

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

Question Set 13

1

A teacher measures the activity of different radioactive isotopes.

Fig. 1.1 is a graph of her results for isotope A.

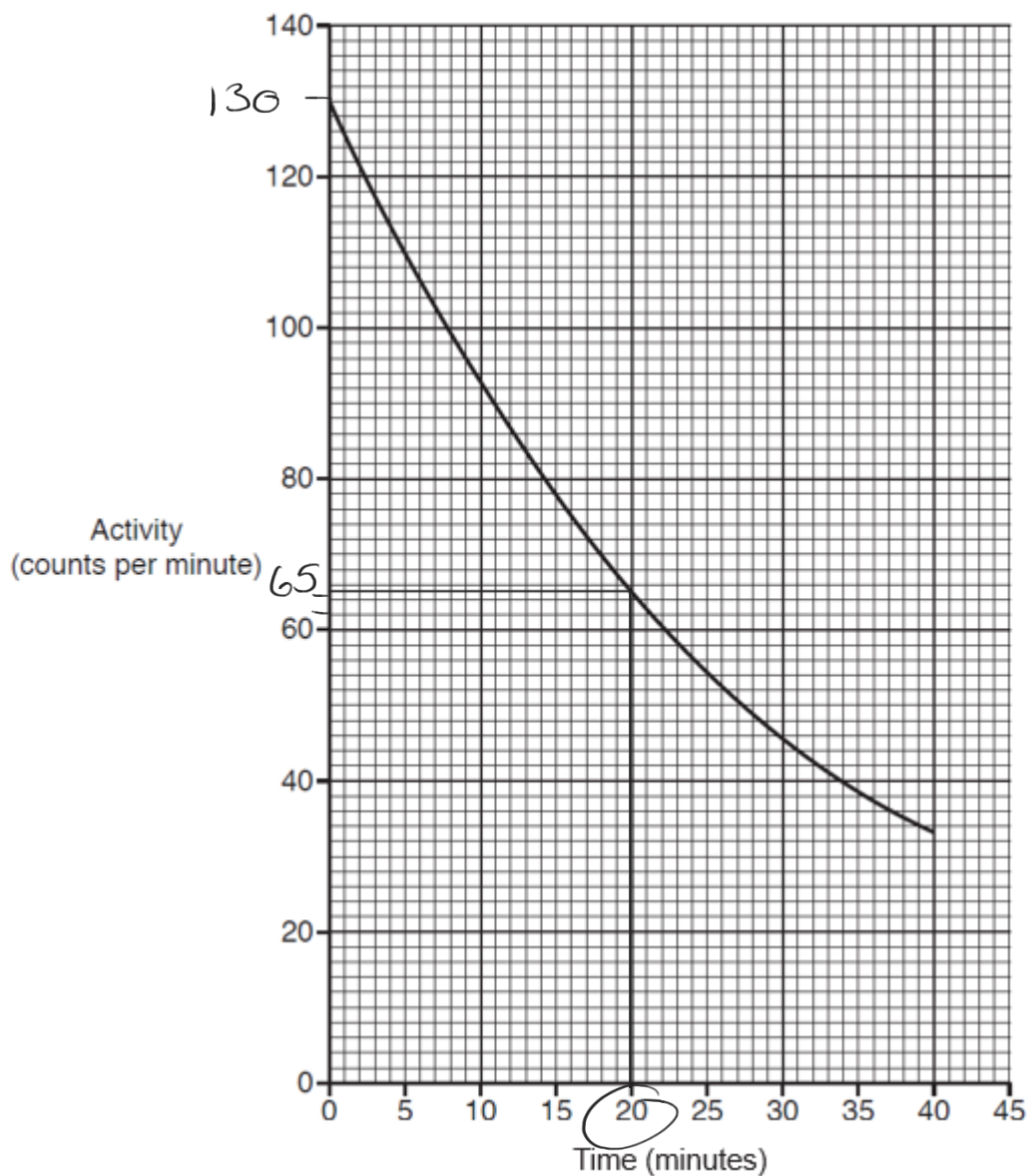


Fig. 1.1

(a) Use Fig. 1.1 to calculate the half-life of isotope A.

Show your working on the graph in Fig. 1.1.

