

Physics MCQ Practice

+2 1st Year (Class XI)

54 questions · 14 chapters · answers with explanations

How to use: attempt each chapter's questions without looking, then check the Answer Key at the end. Read the one-line explanation for every question you got wrong, and revise that topic in your notes.

Units and Measurements

- The SI unit of luminous intensity is
(a) candela (b) lumen
(c) lux (d) watt
- The dimensional formula of force is
(a) $[M L T^{-2}]$ (b) $[M L^2 T^{-2}]$
(c) $[M L T^{-1}]$ (d) $[M L^{-1} T^{-2}]$
- The number of significant figures in 0.00450 is
(a) 2 (b) 3
(c) 5 (d) 6
- If $Z = A^2B$, and A and B have errors of 1% and 2%, the maximum % error in Z is
(a) 3% (b) 4%
(c) 2% (d) 5%
- One light year is a unit of
(a) time (b) distance
(c) speed (d) intensity

Motion in a Straight Line

- The slope of a position–time graph gives
(a) acceleration (b) velocity
(c) displacement (d) distance
- The area under a velocity–time graph gives
(a) acceleration (b) displacement
(c) speed (d) force
- A stone is dropped from rest. Its speed after 2 s is ($g = 10 \text{ m/s}^2$)
(a) 10 m/s (b) 20 m/s
(c) 40 m/s (d) 5 m/s
- A car goes from 0 to 20 m/s in 5 s. Its acceleration is
(a) 2 m/s^2 (b) 4 m/s^2
(c) 5 m/s^2 (d) 100 m/s^2

Motion in a Plane

10. The maximum range of a projectile is obtained at an angle of
(a) 30° (b) 45°
(c) 60° (d) 90°
11. In uniform circular motion, which quantity stays constant?
(a) velocity (b) acceleration
(c) speed (d) displacement
12. Two vectors of 3 and 4 units at right angles have a resultant of
(a) 1 (b) 5
(c) 7 (d) 12
13. At the highest point of a projectile's path, the velocity is
(a) zero (b) vertical
(c) horizontal (d) at 45°

Laws of Motion

14. Newton's first law is also called the law of
(a) momentum (b) inertia
(c) action–reaction (d) gravitation
15. Impulse is equal to the change in
(a) velocity (b) momentum
(c) energy (d) acceleration
16. A man in a lift going up with acceleration a feels an apparent weight of
(a) mg (b) $m(g - a)$
(c) $m(g + a)$ (d) zero
17. A 10 kg body has a momentum of 50 kg m/s. Its speed is
(a) 5 m/s (b) 50 m/s
(c) 500 m/s (d) 0.2 m/s

Work, Energy and Power

18. Work done by the centripetal force in circular motion is
(a) maximum (b) zero
(c) negative (d) infinite
19. The SI unit of power is
(a) joule (b) watt
(c) newton (d) pascal
20. If the speed of a body is doubled, its kinetic energy becomes
(a) double (b) four times
(c) half (d) unchanged
21. In a perfectly elastic collision, which is conserved?
(a) only momentum (b) only kinetic energy
(c) both momentum and kinetic energy (d) neither

System of Particles and Rotational Motion

22. The moment of inertia of a ring of mass M and radius R about its axis is

- (a) MR^2
- (b) $\frac{1}{2}MR^2$
- (c) $\frac{2}{5}MR^2$
- (d) $2MR^2$

23. Torque is the rotational analogue of

- (a) mass
- (b) force
- (c) momentum
- (d) velocity

24. A skater pulls in her arms while spinning. Her angular speed

- (a) decreases
- (b) increases
- (c) stays the same
- (d) becomes zero

25. The SI unit of angular momentum is

- (a) $\text{kg m}^2/\text{s}$
- (b) kg m/s
- (c) N m
- (d) kg m^2

Gravitation

26. The escape speed from the Earth is about

- (a) 7.9 km/s
- (b) 11.2 km/s
- (c) 3 km/s
- (d) 30 km/s

27. The value of g at the centre of the Earth is

- (a) maximum
- (b) 9.8 m/s^2
- (c) zero
- (d) infinite

28. Kepler's second law follows from conservation of

- (a) energy
- (b) linear momentum
- (c) angular momentum
- (d) mass

29. A 60 kg man on the Moon ($g_{\text{moon}} = g/6$) has a mass of

- (a) 10 kg
- (b) 60 kg
- (c) 360 kg
- (d) zero

Mechanical Properties of Solids

30. Young's modulus is the ratio of

- (a) stress to strain (longitudinal)
- (b) strain to stress
- (c) force to area
- (d) change in length to length

