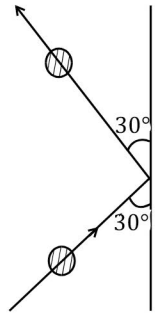
AIPMT 2006

1. A 0.5 kg ball moving with a speed of 12 m/s strikes a hard wall at an angle of 30° with the wall. It is reflected with the same speed and at the same angle. If the ball is in contact with the wall for 0.25 seconds, the average force acting on the wall is :-



(1) 48 N (2) 24 N (3) 12 N (4) 96 N

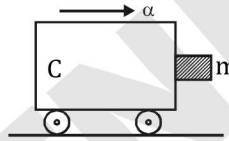
AIPMT 2009

2. A body, under the action of a force $\vec{F}=6\hat{i}-8\hat{j}+10\hat{k}$, acquires an acceleration of 1m/s². The mass of this body must be :-

(1) $10\sqrt{2}$ kg (2) $2\sqrt{10}$ kg
(3) 10 kg (4) 20 kg

AIPMT 2010

3. A block of mass m is in contact with the cart C as shown in the figure. The coefficient of static friction between the block and the cart is μ. The acceleration α of the cart that will prevent the block from falling statisfies :-



(1) $\alpha < \frac{g}{\mu}$ (2) $\alpha > \frac{mg}{\mu}$
(3) $\alpha > \frac{g}{\mu m}$ (4) $\alpha \geq \frac{g}{\mu}$

AIPMT 2011

4. A person of mass 60 kg is inside a lift of mass 940 kg and presses the button on control panel. Then lift starts moving upwards with an acceleration 1.0m/s². If g = 10 m/s², the tension in the supporting cable is :

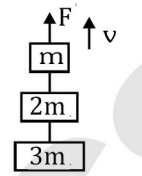
(1) 8600 N (2) 9680 N
(3) 11000 N (4)1200 N

5. A body of mass M hits normally a rigid wall with velocity V and bounces back with the same speed. The impulse experienced by the body is :

(1) MV (2) 1.5 MV (3) 2 MV (4) Zero

NEET-UG-2013

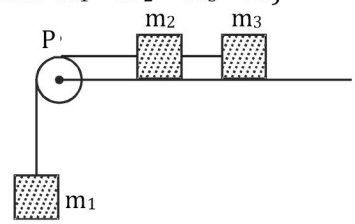
6. Three blocks with masses m, 2m and 3m are connected by strings, as shown in the figure. After an upward force F is applied on block m, the masses move upward at constant speed v. What is the net force on the block of mass 2m? (g is the acceleration due to gravity)



(1) 6 mg (2) zero (3) 2 mg (4) 3 mg

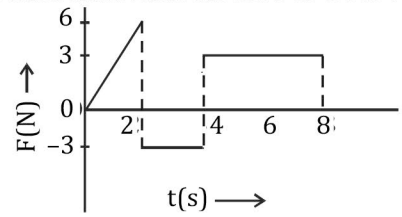
AIPMT 2014

7. A system consists of three masses m_1, m_2 and m_3 connected by a string passing over a pulley P. The mass m_1 hangs freely m_2 and m_3 are on a rough horizontal table (the coefficient of friction = μ). The pulley is frictionless and is of negligible mass. The downward acceleration of mass m_1 is:
(Assume $m_1 = m_2 = m_3 = m$)



(1) $\frac{g(1-2\mu)}{9}$ (2) $\frac{2g\mu}{3}$
(3) $\frac{g(1-2\mu)}{3}$ (4) $\frac{g(1-2\mu)}{2}$

8. The force 'F' acting on a particle of mass 'm' is indicated by the force-time graph shown below. The change in momentum of the particle over the time interval from zero to 8 s is :-



