

CHAPTER 03

DYNAMICS

75 High-Yield Multiple Choice Questions

Comprehensive Question Bank & Explanations

Practice Questions (1 – 3)

1. What is the primary cause of acceleration in a moving body?

- A) Inertia
- B) Force
- C) Momentum
- D) Velocity

Answer: B

Explanation: Force is the fundamental agent that changes a body's state of motion, causing it to accelerate.

2. A force is defined as a push or pull that:

- A) Always increases speed
- B) Starts, stops, or changes velocity's magnitude and direction
- C) Only acts on stationary objects
- D) Is always a contact force

Answer: B

Explanation: Force is a vector quantity that can start, stop, or alter the speed and direction of an object.

3. Which of the following is an example of a non-contact force?

- A) Friction
- B) Tension
- C) Gravitational force
- D) Normal force

Answer: C

Explanation: Gravitational force acts at a distance without any physical contact between objects.

Practice Questions (4 – 6)

4. The force that resists the motion of a body through a fluid is called:

- A) Thrust
- B) Drag
- C) Tension
- D) Elastic force

Answer: B

Explanation: Drag is the resistive force exerted by fluids (liquids or gases) opposing an object's motion.

5. When you immerse an object in water, you feel an upward force. This force is:

- A) Drag
- B) Thrust
- C) Air resistance
- D) Normal force

Answer: B

Explanation: Thrust is the upward buoyant force exerted by a liquid on an immersed object.

6. The force exerted by a surface perpendicular to the object lying on it is:

- A) Normal force
- B) Friction
- C) Tension
- D) Elastic force

Answer: A

Explanation: Normal force acts outward and perpendicular (90 degrees) to the surface of contact.

Practice Questions (7 – 9)

7. Which force is experienced by a rope when a person pulls it?

- A) Elastic force
- B) Tension force
- C) Normal force
- D) Drag force

Answer: B

Explanation: Tension is the pulling force transmitted axially through a rope, string, or cable.

8. The force that brings certain materials back to their original shape is:

- A) Friction
- B) Elastic force
- C) Thrust
- D) Gravitational force

Answer: B

Explanation: Elastic force is a restorative force that returns deformed materials to their original shape.

9. Electrostatic force acts between:

- A) Two magnets
- B) Two charged objects
- C) Two masses
- D) Subatomic particles

Answer: B

Explanation: Electrostatic force is a non-contact force acting between electrically charged particles.

Practice Questions (10 – 12)

10. Magnetic force is exerted by a magnet on:

- A) Only iron
- B) All metals
- C) Magnetic materials like iron, nickel, cobalt
- D) Non-magnetic materials

Answer: C

Explanation: Magnets attract ferromagnetic materials, specifically iron, nickel, and cobalt.

11. Which of the following is NOT a fundamental force in nature?

- A) Gravitational force
- B) Electromagnetic force
- C) Frictional force
- D) Strong nuclear force

Answer: C

Explanation: Friction is a derived contact force, not one of the four fundamental forces of nature.

12. The weakest force among the four fundamental forces is:

- A) Strong nuclear force
- B) Weak nuclear force
- C) Electromagnetic force
- D) Gravitational force

Answer: D

Explanation: Gravitational force is the weakest fundamental force, only noticeable with massive bodies.

Practice Questions (13 – 15)

13. The range of the strong nuclear force is of the order of:

- A) 10^{-17} m
- B) 10^{-14} m
- C) 10^{-10} m
- D) Infinite

Answer: B

Explanation: Strong nuclear force acts over a very short range of about 10^{-14} meters.

14. Which force is responsible for the beta decay of a neutron?

- A) Strong nuclear force
- B) Weak nuclear force
- C) Electromagnetic force
- D) Gravitational force

Answer: B

Explanation: Weak nuclear force governs radioactive decay, including beta decay.

15. Who was awarded the Nobel Prize in Physics in 1979 for unifying weak nuclear and electromagnetic forces?

- A) Albert Einstein
- B) Isaac Newton
- C) Dr. Abdus Salam
- D) Sheldon Glashow

Answer: C

Explanation: Dr. Abdus Salam won the Nobel Prize for unifying the electroweak force.