31. Which is more elastic?

- (a) rubber
- (b) steel
- (c) glass wool
- (d) clay

32. Strain has

- (a) unit N/m^2
- (b) unit m
- (c) no unit
- (d) unit N

Mechanical Properties of Fluids

33. Hydraulic lifts work on

- (a) Bernoulli's principle
- (b) Pascal's law
- (c) Archimedes' principle
- (d) Stokes' law

34. The speed of a small sphere falling through a viscous liquid becomes constant. This speed is called
 (a) escape speed (b) terminal velocity
 (c) critical speed (d) orbital speed
35. The lift on an aeroplane wing is explained by
 (a) Pascal's law (b) Bernoulli's principle
 (c) Hooke's law (d) Newton's law of cooling
36. Surface tension makes a small liquid drop take a
 (a) cube shape (b) flat shape
 (c) spherical shape (d) cylindrical shape

Thermal Properties of Matter

37. Water has its maximum density at
 (a) 0°C (b) 4°C
 (c) 100°C (d) -4°C
38. The relation between coefficients of linear (α) and volume (γ) expansion is
 (a) $\gamma = \alpha$ (b) $\gamma = 2\alpha$
 (c) $\gamma = 3\alpha$ (d) $\gamma = \alpha/3$
39. Heat from the Sun reaches the Earth by
 (a) conduction (b) convection
 (c) radiation (d) all three

Thermodynamics

40. In an adiabatic process
 (a) temperature is constant (b) no heat is exchanged ($Q = 0$)
 (c) pressure is constant (d) volume is constant
41. The first law of thermodynamics is a statement of conservation of
 (a) momentum (b) energy
 (c) mass (d) charge
42. An ideal Carnot engine works between 500 K and 300 K. Its efficiency is
 (a) 40% (b) 60%
 (c) 20% (d) 100%
43. In an isothermal process for an ideal gas, the change in internal energy is
 (a) maximum (b) zero
 (c) negative (d) equal to work done

Kinetic Theory of Gases

44. The average kinetic energy of a gas molecule is proportional to
 (a) pressure (b) absolute temperature
 (c) volume (d) density
45. For a monatomic gas, $\gamma = C_p/C_v$ equals
 (a) $7/5$ (b) $5/3$
 (c) $4/3$ (d) 1

46. The degrees of freedom of a diatomic gas molecule (at room temperature) are
- | | |
|-------|-------|
| (a) 3 | (b) 5 |
| (c) 6 | (d) 7 |

Oscillations

47. In SHM, acceleration is proportional to
- | | |
|--------------|----------------------------|
| (a) velocity | (b) displacement |
| (c) time | (d) amplitude ² |
48. The period of a simple pendulum depends on
- | | |
|--------------------------------------|-----------------------------|
| (a) its mass | (b) its length and g |
| (c) its amplitude (for small swings) | (d) the material of the bob |
49. If the length of a simple pendulum is made four times, its period becomes
- | | |
|------------|----------------|
| (a) double | (b) four times |
| (c) half | (d) unchanged |
50. In SHM, the speed is maximum at
- | | |
|--------------------------|------------------------|
| (a) the extreme position | (b) the mean position |
| (c) halfway | (d) all points equally |

Waves

51. Sound waves in air are
- | | |
|---------------------|---------------------|
| (a) transverse | (b) longitudinal |
| (c) electromagnetic | (d) stationary only |
52. The relation between speed, frequency and wavelength is
- | | |
|---------------------|-----------------------|
| (a) $v = f/\lambda$ | (b) $v = f\lambda$ |
| (c) $v = \lambda/f$ | (d) $v = f + \lambda$ |
53. A pipe closed at one end produces
- | | |
|-------------------------|------------------------|
| (a) all harmonics | (b) only odd harmonics |
| (c) only even harmonics | (d) no harmonics |
54. Beats are produced by the superposition of two waves of
- | | |
|--------------------------------|------------------------------------|
| (a) the same frequency | (b) slightly different frequencies |
| (c) very different frequencies | (d) the same phase only |

Answer Key with Explanations

Units and Measurements

1. (a) candela — Candela (cd) is one of the seven SI base units.
2. (a) $[M L T^{-2}]$ — $F = ma$, so $[M][L T^{-2}]$.
3. (b) 3 — Leading zeros don't count; trailing zero after a decimal does: 4, 5, 0.
4. (b) 4% — $2 \times 1\% + 2\% = 4\%$.
5. (b) distance — It is the distance light travels in one year ($\approx 9.46 \times 10^{15}$ m).

