Q1. A block of mass 5 kg is placed on a smooth horizontal surface. What is the force required to accelerate it at 2 m/s^2?

A) 2.5 N
B) 10 N
C) 7 N
D) 5 N

Answer: B) 10 N
Explanation:
Using Newton's Second Law:
N

Q2. A man of mass 60 kg is standing in an elevator. The apparent weight of the man is maximum when:

A) Elevator is moving up with uniform velocity
B) Elevator is moving down with uniform acceleration
C) Elevator is accelerating upwards
D) Elevator is in free fall

Answer: C) Elevator is accelerating upwards
Explanation:
Apparent weight = ⇒ increases with upward acceleration

Q3. Newton's First Law is also known as:

A) Law of inertia
B) Law of force
C) Law of energy
D) Law of motion

Answer: A) Law of inertia
Explanation:
It states that a body remains in its state of rest or motion unless acted upon by a force.

Q4. Which of the following is not a contact force?

A) Friction

B) Tension
C) Gravitational force
D) Normal force

Answer: C) Gravitational force
Explanation:
Gravitational force is an action-at-a-distance (non-contact) force.

Q5. A body is moving in a circular path with constant speed. Which statement is true?

A) No force acts on the body
B) Acceleration is zero
C) Velocity is constant
D) There is acceleration toward the center

Answer: D) There is acceleration toward the center
Explanation:
Centripetal acceleration always exists in circular motion.

Q6. A 2 kg block is hanging by a string. What is the tension in the string? ($g = 10\ m/s^2$)

A) 2 N
B) 10 N
C) 20 N
D) 5 N

Answer: C) 20 N
Explanation:
Tension = weight = N

Q7. If the net external force on a system is zero, then:

A) System is at rest
B) Momentum is conserved
C) Acceleration is zero
D) Both B and C

Answer: D) Both B and C

Explanation:
From Newton's First Law and Second Law, no force ⇒ no acceleration ⇒ momentum conserved.

Q8. A ball of mass 0.5 kg hits a wall with velocity 20 m/s and rebounds with the same speed. What is the change in momentum?

A) 0
B) 10 kg·m/s
C) 20 kg·m/s
D) 5 kg·m/s

Answer: B) 10 kg·m/s
Explanation:
Change = final − initial = ⇒ Magnitude = 20
But question asks for change, not impulse, and direction reversed ⇒ net change = 0 − (−10) = 10 kg·m/s

Q9. A body of mass 4 kg is acted upon by a force of 20 N. What is its acceleration?

A) 4 m/s²
B) 5 m/s²
C) 10 m/s²
D) 20 m/s²

Answer: B) 5 m/s²
Explanation:
m/s²

Q10. A body is in equilibrium if:

A) Only net force is zero
B) Only net torque is zero
C) Net force and net torque both are zero
D) None of the above

Answer: C) Net force and net torque both are zero
Explanation:
Translational + rotational equilibrium ⇒ both force and torque must be zero.

Q11. A block of mass 2 kg is placed on a rough surface with coefficient of static friction . What is the minimum force needed to just start moving the block?

A) 2 N
B) 5 N
C) 10 N
D) 20 N

Answer: C) 10 N
Explanation:
Minimum force = limiting friction = N

Q12. A block of mass m is hanging from a string inside a lift. The tension in the string is less than mg. The lift must be:

A) Moving up with acceleration
B) At rest
C) Moving downward with acceleration
D) Moving upward with constant velocity

Answer: C) Moving downward with acceleration
Explanation:
Tension when lift accelerates downward ⇒ T < mg

Q13. A 10 kg object is placed on a frictionless table and connected to a 5 kg hanging mass over a pulley. What is the acceleration of the system?

A) 3.3 m/s²
B) 5 m/s²
C) 10 m/s²
D) 15 m/s²

Answer: A) 3.3 m/s²
Explanation:
Total mass = 10 + 5 = 15 kg
Force = weight of hanging mass = 5 × 10 = 50 N
Acceleration = m/s²

Q14. A car takes a sharp turn at high speed. Passengers tend to slide outward due to:

A) Centripetal force
B) Inertia of rest
C) Inertia of motion
D) Centrifugal force

Answer: C) Inertia of motion
Explanation:
Passenger tends to continue in straight-line motion (inertia of motion) when car turns.

Q15. If two bodies A and B collide elastically, and body A was at rest initially, the total momentum:

A) Increases
B) Decreases
C) Remains constant
D) Depends on masses

Answer: C) Remains constant
Explanation:
In elastic collision, momentum and energy both are conserved.

Q16. A 2 kg block is sliding down a rough inclined plane of angle 30°. The coefficient of kinetic friction is 0.2. What is the acceleration? ($g = 10\ m/s^2$)

A) 5 m/s^2
B) 3 m/s^2
C) 2 m/s^2
D) 1 m/s^2

Answer: B) 3 m/s^2
Explanation:
Net force:
m/s^2

Q17. Two blocks are connected over a frictionless pulley: one block ($m_1 = 6$ kg) on a smooth table and the other ($m_2 = 4$ kg) hanging. Find the acceleration of the system.

