GET BETTER AT PHYSICS · MARK SCHEME

# Binding Energy: tiered multiple choice

Edexcel IAL Physics · Unit 5 (WPH15) · Specification points 133–134 · 5 questions · 5 marks

1 mark per correct letter | Worked reasoning for every question

**How students did** = from Pearson examiner reports, where available

## Answer key

| Q1 | Q2 | Q3 | Q4 | Q5 |
|---|---|---|---|---|
| C | D | B | D | D |

## Easy

Questions 1–4

**1** **C**

Mass–energy of a muon · Edexcel IAL January 2024 · Unit 5 · Q3

$E = mc^2$, with m in kilograms. 1 u = $1.66 \times 10^{-27}$ kg, so $E = 0.113 \times 1.66 \times 10^{-27} \times (3.0 \times 10^8)^2$ J.

**How students did:** Examiners reported that at least 60% of students got this right in January 2024.

**2** **D**

Shape of the binding energy per nucleon curve · Edexcel IAL October 2023 · Unit 5 · Q3

Binding energy per nucleon rises steeply for light nuclei, reaches a maximum around iron-56 (about 8.8 MeV), and then decreases slowly for heavier nuclei.

**How students did:** Examiners reported that at least 60% of students got this right in October 2023.

**3** **B**

Stability from the binding energy curve · Edexcel IAL January 2025 · Unit 5 · Q4

The greater the binding energy per nucleon, the more stable the nucleus. On the curve P is lowest, R is next and Q (near the peak) is highest: least to most stable is P, R, Q.

**How students did:** Examiners reported that more than 70% of students got this right in January 2025.

**4** **D**

Binding energy per nucleon in fusion and fission · Edexcel IAL June 2025 · Unit 5 · Q3

Energy is released when the products are more tightly bound than the starting nuclei. In fusion, light nuclei join and move up the steep left side of the curve; in fission, heavy nuclei split and move up from the right side towards the peak. In both, the binding energy per nucleon increases.

> **Watch out:** Both processes head towards iron-56 at the peak of the curve.

**How students did:** Examiners reported that fewer than 60% of students got this right in June 2025.

# Medium

Question 5

**5** **D**

Energy to split helium-4 into nucleons · Edexcel IAL October 2021 · Unit 5 · Q7

From the graph, He-4 has a binding energy per nucleon of about 7.1 MeV. It has 4 nucleons, so its total binding energy, the energy needed to separate it completely, is 4 × 7.1 = 28.4 MeV.

**Watch out:** The graph gives binding energy per nucleon; the question asks for the total.

**How students did:** Examiners singled this out as one of the hardest multiple-choice questions on the October 2021 paper. Examiners called this tricky: the graph shows binding energy per nucleon, but the question asks for total energy.

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

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