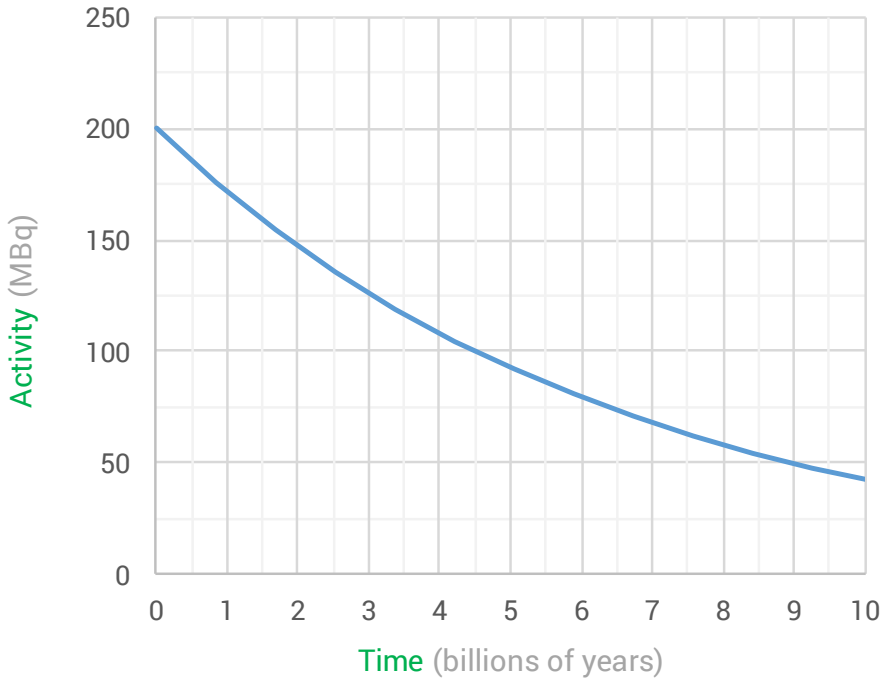
0 1 The below graph shows how the activity of a sample of uranium-238 changes with time.



0 1 . 1 The initial activity of this sample is 200 MBq (1 MBq = 10^6 Bq).
What is meant by the activity of a source?

[2 marks]

0 1 . 2 Uranium-238 has an exceptionally long half-life.
Explain what is meant by the half-life of a substance.

[2 marks]

0 1 . 3 Using information from the graph, determine the half-life of uranium-238.

Half-life = _____ billion years

[2 marks]

0 2

Techentium-99m is an important isotope in medical imaging.
The half-life of technetium-99m is 6 hours.

0 2 . 1

A fresh sample of technetium-99m is prepared in a hospital.
What fraction of this sample will have **decayed** after 18 hours?

Answer = _____

[3 marks]

0 2 . 2

A different sample of technetium of mass 128 mg is prepared on March 3rd at midday.

How much of this technetium will be remaining on March 5th at the same time?

Mass remaining = _____ mg

[3 marks]

0 3

To estimate the age of rocks, scientists sometimes compare the amount of potassium-40 the amount of argon-40 they contain.

They assume that, when the rock was just formed, it contained no argon (argon is a gas which could escape from molten rock).

Potassium-40 has a half-life of 1.3×10^9 years, and it decays to form argon-40, which is stable.

0 3 . 1

The ratio of potassium-40 to argon-40 in a particular rock is 1:1.
Estimate the age of the rock.

Age = _____ years

[2 marks]

0 3 . 2

In a different rock, the ratio of potassium-40 to argon-40 is 1:7.
Show that it is approximately 3.9 billion (3.9×10^9) years old.

[3 marks]