(1) 24 Ns (2) 20 Ns (3) 12 Ns (4) 6 Ns

9. A balloon with mass 'm' is descending down with an acceleration 'a' (where a < g). How much mass should be removed from it so that it starts moving up with an acceleration 'a' ? (Assume that it's volume does not change)

(1) $\frac{2ma}{g+a}$ (2) $\frac{2ma}{g-a}$ (3) $\frac{ma}{g+a}$ (4) $\frac{ma}{g-a}$

AIPMT 2015

10. A block A of mass m_1 rests on a horizontal table. A light string connected to it passes over a frictionless pulley at the edge of table and from its other end another block B of mass m_2 is suspended. The coefficient of kinetic friction between the block and the table is μ_k. When the block A is sliding on the table, the tension in the string is :-

(1) $\frac{(m_2-\mu_k m_1)g}{(m_1+m_2)}$ (2) $\frac{m_1m_2(1+\mu_k)g}{(m_1+m_2)}$

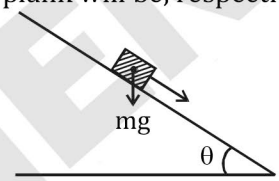
(3) $\frac{m_1m_2(1-\mu_k)g}{(m_1+m_2)}$ (4) $\frac{(m_2+\mu_k m_1)g}{(m_1+m_2)}$

11. Three blocks A, B and C of masses 4 kg, 2 kg and 1 kg respectively, are in contact on a frictionless surface, as shown. If a force of 14 N is applied on the 4 kg block, then the contact force between A and B is :

(1) 6 N (2) 8 N (3) 18 N (4) 2 N

Re-AIPMT 2015

12. A plank with a box on it at one end is gradually raised about the other end. As the angle of inclination with the horizontal reaches 30°, the box starts to slip and slides 4.0 m down the plank in 4.0s. The coefficients of static and kinetic friction between the box and the plank will be, respectively :

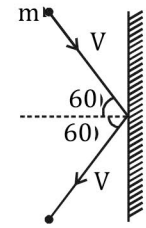


(1) 0.4 and 0.3 (2) 0.6 and 0.6
(3) 0.6 and 0.5 (4) 0.5 and 0.6

NEET-II 2016

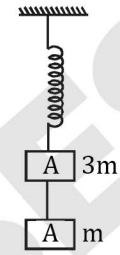
13. A rigid ball of mass m strikes a rigid wall at 60° and gets reflected without loss of speed as shown in the figure below. The value of impulse imparted by the wall on the ball will be :-

(1) $\frac{mV}{2}$
(2) $\frac{mV}{3}$
(3) mV
(4) 2mV



NEET(UG) 2017

14. Two blocks A and B of masses 3 m and m respectively are connected by a massless and inextensible string. The whole system is suspended by a massless spring as shown in figure. The magnitudes of acceleration of A and B immediately after the string is cut, are respectively :-



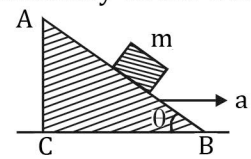
(1) $\frac{g}{3}$, g (2) g, g (3) $\frac{g}{3}$, $\frac{g}{3}$ (4) g, $\frac{g}{3}$

NEET(UG) 2018

15. Which one of the following statements is **incorrect** ?

(1) Rolling friction is smaller than sliding friction
(2) Limiting value of static friction is directly proportional to normal reactions
(3) Frictional force opposes the relative motion
(4) Coefficient of sliding friction has dimensions of length

16. A block of mass m is placed on a smooth inclined wedge ABC of inclination θ as shown in the figure. The wedge is given an acceleration 'a' towards the right. The relation between a and θ for the block to remain stationary on the wedge is :-



(1) $a=\frac{g}{\text{cosec}\,\theta}$ (2) $a=\frac{g}{\sin\theta}$
(3) $a = g\cos\theta$ (4) $a = g\tan\theta$

NEET(UG) 2019 (Odisha)

