Year 9 Science	Emerging	Developing	Secure	Mastery
Term 1				
B1 – Cells & Genetics	Know that genetic information is found in the nucleus of a cell. Know that offspring get half their genetic information from their Mum and half from their Dad. Understand that clones are genetically identical to their parent. Identify an animal and a plant cell. Recognise that substances are able to move in and out of cells.	Describe chromosomes and their role in transferring heredity information to offspring. Describe cloning as one parent producing new individuals and identify examples of cloning that occur naturally; describe natural cloning as asexual reproduction. Describe how fertilised egg cells contain half of the chromosomes from each parent with a random mix of genetic information from each parent. Recognise and label normal and specialised animal and plant cells. Use a microscope to make observations.	Explain the relationship between chromosomes, genes and DNA. Explain why offspring of the same parents may look very different. Explain how artificial cloning is performed – for example in the creation of Dolly the sheep. Explain how every new individual produced by sexual reproduction is genetically unique. Describe the functions of the nucleus, cell membrane, mitochondria, cytoplasm, cell wall, vacuole and chloroplast. Describe the process of diffusion, and name the materials needed by and those removed from the cell.	Explore the role of scientists in the discovery of DNA and evaluate the relative importance of their contributions. Explore and evaluate the advantages and disadvantages of artificial cloning; compare and contrast asexual and sexual reproduction. Explain the impact of slight ‘changes’ to DNA passed on from parents to offspring. Explain how different structures help organisms to survive.

Year 9 Science	Emerging	Developing	Secure	Mastery
		Recognise the role of diffusion in living organisms.		
B2 – Keeping Healthy	Understand that you can catch some diseases from others. Know that your body can fight off disease. Understand that bacteria need certain conditions to survive. Know that antibiotics can be used to kill bacteria. Know that vaccines can prevent you from catching a disease. Know that plants can get disease too.	Describe and give examples of a way in which diseases are spread. Describe the body's mechanisms to prevent infection. State examples of diseases caused by microbes. Describe the conditions that bacteria need to survive. Describe the effect of antibiotics on bacteria. Describe what a vaccine is and how vaccines were discovered.	Describe several examples of how specific diseases are spread and suggest how their spread may be reduced. Describe the roles of white blood cells in fighting infection. Describe the characteristics of different microbes. Compare bacterial growth in different parts of the home. Explain how bacteria become resistant to antibiotics. Explain how vaccines prevent a viral infection. Describe the effects of plant diseases on plant growth.	Consider suggestions to reduce the spread of specific diseases and justify decisions. Explain why we rarely catch the same infectious disease twice but may catch influenza over and over again. Evaluate a model of a type of microbe. Analyse data about bacterial growth. Explain what superbugs are and evaluate their impact on society. Evaluate the risks of vaccines and disease.

Year 9 Science	Emerging	Developing	Secure	Mastery
		State the names of some plant diseases.		Explain how plant diseases can be avoided.
B4 – Growth & Respiration	Understand that chemical reactions in the body release energy. Identify what chemicals are needed for respiration. Understand that if you exercise with not enough oxygen your muscles will ache. Know there are two types of cell growth. Know there are two types of stem cells.	Describe the purpose of respiration. Define anaerobic respiration and give examples of sports that use anaerobic respiration. Identify some living things that carry out anaerobic respiration and identify some applications. State what mitosis and meiosis is. State the names of the two types of stem cells.	Describe and explain aerobic respiration using a word equation. Explain why some sports rely mainly on aerobic respiration while others require anaerobic respiration. Describe and explain some evidence to show the products of anaerobic respiration and plan an investigation into fermentation. Describe the process of mitosis and meiosis. Describe the process of embryonic and adult stem cells.	Explain the role of respiration in building up complex molecules. Describe and explain the effects on the body of anaerobic respiration and explain 'oxygen debt' Plan an investigation to test a hypothesis about anaerobic respiration, analyse the data and evaluate the investigation. Explain mitosis and meiosis using key terminology. Explain the process of two types of stem cells, giving advantages and disadvantages for each.

