Science Curriculum Map

KEVI HWGA Curriculum Map

Curriculum Purpose:		
Context	Beyond KEVI HWGA:	**Science** can lead to further education through either degree level studies or apprenticeships in a wide variety of areas linked to the three specialisms or Biology, Chemistry and Physics. Science can lead to a wide range of career options linked to each of the science areas. **Biological Careers**: Aerobiologist - Agricultural Scientist – Bioinformatician – Biomechanics Engineer – Biomedical engineer or researcher – Biophysicist – Biostatistician – Cell Biologist – Conservationist – Cryobiologist – Cytologist – Ecologist – Ecotoxicology – Embryologist – Endocrinologist – Entomologist – Forensic Psychologist – Forensic Scientist – Geneticist – Genomics – Immunologist – Marine Biologist – Molecular Biologist – Pharmacologist – Teaching - Toxicologist – Veterinarian – Virologist – Zoologist **Chemistry Careers**: Analytical Chemist – Biochemist – Chemical Engineer – Cheminformatics – Cosmetic Chemist – Crystallographer – Food Technologist – Forensic Scientist – Geochemist – Immunologist – Laboratory Analyst – Manufacturing Chemist – Materials Engineer – Organic or Inorganic Chemist – Pharmacist – Process Chemist – Product Developer – Researcher – Toxicologist – Quantum Chemist – Water Chemist **Physics Careers**: Aerospace Engineer – Acoustician – Applied Mathematician -Astronomer Atomic Physicist – Architect – Astrophysicist – Biophysicist – Chemical Physicist – Civil Engineer – Computer Physicist – Cosmologist – Cry physicist – Data analyst – Electrical Engineer – Electromagnetic Physicist – Fluid dynamics/mechanics physicist – Geophysicist – High Energy Physicist – Laser Physicist – Mechanical Physicist – Meteorologist – Molecular Physicist – Nanotechnologist – Nuclear Technician – Nuclear physicist – Optical Physicist – Particle Physicist - Patent analyst – Plasma Physicist – Quantum Physicists – Roboticist – X-ray Analysis And more careers!
	KS5	KS5 Biologists will be taken on a journey that inspires and nurtures a passion for the subject through an in-depth study of Biological Molecules, Cells, Organisms, Genetics, Energy Transfers, and links with the environment which is taught through theory, research, independent study, and practical work. KS5 Chemists will be taken on a journey that inspires and nurtures a passion for the subject through an in-depth study of physical chemistry, Inorganic Chemistry and Organic Chemistry through theory, research, independent study, and practical work. BTEC Applied Science students will be taken on a journey of applied learning that brings together a wide knowledge and understanding of all three sciences with practical and technical skills. This is achieved through students performing vocational tasks that encourage the development of appropriate vocational behaviours and transferrable skills such as communication, teamwork and research and analysis. Students will study a range of mandatory units such as Principles and Application of Science, Science Investigation skills and Contemporary issues in Science and then will undertake optional units.

	KS4	When studying the combined science trilogy course, you will develop a knowledge and understanding of all major biological, chemical and physical concepts and will enhance your ability to apply this knowledge to a wide range of concepts within the scientific world. You will also enhance and refine the practical skills you developed in KS3 which will lead to a deeper understanding of how to work and think scientifically thus developing your analytical and evaluation skills. Through a study of science, we will foster a love of the subject and ensure you learn to see and understand the world through the eyes of a scientist.
	KS3	At KS3 you will learn to develop an enquiring mind where you can; analyse patterns, draw conclusions, present data, communicate ideas, critique claims, justify opinions, collect data, plan variables, test hypothesise, estimate risk, review theories, and interrogate sources. You will do this through learning about 10 key concepts: Forces, Electromagnets, Energy, Waves, Matter, Reactions, Earth. Organisms, Ecosystems and Genes. These foundations of knowledge, practical and analytical skills will prepare you for a more in-depth study of science at KS4 and above
	KS1/2 links	Students at KS1/2 are encouraged to experience and observe scientific phenomena and look closely at the natural and constructed world around them. They are encouraged to be curious and develop scientific enquiry skills by investigating their own questions. They will develop a basic scientific vocabulary. Students will be encouraged to look at interactions, relationships and functions and will develop their scientific skills further by observing changes over time, noticing patterns, grouping, and classifying and carrying out simple comparative tests using basic scientific equipment and writing basic conclusions. Students will study plants and be able to identify functions of each part, investigate water transport and pollination. They will study animals and learn that they gain nutrition from the food they eat and their basic life cycles and will understand the purpose of muscles and the skeleton. They will be able to state the basic functions of organs in the digestive system and be able to construct food chains as well as describing the human life cycle and basic variation. They will be able to group and classify rocks and simple describe how fossils form as well as being able to group materials according to their state of matter. They will know how to separate mixtures and know that dissolving and mixing are reversible They will understand they need light to see things and that it is reflected of surfaces, they will know how shadows form and that sound is created by vibrations that can travel through different medium. They will understand how magnets repel and attract and the basics of electrical circuits and the solar system and earth's rotation as well as the basics of forces and the interactions with other objects.

