Long Term Plan
GCSE Science

Groveside School

Year 1

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
GCSE Unit	Biology 1	Biology 1	Chemistry 1	Chemistry 1	Physics 1	Physics 1
GCSE Topics	B1, B2	B3, B4,	C1, C2	C3, C4	P1, P2	P3, P4
Retrieval	KS3 Cells	B1, B2	B3, B4, B5	C1, C2	C3, C4	KS3 atoms, elements, and compounds
Knowledge and Learning	**Cell Biology** Cells are the basic unit of all forms of life. In this section we explore how structural differences between types of cells enables them to perform specific functions within the organism. For an organism to grow, cells must divide by mitosis producing two new identical cells. Stem cell technology is a new branch of medicine that allows doctors to repair damaged organs by growing new tissue from stem cells. **Organisation** In this section we will learn about the human digestive system which provides the body with nutrients and the respiratory system that provides it with oxygen	**Infection and Response** This section will explore how we can avoid diseases by reducing contact with them, as well as how the body uses barriers against pathogens. Once inside the body our immune system is triggered which is usually strong enough to destroy the pathogen and prevent disease. When at risk from unusual or dangerous diseases our body's natural system can be enhanced using vaccination. Since the 1940s a range of antibiotics have been developed which have proved successful against several lethal diseases caused by bacteria. **Bioenergetics** In this section we will explore how plants	**The Periodic Table** Together we will explore the periodic table, how it is arranged and how it was developed. Discussing how it has developed over time and the famous scientists involved in its development. This will lead to an in-depth look at specific groups in the periodic table including metals, non-metals, group 0, group 1, and group 7. **Bonding, structure, and the properties of matter** Pupils will explore how atoms join to form compounds. Different types of bonds and the shape of the structures made by different compounds. In this topic pupils will begin to learn to recognise different models to represent	**Quantitative Chemistry** In this topic we will be exploring the law of conservation of mass and representing chemical reactions in balanced word and symbol equations further expanding on their skills working with models pupils have been using in the previous topic. Pupils will then learn new scientific skills in using the correct names, units, and prefixes. As well as recognising the importance of scientific quantities and how they are determined. Pupils will continue to practice the skills learned in previous units in arithmetic and numerical computation. **Chemical changes** In this topic we will	**Energy** Pupils will explore energy how it is stored, how it is transferred and use appropriate formulae in calculations. Pupils will begin to manipulate formulae. Pupils will learn about environmental issues, the ability of scientists to identify these issues and the limitations in being able to deal with these issues. **Electricity** Pupils will explore electricity by drawing and interpreting circuit diagrams, recalling and applying the current flow and potential difference equations. Pupils will understand that resistance can be	**Particle Model of Matter** Pupils will investigate density, how to measure it and how to calculate it, building on Maths skills gained in the previous topics to manipulate formulae. Pupils will practice their working scientifically skills in making observations and recording accurately. **Atomic Structure** Pupils will look at atomic structure, exploring the development of the atomic model over time and famous scientists involved in the development of the model before moving on to radioactivity. In this they will explore radioactive decay, nuclear equations, half-life, and contamination. They will

