$$

in the direction of the ball.

(18) **(b).** We know $\vec{F} = \dfrac{d\vec{p}}{dt} \Rightarrow \vec{F}dt = d\vec{p}$

$\Rightarrow 2 \times 2 = d\vec{p} \Rightarrow 4 = d\vec{p}$

Therefore change in momentum $= 4$ Ns

(19) **(a)** We know $\vec{F} = \dfrac{d\vec{p}}{dt}$

$\Rightarrow \vec{F}dt = d\vec{p} = \vec{p}_2 - \vec{p}_1 = m\vec{v}_2 - m\vec{v}_1$

$\Rightarrow 4\hat{j}.1 = 2.\vec{v}_2 - 2(2\hat{i})$

$\Rightarrow 2\vec{v}_2\ 4\hat{j}.1 = 2.\vec{v}_2 - 2(2\hat{i}) = 4\hat{j} + 4\hat{i}$

$\Rightarrow \vec{v}_2 = 2\hat{i} + 2\hat{j}$

$\Rightarrow |\vec{v}_2| = 2\sqrt{2}\text{ m/s}$

(20) **(c)** Initial momentum of the ball

$$= \frac{150}{1000} \times 12 = 1.8\text{ kg.m/sec}$$

$$\text{Final momentum of the ball} = -\frac{150}{1000} \times 20 = -3.0\text{ kg m/sec}$$

Change in momentum = 4.8 kg m/sec

$$\text{Average force exerted} = \text{Impulse/ time} = \frac{4.8}{.01} = 480\text{ N}$$

(21) **(b)** Initial momentum of the body $= mu = 20 \times 3 = 60$

and final momentum of the body $= -mu = -20 \times 3 = -60$

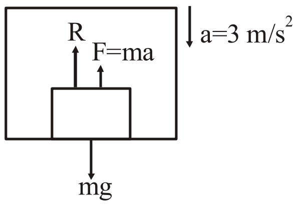
The change in momentum of body in initial direction

$= -60 - 60 = -120$

The change in momemtum imparted to the body in opposite direction = 120

$\therefore$ The impulse imparted to the body = 120 Ns

(22) **(a)** (1) Since the lift is moving down with an acceleration of 3 m/sec^2, then the inertial force $F = ma$, acts upwards on the body



Now, $R + F = mg$

or $R = mg - F = mg - ma = m(g - a) = 60\,(9.8 - 3) = 408\text{ N}$

(2) When the lift is moving down with constant velocity $a = 0$ and hence, $R = mg = 60 \times 9.8 = 588\text{ N}$

(3) The lift is now moving down with a retardation of

$3\ m/sec^2$.

The retardation is $3\ m/sec^2$ in the downward direction is equivalent to an acceleration of $3\ m/sec^2$ upwards.

Hence the direction of fictitious force is downwards.

Now, $R = mg + ma = m(g + a) = 60(12.8) = 768\ N$

(23) **(b)** When the lift is moving up $m(g + a) = $ force

The scale reading $= \dfrac{m(g+a)}{g} = \dfrac{10\left(g + \dfrac{g}{3}\right)}{g} = 13.3\ kg$

When lift is moving down the scale reading

$= \dfrac{m(g-a)}{g} = \dfrac{10\left(g - \dfrac{g}{3}\right)}{g} = 6.67\ kg$

(24) **(a)**

(1) A reference frame in which Newton's first law is valid is called an inertial reference frame.

(2) Frame moving at constant velocity relative to a known inertial frame is also an inertial frame.

(3) Idealy, no inertial frame exists in the universe for practical purpose, a frame of reference may be considered as Inertial if its acceleration is negligible with respect to the acceleration of the object to be observed.

(4) To measure the acceleration of a falling apple, earth can be considered as an inertial frame.

(25) **(a)**

(i) In the case of constant velocity of lift, there is no reaction, therefore the apparent weight = actual weight. Hence the reading of machine is 50 kg wt.

(ii) In this case the acceleration is upward the reaction R = ma acts downward, therefore apparent weight is more than actual weight .

i.e. $W' = W + R = m(g + a)$

Hence, scale show a reading of

$m(g + a)$ Newton $= \left(50 + \dfrac{50g}{a}\right)$ kg wt

(26) **(a)** Tension = $m(g + a)$, when lift moving up, putting the values, we get

$175 = 25(9.8 + a) \Rightarrow a = 2.8\ m/s^2$

[negative sign shows that lift is moving downward]

(27) **(b)** Apparent tension, $T = 2T_0$

So, $T = 2T_0 = T_0\left(1 + \dfrac{a_0}{g}\right)$

or $2 = 1 + \dfrac{a_0}{g} \Rightarrow a_0 = g = 9.8\ m/s^2$

(28) **(b)** Cloth can be pulled out without dislodging the dishes from the table because of inertia. Therefore, statement- 1 is true.

This is Newton's third law and hence true. But statement 2 is not a correct explanation of statement 1.

(29) **(d)** According to Newton's second law

Acceleration $= \dfrac{\text{Force}}{\text{Mass}}$ i.e. if net external force on the body is zero then acceleration will be zero.

(30) **(c)** $F = \dfrac{dp}{dt}$ = Slope of momentum -time graph

i.e. Rate of change of meomentum = Slope of momentum-time graph = force.