A) 2 m/s²
B) 4 m/s²
C) 10 m/s²
D) 6 m/s²

Answer: A) 2 m/s²
Explanation:
Total mass = 6 + 4 = 10 kg
Net force = $m_2g = 4 \times 10 = 40$ N
Acceleration = 40 / 10 = 4 m/s² (but tension on m_1 resists motion → correct = 2 m/s² using Newton's second law)

Q18. In Newton's third law, action and reaction forces:

A) Act on same body
B) Are equal and opposite but act on different bodies
C) Are always balanced
D) Depend on mass of body

Answer: B) Are equal and opposite but act on different bodies
Explanation:
Newton's Third Law: For every action, there is equal and opposite reaction on another body.

Q19. A 60 kg man stands on a weighing machine in a lift. If the machine shows 72 kg, what is the acceleration of the lift?

A) 2 m/s² downward
B) 2 m/s² upward
C) 10 m/s² upward
D) 5 m/s² downward

Answer: B) 2 m/s² upward
Explanation:
Apparent weight =
m/s² upward

Q20. A bullet of mass 0.01 kg strikes a wall with velocity 100 m/s and comes to rest in 0.01 s. What is the force exerted by the wall?

A) 10 N
B) 100 N
C) 1000 N
D) 10,000 N

Answer: C) 1000 N
Explanation:
Impulse = change in momentum = kg·m/s
Force = Impulse / time = N

Q21. A block of 10 kg is pulled on a horizontal rough surface with a force of 100 N at 60° above the horizontal. If coefficient of kinetic friction is 0.3, what is the acceleration of the block? (g = 10 m/s²)

A) 4.5 m/s²
B) 5 m/s²
C) 3.5 m/s²
D) 6 m/s²

Answer: A) 4.5 m/s²
Explanation:
Horizontal force = N
Vertical upward component = N reduces normal force
Normal force = N
Friction = N
Net force = N
Acceleration = m/s²

Q22. In a tug-of-war, two teams pull a rope with equal forces. The rope does not move. What is the net force on the rope?

A) Equal to one team's force
B) Double one team's force
C) Zero
D) Infinite

Answer: C) Zero

Explanation:
Equal and opposite forces ⇒ Net force = 0 ⇒ Rope remains stationary

Q23. A person sitting in a stationary car suddenly feels pushed backward when the car accelerates. This is due to:

A) Inertia of motion
B) Inertia of rest
C) Centripetal force
D) Gravity

Answer: B) Inertia of rest
Explanation:
Body resists change from rest ⇒ feels pushed backward

Q24. A 3 kg block slides down a smooth inclined plane of 30°. What is the normal force?

A) 30 N
B) 15 N
C) 25.45 N
D) 51 N

Answer: C)
Explanation:
Normal force = mgcos30

Q25. The impulse of a force is equal to:

A) Rate of change of momentum
B) Change in kinetic energy
C) Change in momentum
D) Work done

Answer: C) Change in momentum
Explanation:
Impulse =

Q26. In which situation is friction independent of the contact area?

A) Fluid friction
B) Rolling friction
C) Static friction
D) Kinetic dry friction

Answer: D) Kinetic dry friction
Explanation:
Dry friction depends on normal force, not contact area (Amontons' laws)

Q27. The tension in a string joining two blocks on a frictionless table (m_1 = 3 kg, m_2 = 2 kg, pulled by force F = 10 N) is:

A) 4 N
B) 6 N
C) 10 N
D) 2 N

Answer: A) 4 N
Explanation:
Total mass = 5 kg ⇒ acceleration = m/s²
Tension = $m_2 \times a$ = N

Q28. A monkey of mass 20 kg climbs a rope. If it climbs with constant velocity, what is the tension in the rope?

A) 0
B) 200 N
C) 400 N
D) 20 N

Answer: B) 200 N
Explanation:
Constant velocity ⇒ no acceleration ⇒ Tension = Weight = N

Q29. A block of 5 kg is at rest on a table. If a horizontal force of 15 N is applied and the maximum static friction is 10 N, then the block will:

A) Remain at rest
B) Move with uniform velocity
C) Accelerate
D) Move with acceleration = 0

Answer: C) Accelerate
Explanation:
Applied force > static friction ⇒ motion starts ⇒ acceleration = m/s²

Q30. A spring balances a 10 kg mass in an elevator. If the elevator accelerates downward at 4 m/s², what will the balance read?

A) 100 N
B) 60 N
C) 40 N
D) 50 N

Answer: B) 60 N
Explanation:
Apparent weight = N

Q31. Two people pull a box with equal forces at angles 60° and 120° to the horizontal. What is the net horizontal force if each pulls with 10 N?

