Topic 1: Materials and Their Atoms

Knowledge	Application

Subtopic 1.1: Properties and Uses of Materials

The uses of materials are related to their properties, including solubility, thermal and electrical conductivities, melting point, and boiling point. Nanomaterials are substances that contain particles in the size range 1–100 nm.	Suggest uses of materials, including nanomaterials, given their properties and vice versa
Differences in the properties of substances in a mixture can be used to separate them.	Identify how the components of a mixture can be separated by methods including filtration, distillation, and evaporation.

Subtopic 1.2: Atomic Structure

All materials consist of atoms. Atoms are commonly modelled as consisting of electrons orbiting a nucleus containing protons and neutrons. Emission and absorption spectra of elements provide evidence that electrons are arranged in distinct energy levels and can be used to identify some elements in matter.	
Atomic number and mass number provide information about the numbers of subatomic particles in an atom. Many elements consist of a number of different isotopes, which have different physical properties but the same chemical properties.	Represent isotopes of an element using appropriate notation.
The arrangement of electrons in atoms and monatomic ions can be described in terms of shells and subshells.	Write the electron configuration using subshell notation of an atom of any of the first 38 elements in the periodic table

Subtopic 1.3: Quantities of Atoms

The quantities of different substances can be conveniently compared using the mole unit. The relative atomic mass of an element is determined from all the isotopes of that element. The number of moles of atoms in a sample can be determined from the number of atoms present or from the mass of the atoms.	Undertake calculations using the relationship $n = \frac{m}{M}$ and its rearrangements.

Subtopic 1.4: The Periodic Table

In the modern periodic table, elements are arranged in order of increasing atomic number, and display periodic trends in their properties.	Identify trends in atomic radii, valencies, and electronegativities, across periods and down groups of the periodic table.
The position of an element in the periodic table is related to its metallic or non-metallic character.	Identify the position of an atom in the periodic table given its electron configuration. Identify the s, p, d, and f blocks of the periodic table.