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IGCSE PHYSICS 0625 · TOPICAL PAST PAPERS

The Nuclear Model of the Atom — Paper 1

Worked Answer Key (Multiple Choice)

Fahad H. Ahmad

Contact: +92 323 509 4443

M.Eng NUS Singapore · B.Eng NUST · 15+ years of teaching experience in Singapore, UAE & Pakistan · 60,000+ subscribers and 20 million+ video lecture views.

Fahad H. Ahmad · **+92 323 509 4443**

The Nuclear Model of the Atom — Paper 1 · Worked Answer Key

These are **Megalecture worked answers** for the topical multiple-choice compilation on **The Nuclear Model of the Atom (IGCSE Physics 0625, Paper 1)**. Every answer below was solved from first principles by the Megalecture team. Remember the two key relationships used throughout: the **proton number Z** (also the electron number of a neutral atom) fixes the element, the **nucleon number A** is protons + neutrons, and so **number of neutrons = A − Z**. Isotopes of one element share the same Z but have different A. Use this key to mark your work and to see the one-line reasoning behind each correct letter. The compilation is organised into two parts — keep your eye on the part heading, as the exam-paper question numbering restarts in each part.

Part A · Atomic Model & Alpha-particle Scattering

Q #	Exam reference	Answer	Brief working / reason
A1	O/N 17 P11 (Q37)	**A**	Almost all of an atom is empty space, so the vast majority of alpha-particles pass straight through the foil **undeflected**. The largest number therefore continue in their original direction → **A** (straight through). Paths B and D are small/large deflections (few particles); C would be a sideways turn (none).
A2	O/N 18 P11 (Q38)	**D**	A few alpha-particles were deflected through large angles, showing the positive charge and most of the mass are concentrated in a tiny central **nucleus**. This was the evidence for the **nuclear atom** → **D**.

Part B · The Nucleus — Protons, Neutrons, Nucleons & Isotopes

Q #	Exam reference	Answer	Brief working / reason
B1	M/J 16 P11 (Q40)	**C**	For $^{15}_{7}$N: the lower number is the proton number = **7 protons**; neutrons = A − Z = 15 − 7 = **8 neutrons**. So "7 protons and 8 neutrons" → **C**.
B2	M/J 16 P12 (Q40)	**A**	Isotopes share the same number of protons (black circles). Counting protons: P = 3, Q = 3, R = 2. P and Q both have 3 protons (different neutron counts), so they are isotopes of the same element → **A** (P and Q only).
B3	M/J 18 P11 (Q39)	**C**	The nucleon number is the upper figure in $^{84}_{36}$Kr. Number of nucleons (protons + neutrons) = **84** → **C**. (Electrons in a neutral atom are not nucleons.)
B4	M/J 18 P11 (Q40)	**C**	

Q #	Exam reference	Answer	Brief working / reason
			For $^{230}_{92}U$ the element is fixed by Z = **92 protons**. Another isotope must also have 92 protons. Only row C has 92 protons (with 139 neutrons) → **C**.
B5	M/J 19 P11 (Q40)	**C**	Neutrons = nucleon number − proton number = 11 − 5 = **6** → **C**. (The 5 electrons just confirm Z = 5 for the neutral atom.)
B6	M/J 20 P11 (Q37)	**B**	In $^{A}_{Z}X$, A = nucleons and Z = protons, so neutrons = nucleons − protons = **A − Z** → **B**.
B7	O/N 16 P11 (Q40)	**A**	A neutral atom has equal positive and negative charge, so the number of electrons always equals the proton number → **A** (the number of electrons in the atom).
B8	O/N 17 P11 (Q39)	**A**	Isotopes have the same protons but different neutrons. Cl-37 and Cl-35 differ in nucleon number by 37 − 35 = 2, all due to neutrons, so chlorine-37 has **two more neutrons** → **A**.
B9	O/N 18 P11 (Q40)	**A**	Uranium has 92 protons, so neutrons = nucleons − 92. Checking: A 235 → 143 ✓; B 237 → 145 (147 shown ✗); C 238 → 146 (144 shown ✗); D 241 → 149 (146 shown ✗). Only row A is self-consistent (92 protons, 143 neutrons) → **A**.
B10	O/N 18 P12 (Q40)	**B**	Isotopes of one element have the **same number of protons** in the nucleus (hence same Z and same electrons) but different numbers of neutrons → **B**.
B11	O/N 18 P11 (Q40)	**B**	A neutral atom needs protons = electrons, and nucleon number = protons + neutrons = 9. Row B: 4 neutrons + 5 protons = 9 nucleons, with 5 electrons = 5 protons ✓ → **B**.

Note from Megalecture. The two "Q40" items referenced as O/N 18 P11 and O/N 18 P12 (B10 and B11) appear on the same page of the source compilation; they are distinct questions and are answered separately above. These are original Megalecture worked solutions prepared for revision use.