10 (a) Uranium-235 captures a neutron and undergoes nuclear fission in a chain reaction.

The equation shows a possible nuclear fission reaction.

$$^{235}_{92}U + {}^{1}_{0}n \rightarrow {}^{97}_{40}Zr + {}^{135}_{52}Te + x\,{}^{1}_{0}n$$

Calculate x, the number of neutrons released by this fission reaction.

(2)

x = ...

(b) Describe what is meant by a **chain reaction**.

(3)

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(c) Iodine-129 is an isotope found in radioactive waste from nuclear power stations.

Iodine-129 has a half-life of approximately 15 million years.

A sample of iodine-129 has an activity of 72 kBq.

Show that the time required for the sample to have an activity less than 5 kBq is approximately 60 million years.

(3)

(d) Some radioactive waste from nuclear power stations has a very long half-life.

Discuss precautions that must be taken when disposing of this radioactive waste.

(5)

(Total for Question 10 = 13 marks)