AME CET Physics

Sample Paper – 7

Duration: 20 Minutes **Maximum Marks: 80**

Instructions

- This paper contains **20** Multiple Choice Questions (Single Correct Answer), modelled on the Physics section of **AME CET** entrance.
- Each correct answer carries **+4 marks**. Each wrong answer carries -1 **mark**. Unattempted questions carry **0 marks**.
- Only **one** option is correct per question. Choose carefully.
- Syllabus level: **Class 11 and 12 NCERT Physics** (Units & Measurement to Communication Systems).
- Use of mobile phones, calculators, or any electronic gadget is strictly prohibited.

Q1. A $9\,\text{V}$ battery (no internal resistance) is connected to three resistors $1\,\Omega$, $2\,\Omega$, and $3\,\Omega$ in series. What is the voltage across the $3\,\Omega$ resistor?

(A) $1.5\,\text{V}$

(B) $3.0\,\text{V}$

(C) $6.0\,\text{V}$

(D) $4.5\,\text{V}$

Q2. Two cells of EMF $6\,\text{V}$ and $4\,\text{V}$ (connected in series aiding), each with internal resistance $r = 1\,\Omega$, are connected to an external resistance $R_{\text{ext}} = 8\,\Omega$. What is the current I in the circuit?

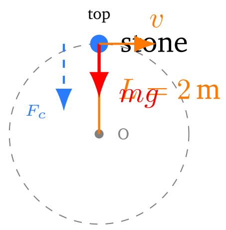
(A) $1\,\text{A}$

(B) $0.5\,\text{A}$

(C) $2\,\text{A}$

(D) $5\,\text{A}$

Q3. A stone tied to a string of length $L = 2\,\text{m}$ is whirled in a vertical circle (see diagram). Taking $g = 10\,\text{m/s}^2$, what is the minimum speed of the stone at the *top* of the circle to maintain a taut string?



(A) $2\,\text{m/s}$

(B) $4\,\text{m/s}$

(C) $2\sqrt{5}\,\text{m/s}$

(D) $10\,\text{m/s}$

Q4. A body starts from rest and accelerates uniformly at $a = 4\,\text{m/s}^2$. What is the distance covered *during* the 5th second of motion?

(A) $10\,\text{m}$

(B) $18\,\text{m}$

(C) $20\,\text{m}$

(D) $25\,\text{m}$

Q5. A beam of white light passes through a glass prism. Which colour is deviated the *most* from its original direction?

(A) Violet

(B) Red

(C) Yellow

(D) Green

Q6. An object is placed $10\,\text{cm}$ in front of a plane mirror. Which of the following correctly describes the image formed?

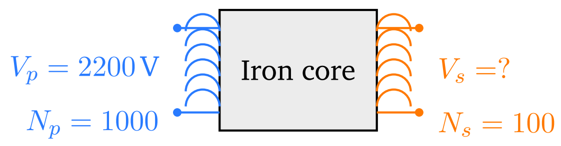
(A) Real, inverted, $10\,\text{cm}$ behind the mirror

(B) Virtual, erect, $10\,\text{cm}$ behind the mirror

(C) Virtual, inverted, $10\,\text{cm}$ in front of the mirror

(D) Real, erect, $20\,\text{cm}$ behind the mirror

Q7. A step-down transformer has $N_p = 1000$ turns in the primary and $N_s = 100$ turns in the secondary. If the primary voltage is $V_p = 2200\,\text{V}$, what is the secondary voltage V_s?



(A) $2200\,\text{V}$

(B) $110\,\text{V}$

(C) $220\,\text{V}$

(D) $22\,\text{V}$

Q8. An inductor of inductance $L = 0.1\,\text{H}$ is connected to an AC supply of frequency $f = 50\,\text{Hz}$. Taking $\pi \approx 3.14$, what is the inductive reactance X_L?

(A) $0.1\,\Omega$

(B) $50\,\Omega$

(C) $5\pi\,\Omega$

(D) $10\pi\,\Omega$

Q9. A bomb of mass $10\,\text{kg}$, initially at rest, explodes into two fragments of mass $4\,\text{kg}$ and $6\,\text{kg}$. If the $4\,\text{kg}$ fragment moves at $15\,\text{m/s}$, what is the speed of the $6\,\text{kg}$ fragment?