17. A truck is stationary and has a bob suspended by a light string, in a frame attached to the truck. The truck, suddenly moves to the right with an acceleration of a. The pendulum will tilt :-

(1) to the left and angle of inclination of the pendulum with the vertical is $\sin^{-1}(g/a)$
(2) to the left and angle of inclination of the pendulum with the vertical is $\tan^{-1}(a/g)$
(3) to the left and angle of inclination of the pendulum with the vertical is $\sin^{-1}(a/g)$
(4) to the left and angle of inclination of the pendulum with the vertical is $\tan^{-1}(g/a)$

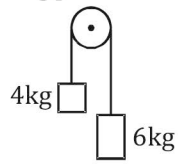
18. A body of mass m is kept on a rough horizontal surface (coefficient of friction = μ) A horizontal force is applied on the body, but it does not move. The resultant of normal reaction and the frictional force acting on the object is given by F, where F is :

(1) $|\vec{F}| = mg + \mu mg$ (2) $|\vec{F}| = \mu mg$

(3) $|\vec{F}| \le mg\sqrt{1+\mu^2}$ (4) $|\vec{F}| = mg$

NEET(UG) 2020

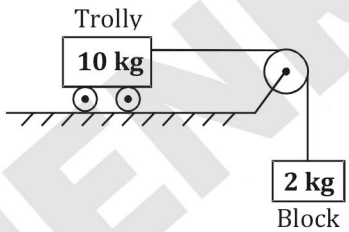
19. Two bodies of mass 4kg and 6kg are tied to the ends of a massless string. The string passes over a pulley which is frictionless (see figure). The acceleration of the system in terms of acceleration due to gravity (g) is :



(1) g/10 (2) g (3) g/2 (4) g/5

NEET(UG) 2020 (COVID-19)

20. Calculate the acceleration of the block and trolly system shown in the figure. The coefficient of kinetic friction between the trolly and the surface is 0.05. ($g = 10\ m/s^2$, mass of the string is negligible and no other friction exists).



(1) $1.25\ m/s^2$ (2) $1.50\ m/s^2$
(3) $1.66\ m/s^2$ (4) $1.00\ m/s^2$

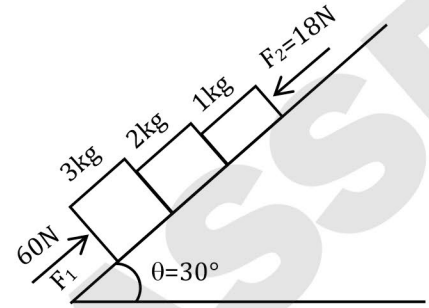
NEET(UG) 2021

21. A ball of mass 0.15 kg is dropped from a height 10 m, strikes the ground and rebounds to the same height. The magnitude of impulse imparted to the ball is ($g = 10\ m/s^2$) nearly :

(1) 0 kg m/s (2) 4.2 kg m/s
(3) 2.1 kg m/s (4) 1.4 kg m/s

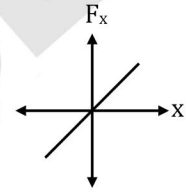
RE-NEET(UG) 2022

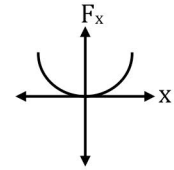
22. 22. In the diagram shown, the normal reaction force between 2 kg and 1 kg is (Consider the surface, to be smooth):
Given $g = 10\ ms^{-2}$

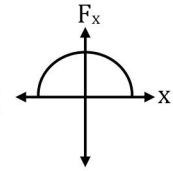


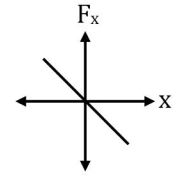
(1) 25 N (2) 39 N (3) 6 N (4) 10 N

23. The restoring force of a spring with a block attached to the free end of the spring is represented by :

(1) 

(2) 

(3) 

(4) 

