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| **Lesson Number: 26.8** |
| **Lesson Title: More about decay modes** |
| **Specification Reference** | **3.8.1.4** |
| **Learning Objectives** |
| Graph of *N* against *Z* for stable nuclei.Possible decay modes of unstable nuclei including α, β+, β− and electron capture.Changes in *N* and *Z* caused by radioactive decay and representation in simple decay equations.Questions may use nuclear energy level diagrams.Existence of nuclear excited states; γ ray emission; application e.g. use of technetium-99m as a γ source in medical diagnosis. |
| **Opportunities for Assessment** |
| Questions page 464 |
| **Starter:** | Slide #1 enables a discussion about what causes radioactive decay and what controls which type occurs – Ask “Why do they decay” or “What keeps a nucleus together” |
| **Main:** | Slide #2 is a description of the standard *N/Z* type graph and how to interpret an isotopes position on it – Shading regions as Beta plus, Beta minus helps students interpret this betterSlide #3 is an optional recap of Year 1 particles and forcesSlides #4 and #5 simply describe the *N/Z* relationship for isotopes up to and beyond 20Slide #6 reaffirms the selections rules from slide #2 – an possible activity is to have pupils draw out a graph using every 5th element in the periodic table then plot on isotopes and derive what their decay modes areSlide #7 shows more complex decay chains or series – If pupils have graphed an *N/Z* then it is interesting to plot this onto itSlide #8 explains the metastable state of technetium – This links nicely with lesson 26.7 and why it is safe to use as a medical tracer |
| **Plenary:** | Slide #9 is a summary |

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| **Homework:** | Questions page 464 |
| **Differentiation / Extension / S&C** |
| Decay chains and selection rules in detail – link to nuclear fission; research of metastable states |
| **Numeracy / Literacy** | **SMSC / Fundamental British Values** |
| Use of graphs and axis | N/A |
| **RESOURCES:** |
| None |
| **Risk Assessment** e.g. CLEAPSS card reference |
| None |
| **Working Scientifically (HSW)** |
| Examples of diagnostic uses of Technetium, page 465 |

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