(A) $15\,\text{m/s}$

(B) $10\,\text{m/s}$

(C) $6\,\text{m/s}$

(D) $4\,\text{m/s}$

Q10. A pump lifts $2\,\text{kg}$ of water per second to a height of $25\,\text{m}$. Taking $g = 10\,\text{m/s}^2$, what is the minimum power required by the pump?

(A) $25\,\text{W}$

(B) $250\,\text{W}$

(C) $500\,\text{W}$

(D) $1000\,\text{W}$

Q11. Two point charges $q_1 = +2\,\mu\text{C}$ and $q_2 = -2\,\mu\text{C}$ are separated by $r = 0.4\,\text{m}$. Taking $k = 9 \times 10^9\,\text{N·m}^2/\text{C}^2$, what is the electrostatic potential energy U of the system?

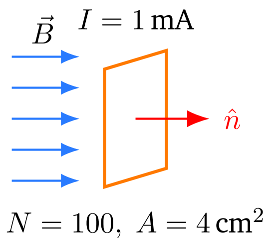
(A) $-0.09\,\text{J}$

(B) $+0.09\,\text{J}$

(C) $-0.9\,\text{J}$

(D) $+0.9\,\text{J}$

Q12. A rectangular coil ($N = 100$ turns, area $A = 4\,\text{cm}^2$) carrying a current $I = 1\,\text{mA}$ is placed in a uniform magnetic field $B = 0.2\,\text{T}$. What is the maximum torque τ on the coil?



(A) $8 \times 10^{-3}\,\text{N·m}$

(B) $4 \times 10^{-6}\,\text{N·m}$

(C) $2 \times 10^{-5}\,\text{N·m}$

(D) $8 \times 10^{-6}\,\text{N·m}$

Q13. The threshold wavelength for photoelectric emission from a metal surface is $\lambda_0 = 600\,\text{nm}$. Given $h = 6.6 \times 10^{-34}\,\text{J·s}$, $c = 3 \times 10^8\,\text{m/s}$, and $e = 1.6 \times 10^{-19}\,\text{C}$, what is the work function ϕ in eV?

(A) $1.0\,\text{eV}$

(B) $2.0\,\text{eV}$

(C) $3.3\,\text{eV}$

(D) $6.6\,\text{eV}$

Q14. In the Bohr model of hydrogen, the radius of the first orbit ($n = 1$) is $r_1 = 0.53\,\text{Å}$. What is the radius of the orbit for $n = 3$?

(A) $1.59\,\text{Å}$

(B) $3.18\,\text{Å}$

(C) $4.77\,\text{Å}$

(D) $1.77\,\text{Å}$

Q15. Three moles of an ideal gas are heated at *constant volume* and absorb $Q = 600\,\text{J}$ of heat. What is the increase in internal energy ΔU?

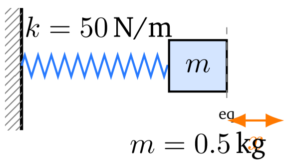
(A) $200\,\text{J}$

(B) $0\,\text{J}$

(C) $1800\,\text{J}$

(D) $600\,\text{J}$

Q16. A block of mass $m = 0.5\,\text{kg}$ is attached to a spring of spring constant $k = 50\,\text{N/m}$. Using $\pi^2 \approx 10$, what is the time period T of oscillation?



(A) $0.2\pi\,\text{s}$

(B) π s

(C) 0.1π s

(D) 2π s

Q17. A solid cylinder of mass $M = 4\,\text{kg}$ and radius $R = 0.2\,\text{m}$ rotates about its own axis with angular velocity $\omega = 10\,\text{rad/s}$. The moment of inertia of a solid cylinder is $I = \frac{1}{2}MR^2$. What is the rotational kinetic energy?

(A) $2\,\text{J}$

(B) $8\,\text{J}$

(C) $4\,\text{J}$

(D) $20\,\text{J}$

Q18. When a p-n junction diode is *reverse biased*, which of the following best describes the current through it?

(A) Very small reverse (leakage) current flows

(B) Large forward current flows

(C) The junction breaks down immediately

(D) Zero current flows under any condition

Q19. Water flows steadily through a horizontal pipe that has a constricted (narrower) section. According to Bernoulli's principle, what happens to the pressure in the narrow section compared to the wider section?