	Year	Autumn 1 2nd Sept - 25th Oct 8 weeks	Autumn 2 4th Nov - 20th Dec 7 weeks	Spring 1 6th Jan - 14th Feb 6 weeks	Spring 2 24th Feb - 11th April 7 weeks	Summer 1 28th April- 23rd May 4 weeks	Summer 2 2nd June - 18th July 7 weeks
KS3	7 4 lessons per week	Introductory Science (TA) Forces (PA)	Particles & their behaviour(SA) Cells (PA) End of Cycle 1 (TA)	Sound (SA) Structure & function of body systems (PA)	Elements, atoms & compounds (SA) End of Cycle 2 (TA) Light (SA)	Reproduction (PA) Reactions (PA) End of cycle 3 (TA)	Acid & Alkalis (SA) Space (PA) End of Cycle 4 (TA) End of year exam (TA)
	8 5 lessons per week	Health & lifestyle (TA) The Periodic table (PA)	Electricity and magnetism (SA) End of Cycle 1 (TA) Biological processes (PA) Separation techniques (SA)	Energy (PA) End of Cycle 2 (TA)	Ecosystems & adaptations (SA) Metals & other materials (PA)	Motion & Pressure (SA) End of Cycle 3 (TA) Inheritance (PA) Earth (SA)	End of cycle 4 (TA) WORKING SCIENTIFICALLY End of year exam (TA)
	9 5 lessons per week	Cells (PA) Particle model & state change (SA) Forces & motion (PA) End of cycle 1 (TA)	Cell systems (SA) Atoms & the periodic table (PA) Energy (SA) End of cycle 2 (TA)	Fertilisation & implantation (PA) Chemical changes (SA)	Electricity & Magnetism (PA) Useful chemical reactions (SA) End of cycle 3 (TA)	C1 (TEST 1) B1 (TEST 2)	Revision End of year exam
Combined science	10 7 lessons per week	P1 (TEST 3) B2	C2 P2 TEST 4	B3 C3 P3 TEST 5	P4 B4 C4 & C5 TEST 6	P5	B5 End of year exam
	11 6 lessons per week	B5 Cont C6 TEST 7	P6 B6 C7 & 8 TEST 8 MOCKS	P7 B7 C9 & C10 TEST 9	Revision programme MOCKS	Revision programme	GCSE EXAMS

KING EDWARD VI HANDSWORTH WOOD GIRLS' ACADEMY

KEVI HWGA Curriculum Map

Big Qs *Linked to NC*	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 11	***How does the body effectively maintain and regulate internal conditions?*** ***(B5 Homeostasis & Response)*** Students will learn and investigate how the human body controls blood glucose, temperature and water levels and these automatic control systems may involve nervous responses or chemical responses. **What factors affect the rate of reactions and how do chemical engineers use this knowledge?** **(C6 Rate & extent of chemical change)** Students will investigate what factors affect the rate of reaction and how to apply this knowledge to a variety of reactions and to the concept of maximising yield.	***How do waves carry energy and how is our knowledge of waves used to design comfortable and safe structures?*** ***(P6 Waves)*** Students will learn about different types of waves, their properties, applications and uses are everyday life. ***How is genetic information passed from your parents to you and why are we so varied? What is the theory of evolution and what is the evidence that supports it (B6 Inheritance, Variation & Evolution)*** Students will learn how genetic information is halved in meiosis and how these combined with the genes from a sexual partner to form a new individual. They will learn how mutations can cause genetic disorders and how they can lead to variation that can then be a driver of evolution. ***Why is there a great variety in carbon compounds and how are they used in everyday life?*** ***(C7 Organic Chemistry)*** Students will learn that organic chemistry is so important it is its own branch of chemistry and that carbon	***How are electromagnetic effects used in a wide variety of devices?*** ***(P7 Magnetism & Electromagnetism)*** Students will learn how engineers make the use of the fact that a magnet moving in a coil can produce electric current and that when a current flows around a magnet it can produce movement. ***What powers our ecosystem and how are material cycled through it? How do organisms interact with each other and their environment and how are humans trying to manage ecosystems in a sustainable way*** ***(B7 Ecology)*** Students will learn about how animals are adapted to their environment and how they interact with other organisms, they will be able to analyse and determine energy losses through a system and explain and interpret how materials are cycled through an ecosystem as well as discussing methods for maintaining and measuring biodiversity in a habitat or ecosystem. ***Why is the Earth's atmosphere dynamic and forever changing?***	***How do we use the analysis of Mock Papers to devise a revision programme?*** Students will be taught individually, in groups and as whole sets, areas of need based on the analysis of Mock Papers ***How do we revise and study independently?*** Students will be taught and practice a variety of revision techniques and apply these to their areas of need. ***What knowledge and understanding are required to successfully answer Required Practical Questions?*** Students will undertake or observe required practical and answer examination style questions based upon these.	GCSE EXAMS	GCSE EXAMS