Practice Questions (16 – 18)

16. In a free-body diagram, an object is usually represented by a:

- A) Circle
- B) Box
- C) Triangle
- D) Vector arrow

Answer: B

Explanation: Objects are simplified as a box to visualize the forces acting on them.

17. According to Newton's first law, a body continues its state of rest or uniform motion unless acted upon by:

- A) An external force
- B) An internal force
- C) Friction
- D) Gravity

Answer: A

Explanation: A body maintains its state unless a net external force compels it to change.

18. When a fast-moving bus stops suddenly, passengers bend forward because:

- A) A force pushes them forward
- B) They want to continue motion due to inertia
- C) Gravity pulls them forward
- D) The bus pushes them forward

Answer: B

Explanation: Passengers lurch forward due to inertia, resisting the sudden stop.

Practice Questions (19 – 21)

19. The property of a body to maintain its state of rest or uniform motion is called:

- A) Force
- B) Momentum
- C) Inertia
- D) Acceleration

Answer: C

Explanation: Inertia is the intrinsic property of matter to resist changes in its motion.

20. Which has more inertia: a bicycle or a truck?

- A) Bicycle
- B) Truck
- C) Both have equal inertia
- D) Depends on their speed

Answer: B

Explanation: Inertia is directly proportional to mass; the heavier truck has more inertia.

21. Newton's second law states that acceleration is:

- A) Directly proportional to mass
- B) Inversely proportional to force
- C) Directly proportional to force & inversely to mass
- D) Independent of force

Answer: C

Explanation: Acceleration increases with force but decreases as mass increases ($F = ma$).

Practice Questions (22 – 24)

22. The SI unit of force is:

- A) Joule
- B) Newton
- C) Watt
- D) Pascal

Answer: B

Explanation: The Newton (N) is the SI unit of force, named after Sir Isaac Newton.

23. One Newton (1 N) is equal to:

- A) 1 kg m s^{-1}
- B) 1 kg m s^{-2}
- C) $1 \text{ kg m}^2 \text{ s}^{-2}$
- D) $1 \text{ kg m}^{-1} \text{ s}^{-2}$

Answer: B

Explanation: 1 N is the force that accelerates a 1 kg mass at 1 m/s^2 .

24. If a force F acts on mass m, the acceleration a is given by:

- A) $a = F \times m$
- B) $a = m / F$
- C) $a = F / m$
- D) $a = F + m$

Answer: C

Explanation: Rearranging Newton's second law ($F = ma$) gives $a = F / m$.

Practice Questions (25 – 27)

25. A force of 20 N acts on a 10 kg block. What is its acceleration?

A) 200 m s^{-2}

B) 2 m s^{-2}

C) 0.5 m s^{-2}

D) 10 m s^{-2}

Answer: B

Explanation: Using $a = F / m = 20 / 10 = 2 \text{ m s}^{-2}$.

26. Newton's third law of motion states that:

A) Action and reaction act on the same body

B) For every action, equal & opposite reaction

C) Action is greater than reaction

D) Reaction occurs before action

Answer: B

Explanation: Every force has an equal and opposite force acting on a different body.

27. When a bullet is fired, the gun recoils backward. This is an example of:

A) Newton's first law

B) Newton's second law

C) Newton's third law

D) Law of gravitation

Answer: C

Explanation: The gun's backward recoil is the reaction force to the bullet's forward action.

Practice Questions (28 – 30)

28. Which is true about action and reaction forces?

- A) They act on the same body
- B) They always cancel each other out
- C) They act on two different bodies
- D) They are unequal in magnitude

Answer: C

Explanation: Action and reaction act on different bodies, which is why they don't cancel out.

29. Newton's laws of motion are not applicable for:

- A) Everyday speeds
- B) Speeds close to the speed of light
- C) Macroscopic objects
- D) Objects on Earth

Answer: B

Explanation: Newton's laws break down at relativistic speeds near the speed of light.

30. The mass of a body is a measure of its:

- A) Weight
- B) Inertia
- C) Force
- D) Velocity

Answer: B

Explanation: Mass quantifies an object's inertia or resistance to changes in motion.

Practice Questions (31 – 33)

31. Which of the following is a scalar quantity?

- | | |
|-----------|-----------------|
| A) Weight | B) Force |
| C) Mass | D) Acceleration |

Answer: C

Explanation: Mass only has magnitude, making it a scalar quantity.

