9 (a) State what is meant by the *binding energy* of a nucleus.

....

....

.... [2]

(b) Data for two isotopes of uranium are given in Fig. 9.1.

isotope	binding energy per nucleon / MeV	binding energy / MeV
uranium-235	7.59	....
uranium-238	....	1802

Fig. 9.1

(i) State what is meant by *isotopes*.

....

....

.... [2]

(ii) Complete Fig. 9.1. [2]

(c) Uranium-235 has a half-life of 7.1×10^8 years.

(i) Show that the decay constant λ of uranium-235 is $3.1 \times 10^{-17}\,s^{-1}$.

[1]

(ii) A sample of uranium-235 has an activity of 5.0×10^3 Bq.

Calculate the mass of the sample.

mass = ... g [3]

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