GET BETTER AT PHYSICS · MARK SCHEME

Properties of Alpha, Beta & Gamma Radiation: tiered multiple choice

AQA A-level Physics · 7408 · Specification 3.8.1.2 · 6 questions · 6 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	Q6
D	D	A	D	C	B

Easy

Questions 1–3

1 **D**

Identifying radiation from absorption · AQA June 2019 · A-level Paper 2 · Q18

Tracks about 4 cm long in a cloud chamber show alpha particles. They can't reach a Geiger tube 10 cm away, so the radiation detected there must be beta or gamma. 5 mm of aluminium cuts the count rate to background, which stops beta but not gamma: the source emits α and β.

How students did: In June 2019 this was answered much better than most of Section B.

2 **D**

What is not true for gamma radiation · AQA June 2022 · A-level Paper 2 · Q30

Absorbing gamma radiation does not make a material radioactive (D is not true). Gamma is more penetrating than alpha or beta (A), follows an inverse-square law (B) and is emitted with discrete frequencies (C).

Watch out: This asks for the statement that is **not** true.

3 **A**

Properties of α, β and γ in a table · AQA June 2022 · A-level Paper 2 · Q26

Alpha and beta are charged, so they are deflected by a magnetic field; gamma is uncharged and is not: row A. Gamma is not deflected by an electric field (B wrong), has no charge (C wrong), and all three come from the nucleus (D wrong).

Medium

Questions 4–6

4 **D**

Distance from an inverse-square fall in count rate · AQA June 2025 · A-level Paper 2 · Q25

Count rate $\propto 1/d^2$, so $800d^2 = 600(d + 10)^2$. $(d + 10) / d = \sqrt{(800/600)} = 1.155$, so $d = 10 \div 0.155 = 64$ cm.

Watch out: Square-root the ratio of count rates before you solve for d.

How students did: Around a third of students got this right in June 2025.

5 **C**

Gamma photons through a small area · AQA November 2021 · A-level Paper 2 · Q27

The photons spread evenly over a sphere of area $4\pi r^2 = 4\pi \times 2.0^2 = 50.3$ m^2. Photons through 0.10 m^2 = $5000 \times 0.10 \div 50.3 \approx 10$ per second.

Watch out: 250 (B) divides by r^2 only, without the 4π.

6 **B**

Radiation for measuring thin aluminium · AQA June 2023 · A-level Paper 2 · Q29

0.5 mm of aluminium partly absorbs beta radiation, so a small change in thickness gives a noticeable change in count rate. Alpha would be stopped completely and gamma would pass through almost unchanged.

> **Watch out:** β^+ (C) would annihilate with electrons in the sheet, so β^- is the usual choice.

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**

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