

MCQs 01–10

Choose the best answer. Correct options and concise explanations are included for revision.

MCQ 01. Which of the following is a base quantity?

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

Correct answer: B) Mass

Mass is an SI base quantity. Velocity, force, and momentum are derived quantities.

MCQ 06. Which of the following is a scalar quantity?

- A) Force
- B) Displacement
- C) Energy
- D) Velocity

Correct answer: C) Energy

Energy has magnitude only. Force, displacement, and velocity are vector quantities.

MCQ 02. The rate of change of displacement is called:

- A) Speed
- B) Velocity
- C) Acceleration
- D) Distance

Correct answer: B) Velocity

Velocity is displacement divided by time: $v = \text{displacement} / \text{time}$.

MCQ 07. The SI unit of momentum is:

- A) N m
- B) kg m/s
- C) kg m/s²
- D) J

Correct answer: B) kg m/s

Momentum $p = mv$, so its SI unit is $\text{kg} \times \text{m/s} = \text{kg m/s}$.

MCQ 03. Which of the following forces is a non-contact force?

- A) Friction
- B) Tension
- C) Magnetic force
- D) Air resistance

Correct answer: C) Magnetic force

Magnetic force can act at a distance without physical contact.

MCQ 08. Which statement best describes translational motion of a body?

- A) All its parts move in one direction
- B) Rotates about a fixed axis
- C) Moves about a fixed point
- D) Changes its shape

Correct answer: A) All its parts move in one direction

In translational motion, every point of a body undergoes the same displacement in the same time interval.

MCQ 04. The tendency of an object to resist a change in its state of rest or motion is called:

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

Correct answer: C) Inertia

Inertia is the property of a body that resists changes in its state of rest or uniform motion.

MCQ 09. The value of 'g' at the surface of the Moon is approximately:

- A) 9.8 m/s²
- B) 1.6 m/s²
- C) Infinite
- D) 0 m/s²

Correct answer: B) 1.6 m/s²

The Moon's gravitational acceleration is about one-sixth of Earth's: $9.8 \div 6 \approx 1.6 \text{ m/s}^2$.

MCQ 05. Pascal's Law is applicable to:

- A) Gases only
- B) Solids only
- C) Fluids
- D) Vacuum

Correct answer: C) Fluids

Pressure applied to an enclosed fluid is transmitted equally and undiminished throughout the fluid.

MCQ 10. Two identical beakers contain the same amount of water. Beaker A is at 30°C while beaker B is at 60°C. Which statement is correct?

- A) Particles of beaker B have more internal energy
- B) Particles of beaker A have more density
- C) Particles of beaker A have more internal energy
- D) Particles of beaker B have less density

Correct answer: A) Particles of beaker B have more internal

energy For the same amount of water, the higher-temperature sample has greater internal energy.

MCQs 11–20

Choose the best answer. Correct options and concise explanations are included for revision.

MCQ 11. A book is lifted from the floor to a shelf. It gains gravitational potential energy (P.E.). Which factor is responsible for the gain in P.E.?

- A) Energy lost by the book as heat
- B) Work done against gravity to raise the book
- C) The increase in the speed of the book
- D) The increase in the weight of the book

Correct answer: B) Work done against gravity to raise the

book Work is done against gravity while raising the book, increasing its gravitational potential energy.

MCQ 12. Which one of the following is a renewable energy source?

- A) Coal
- B) Natural gas
- C) Solar energy
- D) Nuclear energy

Correct answer: C) Solar energy

Solar energy is renewable because sunlight is naturally replenished. Coal and natural gas are fossil fuels.

MCQ 13. A group of students carries a liquid barometer while climbing a mountain. They observe that the mercury level decreases as they go higher. What is the reason for this decrease?

- A) Lower air pressure
- B) Stronger gravity
- C) Lower temperature
- D) Higher air pressure

Correct answer: A) Lower air pressure

Atmospheric pressure decreases with altitude, so it supports a shorter mercury column.

