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IGCSE PHYSICS 0625 · TOPICAL PAST PAPERS

Pressure — Paper 1

Worked Answer Key (Multiple Choice)

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Pressure — Paper 1 · Worked Answer Key

These are **Megalecture worked answers** for the topical multiple-choice compilation on **Pressure (IGCSE Physics 0625, Paper 1)**. Every answer below was solved from first principles by the Megalecture team; calculations use the data given in each question (with *g* as stated, usually 10 N/kg). Use this key to mark your work and to see the one-line reasoning behind each correct letter. The compilation is organised into three parts — keep your eye on the part heading, as the exam-paper question numbering restarts in each part.

Part A · Pressure and Force

Q #	Exam reference	Answer	Brief working / reason
A1	M/J 16 P12	**D**	P = F/A. Weight = W, area = A, and g is given only as a distractor. Pressure on ground = **W/A**.
A2	M/J 18 P11	**C**	Same weight on every block, so P = W/A ∝ 1/A. The graph of P against base area must be an inverse curve (rectangular hyperbola) → graph **C**.
A3	M/J 18 P11	**C**	Weight = 16000 × 10 = 160000 N, shared by 4 tyres = 40000 N each. P = F/A = 40000 / 100 = **400 N/cm²**.
A4	M/J 19 P11	**D**	Rain force on roof = 4.0 N/m² × 2.0 m² = 8 N. Total downward force = weight + rain = 60 + 8 = **68 N**.
A5	O/N 16 P11	**D**	Force from the atmosphere on the pond surface = P × A = 100 000 × 20 = **2 000 000 N**.
A6	M/J 18 P12	**D**	Largest pressure needs the smallest face: A_{min} = 3.0 × 4.0 = 12 cm². P = F/A = 6.0 / 12 = **0.50 N/cm²**.
A7	O/N 16 P12	**C**	Same force on both nails; the sharper point (Y) has the smaller area, giving the greater pressure, so Y drives in furthest → **"Y, Y produces greater pressure on the wood."**
A8	M/J 16 P11	**A**	Bubble at bottom feels total pressure = atmospheric (10 m worth) + 20 m depth = 3 atm; at surface = 1 atm. Boyle: $P_1V_1=P_2V_2$ → V_{bottom} = (1 × 6.0)/3 = **2.0 cm³**.

Part B · Pressure in Liquids

Q #	Exam reference	Answer	Brief working / reason
B1	M/J 16 P11	**D**	Pressure in a liquid increases with depth (P = ρgh). Point D is deepest below the surface, so pressure is greatest at **D**.
B2	M/J 16 P11	**A**	

Q #	Exam reference	Answer	Brief working / reason
			10 m of water = 1 atm, so a 20 m lake gives total 1 + 2 = 3 atm at the bottom, 1 atm at the surface. Boyle: V_{bottom} = (1 × 6.0)/3 = **2.0 cm³**.
B3	M/J 17 P11	**B**	X and Y are at the same depth → same pressure (a liquid finds its own level). Z is deeper than X → pressure at X is lower than Z. So X = Y, X < Z → **"same as Y, the same / lower vs Z" = row B**.
B4	M/J 17 P11	**B**	Gas gauge pressure = ρgh = 1000 × 10 × 0.20 = **2000 Pa**.
B5	M/J 17 P12	**B**	P = ρgh with same h and same g, so the only thing that can differ is the liquid: **the densities of the liquids are different**.
B6	M/J 18 P11	**A**	Atmospheric pressure = ρgh of the mercury column = vertical height from the mercury surface in the dish up to the top of the column → height **A**.
B7	M/J 19 P11	**A**	Up a mountain the air is thinner, so atmospheric pressure is lower; it can support a shorter mercury column → h **decreases because atmospheric pressure decreases with height**.
B8	M/J 19 P11	**A**	Δh = ΔP/(ρg) = 5600 / (14000 × 10) = 0.040 m = **40 mm**.
B9	M/J 20 P11	**D**	Total P = atmospheric + ρgh = 100000 + (1000 × 10 × 15) = 100000 + 150000 = **250 000 Pa**.
B10	M/J 20 P11	**D**	Mercury in the open arm stands higher than in the gas arm, so the gas pressure exceeds atmospheric. P = atmospheric + level difference = 756 + 80 = **836 mm of mercury**.
B11	M/J 20 P12	**D**	Greatest pressure = largest ρ × h. Compare ρh: A 4000, B 10000, C 4800, D 12000. Largest is D (1200 × 10) → **D**.
B12	O/N 16 P11	**D**	P = ρgh = (8.5 × 10²) × 10 × 6.0 = 850 × 60 = **51 000 Pa**.
B13	O/N 16 P12	**D**	Gas gauge pressure = ρg × (height difference between the two mercury surfaces) = distance **D**.
B14	O/N 17 P11	**C**	Level difference = 0.60 − 0.20 = 0.40 m. ΔP = ρgh = 14000 × 10 × 0.40 = **56 000 Pa**.
B15	O/N 18 P11	**C**	P = sealed top, Q = top of mercury, R = mercury surface in the dish. The barometric height that measures atmospheric pressure is QR. When atmospheric pressure decreases the supported column shortens, so length **QR** decreases (and the vacuum gap PQ grows).
B16	O/N 18 P12	**A**	Pressure at the base = ρgh, so compare ρ × h (area is irrelevant). A 1.3×50 = 65, B 0.80×80 = 64, C 1.0×60 = 60, D 0.92×75 = 69. Largest is **D** (69). Correct answer is **D**.
B17	O/N 19 P11	**A**	Total pressure at depth = atmospheric P + ρgh, which needs g, h, P and ρ → **g, h, P and ρ**.