A) 10 N
B) 20 N
C) 0 N
D) 5 N

Answer: A) 10 N
Explanation:
Only horizontal components:

But correct approach is consider symmetry ⇒ resultant = N
So question as worded likely meant opposite directions ⇒ Answer: C) 0 N

Q32. A bullet is fired from a gun. The gun recoils due to:

A) Newton's First Law
B) Newton's Second Law
C) Newton's Third Law
D) Conservation of energy

Answer: C) Newton's Third Law
Explanation:
Action = Bullet moves forward, Reaction = Gun moves backward

Q33. Frictional force always:

A) Helps motion
B) Opposes relative motion
C) Is independent of surface roughness
D) Acts in direction of velocity

Answer: B) Opposes relative motion
Explanation:
Friction resists relative motion between surfaces

Q34. A rope is pulled by two persons with forces 100 N and 80 N from opposite ends. What is the net force?

A) 20 N
B) 180 N
C) 100 N
D) 80 N

Answer: A) 20 N
Explanation:
Net force = N in direction of 100 N

Q35. A ball of mass 0.5 kg moving at 4 m/s strikes a wall and bounces back at 2 m/s. What is the impulse?

A) 3 Ns
B) –1 Ns
C) –3 Ns

D) 2 Ns

Answer: C) –3 Ns
Explanation:
Impulse = Ns

Q36. A 2 kg object is suspended from a spring balance inside a lift. If the lift accelerates upward at 3 m/s², what is the reading on the spring balance?

A) 20 N
B) 26 N
C) 16 N
D) 0 N

Answer: B) 26 N
Explanation:
Apparent weight = N
The spring balance reads the apparent weight, which increases when the lift accelerates upward.

Q37. A car of mass 1000 kg moves in a circular path of radius 20 m with speed 10 m/s. What is the minimum friction force required to keep it moving in a circle?

A) 5000 N
B) 1000 N
C) 2000 N
D) 3000 N

Answer: A) 5000 N
Explanation:
Centripetal force needed = N
This force must be provided by friction in this case.

Q38. A man of mass 60 kg stands on a weighing machine inside an elevator. If the elevator is falling freely, what will the machine read?

A) 600 N
B) 300 N
C) 0 N

D) 60 N

Answer: C) 0 N
Explanation:
In free fall, both man and weighing machine accelerate down at g.
Normal force (apparent weight) = 0
This is a classic weightlessness condition.

Q39. A bullet of mass 20 g moving at 300 m/s hits a wooden block of mass 1.98 kg resting on a frictionless surface. If it gets embedded in the block, what is their final velocity?

A) 2.5 m/s
B) 3 m/s
C) 5 m/s
D) 6 m/s

Answer: A) 3 m/s
Explanation:
Use conservation of momentum:
Total initial momentum = kg·m/s
Final mass = kg
Final velocity = m/s

Q40. A rope can withstand a maximum tension of 500 N. A block of mass 40 kg is suspended and is accelerated upward at 2 m/s^2. Will the rope break?

A) Yes
B) No
C) Tension is exactly 500 N
D) Need more data

Answer: B) No
Explanation:
Tension = N
Since 480 N < 500 N, rope will not break.

Q41. A force of 15 N acts on a body of mass 3 kg for 4 seconds. What is the change in velocity?

A) 5 m/s
B) 15 m/s
C) 20 m/s
D) 10 m/s

Answer: D) 20 m/s
Explanation:
Acceleration = m/s²
Change in velocity = m/s

Q42. The coefficient of kinetic friction between a block and surface is 0.5. What minimum angle of inclination is needed to just slide the block down the plane?

A) 45°
B) 30°
C) 60°
D) $\tan^{-1}(0.5)$

Answer: D) $\tan^{-1}(0.5)$
Explanation:
The block just starts sliding when:

Q43. A machine gun fires bullets at the rate of 10 per second, each of mass 50 g with velocity 500 m/s. What is the force required to hold the gun?

A) 125 N
B) 250 N
C) 500 N
D) 200 N

Answer: B) 250 N
Explanation:
Rate of momentum = N
Force = Rate of change of momentum

Q44. A boy of mass 40 kg is standing on a trolley of mass 60 kg. If the boy jumps backward with a speed of 3 m/s (w.r.t ground), what is the velocity of the trolley (neglect friction)?

A) 2 m/s forward
B) 3 m/s backward
C) 1.2 m/s forward
D) 2.4 m/s forward

Answer: D) 2.4 m/s forward
Explanation:
Using conservation of momentum:
Initial momentum = 0
Final: m/s forward

But correct calc:
 m/s (corrected, A)
So Answer: A) 2 m/s forward

Q45. A ball of mass 0.2 kg falls from a height of 2 m and rebounds to 1.5 m. What is the impulse due to collision with the ground? ($g = 10\ m/s^2$)

A) 2 Ns
B) 3 Ns
C) 4 Ns
D) 1.5 Ns

Answer: B) 3 Ns
Explanation:
Velocity before impact = m/s
Velocity after rebound = m/s
Change in momentum = Ns