12 (a) The decay of a sample of a radioactive isotope is said to be random and spontaneous.

Explain what is meant by the decay being:

  (i) *random*

    ....

    .... [1]

  (ii) *spontaneous*.

    ....

    .... [1]

(b) A radioactive isotope X has a half-life of 1.4 hours.

Initially, a pure sample of this isotope X has an activity of 3.6×10^5 Bq.

Determine the activity of the isotope X in the sample after a time of 2.0 hours.

activity = ... Bq [3]

(c) The variation with time t of the actual activity A of the sample in **(b)** is shown in Fig. 12.1.
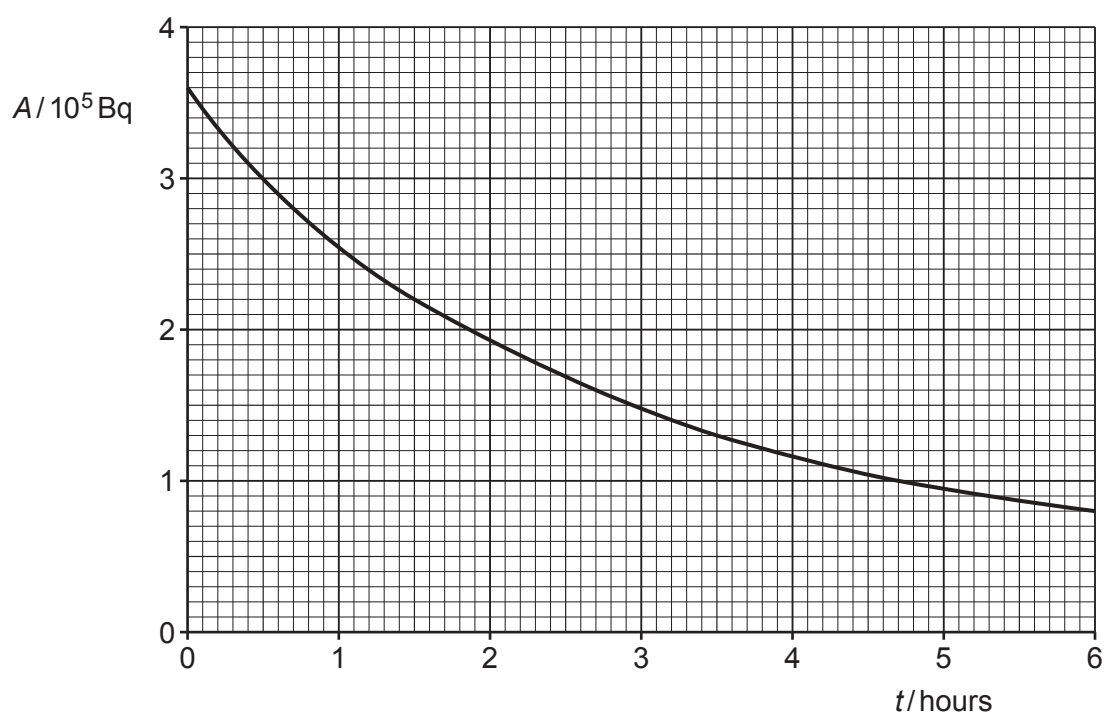

Fig. 12.1

(i) The initial activity of isotope X in the sample is 3.6×10^5 Bq.

Use information from **(b)** to sketch, on the axes of Fig. 12.1, the variation with time t of the activity of a pure sample of isotope X. [1]

(ii) Suggest an explanation for any difference between the actual activity of the sample shown in Fig. 12.1 and the curve you have drawn for the activity of isotope X.

....

....

.... [2]

[Total: 8]

28

BLANK PAGE