		compounds are so varied due to how carbon atoms can form chains and rings. Students will learn that organic molecules can be modified to make new and useful materials. ***What tests are used to detect chemicals and what are the positive results for these tests?*** ***(C8 Chemical Analysis)*** Students will learn the wide range of tests for detect specific chemicals and will put many of these tests into action so they can determine a positive result. Students will learn how precision is essential to these tests in industries such as forensic science and drug control.	***(C9 Chemistry of the atmosphere)*** Students will learn that the atmosphere has changes over time because of natural cycles and man-made influences. They will look at how scientists study these changes and the many variables that influence them as well as studying how human impact has affected the atmosphere. ***How do industries use the Earth's natural resources and how have chemists dispose of products?*** ***(C10 Using resources)*** Students will learn how industries use natural resources, chemists minimise the use of limited resources, energy, waste and environmental impact in the manufacture of products.			
Key Knowledge, Concepts, and skills	Collision theory Particles Chemical Reaction Physical chemistry Homeostasis Nervous system Endocrine system Application of knowledge, analysis of data, practical skills, evaluation, and analysis.	Waves Genes Genetic disorders Organic chemistry Mixtures Separation techniques Chemical reaction Application of knowledge, analysis of data, practical skills, evaluation, and analysis.	Electromagnets Magnetism Ecology Biodiversity Environment Global warming Recycling Chemistry of the atmosphere Using resources	Analysis of strengths and areas of development, Revision Skills, knowledge and understanding of required practical.		
Feedback & Assessment	**Assessment Test 7 - P5, B5, C6** **Required Practical:** **Physics - Force & extension, Acceleration** **Biology- Reaction time** **Chemistry Rates of Reaction**	**Assessment Test 8 – P6, B6, C7-C8** **Required practical:** **Physics – Waves** **Chemistry – Chromatography, Water purification** **Mock exams – Paper 1s**	**Assessment Test 9 - P7, B7, C9 & C10** **Required practical:** **Physics - Radiation and Absorption** **Biology – Field investigations**	**Mock exams – Paper 2s**		