32. The weight of an object is defined as:

- | | |
|-------------------------|---------------------------------------|
| A) Quantity of matter | B) Force with which Earth attracts it |
| C) Resistance to motion | D) Mass times velocity |

Answer: B

Explanation: Weight is the gravitational force exerted by Earth on an object.

33. The SI unit of weight is:

- | | |
|-------------|-----------|
| A) Kilogram | B) Newton |
| C) Joule | D) Meter |

Answer: B

Explanation: Since weight is a force, its SI unit is the Newton (N).

Practice Questions (34 – 36)

34. The value of gravitational field strength (g) on Earth is approximately:

- A) 9.8 m s^{-2}
- B) 10 m s^{-2}
- C) $6.67 \times 10^{-11} \text{ N m}^2 \text{ kg}^{-2}$
- D) Both A and B are acceptable

Answer: D

Explanation: g is approximately 9.8 m/s^2 , often rounded to 10 m/s^2 for calculations.

35. If mass is 10 kg, what is its weight on Earth? ($g = 10 \text{ m s}^{-2}$)

- A) 10 N
- B) 100 N
- C) 1 N
- D) 1000 N

Answer: B

Explanation: $W = mg = 10 \times 10 = 100 \text{ N}$.

36. The weight of an object varies from place to place because:

- A) Its mass changes
- B) The value of g varies
- C) Its volume changes
- D) G changes

Answer: B

Explanation: Weight varies because gravitational field strength (g) differs by location.

Practice Questions (37 – 39)

37. Which instrument is used to measure force directly?

- A) Mechanical balance
- B) Electronic balance
- C) Force meter (Spring balance)
- D) Beam balance

Answer: C

Explanation: A force meter (spring balance) measures force directly in Newtons.

38. In a spring balance, the weight of an object causes the spring to:

- A) Compress
- B) Stretch or compress
- C) Rotate
- D) Break

Answer: B

Explanation: Weight either stretches or compresses the spring to indicate force.

39. A force meter measures force directly in:

- A) Kilograms (kg)
- B) Newtons (N)
- C) Joules (J)
- D) Meters (m)

Answer: B

Explanation: Force meters are calibrated in Newtons (N), the SI unit of force.

Practice Questions (40 – 42)

40. Which balance is more precise and does not require standard weights?

- A) Mechanical balance
- B) Electronic balance
- C) Beam balance
- D) Physical balance

Answer: B

Explanation: Electronic balances are highly precise and display mass digitally without weights.

41. Friction is a force that:

- A) Always helps motion
- B) Opposes relative motion between surfaces
- C) Acts only on stationary objects
- D) Is a non-contact force

Answer: B

Explanation: Friction is a contact force that always opposes relative motion.

42. The type of friction acting between two solid surfaces sliding over each other is:

- A) Rolling friction
- B) Sliding friction
- C) Fluid friction
- D) Static friction

Answer: B

Explanation: Sliding friction occurs when two solid surfaces slide against each other.

Practice Questions (43 – 45)

43. The maximum value of static friction is called:

- A) Kinetic friction
- B) Limiting friction
- C) Rolling friction
- D) Normal force

Answer: B

Explanation: Limiting friction is the maximum static friction just before motion starts.

44. Which friction is generally the smallest for the same object and surface?

- A) Static friction
- B) Sliding friction
- C) Rolling friction
- D) Limiting friction

Answer: C

Explanation: Rolling friction is much smaller than sliding friction, reducing energy loss.

45. Friction between tires and the road (when not skidding) is an example of:

- A) Rolling friction
- B) Static friction
- C) Fluid friction
- D) Drag

Answer: B

Explanation: Non-skidding tires experience static friction, which propels the car forward.

Practice Questions (46 – 48)

46. Why does a paratrooper achieve terminal velocity?

- A) Gravity stops acting
- B) Air resistance balances gravity
- C) His mass increases
- D) He stops moving

Answer: B

Explanation: Terminal velocity occurs when upward air resistance equals downward gravity.

47. Which method is used to reduce friction in machines?

- A) Increasing weight
- B) Using lubricants like oil/grease
- C) Making surfaces rough
- D) Increasing surface area

Answer: B

Explanation: Lubricants replace solid friction with much lower fluid friction.