Motion in a Straight Line

6. (b) velocity — Slope of x - t graph = dx/dt = velocity.
7. (b) displacement — Area under v - t graph = displacement.
8. (b) 20 m/s — $v = gt = 10 \times 2 = 20$ m/s.
9. (b) 4 m/s² — $a = \Delta v/t = 20/5 = 4$ m/s².

Motion in a Plane

10. (b) 45° — $R = u^2 \sin 2\theta / g$ is largest when $\sin 2\theta = 1$, i.e. $\theta = 45^\circ$.
11. (c) speed — Only the magnitude of velocity (speed) is constant; direction keeps changing.
12. (b) 5 — $\sqrt{3^2 + 4^2} = 5$.
13. (c) horizontal — The vertical component becomes zero; the horizontal part $u \cos \theta$ remains.

Laws of Motion

14. (b) inertia — A body keeps its state of rest or uniform motion unless a force acts — inertia.
15. (b) momentum — Impulse = $F \times t = \Delta p$.
16. (c) $m(g + a)$ — Normal reaction $R = m(g + a)$ when accelerating upward.
17. (a) 5 m/s — $v = p/m = 50/10 = 5$ m/s.

Work, Energy and Power

18. (b) zero — The force is perpendicular to motion, so $W = Fs \cos 90^\circ = 0$.
19. (b) watt — Power = work/time; 1 W = 1 J/s.
20. (b) four times — $K = \frac{1}{2}mv^2$, so $K \propto v^2$.
21. (c) both momentum and kinetic energy — Elastic collisions conserve both.

System of Particles and Rotational Motion

22. (a) MR^2 — All the mass is at distance R from the axis.
23. (b) force — $\tau = r \times F$ plays the role of force in rotation.
24. (b) increases — Angular momentum $l\omega$ is conserved; l falls, so ω rises.
25. (a) kg m²/s — $L = l\omega \rightarrow \text{kg m}^2 \times \text{s}^{-1}$.

Gravitation

26. (b) 11.2 km/s — $v_e = \sqrt{2gR} \approx 11.2$ km/s.
27. (c) zero — $g_d = g(1 - d/R)$ becomes zero at $d = R$.
28. (c) angular momentum — Equal areas in equal times means constant areal speed, i.e. constant angular momentum.
29. (b) 60 kg — Mass does not change from place to place; only weight does.

Mechanical Properties of Solids

30. (a) stress to strain (longitudinal) — Y = longitudinal stress / longitudinal strain.
31. (b) steel — Steel needs far more stress for the same strain, so it is more elastic.
32. (c) no unit — Strain is a ratio of two lengths (or volumes), so it has no unit.

Mechanical Properties of Fluids

33. (b) Pascal's law — Pressure applied to an enclosed liquid is transmitted equally in all directions.
34. (b) terminal velocity — At terminal velocity, weight is balanced by buoyancy and viscous drag.
35. (b) Bernoulli's principle — Faster air above the wing means lower pressure above it.

36. (c) spherical shape — A sphere has the least surface area for a given volume.

Thermal Properties of Matter

37. (b) 4°C — Anomalous expansion of water.

38. (c) $\gamma = 3\alpha$ — For an isotropic solid, $\gamma = 3\alpha$.

39. (c) radiation — Space is a vacuum, and only radiation can travel through it.

Thermodynamics

40. (b) no heat is exchanged ($Q = 0$) — Adiabatic means no heat flows in or out.

41. (b) energy — $Q = \Delta U + W$.

42. (a) 40% — $\eta = 1 - T_2/T_1 = 1 - 300/500 = 0.4$.

43. (b) zero — U of an ideal gas depends only on temperature, which is constant.

Kinetic Theory of Gases

44. (b) absolute temperature — Average KE = $(3/2)kT$.

45. (b) $5/3$ — $C_v = 3R/2$, $C_p = 5R/2$, so $\gamma = 5/3$.

46. (b) 5 — 3 translational + 2 rotational.

Oscillations

47. (b) displacement — $a = -\omega^2 x$.

48. (b) its length and g — $T = 2\pi\sqrt{l/g}$.

49. (a) double — $T \propto \sqrt{l}$, so $\sqrt{4} = 2$ times.

50. (b) the mean position — All the energy is kinetic at the mean position.

Waves

51. (b) longitudinal — Air particles vibrate along the direction of travel.

52. (b) $v = f\lambda$ — $v = f\lambda$.

53. (b) only odd harmonics — Closed pipe: $f, 3f, 5f, \dots$ only.

54. (b) slightly different frequencies — Beat frequency = $f_1 - f_2$.