Big Qs *Linked to NC*	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 10	***How is the idea of energy used to explain the work output of devices and machinery and how physicists using their knowledge of energy to identify ways of reducing energy usage?*** ***(P1 Energy)*** Students will learn how energy is stored and changed and how we can calculate energy and efficiency of devices. Students will be able to analyse the pros and cons of a variety of methods for generating electricity as well as being able to explain trends in energy usage. ***How do the digestive, respiratory and circulatory systems complete their bodily functions and how can damage to these systems be debilitating if not fatal?*** ***(B2 Principles of Organisation)*** Students will learn the structure and function of the major organ systems of the body and will analyse what will happen to these systems if they are treated poorly and become damaged by human excesses	***How do chemists use the theories of structure and bonding to explain physical and chemical properties of materials?*** ***(C2 Bonding, Structure, and properties of matter)*** Students will learn about all the ways that elements can be bonded together, how these bonds determine the properties and will be able to discuss a number of specific examples. ***What is electricity and how do we measure it, what do we use it for and how? What kind of PowerStation's should we build for a sustainable future*** ***(P2 Electricity)*** Students will learn all about circuits and how to make them, they will be able to predict potential difference and currents across components in different circuits and will be able to calculate resistance and charge. They will be able to identify components by the way they behave and the IV graph they produce. They will understand power and different methods of electricity generation.	***What pathogens make us ill and how are they transmitted and how do they make us ill? How does the body defend against these pathogens?*** ***(B3 Infection & Response)*** Students will learn about the 4 main pathogens and will learn about specific infections and diseases. They will learn how they are transmitted, how they affect the body and how the body defends itself. ***How do we use quantitative analysis to determine the formulae of compounds and the equations for reactions?*** ***(C3 Quantitative Chemistry)*** Students will learn how to calculate relative formula mass and apply this to reactions and be able to look for patterns and make predictions about the behaviour of chemicals ***How can we use the particle model to predict behaviour of solids, liquids and gases and how do scientists use this knowledge to design submarines and spacecraft?*** ***(P3 Particle Model of Matter)*** Students will be able to explain changes in state using their knowledge of states of matter and internal energy and will investigate density and pressure and be able to explain its effects on objects and materials	***What are the uses and dangers of ionising radiation and how have nuclear physicists learnt about the structure, forces, and stability of atoms?*** ***(P4 Atomic Structure)*** Students will learn about the development of the atomic model, radioactive decay and its dangers and the uses of radiation in medicine, industry agriculture and electrical power generation. ***How do plants harness the Sun's energy and how is the oxygen used to transfer the energy organism need to perform their functions?*** ***(B4 Bioenergetics)*** Students will learn about the process of photosynthesis and how it is limited as well as the processes of Anaerobic and Aerobic Respiration. ***How does our knowledge of chemical change allow us to predict exactly what new substance will be formed?*** ***(C4 Chemical Changes)*** Students will learn about the reactivity of metals and will be able to predict how and whether metals will react. Students will investigate how metals can be extracted in a number of different ways and how salts are formed from acid and alkali reactions. ***Why are energy changes important in chemical***	***How do engineers analyse forces and use this knowledge to design a great variety of machines and instruments?*** ***(P5 Forces)*** Students will learn about a wide variety of forces and their effects on a number of factors and how these can be used and applied to everyday activities and the world around us.	***How does the body effectively maintain and regulate internal conditions?*** ***(B5 Homeostasis & Response)*** Students will learn and investigate how the human body controls blood glucose, temperature and water levels and these automatic control systems may involve nervous responses or chemical responses. ***How do we revise and study independently?*** Students will be taught and practice a variety of revision techniques and apply these to their areas of need. ***What knowledge and understanding are required to successfully answer Required Practical Questions in Paper 1?*** Students will undertake or observe required practical and answer examination style questions based upon these. ***How do we use the analysis of Mock Papers to devise a revision/study programme for the summer holidays?*** Students will be taught individually, in groups and as whole sets, areas of need based on the analysis of Mock Papers

				reactions and what is the energy used for? ***(C5 Energy Changes)*** Students will learn about exothermic and endothermic reactions and how the energy is used to break and form bonds and how the process of electrolysis occurs and is used.		and will be provided a question level analysis that highlights their strengths and areas for development.
Key Knowledge, Concepts and skills	Energy Application of knowledge, analysis of data, practical skills, evaluation, and analysis	Principles of Organisation Bonding, structure and Matter Electricity Required Practical skills and understanding. Application of knowledge, analysis of data, practical skills, evaluation, and analysis	Infection & Response Quantitative Chemistry Matter Application of knowledge, analysis of data, practical skills, evaluation, and analysis.	Photosynthesis Respiration Particle model of matter Energy changes Chemical changes Application of knowledge, analysis of data, practical skills, evaluation, and analysis.	Forces Application of knowledge, analysis of data, practical skills, evaluation, and analysis.	Required practical Revision Techniques Application of knowledge, analysis of data, practical skills, evaluation, and analysis. Plan
Feedback & Assessment	**Assessment Test 3 - P1 SKC** **Required Practical:** **Physics – Specific heat capacity** **Biology – Food tests, Enzymes**	**Assessment Test 4 - B2, C2, P2** **Required practical:** **Physics – Resistance, I-V Characteristics**	**Assessment Test 5 - B3, C3, P3** **Required Practical:** **Physics – Density**	**Assessment Test 6- P4, B4, C4 & C5** **Required Practical:** **Biology – Photosynthesis** **Chemistry – making salts, Electrolysis, Temperature changes**		**Mock Examination** **Paper 1 – KS3 Y7 & 8 CONTENT** **Paper 2 – Year 9 CONTENT**
Big Qs ***Linked to NC***	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 9	***Biology - Mastery Level Cells*** Students will learn how the development of microscopes has helped us to understand cells and how specialised plant cells – phloem and xylem – are adapted to transport materials around a plant. They will investigate how the body responds to the increased demands for energy during exercise and the factors that affect the rate of diffusion. Finally, they will find out about	***Biology – Mastery Level Cell systems*** Students will revisit the hierarchical nature of the levels of organisation within an organism. They will look at the role of enzymes in the digestive system and how they can be used commercially in washing detergents. They will discover the main features of exchange surfaces and their function in multicellular organisms, focusing on the alveoli in the lungs, villi in the intestines, and the structure	***Biology mastery level- Fertilisation & Implantation*** Students will compare sexual reproduction in plants and animals. They will look at pregnancy prevention using contraception before interpreting menstrual cycle diagrams. They will investigate factors that affect seed dispersal and the steps that should be taken to collect valid data. Finally, they will discover how different alleles affect which characteristic is most likely to be displayed in an organism's offspring and how	***Physics Mastery level – Electricity and Magnetism*** In this chapter, students revisit ideas from Year 8 with more detail. Applications of phenomena, such as static electricity, link abstract concepts to observable phenomena. Students will cover new uses of series and parallel circuits and explore why some materials are magnetic and others aren't. Heavy use is made of models throughout. The chapter then introduces some big new ideas: inducing p.d. and	***What is the purpose of the periodic table and how was it developed using knowledge of atomic structure?*** ***(C1 Atomic structure and the periodic table)*** Students will learn that the periodic table provides chemists with a structured organisation of the known chemical elements so they can make sense of physical and chemical properties. Students will investigate the properties of elements and their placement in the	***How do structural differences in cells allow them to perform their function and what feature of cells has allowed scientists to develop stem cell technology?*** ***(B1 Cell Biology)*** Students will learn the differences between cell types and will be able to analyse structures and determine their functions. They will learn how cells divide and produce new identical cells and will

