

Question	Answers	Extra information	Mark	AO / Specification reference
01.1	the iodine-131 has decayed into a different element		1 1	AO3 6.4.2.1 6.4.2.2
01.2	it is random		1	AO3 6.4.2.1
01.3	eight days	accept eight days with no working for two marks accept indication of having drawn on the graph takes eight hours for one mark	2	AO2 6.4.2.3
01.4	below		1	AO3 6.4.2.3
02.1	A		1	AO1 6.4.2.1
02.2	C		1	AO1 6.4.2.1
02.3	α		1	AO1 6.4.2.1
02.4	Becquerel/Bq	do not accept bq or BQ	1	AO1 6.4.2.1
02.5	is the number of decays recorded each second by a detector/Geiger-Muller tube	accept other named type of detector	1	AO1 6.4.2.1

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03.1	six hours		1	AO2 6.4.2.3								
03.2	250 it is another half-life		1 1	AO2 6.4.2.3								
03.3	radioactive decay is a random process		1	AO3 6.4.2.1								
03.4	alpha radiation does not go through the human body/alpha radiation is very ionising/harmful to human cells		1	AO2 6.4.2.4								
04.1	<table border="1"> <thead> <tr> <th>Type</th> <th>Range in air</th> </tr> </thead> <tbody> <tr> <td>gamma</td> <td>> 3 m</td> </tr> <tr> <td>beta</td> <td>1 m</td> </tr> <tr> <td>alpha</td> <td>< 10 cm</td> </tr> </tbody> </table>	Type	Range in air	gamma	> 3 m	beta	1 m	alpha	< 10 cm	all correct for two marks one correct for one mark	2	AO1 4.4.2.1
Type	Range in air											
gamma	> 3 m											
beta	1 m											
alpha	< 10 cm											
04.2	no the radiation that is the most ionising (is alpha) (which) has the smallest range in air		1 1 1	AO2 4.4.2.1								
04.3	the aluminium absorbs alpha and beta radiation (so the activity goes down) gamma is not stopped by the aluminium (so you can still detect radiation)		1 1	AO2 4.4.2.1								

Question	Answers	Extra information	Mark	AO / Specification reference
04.4	nitrogen – beta radon – alpha barium – gamma		2	AO3 6.4.2.2
05.1	${}_{-1}^0\text{X}$		1	AO2 6.4.2.2
05.2	beta/ β		1	AO2 6.4.2.2
05.3	the time it takes for the activity/mass of a radioactive material to halve		1	AO1 6.4.2.3
05.4	$\frac{80}{2} = 40$ counts per minute		1	AO2 6.4.2.3
05.5	sodium-24 has a shorter half-life than magnesium-24		1	AO3 6.4.2.3
06.1	contamination — the unwanted presence of radioactive atoms on other materials irradiation — process of exposing an object to nuclear radiation		2	AO1 6.4.2.4
06.2	An irradiated object does not become radioactive		1	AO1 6.4.2.4
06.3	yes eating things that have been irradiated does not make you radioactive		1 1	AO3 6.4.2.4

Question	Answers	Extra information	Mark	AO / Specification reference
07.1	alpha		1	AO2 4.4.2.2
07.2	beta particle		1	AO2 4.4.2.2
07.3	14 7		1 1	AO2 6.4.2.2
07.4	${}_{92}^{238}\text{U} \rightarrow {}_{90}^{234}\text{Th} + {}_2^4\text{He}$		1 1	AO2 6.4.2.2
08.1	gamma, beta, alpha		1	AO1 6.4.2.1
08.2	damaged/killed		1	AO1 6.4.2.4
08.3	peer review		1	AO1 6.4.2.1
08.4	for example: put the source next to a Geiger counter start by putting paper between the source and the counter if the count rate goes down, the source is emitting alpha radiation repeat with aluminium if the count rate goes down, the source is emitting beta radiation repeat with lead if the count rate goes down, the source is emitting gamma radiation		6	AO1 6.4.2.1

Question	Answers	Extra information	Mark	AO / Specification reference
09.1	thermometer		1	AO1 6.1.2.1
09.2	protect work surface		1	AO3
09.3	time (it takes the water to cool down by a certain amount)		1	AO2 6.1.2.1
09.4	the (independent) variable is categoric/words		1	AO1 6.1.2.1
09.5	polystyrene		1	AO3 6.1.2.1
09.6	repeat experiment/heat water to a set temperature	accept other sensible answers	1	AO3 6.1.2.1