Year: 11	Topic: 6.5 Types of radiation

Knowledge and Understanding to be developed:

This topic covers the structure of the nuclear atom and its representation using atomic notation. It covers the spontaneous nature of nuclear decay and the nature of alpha, beta and gamma radiation. Learners will produce and balance nuclear equations for radioactive decay

Mathematical Skills There are a number of opportunities for the development of mathematical skills in this topic. These include balancing equations representing alpha, beta or gamma decay in terms of the mass number and atomic number, and charges of the atoms involved. These topics afford learners the opportunity to use ratios, fractions and percentages.

Key Terms to be learned this topic:

Proton number	isotope
Radioactive emissions	alpha
Force extension	beta
Nucleon number	gamma

Learning Objectives and Outcomes: Students should be able to :

(a) the terms nucleon number (A), proton number (Z) and isotope, and relate them to the number of protons and neutrons in an atomic nucleus
(b) radioactive emissions as arising from unstable atomic nuclei because of an imbalance between the numbers of protons and neutrons
(c) the fact that waste materials from nuclear power stations and nuclear medicine are radioactive and some of them will remain radioactive for thousands of years
(d) background radiation and be able to make an allowance for it in measurements of radiation
(e) the random nature of radioactive decay and that it has consequences when undertaking experimental work, requiring repeat readings to be made or measurements over a lengthy period as appropriate
(f) the differences between alpha, beta and gamma radiation in terms of their penetrating power, relating their penetrating powers to their potential for harm and discussing the consequences for the long term storage of nuclear waste
(g) alpha radiation as a helium nucleus, beta radiation as a high energy electron and gamma radiation as electromagnetic
(h) producing and balancing nuclear equations for radioactive decay using the symbols 4 2+
2He or 4
2α for the alpha particle and 0
1e − and 0
−1β for the beta
particle respectively
(i) natural and artificial sources of background radiation, respond to information about received dose from different sources (including medical X-rays) and discuss the reasons for the variation in radon levels