(A) Pressure increases

(B) Pressure stays the same

(C) Pressure doubles

(D) Pressure decreases

Q20. The gravitational acceleration at Earth's surface is $g_0 = 10\,\text{N/kg}$. What is the gravitational acceleration at a distance $r = 4R$ from Earth's *centre* (where R is Earth's radius)?

(A) $\frac{5}{4}$ N/kg

(B) $\frac{5}{8}$ N/kg

(C) 2.5 N/kg

(D) $\frac{10}{9}$ N/kg

Detailed Solutions

Q1.

Solution

Concept — Series Circuit Voltage Division: In a series circuit the same current flows through all resistors. Voltage across each resistor is $V = IR$.

Step 1 — Total resistance:

$$R_{\text{total}} = 1 + 2 + 3 = 6\,\Omega$$

Step 2 — Current in circuit:

$$I = \frac{\varepsilon}{R_{\text{total}}} = \frac{9}{6} = 1.5\,\text{A}$$

Step 3 — Voltage across $3\,\Omega$:

$$V_3 = I \times R_3 = 1.5 \times 3 = 4.5\,\text{V}$$

Why other options are wrong:

- Option A (1.5 V): voltage across the $1\,\Omega$ resistor, not $3\,\Omega$.
- Option B (3.0 V): voltage across the $2\,\Omega$ resistor.
- Option C (6.0 V): would require $I = 2\,\text{A}$ which needs $R_{\text{total}} = 4.5\,\Omega$, not $6\,\Omega$.

Final Answer: $V_3 = 4.5\,\text{V} \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q1

Q2.

Solution

Concept — Cells in Series (Aiding): Total EMF equals sum of individual EMFs; total internal resistance equals sum of individual internal resistances.

Step 1 — Total EMF:

$$\varepsilon_{\text{total}} = 6 + 4 = 10\,\text{V}$$

Step 2 — Total resistance:

$$R_{\text{total}} = r_1 + r_2 + R_{\text{ext}} = 1 + 1 + 8 = 10\,\Omega$$

Step 3 — Current:

$$I = \frac{10}{10} = 1\,\text{A}$$

Why other options are wrong:

- Option B (0.5 A): ignores internal resistances.
- Option C (2 A): uses only R_{ext} in denominator.
- Option D (5 A): divides EMF by internal resistance alone.

Final Answer: $I = 1\,\text{A} \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q2

Q3.

Solution

Concept — Minimum Speed at Top of Vertical Circle: At minimum condition, tension $T = 0$ and gravity alone provides centripetal force: $mg = mv^2/L$.

Step 1 — Set tension to zero:

$$mg = \frac{mv_{\text{min}}^2}{L} \implies v_{\text{min}} = \sqrt{gL}$$

Step 2 — Substitute $g = 10$, $L = 2$:

$$v_{\text{min}} = \sqrt{10 \times 2} = \sqrt{20}$$

Step 3 — Simplify:

$$\sqrt{20} = \sqrt{4 \times 5} = 2\sqrt{5} \approx 4.47\,\text{m/s}$$

Why other options are wrong:

- Option A (2 m/s): uses $v = \sqrt{gL/5}$ — wrong formula.
- Option B (4 m/s): uses an incorrect factor.
- Option D (10 m/s): uses $v = gL$ (dimensionally wrong).

Final Answer: $v_{\text{min}} = 2\sqrt{5}\,\text{m/s} \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q3

Q4.

Solution

Concept — Distance in nth Second: $s_n = u + a(n - \frac{1}{2})$, where $u = 0$ for start from rest.

Step 1 — Substitute $u = 0$, $a = 4$, $n = 5$:

$$s_5 = 0 + 4\left(5 - \frac{1}{2}\right) = 4 \times \frac{9}{2}$$

Step 2 — Evaluate:

$$s_5 = 4 \times 4.5 = 18\,\text{m}$$

Why other options are wrong:

- Option A (10 m): uses $s_n = an$ — total distance formula, not nth-second formula.
- Option C (20 m): uses $s_n = an$ with $n = 5$.
- Option D (25 m): computes total distance $\frac{1}{2}at^2$ with $t = 5$ but misapplies it.

Final Answer: $s_5 = 18\,\text{m} \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q4

Q5.

Solution

Concept — Prism Dispersion: Higher refractive index $\Rightarrow$ greater deviation. Refractive index increases with decreasing wavelength (normal dispersion): $n_{\text{violet}} > n_{\text{red}}$.