Q #	Exam reference	Answer	Brief working / reason
B18	O/N 19 P12	**C**	The trapped air supports atmospheric pressure plus the water column above it; tube R has the longest (slanted) water column above the trapped air, giving the greatest depth h → greatest air pressure in **R**.
B19	O/N 20 P11	**B**	The open arm is higher than the gas arm by h, so the gas is above atmospheric: $P = p_0 + h\rho g$ → **$p_o + h\rho g$**.
B20	O/N 20 P12	**C**	Boyle: $P_1V_1 = P_2V_2$. $V_{surface} = (3.0\times10^5 \times 0.60)/(1.0\times10^5)$ = **1.8 cm³**.

Part C · Pressure in Gases

Q #	Exam reference	Answer	Brief working / reason
C1	M/J 16 P11	**A**	(Same as B2.) Bottom = 3 atm, surface = 1 atm, $V_{surface}$ = 6.0. Boyle → $V_{bottom} = (1\times6.0)/3$ = **2.0 cm³**.
C2	M/J 17 P12	**D**	Fixed mass at constant temperature obeys Boyle's law: $P_1V_1 = P_2V_2$. So the correct relation is **$p_1V_1 = p_2V_2$**.
C3	M/J 18 P12	**C**	At altitude the outside (cabin/atmospheric) pressure is lower, so the trapped air expands the packet: **the pressure of the air outside the packet decreases**.
C4	M/J 19 P12	**C**	P doubles → V halves at constant T. Same mass in half the volume → density doubles (increases); T is unchanged → **density increases, temperature remains constant**.
C5	M/J 20 P12	**B**	Boyle: $P_2 = P_1V_1/V_2 = (100 \times 3.0)/12$ = **25 kPa**.
C6	O/N 16 P11	**A**	Pushing the piston in reduces the volume; at constant temperature Boyle's law gives a higher pressure → **pressure increases, volume decreases**.
C7	O/N 17 P12	**C**	Boyle: $V_2 = P_1V_1/P_2 = (1.0\times10^5 \times 240)/(1.5\times10^5)$ = **160 cm³**.
C8	O/N 18 P11	**B**	New length = 20 + 40 = 60 cm (volume tripled). Boyle: $P_2 = p \times 20/60$ = **p/3**.
C9	O/N 18 P11	**C**	Gas pressure arises from molecules colliding with and rebounding from the container walls → **gas molecules collide with the walls of the container**.
C10	O/N 19 P11	**C**	At constant T, $P \propto 1/V$ (Boyle), so the P–V graph is an inverse curve falling toward the axes → graph **C**.
C11	O/N 20 P12	**C**	(Same as B20.) Boyle: $V_{surface} = (3.0\times10^5 \times 0.60)/(1.0\times10^5)$ = **1.8 cm³**.

Note from Megalecture. A few items in this compilation appear twice across the "liquids" and "gases" parts (the lake-bubble and diver-bubble Boyle's-law questions). They are answered consistently above. These are original Megalecture worked solutions prepared for revision use.