

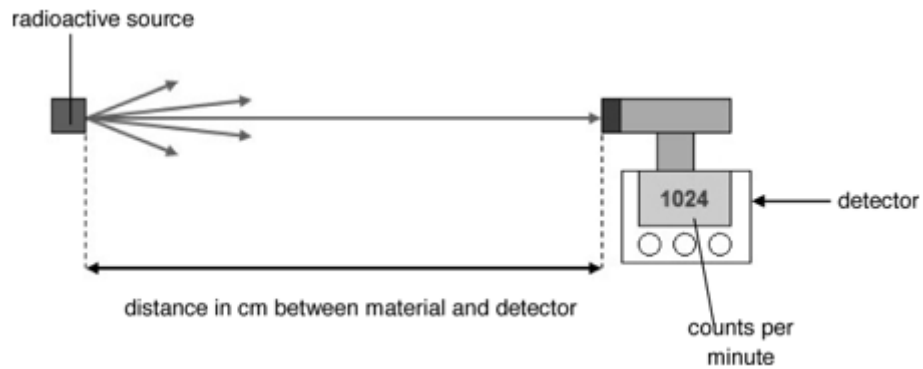
Gateway Science Physics A

J249/02 Physics A P5-P8 and P9 (Foundation Tier)

Question Set 20

A student does an experiment with radioactive materials.

- He investigates how the activity of radiation changes with distance.
- In the experiment, 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	1000
20	240
40	60
80	20

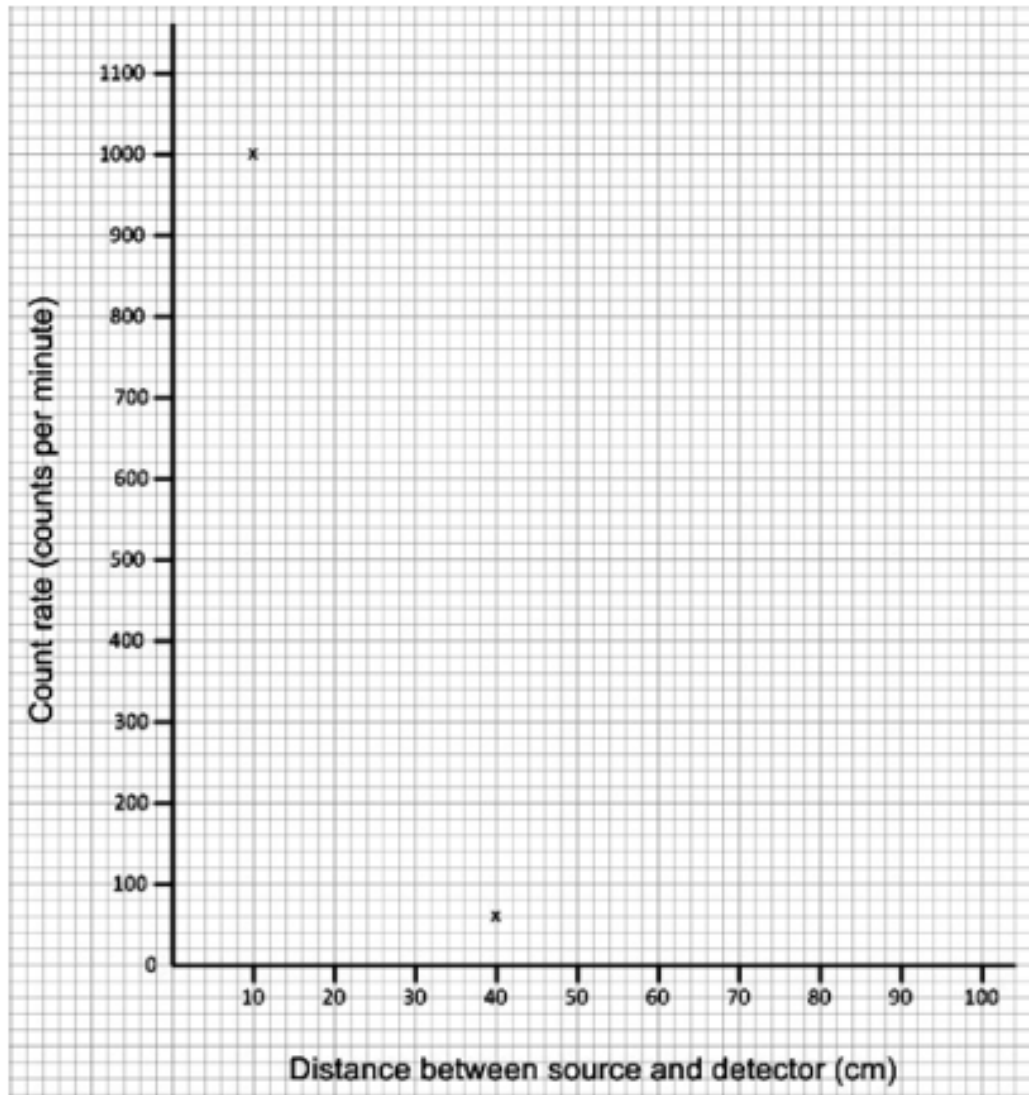
(a) The student could **not** take an accurate reading at 0 cm.

Suggest a reason why.

(b) (i) Plot the results on the graph below.

Two points for 10 cm and 40 cm have been plotted for you.

Join the points with a smooth curve.



(ii) Use the graph to estimate the count rate at 30 cm.

[2]

Answer = counts per minute

[1]

(c) (i) What pattern is shown by the results as the distance is increased from 20 cm to 40 cm?

[2]

(ii) The student wants to find the count rate at 5 cm. Estimate the count rate at a distance of 5 cm.

Answer = counts per minute

[1]

(d) The student considers the risks of doing experiments with radioactive sources.

He does experiments with two radioactive sources, **A** and **B**.

He writes down his conclusions about the sources in the table below.

Radioactive material	State	Distance from source	Irradiation risk	Contamination risk
A	solid	1 m	high	none
A	solid	4 m	low	none
B	gas	1 m	very high	high
B	gas	4 m	high	high

Describe the difference in the risks for irradiation and contamination for **A** and **B**.

[4]

Total Marks for Question Set 20: 11

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