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	and removes carbon dioxide. In each case they provide dissolved materials that need to be moved quickly around the body in the blood by the circulatory system. We will also learn how the plant's transport system is dependent on environmental conditions to ensure that leaf cells are provided with the water and carbon dioxide that they need for photosynthesis	harness the Sun's energy in photosynthesis to make food. This process liberates oxygen which has built up over millions of years in the Earth's atmosphere. Both animals and plants use this oxygen to oxidise food in a process called aerobic respiration which transfers the energy that the organism needs to perform its functions. Conversely, anaerobic respiration does not require oxygen to transfer energy. During vigorous exercise the human body is unable to supply the cells with sufficient oxygen and it switches to anaerobic respiration. This process will supply energy but also causes the build-up of lactic acid in muscles which causes fatigue.	shapes of molecules. They will also transfer data between graphical and numeric form and visualise and represent 2D and 3D forms. Building on the skills they have gained in the previous unit pupils will be continuing to represent numbers in decimal form and use ratios and fractions.	explore how reactive different metals are and focus on their reactions with acids. Following this we will look specifically at Electrolysis. Throughout this topic pupils will continue to build on the skills they have been building in previous units in thinking scientifically and using correct forms of scientific communication and learning new experimental skills and strategies. They will also begin to develop their maths skills in algebra in science, and handling data.	constant or change due to different factors and develop their maths skill in interpreting graphs.	begin to develop their graph skills in plotting graphs of half-life. We will then explore elements and how they interact to form compounds and mixtures. The different sizes of atoms and electronic structure.
Enrichment/ Experiences	Virtual lab; Microscope required practical; DNA extraction; Dissection; Botanical garden visit (real world examples of plant adaptations).	Growing harmless microorganisms; vaccine debate; glitter gel + blacklight hygiene experiment; Talk from a nurse/pharmacist about infection control/ antibiotics/ vaccines; Measuring resting, activity and recover heartrate; Investigating changing	Demonstration of alkali metals reacting with water; Types of bonding simulations; Creating 3D models of molecules.	Elephant toothpaste; growing crystals; lava lamp reactions: reactions of metals with acids.	Build a catapult; lemon/potato battery; trip to wind farm (Green Park); Insulation investigation.	Diffusion practical; cloud in a bottle; contamination vs irradiation simulation; medical case studies; glowstick experiment;

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		conditions affect plant growth; Yeast respiration practical.				
Cross-curricular	ths (Calculations: gnification; BMI; Heart e). od (nutrition and digestive tem) HE (stem cell use, ethical bates; public health)	manities (History) (Fleming d Jenner; Impact of ibiotics). H/ RE (vaccination grammes/ public health npaigns; Moral debates; althy lifestyles). ths (graph plotting and erpretation). od (Diet and energy ance).	ths (ratios and fractions/ ph interpretation; decimal ation). manities (History) velopment and discovery lements and the periodic le). ital Skills (simulations).	ths (calculations; plotting d interpreting data; ctions, ratios, decimals). HE (Environmental tainability).	ths (formula rearranging; tting and interpreting phs). HE (climate change bates). ography (renewable and n-renewable resources).	ths (calculations; nipulating formulae; plotting d interpreting graphs).
Curriculum End Point / Goal	Pupils will demonstrate their **subject knowledge**, their **Working Scientifically skills** and apply **Maths in Science** through regular topic tests, exam question revision and ultimately in the completion of 6 exams, **Biology 1, Biology 2, Chemistry 1, Chemistry 2, Physics 1, and Physics 2.**					

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Year 2

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2 7 weeks (28 hours)
GCSE Unit	Biology 2	Chemistry 2	Physics 2	Revision	Revision	
GCSE Topics	B5, B6, B7	C5, C6, C7, C8, C9, C10	P5, P6, P7,			
Retrieval	B1, B2, B3, B4	C1, C2, C3, C4	P1, P2, P3, P4			
Knowledge and Learning	**Homeostasis and Response** Cells in the body can only survive within narrow physical and chemical limits. Pupils will explore how they require a constant temperature and pH as well as a constant supply of dissolved food and water. They will learn about control systems and what these control systems consist of. We will explore the structure and function of the nervous system and how it can bring about fast responses. We will also explore the hormonal system which usually brings about much slower changes and how it plays a role in reproduction, including how scientists have developed contraceptive drugs and	**Energy Changes** Pupils will explore the importance of energy changes in chemical reactions. Looking at the interaction of particles and the breaking and formation of bonds. Pupils will explore exothermic and endothermic reactions and how some reactions produce electricity. **The rate and extent of chemical change** Pupils will explore different variables that can be manipulated to speed up or slow down chemical reactions. They will learn that chemical reactions may also be reversible and therefore the effect of different variables needs to be established to identify	**Forces** Pupils will explore forces, first looking at their interactions, before moving on to elasticity and motion. They will then move onto exploring Work done and energy transfer, looking at how to calculate work and measure it. **Waves** In this topic pupils will explore waves, looking initially at waves in air, fluids, and solids. Their types and properties. They will then move onto electromagnetic waves, looking at the different types and their properties before looking at the uses and applications of electromagnetic waves. **Magnetism and Electromagnetism** The final topic looks at permanent and induced magnetism, focussing on			

