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

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**Name of the Student**:_____
**Max. Marks : 18 Marks** **Time : 18 Minutes**

Mark Schemes
**Q1.**

| | **Answer** | **Acceptable answers** | **Mark** |
|---|---|---|---|
| **(a)(i)** | Any **two** of: Gamma is a wave (1)<br>Alpha is a helium nucleus (1)<br>Alpha is charged (1)<br>Alpha has a mass (1)<br>Gamma penetrates further/ highly (1)<br>Gamma weakly ionising (1)<br>Gamma travels faster (1) | Reverse arguments em radiation<br>Gamma has no charge<br>Gamma has no mass<br>examples of penetrating power alpha highly ionising<br>ignore vague comments eg stronger<br>Ignore uses and dangers | **(2)** |
| **(b)(i)** | D | | **(1)** |
| **(b)(ii)** | B | | **(1)** |
| **(c)** | An explanation linking: electron(s) (1) is/are lost/gained (1) | do not allow positive electron knocked off / removed/ released | **(2)** |

| | | **Indicative Content** | **Mark** |
|---|---|---|---|
| **QWC** | ***(d)** | An explanation including some of the following points:<br>Radiation from the front of the lens<br>Alpha particles absorbed by glass<br>Beta particles do not penetrate glass<br>Gamma rays pass through glass<br>Background radiation varies<br>There is a large difference in size between front and back counts<br>Radiation detected is gamma rays only<br>Radiation from side | **(6)** |

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|---|---|---|---|
| | | of the lens<br>Alpha particles cannot penetrate aluminium<br>Beta particles are absorbed by aluminium<br>Gamma rays pass through aluminium<br>There is a small/no difference in size between front and side counts<br>Perhaps a few gamma rays absorbed by aluminium<br>Background radiation varies<br>Likely to contain gamma rays only<br>May be different from front count due to random nature of emissions Radiation from the back of the lens<br>Alpha particles absorbed by coating and/or glass<br>Beta particles are emitted the from rear surface<br>Gamma rays emitted from radioactive glass<br>There is a large difference in size between front and back counts<br>Background radiation varies<br>Radiation is both beta particles and gamma rays<br>Difference between front and back counts due to beta particles | |
| **Level** | **0** | No rewardable content | |
| **1** | **1 - 2** | • a limited explanation mentioning two unrelated points, but without linking them properly, e.g. beta particles are stopped by thick aluminium, there is most radiation behind the lens<br>• the answer communicates ideas using simple language and uses limited scientific terminology<br>• spelling, punctuation and grammar | |

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|---|---|---|
| | | are used with limited accuracy |
| **2** | **3 - 4** | • a simple explanation mentioning some points with an appropriate linkage to **one** of the readings e.g. no beta particles escape forwards because the glass absorbs them OR only gamma rays escape to the side because the aluminium stops alpha and beta particles<br>• the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately<br>• spelling, punctuation and grammar are used with some accuracy |
| **3** | **5 - 6** | • a detailed explanation mentioning some of the points with appropriate linkage to a comparison of at least **two** of the readings e.g. no beta particles escape forwards because the glass absorbs them, but beta particles can escape backwards so that count is higher OR only gamma rays can get through the glass and the thick aluminium, so the front and side counts are about the same<br>• the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately<br>• spelling, punctuation and grammar are used with few errors |

Total for question = 12 marks

**Q2.**

| Question Number | Answer | Acceptable answers | Mark |
|---|---|---|---|
| **(i)** | **C**  | | **(1)** |

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| Question Number | Answer | Acceptable answers | Mark |
|---|---|---|---|
| **(ii)** | An explanation linking any three of the following:-<br><br>positron has a positive (charge) (1)<br><br>electron has a {negative (charge) / opposite charge(s) } (1)<br><br>these charges cancel out (1)<br><br>gamma rays /waves have no charge (1) | <br><br>positron has +1 / +e (charge)<br>positron charge is +<br><br>electron has -1 / -e (charge)<br>electron charge is –<br><br>neutralise / overall charge is zero<br><br>Accept for three marks:<br>electron and positron have equal and opposite charges which cancel out. | **(3)** |

| Question Number | Answer | Acceptable answers | Mark |
|---|---|---|---|
| **(iii)** | An explanation linking :<br><br>positron and electron have mass(before the annihilation) (1)<br><br>gamma (rays produced by annihilation) have energy (1)<br>(the equation shows) | <br><br><br><br>mass (of particles) becomes energy of gamma (rays) (2)<br><br>all the mass before the collision becomes the energy of the gamma (rays) after the particles have been annihilated (2)<br><br>$E=mc^2$ reference (1)<br>explained will get the other (1) | **(2)** |

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