Edexcel Physics – 9PH0

Module 11: Nuclear Radiation

You should be able to demonstrate and show your understanding of:	Progress and understanding:			
	1	2	3	4
Nuclear Radiation				
The concept of **nuclear binding energy** and how to use the equation: $\Delta E = c^2 \Delta m$ (used in calculations of **nuclear mass** (with mass deficit) and energy)				
The **atomic mass unit (u)** to express small masses and convert between **u** and SI units: $\mathbf{1\,u = 1.66 \times 10^{-27}\,kg}$				
The processed of **nuclear fusion and fission** with *reference to the 'binding energy per nucleon'* curve				
The mechanism for nuclear fusion and it's need for extremely high densities of matter (*pressure*) and temperatures for the process to occur				
Background radiation and how to take it into account during calculations				
The relationships between the **nature, penetration, ionising ability and range** in different materials of *nuclear radiation*, **Alpha (α), Beta (β) and Gamma (γ)**				
Nuclear equations, given the relevant particle symbols, and how to write / balance / interpret them.				
CORE PRACTICAL 15: Investigate the absorption of gamma radiation by lead.				
The spontaneous and random nature of nuclear decay.				
Half-lives of radioactive isotopes graphically and the equations: $A = \frac{dN}{dt} = -\lambda N \qquad \lambda = \frac{\ln 2}{t_{1/2}} \qquad N = N_0 e^{-\lambda t} \qquad A = A_0 e^{-\lambda t}$ (and their corresponding log equations)				