MCQ 14. The center of gravity of a uniform rod lies at:

- A) Its one end
- B) Its center
- C) One-quarter from an end
- D) Outside the rod

Correct answer: B) Its center

A uniform rod has its mass evenly distributed, so its center of gravity is at the midpoint.

MCQ 15. What is the purpose of using ball bearings in a machine?

- A) They increase friction
- B) They reduce friction
- C) They increase mass
- D) They reduce air resistance

Correct answer: B) They reduce friction

Ball bearings replace sliding friction with rolling friction, which is smaller.

MCQ 16. A file size is 2 gigabytes (GB). If expressed in megabytes (MB), what is the correct value?

- A) 2 MB
- B) 20 MB
- C) 200 MB
- D) 2000 MB

Correct answer: D) 2000 MB

Using the decimal conversion 1 GB = 1000 MB, 2 GB = 2 × 1000 = 2000 MB.

MCQ 17. Which factor determines the validity of a theory?

- A) Length of time
- B) Experimental evidence
- C) Popularity
- D) Number of equations

Correct answer: B) Experimental evidence

Scientific theories are evaluated using observations, experiments, and repeatable evidence.

MCQ 18. In a hydraulic press, the pressure applied on the small piston is:

- A) Decreased
- B) Transmitted equally
- C) Increased
- D) Vanished

Correct answer: B) Transmitted equally

Pascal's law states that pressure applied to an enclosed fluid is transmitted equally throughout the fluid.

MCQ 19. The energy stored in a compressed spring is:

- A) Kinetic energy
- B) Elastic potential energy
- C) Chemical energy
- D) Thermal energy

Correct answer: B) Elastic potential energy

A compressed spring stores elastic potential energy because it is deformed from its natural shape.

MCQ 20. The slope of a distance-time graph gives:

- A) Acceleration
- B) Force
- C) Speed
- D) Work

Correct answer: C) Speed

The slope is the change in distance divided by the time taken.

MCQs 21–30

Choose the best answer. Correct options and concise explanations are included for revision.

MCQ 21. A shopping cart is pushed with a force of 2 N for 5 s. What impulse is given to the cart?

- A) 2 Ns
- B) 5 Ns
- C) 10 Ns
- D) 20 Ns

Correct answer: C) 10 Ns

Impulse = Force $\times$ time. $J = F \times t = 2 \times 5 = 10 \text{ Ns}$.

MCQ 26. Like parallel forces act in:

- A) Opposite directions
- B) Same direction
- C) At an angle of 90° to each other
- D) At an angle of 45° to each other

Correct answer: B) Same direction

Like parallel forces have parallel lines of action and act in the same direction.

MCQ 22. A factory machine has an efficiency of 30%. It means that:

- A) 30% of the input energy is lost as heat
- B) 30% of the input energy is converted into useful output
- C) 70% of the input energy is converted into useful output
- D) 40% of the input energy is converted into useful output

Correct answer: B) 30% of the input energy is converted into

useful output Efficiency is the percentage of input energy converted into useful output energy.

MCQ 27. The state of matter found in stars is called:

- A) Solid
- B) Plasma
- C) Gas
- D) Liquid

Correct answer: B) Plasma

Stars contain extremely hot, ionized matter called plasma.

MCQ 23. When a pressure is applied on a surface, the force acts:

- A) Parallel to the surface
- B) Perpendicular to the surface
- C) At 45° angle to the surface
- D) In the same direction as gravity

Correct answer: B) Perpendicular to the surface

Pressure acts normally to a surface, i.e. at 90° to it.

MCQ 28. How much work is needed to lift a bag of groceries that weighs 150 N to a height of 4 m?

- A) 300 J
- B) 450 J
- C) 600 J
- D) 750 J

Correct answer: C) 600 J

Work = force $\times$ height = $150 \times 4 = 600 \text{ J}$.

MCQ 24. When a bus starts suddenly, passengers fall backward due to:

- A) Friction
- B) Weight
- C) Inertia
- D) Gravitation

Correct answer: C) Inertia

Passengers tend to remain at rest when the bus suddenly moves forward.

MCQ 29. Vector X points towards east and vector Y points towards north. In which direction does the resultant vector lie?

