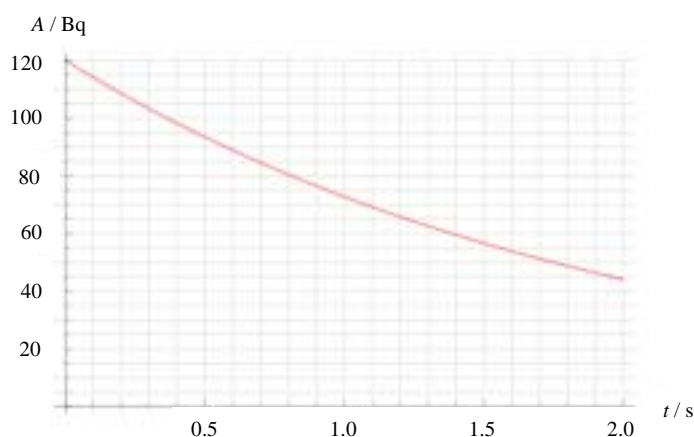


Support Worksheet – Topic 6, Worksheet 5

- 1 a** The half-life of an isotope of mass number 234 is 4.5×10^9 yr. Calculate the initial activity of a freshly prepared sample of 12 g of this isotope. [3]
- b** Suggest how your calculation in **a** allows for the determination of a very long half-life. [2]
- 2** A radioactive isotope has a half-life of 22 s. Calculate the time after which the activity of a sample is reduced to 35% of the initial activity. [3]
- 3** An unstable isotope X decays into a stable isotope Y. Initially no nuclei of isotope Y are present. The half-life of isotope X is 2.2 minutes. Calculate the time at which the ratio of the number of Y nuclei to X nuclei is 1.4. [3]
- 4** The graph below shows how the activity (in Bq) of a radioactive sample varies with time (in s).



The energy released in one decay is 0.50 MeV.

- a** State what is represented by the area under the curve from $t = 0$ to $t = 2$ s. [1]
- b** Estimate the average power emitted by the radioactive sample from $t = 0$ to $t = 2$ s. [3]