Step 1 — Recall the VIBGYOR order of refractive indices:

$$n_{\text{violet}} > n_{\text{indigo}} > \cdots > n_{\text{red}}$$

Step 2 — Higher $n \Rightarrow$ more bending $\Rightarrow$ violet deviated most.

Why other options are wrong:

- Option B (Red): has smallest n — deviated the *least*.
- Option C (Yellow): intermediate deviation.
- Option D (Green): intermediate deviation.

Final Answer: Violet deviated most $\Rightarrow \boxed{A}$

Answer: (A) Go Back to Q5

Q6.

Solution

Concept — Plane Mirror Image: A plane mirror always forms a virtual, erect image at the same distance behind the mirror as the object is in front.

Step 1: Object is 10 cm in front $\Rightarrow$ image is 10 cm behind.

Step 2: Image is virtual (cannot be projected on screen) and erect (same orientation).

Why other options are wrong:

- Option A (Real, inverted): plane mirrors never form real images.
- Option C (Virtual, inverted): plane mirror images are erect, not inverted.
- Option D (Real, 20 cm): image distance equals object distance; image is always virtual.

Final Answer: Virtual, erect, 10 cm behind mirror $\Rightarrow \boxed{B}$

Answer: (B) Go Back to Q6

Q7.

Solution

Concept — Transformer Voltage Ratio: For an ideal transformer, $V_s/V_p = N_s/N_p$.

Step 1 — Rearrange:

$$V_s = V_p \times \frac{N_s}{N_p}$$

Step 2 — Substitute values:

$$V_s = 2200 \times \frac{100}{1000} = 2200 \times \frac{1}{10}$$

Step 3 — Evaluate:

$$V_s = \frac{2200}{10} = 220\,\text{V}$$

Why other options are wrong:

- Option A (2200 V): uses 1:1 turns ratio.
- Option B (110 V): uses ratio $1/20$ instead of $1/10$.
- Option D (22 V): uses ratio $1/100$.

Final Answer: $V_s = 220\,\text{V} \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q7

Q8.

Solution

Concept — Inductive Reactance: $X_L = 2\pi f L$.

Step 1 — Substitute $f = 50\,$Hz, $L = 0.1\,$H:

$$X_L = 2\pi \times 50 \times 0.1$$

Step 2 — Simplify:

$$X_L = 100\pi \times 0.1 = 10\pi \approx 31.4\,\Omega$$

Why other options are wrong:

- Option A (0.1 Ω): uses $X_L = L/f$ — wrong formula.
- Option B (50 Ω): omits the $2\pi L$ factor.
- Option C (5π Ω): uses $f = 25\,$Hz.

Final Answer: $X_L = 10\pi\,\Omega \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q8

Q9.

Solution

Concept — Conservation of Momentum (Explosion): Initial total momentum $= 0$, so $m_1 v_1 = m_2 v_2$.

Step 1 — Apply conservation of momentum:

$$m_1 v_1 = m_2 v_2$$

Step 2 — Solve for v_2:

$$v_2 = \frac{m_1 v_1}{m_2} = \frac{4 \times 15}{6} = \frac{60}{6} = 10\,\text{m/s}$$

Why other options are wrong:

- Option A (15 m/s): ignores mass difference.
- Option C (6 m/s): swaps m_1 and m_2.
- Option D (4 m/s): uses wrong concept.

Final Answer: $v_2 = 10\,\text{m/s} \Rightarrow \boxed{\text{B}}$

Answer: (B) **Go Back to Q9**

Q10.

Solution

Concept — Pump Power: $P = \dot{m} \times g \times h$ (rate of doing work against gravity).

Step 1 — Substitute $\dot{m} = 2$ kg/s, $g = 10$, $h = 25$ m:

$$P = 2 \times 10 \times 25$$

Step 2 — Evaluate:

$$P = 20 \times 25 = 500\,\text{W}$$

Why other options are wrong:

- Option A (25 W): uses $\dot{m} = 0.1\,\text{kg/s}$.
- Option B (250 W): uses $\dot{m} = 1\,\text{kg/s}$.
- Option D (1000 W): doubles the correct answer.

Final Answer: $P = 500\,\text{W} \Rightarrow \boxed{\text{C}}$

Answer: (C) **Go Back to Q10**

Q11.

Solution

Concept — Electrostatic Potential Energy: $U = kq_1q_2/r$.