	prokaryotic cells and the process of active transport. ***Chemistry – Mastery Level Particle model & state change*** Students will learn about the particle model and state changes that students will have encountered before. The chapter begins with the particle model and then moves onto substances, states of matter, energy changes during state changes, and finally limitations of the model. This chapter also covers sublimation – often a forgotten about state change, as well as foams and aerosols. This topic will not only be important for GCSE chemistry, but GCSE physics as well, when students go on to study temperature, density, state changes, and gas pressure. ***Physics Mastery Level Forces & Motion*** This chapter applies concepts students have learnt at KS3, such as balanced and unbalanced forces, to more challenging situations, such as a skydiver. In KS3, students have begun to quantify motion and physical properties, such as the stiffness of a spring, and have calculated speed and weight. This chapter extends quantification to resultant force and acceleration. Distance-time	of a leaf. Finally, they will study transport systems in both animals and plants by looking at the circulatory system and the transpiration stream. ***Chemistry – Mastery level Atoms & the periodic table*** Students will learn about the development of the Periodic Table, then the structure of atoms, metals and non-metals, Group 2 elements, and compounds, before concluding with electron configuration and bonding. ***Physics mastery level- Energy*** In this chapter, students engage more fully with the fundamental idea of energy stores and begin to quantify how much energy is in them and moving between them. Examples of energy stores include the thermal store of a ball or the air in a room and the kinetic store of a moving object. Energy is an abstract concept that can be stored in any of these stores and can move between them but cannot be created or destroyed. When energy moves from one store to another, something changes in the physical world, for example, the temperature of an object goes down or a moving object gets faster.	some organisms reproduce asexually**.** ***Chemistry mastery level- Chemical changes*** Students will learn the difference between a chemical and a physical change, reactants, and products, and how to write and balance simple chemical equations. Then they investigate different types of chemical reactions. After this, students will learn about conservation of mass, combustion, and exothermic and endothermic reactions.	the generator. Students will know that you can induce a magnetic field around a wire by passing current through it, but not that you can induce a p.d. across a wire or a current through a loop by moving it past a magnet. ***Chemistry mastery level- Useful chemical changes*** Students will explore further chemical reactions, with a focus on metals and the reactivity series. Students will first cover metals and their properties. They then study the reactivity series, displacement reactions, and catalysts before concluding the chapter with some more mathematical topics, including relative mass and yields. This chapter provides excellent opportunity for practical work and practicing maths skills in science.	periodic table and will learn how the development of scientific knowledge has led to the production of the current periodic table. ***How do structural differences in cells allow them to perform their function and what feature of cells has allowed scientists to develop stem cell technology? (B1 Cell Biology)*** Students will learn the differences between cell types and will be able to analyse structures and determine their functions. They will learn how cells divide and produce new identical cells and will investigate how stem cell research is being used to repair cells, organs and grow new tissue.	investigate how stem cell research is being used to repair cells, organs and grow new tissue. **Finals**

