4 Cobalt-60 is a radioactive isotope of cobalt.
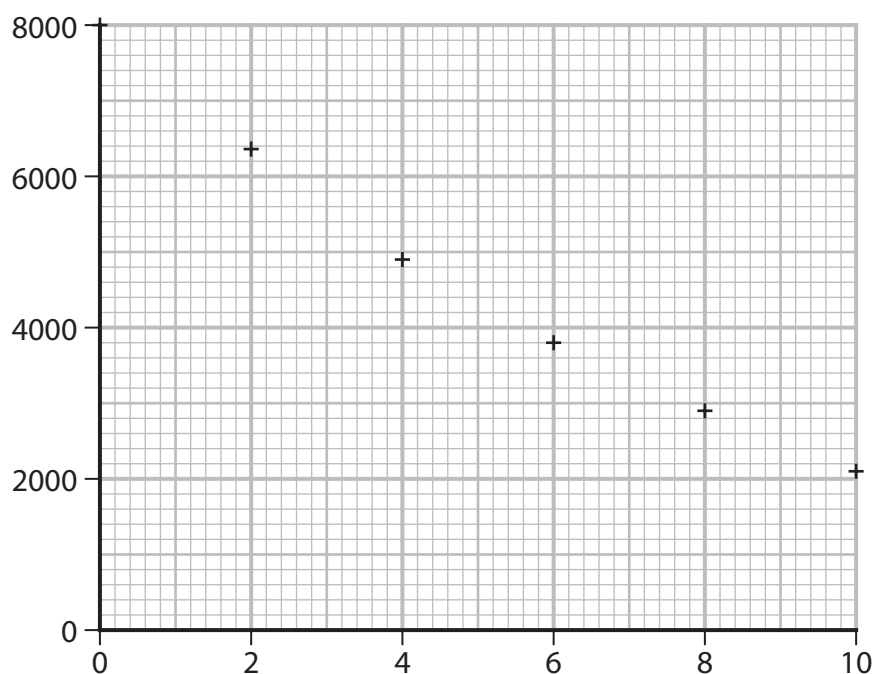
The table gives the activity of a sample of cobalt-60 over a period of 10 years.

Time in years	Activity
0	8000
2	6350
4	4900
6	3800
8	2900
10	2100

(a) Give a suitable unit for activity.

(1)

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(b) The graph shows the data.

(i) Label both axes.

(1)

(ii) Draw the curve of best fit.

(1)

(iii) Use the graph to determine the half-life of cobalt-60.

(2)

half-life = ... years

(iv) Estimate the time taken for the activity to decrease to $\frac{1}{8}$ of its initial value.

(2)

time = ... years

(c) Cobalt-60 is produced when a neutron is absorbed by the nucleus of a stable atom of cobalt-59.

The nuclei of these two isotopes can be represented as

$$^{60}_{27}\text{Co} \qquad ^{59}_{27}\text{Co}$$

Describe a similarity and a difference for the nuclei of these two isotopes of cobalt.

(2)

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(d) Cobalt-60 decays by beta emission.

Describe what happens to the nucleus of a cobalt-60 atom during beta decay.

(2)

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(e) Cobalt-60 also emits gamma radiation.

Cobalt-60 is produced in a nuclear reactor.

Discuss the hazards involved and the precautions taken when disposing of cobalt-60.

(4)

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(Total for Question 4 = 15 marks)