GET BETTER AT PHYSICS · MARK SCHEME

Nuclear Stability & Decay Equations: tiered multiple choice

AQA A-level Physics · 7407 / 7408 · Specification 3.2.1.2 · 5 questions · 5 marks

1 mark per correct letter | Worked reasoning for every question | **How students did** = from AQA examiner reports, where available

Answer key

Q1	Q2	Q3	Q4	Q5
B	C	C	C	C

Easy

Questions 1–3

1 **B**

Which emissions give an isotope? · AQA June 2016 · AS Paper 2 · Q5

An isotope has the same proton number. One α lowers Z by 2 and each β^- raises Z by 1, so 1 α and 2 β^- leave Z unchanged (with A 4 lower).

How students did: 84% of students got this right in June 2016.

2 **C**

Counting alpha decays in a series · AQA June 2018 · AS Paper 2 · Q6

Only α decays change the nucleon number, by 4 each time. 236 − 204 = 32, so there are 32 / 4 = 8 α decays.

Watch out: β decays don't change the nucleon number, so ignore them when counting α decays.

How students did: 61.4% of students got this right in June 2018.

3 **C**

How the strong force varies with distance · AQA June 2022 · A-level Paper 1 · Q11

The strong nuclear force between nucleons is repulsive at very short range (up to about 0.5 fm, stopping nuclei collapsing) and attractive from about 0.5 fm to about 3 fm. Beyond that it is negligible.

How students did: This was one of the easiest questions on the June 2022 paper.

Medium

Questions 4–5

4 **C**

Daughter nucleus after β^+ decay · AQA June 2025 · AS Paper 2 · Q32

In β^+ decay a proton becomes a neutron. $^{15}_{8}O$ has 8 protons and 7 neutrons, so the daughter has 7 protons and 8 neutrons ($^{15}_{7}N$).

Watch out: A and B add a proton: that would be β^- decay.

How students did: In June 2025 the correct answer was the most popular choice.

5 **C**

Neutron absorption then two decays · AQA June 2023 · AS Paper 2 · Q22

Absorbing a neutron: $^{210}_{83}Bi$. β^- decay: Z rises to 84, A stays 210. α decay: A falls by 4 to 206 and Z falls by 2 to 82. X is $^{206}_{82}Pb$.

Watch out: Don't forget the neutron: it raises the nucleon number from 209 to 210 before either decay.

End of mark scheme. Answers from AQA's published keys; explanations written for this pack. AQA material is © AQA. More free packs and 1-to-1 tuition: **www.getbetteratphysics.co.uk**

GET BETTER AT PHYSICS · WHAT NEXT?

Got some of these wrong?

Good. The questions you got wrong show you exactly what to work on next. The quickest way to fix them is to work through them with someone who marks these papers.

Book a free 15-minute call

Tell me which questions caught you out. We'll talk about what's going wrong and whether 1-to-1 or small-group tuition would help. There's no obligation.

Book your free call

calendly.com/getbetteratphysics/freechat

Scan to book

Current AQA examiner
I know what the mark schemes reward and where marks are lost.

Matched to your exam board
Sessions follow your specification and the topics you find hardest.

Pay per session
No block booking. 1-to-1 or small groups of up to 4.

More free packs

Tiered past-paper questions with full mark schemes, sorted by topic.
getbetteratphysics.co.uk/free-revision-packs

Masterclasses are coming

Want to hear first? Email **helpme@getbetteratphysics.co.uk** and I'll let you know when dates are announced.

Parents: I use these packs in my own tutoring sessions. Tuition options and prices:
getbetteratphysics.co.uk/tuitionpricing