Step 1 — Product of charges:

$$q_1q_2 = (+2 \times 10^{-6})(-2 \times 10^{-6}) = -4 \times 10^{-12}\,\text{C}^2$$

Step 2 — Numerator kq_1q_2:

$$9 \times 10^9 \times (-4 \times 10^{-12}) = -36 \times 10^{-3} = -0.036$$

Step 3 — Divide by $r = 0.4$ m:

$$U = \frac{-0.036}{0.4} = -0.09\,\text{J}$$

Why other options are wrong:

- Option B ($+0.09$ J): treats both charges as positive.
- Option C (-0.9 J): uses $r = 0.04$ m.
- Option D ($+0.9$ J): wrong sign and wrong r.

Final Answer: $U = -0.09\,\text{J} \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q11

Q12.

Solution

Concept — Torque on a Current-Carrying Coil: Maximum torque $\tau = NBIA$.

Step 1 — Convert units: $A = 4\,\text{cm}^2 = 4 \times 10^{-4}\,\text{m}^2$; $I = 1\,\text{mA} = 10^{-3}\,\text{A}$.

Step 2 — Substitute:

$$\tau = 100 \times 0.2 \times 10^{-3} \times 4 \times 10^{-4}$$

Step 3 — Evaluate step by step:

$$100 \times 0.2 = 20; \quad 20 \times 10^{-3} = 2 \times 10^{-2}; \quad 2 \times 10^{-2} \times 4 \times 10^{-4} = 8 \times 10^{-6}$$

Why other options are wrong:

- Option A (8×10^{-3} N·m): forgets $I = 10^{-3}$.
- Option B (4×10^{-6} N·m): uses $N = 50$.
- Option C (2×10^{-5} N·m): doubles area erroneously.

Final Answer: $\tau = 8 \times 10^{-6}\,\text{N·m} \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q12

Q13.

Solution

Concept — Work Function from Threshold Wavelength: $\phi = hc/\lambda_0$.

Step 1 — Compute hc:

$$hc = 6.6 \times 10^{-34} \times 3 \times 10^{8} = 19.8 \times 10^{-26}\,\text{J} \cdot \text{m}$$

Step 2 — Divide by $\lambda_0 = 600 \times 10^{-9}$ m:

$$\phi = \frac{19.8 \times 10^{-26}}{6 \times 10^{-7}} = 3.3 \times 10^{-19}\,\text{J}$$

Step 3 — Convert to eV:

$$\phi = \frac{3.3 \times 10^{-19}}{1.6 \times 10^{-19}} \approx 2.0\,\text{eV}$$

Why other options are wrong:

- Option A (1.0 eV): uses $\lambda_0 = 1200\,\text{nm}$.
- Option C (3.3 eV): forgets to divide by e (gives result in 10^{-19} J directly).
- Option D (6.6 eV): uses h directly without full formula.

Final Answer: $\phi = 2.0\,\text{eV} \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q13

Q14.

Solution

Concept — Bohr Radius Scaling: $r_n = n^2 r_1$.

Step 1 — For $n = 3$:

$$r_3 = (3)^2 \times r_1 = 9 \times 0.53$$

Step 2 — Evaluate:

$$r_3 = 9 \times 0.53 = 4.77\,\text{Å}$$

Why other options are wrong:

- Option A (1.59 Å): uses $r_n = n \times r_1$ (linear, not quadratic).
- Option B (3.18 Å): uses $n = 2.45$ or doubles incorrectly.
- Option D (1.77 Å): uses wrong formula.

Final Answer: $r_3 = 4.77\,\text{Å} \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q14

Q15.

Solution

Concept — Isochoric Process (First Law): At constant volume, $W = P\Delta V = 0$, so $\Delta U = Q - W = Q$.

Step 1 — Work done at constant volume:

$$W = P \times \Delta V = P \times 0 = 0$$

Step 2 — Apply First Law:

$$\Delta U = Q - W = 600 - 0 = 600\,\text{J}$$

Why other options are wrong:

- Option A (200 J): divides Q by number of moles.
- Option B (0 J): confuses isochoric with isothermal.
- Option C (1800 J): multiplies Q by number of moles.

Final Answer: $\Delta U = 600\,\text{J} \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q15

Q16.

Solution

Concept — Spring-Mass Period: $T = 2\pi\sqrt{m/k}$.