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	drugs to increase fertility. **Inheritance, Variation and Evolution** In this section we will discover how the process of meiosis and how it leads to the production of unique offspring. Pupils will learn about genetic mutation and how it can be harmful or helpful. They will explore variation generated by mutations and sexual reproduction and how this is the basis for natural selection. This will lead to gaining an understanding of the process of selective breeding, leading on to further advancements of cloning and genetic engineering. Pupils will look at the controversy and ethical issues surrounding these advances. **Ecology** Pupils will explore how carbon and water are constantly being recycled before looking into ecosystems and how species interact before looking at how species are adapted to both biotic and abiotic conditions. Pupils will explore how humans need to engage with the environment in a	how to maximise the yield of desired product. Following on from this, pupils will seek to understand energy changes that accompany chemical reactions. **Organic Chemistry** The chemistry of carbon compounds is so important that it forms a separate branch of chemistry. Pupils will explore the great variety of carbon compounds possible because carbon atoms can form chains and rings linked by C-C bonds. Sources of organic compounds include fossil fuels which are a major source of feedstock for the petrochemical industry. Pupils will learn how chemists are able to take organic molecules and modify them in many ways to make new and useful materials such as polymers, pharmaceuticals, perfumes and flavourings, dyes, and detergents. **Chemical Analysis** Pupils will explore a range of qualitative tests to detect specific chemicals. The tests are based on reactions that produce a gas with distinctive properties, or a colour	poles and the magnetic field. Expanding on from this, pupils learn about the motor effect, specifically electromagnetism, Flemings left hand rule and electric motors.			

	sustainable way how humans are threatening biodiversity as well as the natural systems that support it. We will also consider some actions we need to take to ensure our future health, prosperity, and well-being.	change or an insoluble solid that appears as a precipitate. They will also look at instrumental methods which provide fast, sensitive, and accurate means of analysing chemicals, and are particularly useful when the amount of chemical being analysed is small. **Chemistry of the Atmosphere** Pupils will look at the dynamic and forever changing atmosphere. They will focus on how the causes of these changes are sometimes man-made and sometimes part of many natural cycles. They will then look at the problems caused by increased levels of air pollutants which require scientists and engineers to develop solutions that help to reduce the impact of human activity. **Using Resources** Pupils will learn about how natural resources are used to manufacture useful products. They will investigate how chemists seek to minimise the use of limited resources, use of energy, waste, and environmental impact in the manufacture of these products. Following on from this, pupils will look				

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		at how pollution, disposal of waste products and changing land use have a significant effect on the environment, and how human activity has affected the Earth's natural cycles, and how damaging effects can be minimised.				
Enrichment/ **Experiences**	Reaction time test; DNA extraction; Natural selection "bird beak buffet"; ecosystem in a bottle; litter pick up; local biodiversity data collection.	Slime making; perfume chemistry; Elephants' toothpaste; water purification; greenhouse in a bottle; chromatography art; Alka-Seltzer Rockets.	Balloon rocket race; Egg drop challenge; Toy car ramp investigation; parachute drop; Slinky waves; Sound straw instruments; Magnetic maze; Build an electromagnet.			
Cross-curricular	• Maths (calculations; graph plotting and interpretation). • PE (effects of exercise). • Humanities (History) (Darwin, Watson, Crik, Franklin).	• Maths (calculations; ratios; working with formulae; plotting and interpreting graphs). • PSHE (Environmental impact of plastics; sustainable living; climate ethics).	• Maths (calculations; working with formulae; plotting and interpreting graphs). • PE (forces in sport/ daily life).			
Curriculum End Point / Goal	Pupils will demonstrate their **subject knowledge**, their **Working Scientifically skills** and apply **Maths in Science** through regular topic tests, exam question revision and ultimately in the completion of 6 exam, **Biology 1, Biology 2, Chemistry 1, Chemistry 2, Physics 1, and Physics 2.**					