

Question number	Answer	Notes	Marks
11 a	91; 56; <div style="border: 1px solid red; padding: 5px; width: fit-content; margin: 10px auto;"> $\begin{array}{ccccccc} \boxed{235} & & \boxed{1} & & \boxed{142} & & \boxed{91} \\ \text{U} & + & \text{n} & \rightarrow & \text{Ba} & + & \text{Kr} \\ \boxed{92} & & \boxed{0} & & \boxed{56} & & \boxed{36} \end{array} + 3 \begin{array}{c} \boxed{1} \\ \boxed{0} \end{array} \text{n}$ </div>		1 1
b	Three FROM – MP1. Neutrons released; MP2. neutrons slowed by moderator; MP3. Can be absorbed by other (U) nuclei ; MP4. Causing further fissions;	ignore comments about control rods collide or react for absorb if MP3 or 4 or both not given then award 1 mark for a description of a first absorption	3
c i	Correct labels for – Control rods; Shielding;	Accept <ul style="list-style-type: none"> lines with or without arrow heads (in either direction) any part of control rod (black in diagram) any part of external box for shielding 	1 1 2

ii	Two from: MP1. Reactor material / waste is radioactive ; MP2. (radiation) ionises cells/ tissues / organs / body or causes cancer; MP3. radiation is very penetrating;	allow damages for ionises NOT ALLOW bald 'it is dangerous' do not award marks for 'shielding prevents escape of radiation'/eq	
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(Total for Question 11 = 9 marks)