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Kerala Plus One Physics Unofficial Answer Key 2026

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SECTION A ($5 \times 1 = 5$)

1 At the centre of Earth, the value of g is

Zero (0 m/s^2) – gravitational field cancels out.

2 Area under force–time graph represents

(b) impulse (impulse = change in momentum).

3 Simple pendulum with time period 2 seconds is called

Seconds pendulum.

4 Average kinetic energy of gas molecule \propto ?

(c) Temperature ($\text{KE}_{\text{avg}} = \frac{1}{2} mv^2 \propto T$).

5 Centre of mass does NOT lie on the body for

(d) Bangle (CM lies at geometric centre, outside material).

6 Steel is more elastic than rubber.

True (steel has higher Young's modulus).



7 Wave relation: frequency, wavelength, velocity

✓ (b) $f = v / \lambda$ (where v = wave velocity, f = frequency).

SECTION B ($5 \times 2 = 10$)

8 Moment of inertia & factors

Moment of inertia (I) = $\sum m_i r_i^2$ — rotational inertia.

Factors: mass of body, distribution of mass (shape), axis position.

9 Derive $S = ut + \frac{1}{2} at^2$ from $v-t$ graph

Area under $v-t$ = rectangle (ut) + triangle ($\frac{1}{2} \times t \times (v-u)$). Since $v-u = at$
 $\Rightarrow S = ut + \frac{1}{2} at^2$.

10 Mean free path

Average distance between collisions. $\lambda = 1/(\sqrt{2} \pi d^2 n)$ or $\lambda = kT/(\sqrt{2} \pi d^2 P)$.

d = molecular diameter, n = number density, P = pressure, T = temp.

11 Match the following



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(a) Surface tension \rightarrow N/m (r)

(b) Surface energy \rightarrow J/m² (p)

(c) Pressure \rightarrow N/m² (s)

(d) Capillary rise \rightarrow m (q)

12 Heat engine & block diagram

Converts heat \rightarrow mechanical work.

Diagram: Source (hot reservoir) \rightarrow Working substance \rightarrow Sink (cold reservoir) + Work output.

13 Escape speed & relation with orbital velocity

Escape speed $v_e = \sqrt{2GM/R}$. Orbital velocity $v_o = \sqrt{GM/R}$. Hence $v_e = \sqrt{2} \cdot v_o$.

14 Define power. Convert 1 kWh \rightarrow joule

Power = rate of doing work ($P = dW/dt$).

1 kWh = 3.6×10^6 J (since $1 \text{ kW} \times 3600 \text{ s} = 1000 \times 3600 = 3.6 \times 10^6 \text{ J}$).



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SECTION C ($6 \times 3 = 18$)

15 (a) Unit definition & (b) unit of c

(a) Unit = standard reference used to measure physical quantity.

(b) $x = a + bt + ct^2 \rightarrow ct^2$ has dimension of meter \Rightarrow unit of $c = \text{m/s}^2$.

16 Modulus of elasticity, SI unit & elastomer

Modulus = stress/strain. SI unit: N/m^2 (Pa). Dimensions: $[\text{M L}^{-1} \text{T}^{-2}]$.

Elastomer: highly elastic material (e.g., rubber).

17 Ratio of frequencies (air column modes)

Fundamental (first mode) $f_1 = v/4L$; next mode (third harmonic) $f_3 = 3v/4L \Rightarrow$ ratio $f_1 : f_3 = 1 : 3$.

18 Open/closed systems & first law

(i) Open: exchanges energy & matter. (ii) Closed: exchanges energy only.

First law: $\Delta U = Q - W$, obeys energy conservation (energy neither created nor destroyed).

19 Vector product & resultant force

(a) $A \times B = AB \sin\theta \hat{n}$.

(b) $R = \sqrt{(5^2 + 7^2 + 2 \cdot 5 \cdot 7 \cdot \cos 60^\circ)} = \sqrt{(25 + 49 + 35)} = \sqrt{109} \approx 10.44 \text{ N}$.

20 Conservative vs non-conservative forces

Conservative: work independent of path (eg: gravity).

Non-conservative: work depends on path (eg: friction).

21 Angular momentum conservation & ice skater

(a) If $\tau_{\text{ext}} = 0 \Rightarrow L = \text{constant}$ (proof: $\tau = dL/dt$).

(b) Stretching arms $\rightarrow I \uparrow \rightarrow \omega \downarrow$; folding arms $\rightarrow I \downarrow \rightarrow \omega \uparrow$.

SECTION D (4 × 4 = 16)

22 Heat vs temperature & Fahrenheit/Celsius relation

(a) Heat = energy transfer; Temperature = avg KE of molecules.

(b) $F = C/2$. Using $(F-32)/9 = C/5 \rightarrow C/2 - 32 = 9C/5 \rightarrow \text{solve: } C \approx -24.6^\circ\text{C}$.



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23 Newton's second law, 1 N definition & lift reaction

(a) $F = dp/dt$. 1 N = force to accelerate 1 kg at 1 m/s^2 .

(b) Lift acceleration = $2g$ upward $\Rightarrow R = m(g + 2g) = 3mg$ upward.

24 SHM definition, energy-position graph & wave parameters

(a) SHM: $a \propto -x$.

(b) PE parabola, KE inverted parabola, TE constant.

(c) From figure: frequency = $1/T$ (Hz), amplitude = max displacement (m).

25 Distance vs displacement & school trip

(a) Distance = scalar (total path); Displacement = vector (net change in position).

(b) Total distance = 4 km ; displacement = 0 km (returns home).

SECTION E ($3 \times 5 = 15$)

26 Acceleration due to gravity (g)



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(a) g = acceleration of freely falling body.

(b) $g = GM/R^2 = 6.67 \times 10^{-11} \times 6 \times 10^{24} / (6.4 \times 10^6)^2 \approx 9.8 \text{ m/s}^2$.

(c) At altitude h : $g_h = GM/(R+h)^2 \approx g(1 - 2h/R) \Rightarrow$ decreases with height.

27 Projectile motion

(a) Object thrown under gravity only.

(b) Horizontal velocity constant; vertical changes linearly (parabolic).

(c) Time of flight $T = 2u \sin\theta / g$.


28 Capillary rise & mercury depression

(a) Rise/fall due to surface tension.

(b) $h = 2S \cos\theta / (\rho g r)$.

(c) For mercury ($\theta=140^\circ$, $r=2\text{mm}$, $S=0.456 \text{ N/m}$, $\rho=13.6 \times 10^3$): $\cos 140^\circ = -0.766 \rightarrow h = [2 \times 0.456 \times (-0.766)] / [13.6 \times 10^3 \times 9.8 \times 10^{-3}] \approx -2.62 \text{ mm}$ (depression).

29 Hooke's law & work in stretching wire

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(a) Stress \propto Strain within elastic limit.

(b) PE = $\frac{1}{2} kx^2$ (work done to stretch).

(c) Work = $\frac{1}{2} \times F \times \text{extension} = \frac{1}{2} \times (5 \times 9.8) \times (0.5 \times 10^{-2}) = 0.1225 \text{ J}$.

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