- A) North-East
- B) South-East
- C) North
- D) East

Correct answer: A) North-East

The resultant of eastward and northward vectors points between them, towards the north-east.

MCQ 25. An astronaut takes an object that weighs 200 N on Earth to an unknown planet, where it weighs 50 N. If the mass of the object is 20 kg, what is the gravitational field strength on that planet?

- A) 0.4 N/kg
- B) 9.8 N/kg
- C) 2.5 N/kg
- D) 25 N/kg

Correct answer: C) 2.5 N/kg

$g = \text{weight} \div \text{mass} = 50 \div 20 = 2.5 \text{ N/kg}$.

MCQ 30. The branch of physics which deals with the study of light is:

- A) Mechanics
- B) Optics
- C) Thermodynamics
- D) Magnetism

Correct answer: B) Optics

Optics is the branch of physics concerned with light and its behaviour.

MCQs 31–40

Choose the best answer. Correct options and concise explanations are included for revision.

MCQ 31. In which of the following situations are the distance traveled and the magnitude of the displacement equal?

- A) A child moving on a swing
- B) An object is moving along a circular path
- C) A car moving on a curved road
- D) Linear motion in one direction

Correct answer: D) Linear motion in one direction

In straight-line motion without changing direction, distance traveled equals the magnitude of displacement.

MCQ 32. When an external magnetic field is removed, a paramagnetic material usually:

- A) Remains permanently magnetized
- B) Loses most of its induced magnetism
- C) Becomes strongly magnetic
- D) Repels magnetic fields strongly

Correct answer: B) Loses most of its induced magnetism

Paramagnetic materials are weakly attracted by an external magnetic field and lose most induced magnetism when it is removed.

MCQ 33. The distance–time graph for a cyclist moving along a straight road is shown. Which motion is displayed by the cyclist in portion A of the graph?

- A) At rest
- B) Uniform speed
- C) Non-uniform speed
- D) Variable speed

Correct answer: B) Uniform speed

Portion A is a straight sloping line on a distance–time graph, so its slope is constant and the cyclist moves at uniform speed.

MCQ 34. In scientific notation, 0.005 is written as:

- A) 5×10^3
- B) 5×10^3
- C) 5×10^2
- D) 5×10^{-3}

Correct answer: D) 5×10^{-3}

Move the decimal point three places to the right to get 5, so the exponent is -3 .

MCQ 35. A raindrop falling from a cloud reaches a constant speed before hitting the ground. At this stage, the raindrop has reached terminal velocity because:

- A) Its acceleration becomes zero
- B) Its weight becomes zero
- C) Air resistance disappears
- D) Gravity no longer acts on it

Correct answer: A) Its acceleration becomes zero

At terminal velocity, air resistance balances weight, so the net force and acceleration are zero.

MCQ 36. A spanner of length 30 cm uses a force of 150 N to open a tight nut. The torque is:

- A) 10 N m
- B) 25 N m
- C) 35 N m
- D) 45 N m

Correct answer: D) 45 N m

Torque = force $\times$ perpendicular distance $\tau = 150 \times 0.30 = 45 \text{ N m}$

MCQ 37. What is a reasonable estimate for the mass of an apple?

- A) 2 kg
- B) 200 g
- C) 2 mg
- D) 20 kg

Correct answer: B) 200 g

An ordinary apple typically has a mass of around 200 g (about 0.2 kg).

MCQ 38. A relationship between physical quantities remains unchanged under the same conditions after many experiments. Scientists accept it as a:

- A) Theory
- B) Assumption
- C) Hypothesis
- D) Law

Correct answer: D) Law

A scientific law describes a consistent relationship or pattern observed in nature.

MCQ 39. Which of the following is a physical property that can be used to measure temperature?

- A) Mass of a liquid
- B) Volume of a liquid
- C) Mass of a substance
- D) Weight of a substance

Correct answer: B) Volume of a liquid

A liquid's volume changes with temperature, so it can be used as a thermometric property.

