FREE REVISION PACK

Properties of Alpha, Beta & Gamma Radiation

AQA A-level Physics · 7408 · Specification 3.8.1.2

Easy Medium Multiple choice · past-paper questions

6	6	≈ 10 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	Identifying radiation from absorption	AQA June 2019 · A-level Paper 2 · Q18	1 mark
2	Easy	What is not true for gamma radiation	AQA June 2022 · A-level Paper 2 · Q30	1 mark
3	Easy	Properties of α, β and γ in a table	AQA June 2022 · A-level Paper 2 · Q26	1 mark
4	Medium	Distance from an inverse-square fall in count rate	AQA June 2025 · A-level Paper 2 · Q25	1 mark
5	Medium	Gamma photons through a small area	AQA November 2021 · A-level Paper 2 · Q27	1 mark
6	Medium	Radiation for measuring thin aluminium	AQA June 2023 · A-level Paper 2 · Q29	1 mark

Key ideas to have ready

- Alpha: strongly ionising, range a few cm in air, stopped by paper. Beta: range about a metre in air, stopped by a few mm of aluminium. Gamma: weakly ionising, reduced by thick lead or concrete.
- Alpha and beta are charged, so they are deflected by electric and magnetic fields. Gamma is EM radiation and is not deflected.
- Gamma from a point source obeys the inverse-square law: $I = k / x^2$.
- Choosing a source: the radiation must be partly absorbed by what is being measured, e.g. beta for thin sheets of metal.

How to use this pack

1. The questions are grouped into levels (Easy and Medium). Work through them in order, and check your answers at the end of each level before moving on.
2. Every question is multiple choice with one correct answer. Write down your working anyway; that is how you find mistakes.
3. The separate mark scheme uses the same numbers and explains every answer.

Levels are based on how students did in AQA's examiner reports where that information exists, plus our own difficulty rating. *About 1.5 minutes per question.

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Easy

Definitions and one-step ideas. Most students get these right.

Questions 1–3

Only **one** answer per question is allowed. For each question, completely fill in the circle alongside the appropriate answer.

AQA June 2019 · A-level Paper 2 · Q18

1 When a small radioactive source is placed in a cloud chamber, straight tracks about $4\ \text{cm}$ long are observed. The same source is placed $10\ \text{cm}$ from a Geiger tube and a count rate is detected. When a sheet of aluminium $5\ \text{mm}$ thick is placed between the source and the Geiger tube the count rate falls to the background count rate.

Which types of radiation are emitted by the source?

[1 mark]

A α, β and γ ⬭

B β and γ ⬭

C α and γ ⬭

D α and β ⬭

AQA June 2022 · A-level Paper 2 · Q30

2 Which is **not** true for gamma radiation?

[1 mark]

A It is more penetrating than alpha or beta radiation of the same energy through the same material. ⬭

B Its intensity is inversely proportional to the square of the distance from its source. ⬭

C It is emitted with discrete frequencies. ⬭

D When it is absorbed it makes the absorber radioactive. ⬭

AQA June 2022 · A-level Paper 2 · Q26

3 Which row is correct for α, β and γ radiation?

[1 mark]

		α	β	γ	
A	Is it deflected by a magnetic field?	yes	yes	no	⬭
B	Is it deflected by an electric field?	yes	yes	yes	⬭
C	Does it have a positive charge?	yes	no	yes	⬭
D	Does it come from outside the nucleus?	no	yes	no	⬭

Medium

Two or three steps. Roughly a third to a half of students get these right.

Questions 4–6

AQA June 2025 · A-level Paper 2 · Q25

4 A radiation meter is placed at a distance d from a source of gamma radiation.
The corrected count rate is 800 counts per second.

When the radiation meter is moved a further 10 cm from the source the corrected count rate is 600 counts per second.

What is d?

[1 mark]

A 8.7 cm ⬭

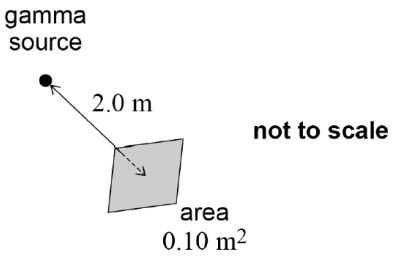
B 13 cm ⬭

C 30 cm ⬭

D 64 cm ⬭

AQA November 2021 · A-level Paper 2 · Q27

5 The diagram shows an area of 0.10 m^2 normal to a line connecting it to a point source of gamma radiation. The source emits photons uniformly in all directions.
The area and the source are separated by a distance of 2.0 m.



The source emits 5000 gamma photons per second.

How many photons pass through the area every second?

[1 mark]

A 500 ⬭

B 250 ⬭

C 10 ⬭

D 2.5 ⬭

AQA June 2023 · A-level Paper 2 · Q29

6 Radiation is used to measure the thickness of an aluminium sheet accurately.
The thickness of the sheet is about $0.5\ \text{mm}$.

Which type of radiation is most appropriate for the measurement?

[1 mark]

A α ⬭

B β^- ⬭

C β^+ ⬭

D γ ⬭

End of questions. Check your answers with the matching mark scheme. More free packs and 1-to-1 tuition:
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