Background radiation and count rate

Teacher / technician

YEAR 11 / LESSON 95 / PHYSICS + SCIENCE (DOUBLE AWARD)

Staff preparation and answer guidance. Keep separate from student sheets. No added radioactive source. Actual background counts and supplied practice counts must be clearly distinguished.

Coverage and delivery

Shared Physics / Double Award: 7.1, 7.9–7.11. Detection, background sources, activity and becquerels.

Allow about 60 minutes. Follow the student sequence and use the answers to check reasoning.

Requisition • class of 30 observing one optional staff setup

Item	Per pair / setup	Class total
GM detector/counter and timer	Optional shared staff setup	1 set
Booklets and data sheets	1 each per learner	30 of each
Calculators	1 per learner	30

Immediate safety

No radioactive source is brought in or handled. Staff operate the intact detector; do not open it, touch a fragile window or access its internal high-voltage circuit. Do not use counts to screen people or make a personal health or dose judgement.

Preparation and delivery

Read alongside the student method

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1. Check the manufacturer's detector instructions and normal background operation. Keep the same position and interval for all five measurements.

2. Provide the clearly marked practice alternative if no suitable detector is available. Explain that a count rate alone is not a dose or source-activity measurement.

Close of lesson

- Switch off and store the detector; retain the counts and timing.

Check before teaching

Check the cards, reference data and quantities against this requisition. Keep the staff answer guide separate until the checking stage. Supplied numerical practice datasets are labelled examples; they are not class measurements.

Answers and teaching notes

Expected explanations • do not give as experimental observations

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- Detection and nuclear decays are random.
- 100 counts.
- About 0.333 counts s^{-1}.
- For example cosmic radiation and terrestrial rocks.
- One nuclear decay per second.
- Detection efficiency, geometry and multiple emissions per decay affect the recorded count.

References and provenance

Pearson Physics specification

IOP: teaching radioactivity

Prepared 22 November 2026. Original wording, tables and questions. Sources inform the concepts and technique; the lesson scope and classroom quantities are explicitly described here. No laboratory trial or final school risk approval is claimed.