

# Science Y9

| Term      | 1   | 2  | 3   | 4  | 5  | 6  |
|-----------|---|--|---|--|--|--|
| Topic     | Cell Biology  | Atomic Structure and the Periodic Table  | Forces  | Bonding, structure and the properties of matter  | Energy   | Organisation   |
| Detail    | B1  | C1   | P1  | C2   | P2   | B2   |
| Grade 8-9 | Explain how electron microscopy has increased understanding of sub cellular structures, referring to magnification and resolution. Interpret information regarding mitosis in contextual situations. Apply understanding of molecular movement to kidney dialysis and sports drinks.  | Describe + construct balanced formulae equations. Describe the properties of the elements in Groups 0, 1 and 7 + explain how they are related to the atomic structure of the elements.   | Resolve single forces in 2 components and adding two forces using scale diagrams. Use principle of moments and conservation laws to solve complex problems.   | Explain how ionic, covalent + metallic bonding occur. Draw dot + cross diagrams for commonly used compounds. Describe the limitations of using dot + cross, ball + stick, 2D + 3D diagrams to represent giant structures. Evaluate the limitations of using the simple model of particle theory to explain the (thermal) properties of elements. Describe balanced symbol equations including the states of matter.  |  | Interpret data + evaluate the effect of different factors on biological reactions. Evaluate the advantages + disadvantages of treating CVD by drugs, mechanical devices or transport.  |
| Grade 6-7 | Use models and analogies to develop explanations of how cells divide. Evaluate the practical, social + ethical issues surrounding the use of stem cells in medicine. Explain how structure relates to function in specialised cells. Calculate the area of colonies/inhibition zones in microorganism cultures. Explain the purpose + uses of stem cells. Explain the adaptations of plants + animals for exchange. Calculate surface area to volume ratio. | Describe the development of the Periodic table + explain the evidence that supported it. Calculate the number of protons, neutrons + electrons given the atomic + mass numbers of the first 20 elements. Explain how the elements are arranged + grouped in the Periodic table. Describe the properties of the transition metals + compare them with Group 1 elements. | Apply the principles of pressure to columns of liquid and the atmosphere. Use principle of moments and conservation of momentum to solve problems. Recall + rearrange equations. Be able to calculate acceleration and distance covered on V-T graphs. Calculate work done on a spring using a graph. Explain how levers + gears transmit the rotational effects of forces. Explain the factors affecting the pressure in a column of liquid. Describe upthrust + the factors which influence floating + sinking. | Work out the molecular formula from a given model or diagram of a compound. Describe giant ionic structures, giant covalent structures, polymers, giant metallic structures + their properties including their melting + boiling points + electrical conductivity + explain how they are related to their structure. Explain the properties of diamond + graphite related to their structure. Describe the structure + use of graphene and fullerenes. Draw dot and cross diagrams for ionic compounds formed by metals in Groups 1 and 2 with non-metals from Groups 6 and 7. State the ionic charge of ions formed by metals in Groups 1 and 2 with non-metals from Groups 6 and 7. Evaluate the use of nanoparticles. | Carry out calculations involving specific heat capacity. Interpret data on the efficiency of different machines.   | Use models to explain enzyme action + denaturation + apply this to the action of digestive systems. Carry out rate calculations + use simple compound measures such as rate. Link adaptations of cells, tissues and organs to their functions. |
| Grade 5   | Calculate magnification. Describe how genetic information is organised. Explain how aseptic techniques are used in culturing microorganisms. Calculate population in microorganisms. Describe mitosis. Explain the factors affecting diffusion. Describe the adaptations of plants + animals for exchange.  | Describe formulae equations. Describe + explain why the atomic model has changed over time due to new evidence. Describe why atoms have no charge. Construct word equations. Explain how the atomic structure of metals + non-metals relate to their position in the Periodic table + how they react.  | State + use equations. Identify shapes on D-T and V-T graphs and relate it to motion. Interpret V-T graphs for falling objects. State + apply the equations to calculate the moment of a force + the pressure of a fluid. Calculate the pressure in a column of liquid.   | Describe the three types of chemical bonding. Describe the structure and properties of diamond and graphite. Describe uses of nanoparticles.   | Calculate changes in the way energy is stored when changes occur in a given system. Evaluate the various types of insulation used in the home. Calculate the efficiency of given energy transfers and describe ways to increase efficiency. Compare the ways different energy resources are used and explain their advantages and disadvantages.                   | Describe function of organ systems using key terms in the correct context. Explain how enzymes are affected by temperature + pH.   |
| Grade 4   | Describe the functions of all cell structures. Demonstrate an understanding of scale using the correct keywords. Describe how microorganisms can be cultured. Define stem cells.  | Describe the structure of the atom. Draw the electronic structure of the first 20 elements. State the difference between metals + non-metals.  | Classify Vectors and Scalars. Describe differences in linear and non linear relationships. Link together balanced and unbalanced forces with motion. Describe examples in which forces cause rotation.  | Make order of magnitude calculations. Describe sizes of particles.   | Calculate the amount of energy stored by various objects as kinetic, elastic potential and gravitational potential energy. Explain the factors affecting the kinetic energy of a moving object. Carry out calculations to determine work done, power + the amount of energy transferred by electrical work. Describe the main energy resources available on Earth. | Understand the principles of sampling as applied to communicable + non-communicable diseases. Describe the function of enzymes.  |
| Grade 2-3 | Label all cell components on a diagram of a plant, animal + bacterial cell. Define diffusion, osmosis + active transport. Label the basic cell components on a diagram of a plant + animal cell. Identify a plant, animal + bacterial cell from a diagram   | Explain how techniques for separating mixtures work. State the relative mass + charge of the particles that make up an atom. State chemical names + symbols for often used elements. Describe techniques for separating mixtures. Describe word equations. Define 'atom', 'element', 'compound' + 'mixture'. State the atomic number + mass number of a given element. | Recall factors that affect braking and thinking distance. Describe a simple model of the Earth's atmosphere. Name examples of contact and non-contact forces. Recognise that forces can be a push and pull.   | Recognise the three types of bonding in new scenarios. Explain the changes in the states of matter using particle theory. State the three types of chemical bonding. State the three states of matter and the changes that occur between them.   | State the equations for calculating kinetic and gravitational potential energy. Define 'power', 'wasted energy' + 'conservation of energy'. Describe the changes in energy stores in simple machines and systems. Define 'renewable' and 'non-renewable'.  | Recall parts of organs. Describe the function of the 3 types of blood vessels. Label a diagram of different organ systems in animals + plants. Order the hierarchy into cells, tissues, organ, and organ systems                               |