7 A medical treatment makes use of a sample of americium-240 that emits alpha particles to kill cancer cells. In one such treatment, a total energy of 1140 J is applied to a tumour of mass 0.500 kg. At the start of the treatment, the mass of the americium-240 sample is 2.00×10^{-9} kg.

Americium-240 has a half-life of 50.2 hours, and it decays by emitting an alpha particle of kinetic energy 5.71 MeV.

(a) Determine

(i) the initial activity of the americium-240 sample,

activity = ... Bq [2]

(ii) the number of decays required for the treatment,

number of decays = ... [2]

(iii) the duration of the treatment.

duration = ... h [2]

(b) A student states that "radioactive materials with a long half-life have low activity".

Explain whether the statement is correct.

.....

..... [1]