	graphs are reviewed and speed-time graphs are introduced. Instantaneous speeds and accelerations are calculated from tangents.					
Key Knowledge, Concepts and skills	Cells Particle Model Forces Application of knowledge, analysis of data, practical skills, evaluation, and analysis	Cell systems Atoms Energy Application of knowledge, analysis of data, practical skills, evaluation, and analysis	Fertilisation Chemical changes Application of knowledge, analysis of data, practical skills, evaluation, and analysis	Electricity Magnetism Reactions Application of knowledge, analysis of data, practical skills, evaluation, and analysis	Atomic Structure and the periodic table Application of knowledge, analysis of data, practical skills, evaluation and analysis	Cells Revision Techniques Required Practical skills and understanding. Application of knowledge, analysis of data, practical skills, evaluation and analysis
Feedback & Assessment	**End of topic tests – Cells, Particle model & state change, Forces & Motion** **End of cycle 1 Test**	**End of topic tests- Cell systems, Atoms & the periodic table, Energy** **End of cycle 2 test**	**End of topic test - Fertilisation & implantation, Chemical changes**	**End of topic test - Electricity & Magnetism, Useful chemical reactions** **End of Cycle 3 test**	**Assessment 1 Test 1 - C1 Atomic structure &the periodic table** **Test 2 - B1 Cell biology** **Required practical – Biology – Microscopy, Osmosis**	**End of Year Assessment – Al units covered**
Big Qs ***Linked to NC***	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 8	***What are the key features of the digestive system and what are their functions? How do we maintain a healthy body and what factors can affect our organ systems? (Health and lifestyle)*** In this chapter, students will be introduced to the components of a balanced diet and its importance in maintaining health. They will study the process of digestion, concentrating on the role of enzymes, bacteria, and some of the main organs in the digestive system. In the final section of the chapter, students will look at the effects of drugs on the	***What are the differences in Current, Voltage and resistance in series and parallel circuits? How can we vary the strength of an electromagnet? What does the field pattern look like around the earth and how does this compare to a magnet? (Electricity & magnetism))*** This chapter introduces students to electric fields, current, and magnetism. Students will look at how to build simple circuits and take measurements of current and potential difference. Students will study electromagnets and plan how to investigate the shape of magnetic fields.	***Which light bulb is the most cost effective to run a filament bulb or a fluorescent? What are the energy transfers in a car or computer? What is work done and how do we measure it? How can we prevent heat loss? (Energy)*** This chapter introduces students to energy resources, stores, and transfers. Students will look at how electricity is generated by renewable and non-renewable resources. They will be introduced to stores of energy and methods of transfer between stores, in particular, by particles, radiation, and forces. Students will also study the links between energy, work done,	***What is the interdependence of organisms in an ecosystem? How are organisms affected by their environment? (Ecosystems & Adaptations)*** In this chapter, students will begin by looking at the feeding relationships within food chains and webs, and how this can result in bioaccumulation. They will then study the interdependence of organisms by looking at what happens to the population of one organism when the population of another is changed; this is studied within food web diagrams, and graphically through predator-prey interactions.	**How is speed calculated, what are motion graphs? how and why does pressure vary? (Motion and pressure)** This chapter introduces students to speed, pressure, and turning forces. Students will look at how motion can be described using distance-time graphs. They will be introduced to pressure in gases, in liquids, and on solids. Students will also study situations in which a force has a turning effect. Students will have the opportunity to develop their mathematical skills by using equations to calculate speed and pressure.	**What would be expected of me when completing a Required Practical? (Full Practical Write-ups)** Students will embed their practical write-up knowledge. Students will be able to identify variables in a practical, collect valid data and identify errors. They will be able to graph their results and draw a valid conclusion **What question can I investigate or what topic of interest can I improve my knowledge and understanding of? (Projects)**