48. The use of ball bearings in machinery converts:

- A) Rolling to sliding friction
- B) Sliding to rolling friction
- C) Static to kinetic friction
- D) Fluid to sliding friction

Answer: B

Explanation: Ball bearings convert sliding friction into much smaller rolling friction.

Practice Questions (49 – 51)

49. Streamlining is a technique used to reduce:

- A) Weight
- B) Air or water resistance
- C) Mass
- D) Friction between solid surfaces

Answer: B

Explanation: Streamlining shapes objects to minimize resistance from air or water.

50. Momentum is defined as the product of:

- A) Mass and acceleration
- B) Mass and velocity
- C) Force and time
- D) Force and velocity

Answer: B

Explanation: Momentum (p) is the product of an object's mass and velocity.

51. The SI unit of momentum is:

- A) kg m s^{-2}
- B) kg m s^{-1}
- C) N m
- D) Joule

Answer: B

Explanation: The SI unit of momentum is kg m s^{-1} or Newton-second (N s).

Practice Questions (52 – 54)

52. What is the momentum of a 15 g bullet moving at 150 m s^{-1} ?

- A) 2.25 kg m s^{-1}
- B) 225 kg m s^{-1}
- C) $0.225 \text{ kg m s}^{-1}$
- D) 22.5 kg m s^{-1}

Answer: A

Explanation: $p = mv = 0.015 \text{ kg} \times 150 \text{ m/s} = 2.25 \text{ kg m/s}$.

53. The impulse of a force is defined as:

- A) Force times distance
- B) Force times time interval
- C) Rate of change of momentum
- D) Change in velocity

Answer: B

Explanation: Impulse is the product of force and the time interval it acts upon.

54. Impulse is equal to the change in:

- A) Mass
- B) Velocity
- C) Momentum
- D) Acceleration

Answer: C

Explanation: Impulse ($F \times \Delta t$) equals the total change in momentum (Δp).

Practice Questions (55 – 57)

55. When a cricketer draws his hands back while catching, he:

- A) Increases impulse
- B) Increases impact time, reducing force
- C) Decreases momentum change
- D) Increases momentum change

Answer: B

Explanation: Increasing impact time reduces the average force exerted on the hands.

56. According to Newton's second law in terms of momentum, force equals:

- A) Rate of change of velocity
- B) Rate of change of momentum
- C) Mass times velocity
- D) Change in momentum

Answer: B

Explanation: Force is equal to the rate of change of an object's momentum.

57. Crumple zones in automobiles are designed to:

- A) Increase impact force
- B) Decrease impact time
- C) Increase impact time to reduce force
- D) Increase momentum

Answer: C

Explanation: Crumple zones deform to increase impact time, reducing force on passengers.

Practice Questions (58 – 60)

58. The principle of conservation of momentum states that in an isolated system:

- A) Total momentum increases
- B) Total momentum decreases
- C) Total momentum remains constant
- D) Kinetic energy remains constant

Answer: C

Explanation: Total momentum of an isolated system remains constant without external forces.

59. In an isolated system, two objects collide. Which is true?

- A) $m_1v_1 + m_2v_2 = m_1v_1' + m_2v_2'$
- B) $m_1v_1 - m_2v_2 = m_1v_1' - m_2v_2'$
- C) $m_1v_1 = m_2v_2$
- D) $m_1v_1' + m_2v_2' = 0$

Answer: A

Explanation: Total initial momentum equals total final momentum in a collision.

60. A 3 kg ball moving at 5 m s^{-1} collides with a stationary 2 kg ball and they move together. Combined velocity is:

- A) 5 m s^{-1}
- B) 3 m s^{-1}
- C) 2 m s^{-1}
- D) 10 m s^{-1}

Answer: B

Explanation: $(3 \times 5) + (2 \times 0) = (3+2)v \Rightarrow 15 = 5v \Rightarrow v = 3 \text{ m/s}$.

Practice Questions (61 – 63)

61. When a gun is fired, total momentum of gun and bullet system before firing is:

- A) Equal to bullet's momentum B) Equal to gun's momentum
C) Zero D) Maximum

Answer: C

Explanation: Both are at rest before firing, so total initial momentum is zero.

