P6 Module Outline

- recall that atomic nuclei are composed of both protons and neutrons, that the nucleus of each element has a characteristic positive charge
- recall that atoms of the same elements can differ in nuclear mass by having different numbers of neutrons
- Use the conventional representation for nuclei to relate the differences between isotopes
- recall that some nuclei are unstable and may emit alpha particles, beta particles, or neutrons, and electromagnetic radiation as gamma rays
- relate these emissions to possible changes in the mass or the charge of the nucleus, or both
- use names and symbols of common nuclei and particles to write balanced equations that represent radioactive decay
- balance equations representing the emission of alpha-, beta- or gamma-radiation in terms of the masses, and charges of the atoms involved
- recall that in each atom its electrons are arranged at different distances from the nucleus, that such arrangements may change with absorption or emission of electromagnetic radiation and that atoms can become ions by loss of outer electrons
- recall that changes in atoms and nuclei can also generate and absorb radiations over a wide frequency range
- explain the concept of half-life and how this is related to the random nature of radioactive decay
- **calculate the net decline, expressed as a ratio, during radioactive emission after a given (integral) number of half-lives (higher only)**
- recall the differences in the penetration properties of alpha-particles, beta-particles and gamma-rays
- recall the differences between contamination and irradiation effects and compare the hazards associated with these two
- *explain why the hazards associated with radioactive material differ according to the half-life involved (separate science only)*
- *describe the different uses of nuclear radiations for exploration of internal organs, and for control or destruction of unwanted tissue (separate science only)*
- *recall that some nuclei are unstable and may split, and relate such effects to radiation which might emerge, to transfer of energy to other particles and to the possibility of chain reactions (separate science only)*
- *describe the process of nuclear fusion (separate science only)*