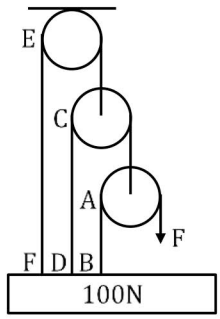
24. The distance covered by a body of mass 5 g having linear momentum 0.3 kg m/s in 5 s is:

(1) 300 m (2) 30 m
(3) 3 m (4)0.3 m

EXERCISE-II (Previous Year Questions) ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	2	1	4	3	3	2	3	3	1	2	1	3	3	1	4
Question	16	17	18	19	20	21	22	23	24						
Answer	4	2	3	4	1	2	1	4	1						

1. In the arrangement shown below force F is just sufficient to keep equilibrium of 100 N block, T_1 T_2 and T_3 are tension, in strings AB, CD and EF and T_4 is total force of all tensions on block 100 N

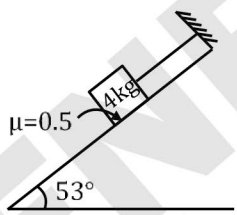


Match the following :

Column I	**Column II**
(a) T_1	(P) $\frac{400}{7}$N
(b) T_2	(Q) $\frac{100}{7}$N
(c) T_3	(R) $\frac{200}{7}$N
(d) T_4	(S) 100 N

(1) (a) – Q (b) – R (c) – P (d) – S
(2) (a) – P (b) – R (c) – Q (d) – S
(3) (a) – P (b) – Q (c) – S (d) – R
(4) (a) – P (b) – S (c) – Q (d) – S

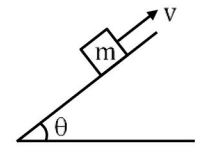
2. For the given figure, match column-I to column-II



Column-I		**Column-II**	
(a)	Tension in the string	(P)	24 N
(b)	Normal on the block	(Q)	20 N
(c)	Contact force between block and inclined plane	(R)	12 N
(d)	Friction on the block	(S)	27 N

(1) (a) – Q, (b) – P, (c) – S, (d) – R
(2) (a) – P, (b) – Q, (c) – S, (d) – R
(3) (a) – P, (b) – Q, (c) – R, (d) – S
(4) (a) – Q, (b) – P, (c) – R, (d) – S

3. A block of mass m is thrown upwards with some initial velocity as shown. On the block



Column-I		**Column-II**	
(a)	Net force in horizontal direction	(P)	zero
(b)	Net force in vertical direction	(Q)	$m(g\sin\theta+\mu g\cos\theta)$
(c)	Net force along the plane	(R)	$m(g\sin\theta\cos\theta+\mu g\cos^2\theta)$
(d)	Net force perpendicular to plane	(S)	$m(g\sin^2\theta+\mu g\sin\theta\cos\theta)$
		(T)	None

(1) (a) – P (b) – R (c) – Q (d) – P
(2) (a) – R (b) – S (c) – Q (d) – P
(3) (a) – P (b) – S (c) – Q (d) – P
(4) (a) – Q (b) – R (c) – P (d) – R

4. If the net force acting on a system is represented by $\vec{F}$ and its momentum is $\vec{P}$. Then match the entries of column I with the entries of Column II.

Column-I		**Column-II**	
(a)	If $\vec{F}$ is constant	(P)	$\vec{P}$ may change its direction
(b)	If $\vec{F}$ is changing in magnitude only	(Q)	$\vec{P}$ must change its magnitude
(c)	If $\vec{F}$ is changing in direction only	(R)	$\vec{P}$ may not change its direction
(d)	If $\vec{F}$ is zero	(S)	$\vec{P}$ may be constant in magnitude

(1) (a) – P,Q,R (b) – P,Q,R (c) – P,S (d) – S
(2) (a) – P,R (b) – P,Q (c) – P,R (d) – S
(3) (a) – P,Q (b) – Q,R (c) – P,R (d) –S
(4) (a) – P,R (b) – P,Q,R (c) – P (d) – S

5. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : When a body is at rest on a horizontal surface then the contact force on the body by the surface must be equal to the weight of body.

