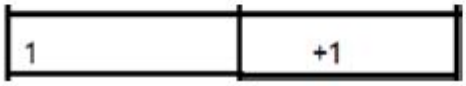
Practice Question Set For GCSE
Subject : Physics
Paper-1 Topic : 6_ Radioactivity

Name of the Student:_____
Max. Marks : 25 Marks **Time : 25 Minutes**

Mark Schemes
Q1.

Question Number	Answer	Mark
(i)	C  **A** is incorrect the proton has a mass of 1 not 0 **B** is incorrect the proton has a mass of 1 not 0 **D** is incorrect the proton has a charge of +1 not -1	(1) AO1

Question Number	Answer	Additional guidance	Mark
(ii)	substitution (1) ratio = $\frac{10^{-10}}{10^{-15}}$ evaluation (1) 10^{5}	$10^{-10} : 10^{-15}$ accept suitable equivalent ratios e.g. $1 \times 10^{5} : 1$ $1 : 10^{-5}$ or $10^{5} : 1$ 1: 0.00001 or 100000:1 allow 1 mark for inverted ratios e.g. $10^{-15} : 10^{-10}$ 0.00001:1 or 1:100000 award full marks for the correct answer with no working	(2) AO2

Question Number	Answer	Additional guidance	Mark
(iii)	an explanation linking same number / amount of (1) electrons and protons (1)	 equal number / amount of allow balanced (number / amount of) negative and positive charges ignore (neutral) neutrons reject positive/negative neutrons for 2nd marking point	(2) AO1

Q2.

Question Number	Answer	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. **AO3 and AO2 (6 marks)** **AO3** • most go straight through to P • some are deflected through small angles to Q • few have deflections greater than 90° to R • or are even reflected (bounce back off the foil) to R **AO2** • alpha positive is repelled by positive nucleus • atom being mostly empty space • atoms have a small nucleus • nucleus has a big mass / density • +ve charge concentrated into a very small space	**(6)**

Level	Mark	Descriptor
	0	• No awardable content
Level 1	1–2	• Interpretation and evaluation of the information attempted but will be limited with a focus on mainly just one variable. Demonstrates limited synthesis of understanding. (AO3) • The explanation attempts to link and apply knowledge and understanding of scientific ideas, flawed or simplistic connections made between elements in the context of the question. (AO2)
Level 2	3–4	• Interpretation and evaluation of the information on both variables, synthesising mostly relevant understanding. (AO3) • The explanation is mostly supported through linkage and application of knowledge and understanding of scientific ideas, some logical connections made between elements in the context of the question. (AO2)
Level 3	5–6	• Interpretation and evaluation of the information, demonstrating throughout the skills of synthesising relevant understanding. (AO3) • The explanation is supported throughout by linkage and application of knowledge and understanding of scientific ideas, logical connections made between elements in the context of the question. (AO2)

Summary for guidance			
Level	**Mark**	**Additional Guidance**	**General additional guidance – the decision within levels** Eg - 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 unlinked statement from the diagram or table or knowledge of the atom	Possible candidate responses most particles go to P *(from table)* OR particles refract/bend to Q *(from diagram)*
Level 2	3–4	Additional guidance One link between any TWO of diagram, table, knowledge about atoms.	Possible candidate responses Most particles go straight through (the gold) to P *(from table and diagram)* OR Most particles go to P which means an atom is mainly space *(from table and knowledge)* OR particles are reflected because there is a nucleus (*diagram and knowledge)*
Level 3	5–6	Additional guidance One link between diagram **AND** table **AND** knowledge about atoms	Possible candidate responses Most particles go straight through (the gold) to P which means an atom is mainly space OR A few particles reflected back to R which means an atom has a nucleus

Q3.

Question number	Answer	Additional guidance	Mark
(i)	An explanation to include; there is no aluminium to absorb β particles (1) (therefore) more β particles reach the G-M tube (1)	 aluminium absorbs/stops/blocks beta particles accept reverse arguments accept radiation for beta particles	(2) AO2

Question number	Answer	Additional guidance	Mark
(ii)	(idea of) background radiation	a named source of background radiation	(1) AO3

Question number	Answer	Additional guidance	Mark
(iii)	becquerel	accept Bq accept close spelling	(1) AO1

Q4.

	Answer	Acceptable answers	Mark
(a)(i)	☒ **A** electron		(1)
(a) (ii)	suggestion to include **two** of • the ionisation is different (1) • correct difference in ionisation (1) • the masses are different (1) • alpha is bigger than beta (1) • alpha hits more (air) particles (1) • alpha loses	alpha more ionising (than beta) scores 2 marks RA (heavier for bigger) RA RA IGNORE references to penetration	(2)

	its energy in shorter distance (1)		
(b)	☒ **A** gamma radiation		**(1)**
(c)(i)	A description linking the following: • neutron decays / changes / becomes (1) • (neutron) into proton (1) • (plus an) electron (1)	quark changes (quark changes) from down to up / d to u e^- (do not accept β^-) accept n and p for neutron and proton $n > p + e^-$ scores 3 marks IGNORE references to atomic and mass numbers; unstable nuclei; too many neutrons; gamma emitted	**(3)**
(c)(ii)	An explanation linking **three** of the following: • mass number doesn't change (1) • (because) same number of nucleons / quarks (1) • atomic number goes up by one (1) • (because) there is an extra proton (1)	emitted electron mass is negligible proton and neutron have same mass a neutron has (decayed in)to a proton	**(3)**