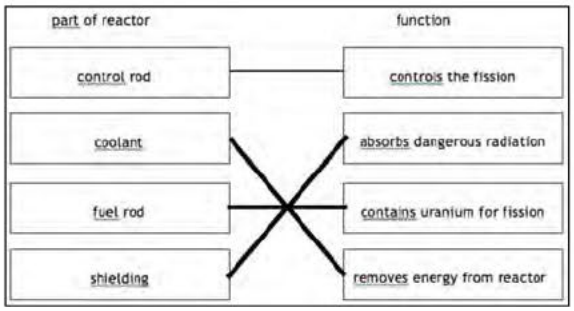
Question number	Answer	Notes	Marks
1 (a)	All lines correct = 2 marks Any correct added line = 1 mark  		2
(b)	kinetic energy;		1
(c)	slows neutrons/reduces KE of neutrons; and any one from (which)allows fission to continue; (which) causes (induced) fission; (so) neutrons can be absorbed by uranium;	makes the neutrons thermal/eq ignore moderator absorbs neutrons ignore • neutrons collide with uranium • successful collisions	2
(d)	any three of - MP1 each fission (of a nucleus) caused by a single neutron; MP2 each fission releases more than one neutron; MP3 excess neutrons can speed up the reaction; MP4 (more) fissions release excess energy; MP5 control rods absorb neutrons; MP6 control rods regulate the rate of fission/reaction;	e.g. a nucleus splits when neutron has been absorbed ignore 'block'/ eq allow control rods speed up/slow down rate of fission	3

Total 8 marks

Question number	Answer	Notes	Marks
2 (a)	any 3 of: MP1. neutron absorbed by (U) **nucleus**; MP2. (U nucleus) splits; MP3. (producing 2) daughter nuclei; MP4. extra **neutrons** released;	 accept collides with/hits/bombards/eqn for neutron condone breaks up must be plural reject 'daughter cells' for MP3 must be plural	3
(b)	kinetic (energy)	accept phonetic spellings e.g. 'kenetic'	1

Total 4 marks

Question number		Answer	Notes	Marks
3 (a)		A description to include any 5 of MP1 nucleus absorbs neutron OR nucleus hit by neutron; MP2 splits into (two) fragments/parts OR daughter atoms OR daughter nuclei; MP3 extra neutrons released; MP4 (kinetic) energy released; MP5 released neutrons hit further nuclei OR uranium nuclei; MP6 moderator slows down the neutrons/ makes it more likely for a neutron to be absorbed; MP7 control rods absorb extra neutrons; MP8 idea that control rods help prevent a "runaway" chain reaction;	Correct process using consistently incorrect particle instead of neutron (e.g. electron) = max 4 NB uranium, U-235 or nucleus must be mentioned Reject cells, molecules, more uranium Ignore heat allow atoms OR uranium atoms	5
(b)		kinetic/movement energy;		1
(c)		Idea that the shielding **absorbs** radiation / particles / energy;	Allow "stops radiation /particles from escaping" Ignore "radioactvity" escaping	1
			Total	**12**