	body, focusing on smoking and alcohol. ***How are elements arranged in the periodic table?*** ***(The periodic table)*** In this chapter, students develop their knowledge about elements, learning how to distinguish between metal and non-metal elements. Chemical and physical properties are introduced, and the chemical and physical properties and uses of some typical metals and non-metals, and elements in Group 1, 7, and 0 are explored.	Throughout the chapter, students will develop their mathematical skills as they learn how to change the subject in an equation. ***What is photosynthesis and why it is important? How can we test for the products of photosynthesis? How is a leaf adapted for photosynthesis? What and why is respiration important? How is aerobic respiration different from Anaerobic? What is fermentation?*** ***(Biological processes)*** In this chapter, students will study the process of photosynthesis, how leaves are adapted to maximise this process, and its importance for all life on Earth. They will then look at the effects of minerals on plant growth. The focus of the second half of the chapter is the process of respiration, beginning with aerobic respiration. Students will then compare this with anaerobic respiration in animals and fermentation in plants. ***How can you separate a mixture of salt, sand, plastic beads, and iron filings?*** ***(Separation techniques)*** In this chapter students learn about pure substances and mixtures, how to determine if a substance is pure, and the differences between the terms solute, solvent, solution, and solubility. They compare mixtures and	and power, and will have the opportunity to develop their mathematical skills to real-life scenarios when calculating work done, power, and the cost of using domestic appliances.	Students will then look in detail at the adaptations of a number of organisms that enable them to be successful competitors and survive in harsh and changing environments. ***How do you know when a chemical reaction has occurred and how can we determine reactivity? How do metals react with different materials? What are polymers and their uses?*** ***(Metals & other materials)*** In this chapter students learn about the reactions of metals with acids, with oxygen, and with water, and write word equations for these reactions. They describe the reactivity series and use this to predict the reactivity of metals with acids, with oxygen, and with water. Displacement reactions are explored, including the displacement reaction between a metal compound and carbon as a method for extracting the metal from its ore. Students look at the properties of ceramics, some polymers, and some composites, and explain how the properties of these materials make them suitable for their uses.	***How and why do humans vary from each other? How have these changes occurred over millions of years?*** ***(Inheritance)*** In this chapter, students will look at the variation in characteristics in organisms within a species and determine whether these are a result of inherited variation, environmental variation, or both. They will categorise characteristics as showing discontinuous or continuous variation and will plot this on appropriate graphs. Students will then study how characteristics are inherited through chromosomes. The final section in the chapter looks at evolution through the process of natural selection, why some organisms become extinct, and the role gene banks can play in trying to prevent extinction. ***What is the structure of the earth, what resources can we obtain from it? How has the atmosphere evolved and what factors continue to change its composition?*** ***(Earth)*** In this chapter students learn about the composition of the Earth and its atmosphere. They are reintroduced to three different types of rocks, sedimentary, igneous, and metamorphic rocks, and describe how they are made, their properties and uses, and how their properties make them suitable for their	Students will work in groups on a project of their choice and develop a wider knowledge and understanding of their chosen area. Groups will present back to the class.

		compounds and learn about different ways to separate the substances in a mixture and when each is appropriate, including filtration, evaporation, distillation, and chromatography. Students develop their skills of representing and analysing data by plotting solubility data and using this to describe how solubility changes with temperature.			uses. The rock cycle and the carbon cycle are explored, allowing students to consider how materials are recycled naturally. Students also study the greenhouse effect, global heating, and climate change, and explore how to look after and protect the Earth by preventing climate change and preserving our natural resources by recycling.	
Key Knowledge, Concepts and skills	Health & Lifestyle The Periodic table Graph skills and understanding. Data analysis skills Application of knowledge, practical skills, evaluation and analysis	Electricity & magnetism Photosynthesis Respiration Separation Techniques	Energy	Ecosystems & adaptations Metals	Forces Pressure Inheritance Earth	Practical skills; predictions, variables, data collection, error identification, graph skills and conclusions. Projects: Group work, self-motivation, research, organisation, presentation skills, confidence
Feedback & Assessment	**End of topic tests – Health & lifestyle, The periodic table**	**End of topic tests – Electricity & magnetism, Biological processed, Separation techniques** **End of cycle 1 Test**	**End of topic tests – Energy** **End of cycle 2 Test**	**End of topic tests – Ecosystems & adaptations, Metals and other materials**	**End of topic tests – Motion & pressure, Inheritance, Earth** **End of cycle 3 Test**	**End of topic tests – Working scientifically** **End of cycle 4 Test**
Big Qs ***Linked to NC***	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 7	***How do you conduct a science investigation safely and so you can obtain reliable and valid data? (Introduction to practical science)*** Students will learn how to be safe in a laboratory and will conduct a practical determining variables and safety precautions as well as gathering valid data and writing a detailed conclusion.	***What is the particle model and how to scientists use it to explain changes of state? (Particle & their behaviour)*** In this chapter, students are introduced to the particle model and how to use it to explain the properties of substances in the three states of matter. The chapter also introduces the concept of density and diffusion and the factors that affect them.	***How does sound travel and how to scientists represent this in diagrammatic form? What are the key features of waves? (Waves- Sound)*** This chapter introduces students to longitudinal and transverse waves and looks at what happens when waves meet each other or hit a barrier. Students look at sound waves in more detail, what mediums sound waves can travel through, and how they	***What is the differences between atoms, elements, and compounds. How do scientists write the chemical symbols and formulae for elements and compounds. (Elements, Atoms, and compounds)*** In this chapter, students are introduced to the concepts of atoms, elements, molecules, and compounds, and use their knowledge of particles to start naming molecules and compounds	***What advice would you give a pregnant woman to ensure the embryo develops well and safely? (Human Reproduction)*** This chapter introduces students to the process of sexual reproduction in both plants and animal cells. It begins by introducing the emotional and physical changes which take place during adolescence, which is likely to tie in with what students are currently	***How do you know when a chemical reaction has occurred and how can we determine reactivity? (Acids and alkalis)*** In this chapter, students are introduced to the term acid, alkali, base and neutral, and they are taken through the reactions between acid and metals and bases, called neutralisation reactions, and some examples of how useful

