

- 5 (a) The table gives some statements about different parts of a nuclear reactor.

Place ticks (✓) in the boxes to show which statements are about the moderator and which statements are about a control rod in a nuclear reactor.

(3)

	Moderator	Control rod
absorbs excess neutrons		
can be made of boron		
can be made of water or graphite		
is lowered into or raised from the reactor core to adjust the rate of reaction		
reduces the speed of neutrons so they are more likely to cause fission		

- (b) Describe the role of shielding around a nuclear reactor.

(2)

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- (c) A uranium fuel rod is made from fuel pellets that contain uranium-235 and uranium-238.

Only uranium-235 undergoes nuclear fission in the reactor core.

Energy is released when the uranium-235 nuclei undergo fission.

The box gives some data about a typical uranium fuel pellet.

Total mass of uranium in fuel pellet	0.0088 kg
Percentage (by mass) of uranium-235 in fuel pellet	3.0%
Mass of uranium-235 atom	3.90×10^{-25} kg
Total energy released from fuel pellet due to fission	2.17×10^{10} J

- (i) Calculate the number of uranium-235 atoms in the fuel pellet.

(2)

number of uranium-235 atoms =

- (ii) Calculate the energy released when the nucleus of a single atom of uranium-235 undergoes fission.

(2)

energy released = J

(Total for Question 5 = 9 marks)