MCQ 40. A perpetual motion machine is impossible because of:

- A) Friction
- B) Conservation of energy
- C) Gravity
- D) Air resistance

Correct answer: B) Conservation of energy

A machine cannot continuously produce energy without an equivalent energy input; that would violate conservation of energy.

MCQs 41–50

Choose the best answer. Correct options and concise explanations are included for revision.

MCQ 41. What type of motion does the toy car exhibit?

- A) Constant velocity
- B) Constant acceleration
- C) Decreasing velocity
- D) Decreasing momentum

Correct answer: B) Constant acceleration

The car gradually speeds up. Constant acceleration is the intended answer if its speed increases at a constant rate.

MCQ 42. How would the toy car's speed-time graph look like?

- A) Straight line with negative slope
- B) Straight line with positive slope
- C) Curved graph
- D) Horizontal line

Correct answer: B) Straight line with positive slope

A straight line with a positive slope shows that speed increases at a constant rate.

MCQ 43. The toy car has a mass of 0.5 kg. If it accelerates at 0.4 m/s^2 , what is the magnitude of the force applied to it?

- A) 0.2 N
- B) 0.4 N
- C) 0.8 N
- D) 2 N

Correct answer: A) 0.2 N

Use Newton's second law: $F = ma = 0.5 \times 0.4 = 0.2 \text{ N}$.

MCQ 44. He then places a small weight on the car, increasing its mass while applying the same force. What will happen to acceleration?

- A) Increases
- B) Decreases
- C) Remains the same
- D) Becomes zero

Correct answer: B) Decreases

For the same force, increasing mass decreases acceleration: $a = F/m$.

MCQ 45. What key idea should the worker keep in mind while operating the crane with an electromagnet?

- A) Electromagnet works without electricity
- B) Magnet can be controlled (ON/OFF)
- C) Electromagnet only attracts plastic materials
- D) Magnet becomes weaker as iron is attached to it

Correct answer: B) Magnet can be controlled (ON/OFF)

An electromagnet can be switched on to lift iron scrap and switched off to release it.

MCQ 46. Why does the crane attract only iron scraps and not plastic or wood?

- A) Plastic and wood are lighter than iron
- B) Plastic and wood are electrically charged
- C) Iron is a magnetic material
- D) Both plastic and wood block magnetic field

Correct answer: C) Iron is a magnetic material

Iron is attracted to the electromagnet, while ordinary plastic and wood are not.

MCQ 47. What will happen to the crane's ability to lift and drop scrap if it replaces the electromagnet with a permanent bar magnet?

- A) It will only attract iron pieces
- B) It works as normal
- C) It will attract only plastic materials
- D) It will repel all types of materials

Correct answer: A) It will only attract iron pieces

A permanent magnet attracts iron but cannot be switched off to release the scrap as an electromagnet can.

MCQ 48. Why is an electromagnet preferred over a permanent magnet in a scrapyards crane?

- A) It is cheaper than a permanent magnet
- B) It allows control over lifting and releasing scrap
- C) It attracts all metals permanently
- D) It does not use any electricity

Correct answer: B) It allows control over lifting and releasing

scrap Electric current can be switched on for lifting and off for releasing scrap.

MCQ 49. The situation described is an example of:

- A) Circular motion
- B) Principle of moments
- C) Principle of inertia
- D) Principle of action and reaction

Correct answer: B) Principle of moments

A balanced beam has equal clockwise and anticlockwise moments about the pivot.

MCQ 50. Which factor does not affect the moment of a force?

- A) Shape of the object
- B) Magnitude of force
- C) Distance from pivot
- D) Direction of force

Correct answer: A) Shape of the object

The moment depends on the force and its perpendicular distance from the pivot, not the object's shape.

MCQs 51–60

Choose the best answer. Correct options and concise explanations are included for revision.

MCQ 51. A 5 kg sandbag is placed 1.2 m on the left side of the pivot. How far must the carpenter sit on the right side to balance the beam? [$g = 10 \text{ m/s}^2$]

- A) 0.8 m
- B) 1.2 m
- C) 2 m
- D) 0.2 m

Correct answer: D) 0.2 m

Sandbag weight = $mg = 5 \times 10 = 50 \text{ N}$. Using the principle of moments: $50 \times 1.2 = 300 \times d \Rightarrow d = 0.2 \text{ m}$.