	What effect does gravity have on objects on different planets, what factors affect frictional forces and how and why does pressure vary? ***(Forces)*** This chapter introduces students to forces that are all around them. Students learn that forces act on stationary objects and that, without forces, nothing would be able to move. They also study how forces can change the shape of an object and investigate Hooke's law. Students will take measurements using newton meters and develop their graph drawing skills.	***What are the main features of an onion and cheek cell and how can we observe them? What are specialised cells and what are their functions?*** ***(Cells)*** In this chapter, students are introduced to cells as the building blocks of all living organisms. Students will look at the structures in plants and animal cells. They will look at the adaptation of specialised cells. They will learn about the process of diffusion by which substances move into and out of cells. They will also study the unicellular organisms, euglena, and amoeba. Throughout the chapter, students will have opportunities to use a microscope to observe cells and other small structures.	are detected by the ear and microphone. Throughout the chapter, students will learn about the features of waves and how they are represented. Students will study how the amplitude and frequency of a sound wave affects its loudness and pitch. ***What are multicellular organisms and how are they organised? Why do we breathe? What is the role of the skeleton? Why are joints and muscles important?*** ***(Structure and function of body systems)*** This chapter builds on the concept of cells as building blocks of all living organisms. Students are introduced first to the levels of organisation present within a multicellular organism, starting with the cell. Then, the focus turns to two organ systems – the respiratory system (through looking at breathing and the process of gas exchange) and the skeletal system. Finally, students will consider the roles of skeleton, including looking in detail as its role in movement through the study of joints and antagonistic muscles.	and writing chemical symbols and chemical formulae. ***How does light travel and how to scientists represent this in diagrammatic form? What are the key features of waves?*** ***(Waves- light)*** This chapter introduces students to some properties of light and how light travels. Students compare how the eye and the camera work. They gain an understanding of the effect of coloured filters on light and the effect of coloured light on different coloured objects. Throughout the chapter, students will learn about the behaviour of light in different situations where light interacts with matter, such as reflection, refraction, and dispersion.	experiencing. Students then study human reproductive systems and the processes involved in reproduction. The second half of the chapter focuses on plant reproduction, including fertilisation, germination, and seed dispersal. To align with the National Curriculum, this chapter cover the biology of sexual reproduction between a male and female. ***Chemical reaction has occurred and how can we determine reactivity?*** ***(Reactions)*** In this chapter, students are introduced to chemical reactions. They will develop their knowledge by looking at different types of chemical reactions, including oxidation, combustion, and decomposition. Students will also learn how to represent chemical substances and reactions using ratios and how to write word equations and balanced formula equations.	these can be. The chapter looks at pH for the first time as a measure of how acidic a solution is, and the pH range associated with acidic, alkaline, and neutral substances. ***What is our solar system made up of? How do we get different seasons and day lengths?*** ***What are the different phases of the moon?*** ***(Space)*** This chapter introduces students to some of the celestial objects that they can see in the night sky as well as other objects in the Universe. They gain an understanding of how the planets in our Solar System formed. Students will learn why seasonal changes occur in the UK and other regions on Earth. Students will learn about the apparent motion of celestial objects and apply this knowledge to explain the phases of the Moon and eclipses.
Key Knowledge, Concepts and skills	Practical Skills Forces	Particles Cells	Waves Organisation – organ systems	Elements, atoms and compounds Waves	Reproduction Reactions	Acids and alkalis Space
Feedback & Assessment	**End of topic tests – Introductory science**	**End of topic tests – Particles and their behaviour, Cells** **End of cycle 1 Test**	**End of topic tests – Sound, Structure and function of body systems**	**End of topic tests – Elements, atoms & compounds, Light** **End of cycle 2 Test**	**End of topic tests – Reproduction, Reactions** **End of cycle 3 Test**	**End of topic tests – Acids & Alkalis, Space** **End of cycle 4 Test** **Final year exam**