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| **Lesson Number: 26.6** | | |
| **Lesson Title: The theory of radioactive decay** | | |
| **Specification Reference** | | **3.8.1.3** |
| **Learning Objectives** | | |
| Random nature of radioactive decay; constant decay probability of a given nucleus;      Use of activity,  Modelling with constant decay probability.  Questions may be set which require students to use    Half-life equation: *T*½  Determination of half-life from graphical decay data including decay curves and log graphs. | | |
| **Opportunities for Assessment** | | |
| Questions page 457 | | |
| **Starter:** | Slide #1 enables pupils to discuss quantum mechanics and the uncertainty inherent in this field of Physics – try to remove the preconception that this is due to a lack of knowledge but instead it is simply how the universe works! | |
| **Main:** | Slide #2 links activity to rate of change of particles and hence the decay constant  Slides #3 to #6 are a recap of exponential decay mathematics and use differentiation to derive the exponential decay formula – Whilst no needed for A-Level Physics this is included again as an essential understanding to why the formula has to have *e* in it  Slide #7 moves on from the derivation of the exponential formula to putting it in context with activity – It is worth showing that this formula works with *N* or *C*  Slide #8 is the essential skill of graphically finding the half-life of a sample and reducing uncertainty in the exercise.  Slide #9 is a derivation of the link between activity and half-life – The derivation need not be understood but ensure all pupils can find ln2 on a calculator | |
| **Plenary:** | Slide #10 is summary | |

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| **Homework:** | Questions page 457; Research Euler’s constant (ln2) | |
| **Differentiation / Extension / S&C** | | |
| Get the pupils to work one step ahead of the mathematical derivation slides, using them as assistance and clarification instead of a teaching aid | | |
| **Numeracy / Literacy** | | **SMSC / Fundamental British Values** |
| Exponential decay and differentiation, natural logs | | N/A |
| **RESOURCES:** | | |
| None | | |
| **Risk Assessment** e.g. CLEAPSS card reference | | |
| None | | |
| **Working Scientifically (HSW)** | | |
| N/A | | |

Picture on slide #1 was taken from free, public domain source on pixabay