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**LANGDON PARK SIXTH FORM**

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| **Subject: Physics** | **Year: Y13** | **Topic: 3.8.1 Radioactivity** |

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| ***What and Why*** “Why is radioactive decay a random process? What was the Rutherford scattering experiment? How has electron scattering allowed detailed analysis of the nucleus? How and why is radioactivity used in medicine? What are the benefits and risks of nuclear medicine?” |

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| **Key terms**  Activity  Alpha particle  Argon dating  Atomic number  Background radiation  Beta particle  Carbon dating  De Broglie wavelength | Decay constant  Electron  Electron capture  Electron scattering  Excited state  Exponential decay  Exponential function  Gamma ray  Ground state | Half life  Intensity  Ionising radiation  Mass number  Metastable state  Neutron  Nuclear density  Nucleon  Nucleus | Positron  Proton  Random decay  Rutherford scattering  Technitium-99m  Tracer  X-ray |

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| **Specification point** | **Pre-reading** | **Application and Assessment (date)** | **Home learning** | **Extension – Cultural Capital and Reading** |
| **3.8.1.1:** I can explain the Rutherford scattering experiment  **3.8.1.2**: I can use absorption techniques to identify radiation. Apply the inverse square law for - rays and the experimental verification. Describe what background radiation is and determine corrected count rates. Identify the benefits and risks of nuclear medicine.  **3.8.1.3:**  Recognise the random nature of radioactive decay and the constant decay probability of a given nucleus.  **3.8.1.4:** Determination of half-life from graphical decay data including decay curves and log graphs**.**  **3.8.1.4:** Interpret graph of *N* against *Z* for stable nuclei and possible decay mode.  Recognise the existence of nuclear excited states and γ ray emission. Discuss the use of technetium-99m as a γ source in medical diagnosis. | Use the Oxford AQA A2 textbook p.168 to 197. Look at other textbooks in the library for alternative ideas, explanations and diagrams.  **YouTube Videos:**  (1) [Stable & Unstable Nuclei | Radioactivity | Physics | FuseSchool](https://www.youtube.com/watch?v=UtZw9jfIxXM)  (2) [Rutherford Gold Foil Experiment - Backstage Science](https://www.youtube.com/watch?v=XBqHkraf8iE)  (3) [Radioactive tracers in medicine](https://www.youtube.com/watch?v=7mSR--zJGv0)    **Websites:**  <https://isaacphysics.org/concepts/cp_radioactive_decay>  <http://phet.colorado.edu/sims/html/rutherford-scattering/latest/rutherford-scattering_en.html> | **Practicals:**  (1) Required practical 12:  Investigating the inverse-square law for gamma rays    (2) Demonstrate ionizing radiation in a cloud chamber  (3) Investigate half-life with radioactive dice  **Assessment**:  Minitest on Radioactivity (3rd week Jan) | (1) Analyse data for the attenuation of  β-particles versus the layers of aluminum sheets  (2)Research the use of radioactive tracer in medicine (CPAC 5)    Make notes on each topic and complete the exam style practice questions | (1) What are the  benefits and risks of  radiotherapy  (2) What is carbon  Dating in paintings  **Reading:**  (1) The Shroud  By Ian Wilson  (2) Paradox: The Nine  Greatest Enigmas in  Physics  By Jim Al-Khalili |

**Pre-assessment content review**

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| I feel secure in | I need to focus on | My action plan |

**Pre-assessment skills review**

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| I feel secure in | I need to focus on | My action plan |

**Post-assessment review**

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| Weaknesses in content knowledge | Skills I need to focus on | My action plan |
| Retest / review – teacher and student comment | | |

**Revision planning**

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| Spec point | Notes complete | Revision materials | Past paper Qs | Timed conditions |
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