

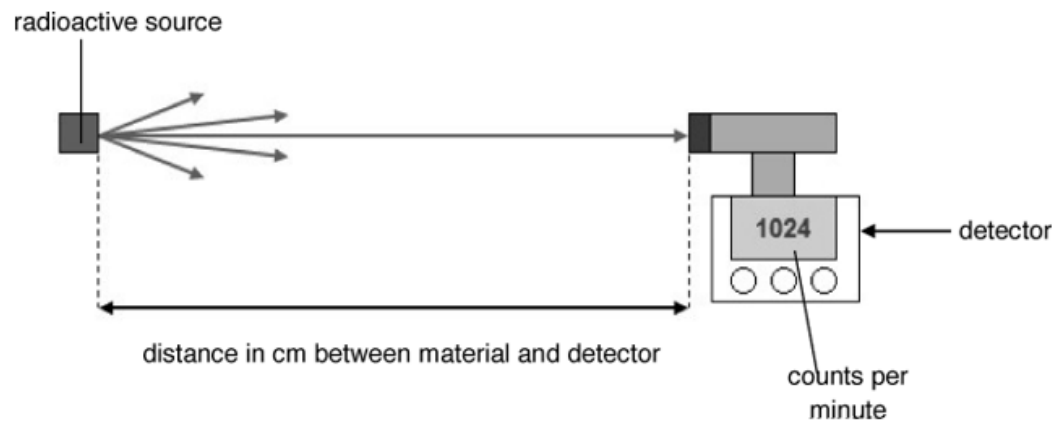
GCSE Physics A (Gateway)

J249/04 Physics A P5-P8 and P9 (Higher Tier)

Question Set 23

A student does an experiment with radioactive materials.

- He investigates how the activity of radiation changes with distance.
- The radiation moves from the radioactive source to a detector.
- He measures the counts per minute at the detector.



The table shows the results.

| Distance between source and detector (cm) | Count rate (counts per minute) |
|---|--------------------------------|
| 10 | 1024 |
| 20 | 256 |
| 40 | 64 |
| 80 | 16 |

- (a) Describe, using these results, how the count rate changes as the detector is moved away from the source.

(b) The student takes two further readings at 160 and 320 cm.

He adds these further readings to his table.

| Distance between source and detector (cm) | Count rate (counts per minute) |
|---|--------------------------------|
| 10 | 1024 |
| 20 | 256 |
| 40 | 64 |
| 80 | 16 |
| 160 | 6 |
| 320 | 0 |

As the distance is increased to 160 and 320 cm, the results do **not** follow the same pattern as the other results.

Predict what these last two results should have been and explain the anomalies in the last two results.

[3]

(c) Gamma radiation is used to irradiate cancers in the brain.

Treatment is given for 15 minutes every 4 days.

Each patient receives a certain dose of radiation.



gamma source is rotated 360° around the head.

patient remains still during treatment.

Explain how this treatment reduces damage to healthy cells.

[4]

Total Marks for Question Set 23: 9

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