Reason (R) : The contact force applied by a surface on a body placed on it is the total force applied by surface on the body.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
(2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
(3) **(A)** is true but **(R)** is false.
(4) **(A)** is false but **(R)** is true.

6. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : When a block is placed in a lift which is accelerating upwards then the body experiences the following three forces :

(a) Weight (mg)
(b) Normal reaction (N) and
(c) Pseudo force (ma) if 'a' is acceleration of lift

Reason (R) : Pseudo force is applied on a body only when body is seen from an accelerated observer.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
(2) Both **(A)** and **(R)** are true and **(R)** is NOT the correct explanation of **(A)**.
(3) **(A)** is true but **(R)** is false.
(4) **(A)** is false but **(R)** is true.

7. Equilibrium means zero acceleration while rest means zero velocity.

(1) True (2) False
(3) Partially true (4) None of the above

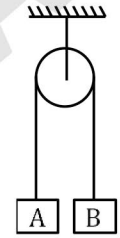
8. Newton's first law is a special case of second law.

(1) True
(2) False
(3) Partially true
(4) None of the above

9. A body released from a balloon rising up continues to move up along with the ballon due to inertia of motion.

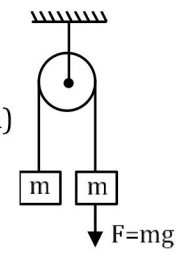
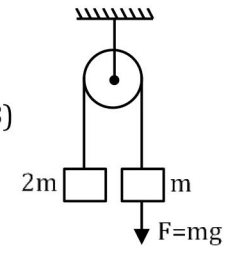
(1) True
(2) False
(3) Partially true
(4) None of the above

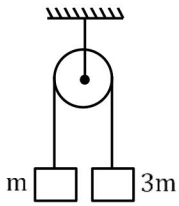
10. Two blocks of mass 2 kg and 3 kg are arranged as shown and released from rest. Assuming string and pulley to be ideal. Find the separation between them after 1 sec. [g =10 m/s^2]



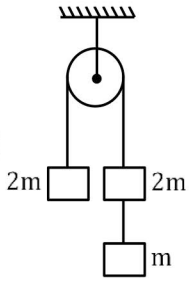
(1) 1 m (2) 2 m (3) 4 m (4) None

11. Match the situations in column I to the accelerations of blocks in the column II (acceleration due to gravity is g and F is an additional force applied to one of the blocks ?

Column I	**Column II**
(A) 	(P) $\frac{g}{5}$
(B) 	(Q) $\frac{g}{3}$

(C) 

(R) $\frac{g}{2}$

(D) 

(S) 0

Options :-

(1) A → R, B → S, C → R, D → P

(2) A → R, B → S, C → Q, D → P

(3) A → Q, B → P, C → R, D → S

(4) A → P, B → Q, C → R, D → S

12. If a body is placed on a rough inclined plane, the nature of forces acting on the body is(are)

(A) gravitational (B) electromagnetic

(C) nuclear (D) weak

(1) Only A (2) A and D

(3) A, B, C, D (4) A and B

13. **Statement-I** : When a cloth with a lot of dirt in it, is jerked the dirt gets away from it.

Statement-II : When an object applies force on another object the other object also applies an equal force but opposite in direction.

(1) Statement–1 is True, Statement–2 is True ; Statement–2 is a correct explanation for Statement–1.

(2) Statement–1 is True, Statement–2 is True ; Statement–2 is not a correct explanation for Statement–1.

(3) Statement–1 is True, Statement–2 is False.

(4) Statement–1 is False, Statement–2 is True.

EXERCISE-III (Analytical Questions) ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13
Answer	1	1	2	1	4	4	1	2	2	2	1	4	2