Step 1 — Compute m/k:

$$\frac{m}{k} = \frac{0.5}{50} = \frac{1}{100}$$

Step 2 — Take square root:

$$\sqrt{\frac{m}{k}} = \sqrt{\frac{1}{100}} = \frac{1}{10}$$

Step 3 — Multiply by 2π:

$$T = 2\pi \times \frac{1}{10} = \frac{2\pi}{10} = 0.2\pi\,\text{s}$$

Verification ($\pi^2 \approx 10$): $T^2 = 4 \times 10 \times \frac{1}{100} = 0.4 \Rightarrow T \approx 0.632\,\text{s}$; $0.2\pi \approx 0.628\,\text{s}$ ✓

Why other options are wrong:

- Option B (π s): uses wrong $m/k = 0.25$.
- Option C (0.1π s): forgets the factor 2 in 2π.
- Option D (2π s): uses $m/k = 1$.

Final Answer: $T = 0.2\pi\,\text{s} \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q16

Q17.

Solution

Concept — Rotational KE of Solid Cylinder: $KE_{\text{rot}} = \frac{1}{2}I\omega^2$, with $I = \frac{1}{2}MR^2$.

Step 1 — Compute moment of inertia:

$$I = \frac{1}{2} \times 4 \times (0.2)^2 = \frac{1}{2} \times 4 \times 0.04 = 0.08\,\text{kg}\cdot\text{m}^2$$

Step 2 — Compute rotational KE:

$$KE_{\text{rot}} = \frac{1}{2} \times 0.08 \times (10)^2 = \frac{1}{2} \times 0.08 \times 100 = \frac{8}{2} = 4\,\text{J}$$

Why other options are wrong:

- Option A (2 J): uses $I = MR^2$ (hollow cylinder formula).
- Option B (8 J): omits the $\frac{1}{2}$ in $KE = \frac{1}{2}I\omega^2$.
- Option D (20 J): confuses mass with moment of inertia.

Final Answer: $KE_{\text{rot}} = 4\,\text{J} \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q17

Q18.

Solution

Concept — Reverse Biased p-n Junction: Depletion region widens; majority carriers cannot flow. Thermally generated minority carriers produce a very small leakage current.

Step 1: Majority carriers pulled away from junction $\Rightarrow$ no significant majority-carrier current.

Step 2: Minority carriers drift across junction under reverse field $\Rightarrow$ small reverse saturation (leakage) current (microamperes to nanoamperes).

Why other options are wrong:

- Option B (large forward current): occurs only in forward bias.
- Option C (breakdown immediately): breakdown needs a specific high reverse voltage (Zener/avalanche).
- Option D (zero current): always some minority carrier current; not exactly zero.

Final Answer: Very small reverse leakage current $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q18

Q19.

Solution

Concept — Bernoulli's Principle: $P + \frac{1}{2}\rho v^2 = \text{const.}$ Narrower cross-section $\Rightarrow$ higher speed (continuity) $\Rightarrow$ lower pressure.

Step 1 — Continuity equation: $A_2 < A_1 \Rightarrow v_2 > v_1$.

Step 2 — Bernoulli's equation: If v increases, $\frac{1}{2}\rho v^2$ increases $\Rightarrow$ P must decrease to keep sum constant.

$$P_2 < P_1 \quad \text{(Venturi effect)}$$

Why other options are wrong:

- Option A (increases): contradicts Bernoulli's principle.
- Option B (stays same): applies only to static fluids.
- Option C (doubles): not a valid consequence here.

Final Answer: Pressure decreases in narrow section $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q19

Q20.

Solution

Concept — Gravitational Acceleration at Distance r: $g(r) = g_0(R/r)^2$.

Step 1 — Substitute $r = 4R$:

$$g = g_0\left(\frac{R}{4R}\right)^2 = g_0 \times \frac{1}{16}$$

Step 2 — Evaluate:

$$g = \frac{10}{16} = \frac{5}{8}\,\text{N/kg}$$

Why other options are wrong:

- Option A ($5/4$ N/kg): uses $r = 2R$.
- Option C (2.5 N/kg): uses $r = 2R$ giving $10/4$.
- Option D ($10/9$ N/kg): uses $r = 3R$.

Final Answer: $g = 5/8\,\text{N/kg} \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q20

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	D	2	A	3	C	4	B	5	A
6	B	7	C	8	D	9	B	10	C
11	A	12	D	13	B	14	C	15	D
16	A	17	C	18	A	19	D	20	B