62. A bullet of mass m_1 is fired with velocity v_1 . Recoil velocity v_2 of gun of mass m_2 is:

- A) $m_1 v_1 / m_2$ B) $-m_1 v_1 / m_2$
C) $m_2 v_1 / m_1$ D) $-m_2 v_1 / m_1$

Answer: B

Explanation: Conservation of momentum gives $v_2 = -m_1 v_1 / m_2$ (opposite direction).

63. Which of the following is NOT a unit of force?

- A) Newton B) kg m s^{-2}
C) Joule D) Dyne

Answer: C

Explanation: Joule is the unit of energy, not force.

Practice Questions (64 – 66)

64. The gravitational force is:

- A) Always repulsive
- B) Always attractive
- C) Sometimes attractive/repulsive
- D) Independent of mass

Answer: B

Explanation: Gravitational force is exclusively an attractive force between masses.

65. The value of the gravitational constant G is:

- A) $6.67 \times 10^{-11} \text{ N m}^2 \text{ kg}^{-2}$
- B) 9.8 m s^{-2}
- C) 10 m s^{-2}
- D) $6.67 \times 10^{11} \text{ N m}^2 \text{ kg}^{-2}$

Answer: A

Explanation: G is the universal gravitational constant, $6.67 \times 10^{-11} \text{ N m}^2 \text{ kg}^{-2}$.

66. The weight of an object is:

- A) Same everywhere
- B) Maximum at Earth's center
- C) Different at different places
- D) A scalar quantity

Answer: C

Explanation: Weight varies with location because g changes from place to place.

Practice Questions (67 – 69)

67. A body of mass 5 kg is taken to the Moon. What happens to its mass and weight?

- | | |
|--------------------------------|--------------------------------|
| A) Mass decreases, weight same | B) Mass same, weight decreases |
| C) Both decrease | D) Both remain same |

Answer: B

Explanation: Mass is constant, but weight decreases due to lower lunar gravity.

68. The force required to stop a moving object depends on its:

- | | |
|--------------|------------------|
| A) Mass only | B) Velocity only |
| C) Momentum | D) Acceleration |

Answer: C

Explanation: Stopping requires overcoming momentum ($p = mv$), depending on mass and velocity.

69. When a moving car stops suddenly, passengers move forward due to:

- | | |
|-------------|-------------|
| A) Gravity | B) Inertia |
| C) Momentum | D) Friction |

Answer: B

Explanation: Passengers continue moving forward due to their inertia of motion.

Practice Questions (70 – 72)

70. The momentum of a system is conserved when:

- A) External forces are large
- B) The system is isolated
- C) Friction is present
- D) The collision is elastic

Answer: B

Explanation: Momentum is conserved in an isolated system with no net external force.

71. A force of 100 N acts for 0.1 seconds. What is the impulse?

- A) 10 N s
- B) 1000 N s
- C) 0.1 N s
- D) 1 N s

Answer: A

Explanation: $\text{Impulse} = F \times t = 100 \times 0.1 = 10 \text{ N s}$.

72. Which of the following is an example of a contact force?

- A) Magnetic force
- B) Gravitational force
- C) Normal force
- D) Electrostatic force

Answer: C

Explanation: Normal force requires physical contact between surfaces.

Practice Questions (73 – 75)

73. The reaction force to the weight of a book resting on a table is:

- A) Normal force by the table
- B) Force exerted by book on Earth
- C) Force exerted by book on table
- D) Weight of the table

Answer: B

Explanation: The reaction to Earth pulling the book is the book pulling the Earth.

74. If the net force on an object is zero, the object:

- A) Must be at rest
- B) Must be moving with constant velocity
- C) Must be accelerating
- D) At rest or uniform velocity

Answer: D

Explanation: Zero net force means constant velocity (which includes being at rest).

75. The acceleration produced in a body is inversely proportional to its:

- A) Velocity
- B) Momentum
- C) Mass
- D) Force

Answer: C

Explanation: From $a = F / m$, acceleration is inversely proportional to mass.

GREAT JOB!

You have completed all 75 High-Yield Questions
on Chapter 03 (Dynamics).

Keep revising and mastering the fundamental
concepts of Physics!

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