Mark Schemes

Q1.

Question Number	Answer	Mark
(i)	**D gamma** ***A*** *is not correct because alpha cannot pass through and out of the body* ***B*** *is not correct because beta plus cannot pass through and out of the body* ***C*** *is not correct because beta minus cannot pass through and out of the body*	**(1)** **AO1**

	Answer	Additional guidance	Mark
(ii)	decays too quickly to give a reading (1)	accept (half-life) not long enough for reading to be taken Ignore disappear after 12 min	**(1)** **AO1**

	Answer	Additional guidance	Mark
(ii)	stays in the body too long (1)	accept could harm/damage other organs patients stay radioactive for too long so the patient does not get too high a dose of radiation	**(1)** **AO1**

	Answer	Additional guidance	Mark
(iii)	**Two** from: shielding (1) time limiting exposure (1) distance limiting exposure (1) wear PPE / protective clothing (1)	 accept stand behind barriers / store (source) in lead box radiation monitoring badges leave the room/ go outside/stay away from the patient / use tongs lead aprons / gloves ignore goggles / masks	**(2)** **AO1**

Q2.

Question number	Answer	Additional guidance	Mark
	same number of protons (1) different number of neutrons (1)	same atomic number different mass number	**(2)** **AO2**

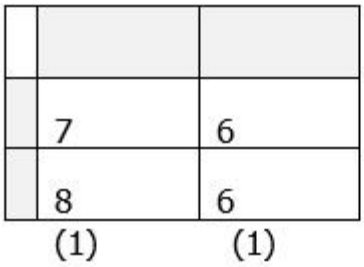
Q3.

Question number	Answer	Additional guidance	Mark
	split (1) neutrons (1) chain (1)	in this order	**(3)**

Q4.

Question number	Answer	Additional guidance	Mark
	mass in g / time in days 1600 / 0 800 (1) / 29 400 / 58 (1)	numbers in correct boxes	(2)

Q5.

Question Number:	Answer	Additional guidance	Mark
		one mark for each column must have both numbers in a column correct to get the mark	**(2)**

Q6.

	Answer	Acceptable answers	Mark
	An explanation linking two of the following points • absorb (1) • neutrons (1) • (influences) chain reaction / rate of reaction (1)	Accept reverse arguments collects/removes/takes away slows down/changes	**(2)**

Q7.

Question number	Indicative content	Mark
*	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. **Dangers of exposing people to radioactive sources/radiation.** • it is ionising • may cause cancer • may destroy /kill cells • can mutate DNA • can burn the skin **Protection of hospital staff using radioactive sources/radiation.** • use tongs to carry radioactive sources • use lead containers to store sources • stay at a distance from radioactive sources • use sources for as short a time as possible • wear (lead lined) protective clothing (PPE) • give treatments from behind a shield /wall • wear a radiation badge (dosimeter)	**(6)** **AO1**

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	Demonstrates elements of physics understanding, some of which is inaccurate. Understanding of scientific, enquiry, techniques and procedures lacks detail. (AO1) Presents a description which is not logically ordered and with significant gaps. (AO1)
Level 2	3–4	Demonstrates physics understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas, enquiry, techniques and procedures is not fully detailed and/or developed. (AO1) Presents a description of the procedure that has a structure which is mostly clear, coherent and logical with minor steps missing. (AO1)
Level 3	5–6	Demonstrates accurate and relevant physics understanding throughout. Understanding of the scientific ideas, enquiry, techniques and procedures is detailed and fully developed. (AO1) Presents a description that has a well-developed structure which is clear, coherent and logical. (AO1)

Level	Mark	Additional Guidance	General additional guidance – the decision within levels e.g. - At each level, as well as content, the scientific coherency of what is stated will help place the answer at the top, or the bottom, of that level.
	0	No rewardable material.	
Level 1	1–2	Additional guidance At least one isolated fact about the dangers of radiation and/or protection from radiation	Possible candidate responses it's ionising causes cancer burns you kills cells mutates DNA wear a radiation badge use tongs work from behind a shield use protective clothing
Level 2	3–4	Additional guidance simple explanation of the dangers of radiation and a fact about protection or reverse OR detailed explanation of the dangers of radiation or protection from radiation	Possible candidate responses radiation is ionising and can kill cells so wear a radiation badge **or** use tongs and stay at a distance from radiation source as it can cause cancer **or** use tongs to stay at a distance from radiation sources and wear a radiation badge
Level 3	5–6	Additional guidance detailed explanation of the dangers of radiation and protection from radiation	Possible candidate responses radiation is ionising and can kill cells **and** use tongs and stay at a distance from the radiation source