MCQ 52. The carpenter shifts the pivot so it is now 1 m from the sandbag (left side). What is the moment arm of the carpenter?

- A) 1 m
- B) 2 m
- C) 3 m
- D) 4 m

Correct answer: C) 3 m

The beam is 4 m long. The pivot is 1 m from the left end, while the carpenter sits at the 4 m mark. Moment arm = $4 - 1 = 3 \text{ m}$.

MCQ 53. Which expression will be used to determine the orbital velocity of a satellite around the Earth?

- A) $2\pi r/t$
- B) $2\pi r/T$
- C) $2\pi T/R$
- D) $2\pi t/r$

Correct answer: B) $2\pi r/T$

Orbital speed is the circumference of the orbit divided by the time period. $v = 2\pi r/T$.

MCQ 54. The period of a satellite to orbit the Earth is 96.5 minutes, at a height $6.97 \times 10^1 \text{ m}$ from the centre of Earth. What will be its speed in the orbit?

- A) 7.56 km/s
- B) 7.56 m/s
- C) 756 km/s
- D) 7.56 cm/s

Correct answer: A) 7.56 km/s

$T = 96.5 \times 60 = 5790 \text{ s}$. $v = 2\pi r/T = 2\pi(6.97 \times 10^1)/5790 \approx 7560 \text{ m/s} = 7.56 \text{ km/s}$.

MCQ 55. The satellite is launched through a rocket. The engine is started, hot gases are pushed downwards and the rocket lifts off the ground. Which force is directly responsible for pushing the rocket upwards?

- A) Friction between rocket and air
- B) Force of engine downwards
- C) Force exerted by exhaust gases pushing against the ground
- D) Reaction force exerted by exhaust gases on the rocket

Correct answer: D) Reaction force exerted by exhaust gases

on the rocket The rocket pushes exhaust gases downward. The gases exert an equal and opposite reaction force upward on the rocket.

MCQ 56. Which of the following explains the working of a rocket in space?

- A) Pascal's law
- B) Buoyant force
- C) Newton's third law of motion
- D) Thermal expansion of gases

Correct answer: C) Newton's third law of motion

A rocket moves forward because expelled gases produce an equal and opposite reaction force.

MCQ 57. Amir steps onto the snow and his feet immediately sink deep while his father walks easily on the surface. What is the physical reason behind this?

- A) Snowshoes increase the weight on snow
- B) Snowshoes decrease the weight on snow
- C) Snowshoes increase the area of contact, decreasing
- D) Snowshoes decrease the area of contact, decreasing

Correct answer: C) Snowshoes increase the area of contact,

decreasing pressure For the same weight, a larger contact area produces less pressure on the snow. $P = F/A$.

MCQ 58. For a constant force, what is the relation between the pressure exerted and area of contact?

- A) Direct
- B) Exponential
- C) Proportional
- D) Inverse

Correct answer: D) Inverse

Pressure is inversely proportional to area when force is constant. $P = F/A$, so increasing area decreases pressure.

MCQ 59. Amir's weight is 600 N, and the area of contact of his sports shoes with snow is 0.02 m^2 . What is the pressure exerted by Amir on the snow?

- A) 12 kPa
- B) 30 kPa
- C) 600 Pa
- D) 30 Pa

Correct answer: B) 30 kPa

$P = F/A = 600/0.02 = 30,000 \text{ Pa} = 30 \text{ kPa}$.

MCQ 60. Amir's father has the same weight (600 N), and his snowshoes' contact area is 0.20 m^2 . How many times smaller is the pressure he exerts compared to Amir?

- A) 20 times
- B) 2 times
- C) 5 times
- D) 10 times

Correct answer: D) 10 times

Both have the same weight. The father's area (0.20 m^2) is 10 times Amir's (0.02 m^2), so his pressure is 10 times smaller.