Year 9 Science	Emerging	Developing	Secure	Mastery
Term 2				
P5 - Radiation	Know the three things an atom is made up of. Know there is three types of radiation. State what half-life is. State some effects of radiation. State what an isotope is. Recognise that nuclear decay happens. Link theory of radiation decay to the Chernobyl documentary.	Draw and label the structure of the atom. Name the three types of radiation. Draw a half-life graph. State the definition for irradiation and contamination. State the definition for an isotope and give some examples. State what alpha and beta decay does to the nucleus of atom. Link theory of radiation decay to the Chernobyl documentary.	Draw, label and describe the charges and mass of the three subatomic particles. Describe the properties of each type of radiation. Interpret data from a graph to work out half-life. Describe the effects of irradiation and contamination. Use a mathematical equation to prove isotopic abundance of elements. Write decay equations for Alpha & Beta decay. Link theory of radiation decay to the Chernobyl documentary.	Explain the effects each type of radiation can have. Interpret data from a graph to work out half life and relate this to how dangerous it is. Use a mathematical equation to prove isotopic abundance of elements to explain the numbers on the periodic table. Write decay equations for Alpha, Beta & Gamma decay. Link theory of radiation decay to the Chernobyl documentary.

Year 9 Science	Emerging	Developing	Secure	Mastery
P6 – States of Matter	Identify basic lab equipment. Use laboratory equipment safely to gather evidence. Represent particles as circles. Label a diagram with correct changes of state. Identify objects that may float or that may sink. State that hot objects give out heat.	Name and draw equipment and explain obvious laboratory risks. Compare the properties of solids, liquids and gases. Use correct terminology and the particle model to describe changes of state, including evaporation. Suggest why some objects float and others sink. Describe the transfer of energy by heating and cooling.	Select and draw apparatus accurately; explain safety precautions. Draw circle diagrams to demonstrate the differences between the arrangement of particles in solids, liquids and gases, and describe their different properties. Interpret and explain data relating to melting and boiling points. Use the concepts of density, displacement and upthrust in explaining floating and sinking. Explain the relationship between energy transfer and temperature difference.	Use particle diagrams to explain the differences in energy and forces between the particles in different states of matter, accounting for differences in their properties. Use the particle model to explain latent heat and how impurities affect melting and boiling points. Apply ideas about density and upthrust to predict the outcomes of various situations Compare the transfer of energy by conduction and by radiation.

Year 9 Science	Emerging	Developing	Secure	Mastery
Term 3				
C1 – Climate change	Identify basic lab equipment. Use laboratory equipment safely to gather evidence. Represent particles as circles. Label a diagram with correct changes of state. Understand that some chemical reactions produce heat. Know what gas is produced by combustion. State the four greenhouse gases. State the water sources in the UK.	Name and draw equipment and explain obvious laboratory risks. Compare the properties of solids, liquids and gases. Use correct terminology and the particle model to describe changes of state, including evaporation. Describe what is meant by the terms exothermic and endothermic reactions, with examples. Describe what a catalyst is and give examples. Describe features of physical and chemical changes, recognising how mass is conserved.	Select and draw apparatus accurately; explain safety precautions. Draw circle diagrams to demonstrate the differences between the arrangement of particles in solids, liquids and gases, and describe their different properties. Interpret and explain data relating to melting and boiling points. Explain the energy changes taking place during an exothermic and an endothermic reaction. Interpret data to explain how a catalyst affects a reaction. Describe the effects of acid rain. Describe effects of greenhouse gases.	Use particle diagrams to explain the differences in energy and forces between the particles in different states of matter, accounting for differences in their properties. Use the particle model to explain latent heat and how impurities affect melting and boiling points. Use energy-level diagrams to compare the energy in the reactants and products of exothermic and endothermic reactions, explaining the energy changes in the particles. Explain, using an equation, the effects of acid rain.

Year 9 Science	Emerging	Developing	Secure	Mastery
		Describe how combustion contributes to acid rain. State the greenhouse gases and where they come from. State the definition of potable water.	Describe how potable water is obtained.	Describe the effects of greenhouse gases and how we can mitigate them.
C2 – Chemical Patterns	Identify basic lab equipment. Use laboratory equipment safely to gather evidence. Give some examples of elements. Identify metals and non-metals. Understand what a compound is. State what an ion is.	Name and draw equipment and explain obvious laboratory risks. Give some examples of elements, locate them in the Periodic Table and use the table to identify metals and non-metals. Identify metals and non-metals using data and suggest a reason for applications.	Select and draw apparatus accurately; explain safety precautions. Give examples of elements and explain how they are organised in the Periodic Table. Explain the properties of elements using data and why they are used for different applications. Explain how compounds can be formed and explain a chemical reaction using simple models.	Define elements, use symbols, link the organisation of the Periodic Table to element features. Select and justify the use of elements for different purposes, based on their properties. Make links between simple models of compounds and chemical symbols.

Year 9 Science	Emerging	Developing	Secure	Mastery
		Describe an example of a compound and represent a chemical reaction using a simple model. Describe where ionic bonding takes place.	Draw dot & cross diagrams to represent Ionic bonding.	