FREE REVISION PACK

Alpha, Beta & Gamma Radiation

Pearson Edexcel International Advanced Level Physics · Unit 5 (WPH15) · Specification points 137–138, 140

Easy | Medium | Multiple choice · past-paper questions

5	5	≈ 10 min
QUESTIONS	TOTAL MARKS	SUGGESTED TIME*

Contents

Q	LEVEL	FOCUS	SOURCE	MARKS
1	Easy	Ionising power and penetration	Edexcel IAL January 2021 · Unit 5 · Q3	1 mark
2	Easy	Properties of alpha, beta and gamma	Edexcel IAL October 2024 · Unit 5 · Q1	1 mark
3	Easy	Ionising power and penetration of gamma	Edexcel IAL October 2023 · Unit 5 · Q8	1 mark
4	Easy	Intensity after three half-thicknesses of lead	Edexcel IAL June 2025 · Unit 5 · Q7	1 mark
5	Medium	Inverse square law with background radiation	Edexcel IAL June 2025 · Unit 5 · Q6	1 mark

Key ideas to have ready

- Alpha: most ionising, least penetrating. Gamma: least ionising, most penetrating.
- Always subtract the background count rate before using count rates.
- Gamma from a point source follows an inverse square law (corrected count rate only).
- Half-thickness: each extra half-thickness of absorber halves the intensity.

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 Pearson'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 1–4

Choose **one** answer for each question and put a cross in the box next to it.

Edexcel IAL January 2021 · Unit 5 · Q3

1 The penetration of matter by radiation depends on the ionising power of the radiation.

Which of the following statements is correct?

- ☒ **A** α-particles are weakly ionising so they are stopped by thin paper.
- ☒ **B** α-particles are highly ionising so they only travel a few centimetres in air.
- ☒ **C** γ-radiation is highly ionising so it is highly penetrating.
- ☒ **D** γ-radiation is weakly ionising so it is not very penetrating.

Edexcel IAL October 2024 · Unit 5 · Q1

2 A radioactive source emits alpha radiation, beta radiation and gamma radiation.

Which of the following is correct?

- ☒ **A** Alpha radiation is the most ionising.
- ☒ **B** Beta radiation is the least penetrating.
- ☒ **C** Beta radiation is the most ionising.
- ☒ **D** Gamma radiation is the least penetrating.

Edexcel IAL October 2023 · Unit 5 · Q8

3 Which row of the table gives the relative ionising power and penetration of gamma radiation?

		Ionising power	Penetration
☒	**A**	low	low
☒	**B**	low	high
☒	**C**	high	low
☒	**D**	high	high

Edexcel IAL June 2025 · Unit 5 · Q7

4 A student used a detector to determine the intensity of radiation from a source of gamma radiation. After correcting for background, the intensity of radiation recorded by the detector was I_0.

A lead sheet of thickness 2.5 cm was placed between the source and the detector. The corrected intensity of radiation recorded by the detector was now $0.50\,I_0$.

The original lead sheet was replaced by a new lead sheet of thickness 7.5 cm.

Which of the following was the corrected intensity of gamma radiation recorded by the detector?

- ☒ **A** $0.33\,I_0$
- ☒ **B** $0.25\,I_0$
- ☒ **C** $0.13\,I_0$
- ☒ **D** $0.06\,I_0$

Medium Two or three steps. Roughly a third to a half of students get these right. **Question 5**

Edexcel IAL June 2025 · Unit 5 · Q6

5 In a laboratory, the background count rate is 22 counts per minute.

A detector is placed 25 cm from a gamma source. The count rate recorded by the detector is 54 counts per minute.

The detector is then placed 50 cm from the source.

Which of the following is the expected number of counts per minute?

☒ **A** $\left(\frac{54 - 22}{2}\right) + 22$

☒ **B** $\left(\frac{54 - 22}{4}\right) + 22$

☒ **C** $\left(\frac{54 + 22}{2}\right) - 22$

☒ **D** $\left(\frac{54 + 22}{4}\right) - 22$

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