Topic 1 – Atomic Structure and the Periodic Table (Paper 1 only)

* I can appreciate that knowledge and understanding of atomic structure has evolved over time
* I can describe the relative charge and relative mass of protons, neutrons and electrons
* I can describe an atom as consisting of a nucleus containing protons and neutrons surrounded by electrons
* I can define mass number (*A*) and atomic (proton) number (*Z*)
* I can determine the number of fundamental particles in atoms and ions using mass number, atomic number and charge
* I can explain the existence of isotopes
* I can explain that the mass of atoms and molecules can be measured to a high degree of accuracy in a mass spectrometer
* I can explain how the mass spectrometer gives accurate information about relative isotopic mass and also about the relative abundance of isotopes
* I can use simple mass spectra of elements to identify elements and to calculate relative atomic mass from isotopic abundance, limited to mononuclear ions
* I can use mass spectra of molecules to determine relative molecular mass
* I can explain the principles of operation of a simple time of flight (TOF) mass spectrometer, limited to electrospray ionisation, acceleration to give all ions constant kinetic energy, ion drift, ion detection and data analysis
* I can write electron configurations of atoms and ions up to *Z* = 36 in terms of shells and sub-shells (orbitals) s, p and d
* I can explain that the chemical properties of elements depend on their atomic structure and in particular on the arrangement of electrons around the nucleus
* I can explain that the arrangement of electrons in orbitals is linked to the way in which elements are organised in the Periodic Table
* I can classify an element as s, p, d or f block according to its position in the Periodic Table, which is determined by its proton number
* I can define first ionization energy
* I can write equations for first and successive ionization energies
* I can *e*xplain how first and successive ionisation energies in Period 3 (Na–Ar) and in Group 2 (Be-Ba) give evidence for electron configuration in sub-shells and in shells.
* I can describe and explain the trends in atomic radius and first ionisation energy of the elements Na–Ar