* Assuming
no
background
radiation *

Half-life = 20 minutes

[2]

- (b) The teacher measures the activity of isotope **B**.
She starts taking activity measurements after 20 minutes.

Table 1.1 shows her results for isotope **B**.

Time (minutes)	Activity (counts per minute)
0	
10	
20	84
30	64
40	52
50	40
60	32
70	25
80	20
90	16

Table 1.1

Predict the activity of isotope **B** at 0 minutes.

Use the information in **Table 1.1** to help you.

Activity =¹²⁸.....counts per minute

[2]

$$t = 30 \quad A = 64$$

$$t = 60 \quad A = 32$$

$$\text{So } T_{1/2} = 30$$

So $t=0$ should be double $t=30$

$$t=0 \quad A = 64 \times 2 = 128$$

(c) The teacher measures the activity of isotope C.

Fig. 1.2 is a graph which shows how activity varies with time for isotope C.

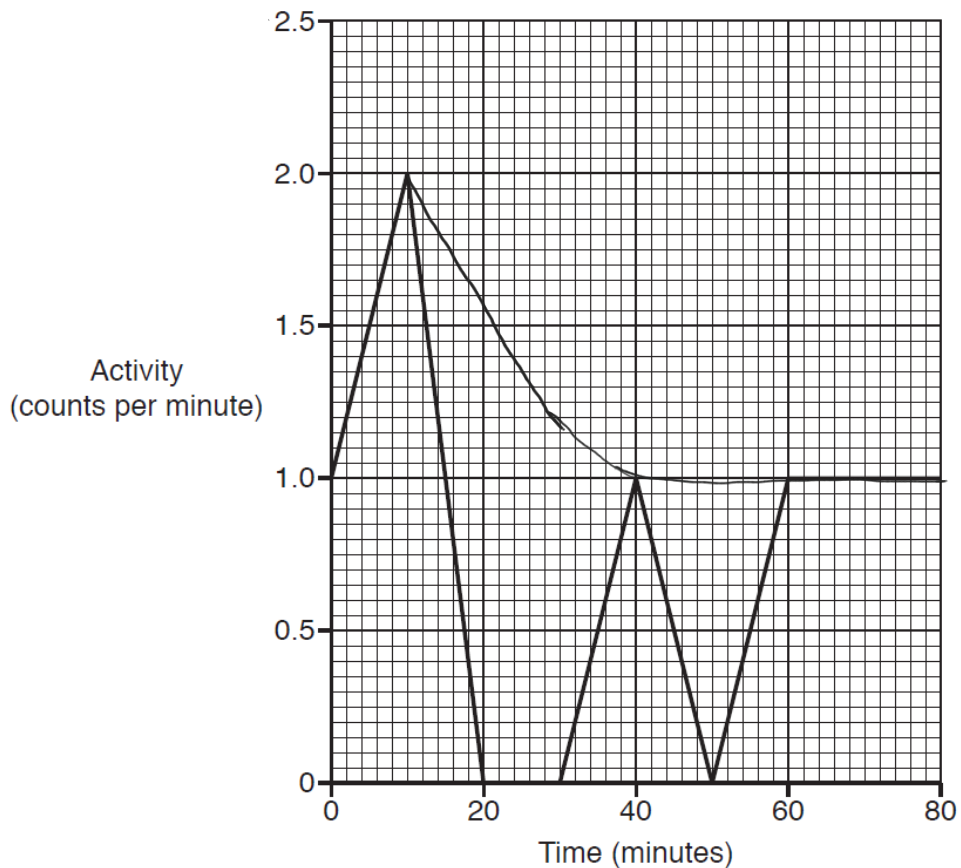


Fig. 1.2

A student makes two conclusions from the graph in Fig. 1.2:

Conclusion 1: I think the results are very inaccurate.
The isotope stops being radioactive and then gets more radioactive again.

Conclusion 2: I do **not** think the isotope has a half-life.

Is the student correct?

Evaluate **each** conclusion and explain your answer.

conclusion 1

[2]

Radioactivity is a random process \therefore the isotope decays randomly and may not show an obvious pattern. This lack of pattern highlights that the isotope is randomly decay and \therefore sometimes decays a lot in eg. minute 12 but not at all at minute 20.

conclusion 2

All isotopes have a half-life, however this experiment may have to be longer to show an apparent half life / trend.

Total Marks for Question Set 13: 6

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