Long Term Plan
KS3 Science

Groveside School

Year 9

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Unit	**Physics:** Space Physics	**Chemistry:** Earth and Atmosphere	**Biology**: Reproduction	**Physics:** Matter	**Chemistry**: Materials	**Biology:** Inheritance and Evolution
NC/Qualification Objectives	Gravity (non-contact force, mass vs weight, gravitational field strength) The solar system (planets, natural satellites, orbital motion, day length, seasons) The Sun as a star, other stars, galaxies, and the Universe The scale and distances in space	The composition and structure of the Earth (crust, mantle, core, tectonics) The rock cycle and types of rocks (igneous, sedimentary, metamorphic) Earth's resources (fossil fuels, ores, recycling, sustainability) Composition of the atmosphere (oxygen, nitrogen, carbon dioxide, noble gases) Carbon cycle (photosynthesis, respiration, combustion, decomposition) Human impact on climate (production of carbon dioxide, global warming, sustainability)	Reproduction in plants (flower structure, pollination, fertilisation, seed and fruit formation, dispersal mechanisms) Reproduction in humans (male and female systems, gametes, fertilisation, gestation, birth) The menstrual cycle (without detailed hormones), infertility, foetal development, maternal health impacts on foetus Puberty	The particle model (states of matter, density, particle motion in gases) Changes of state (melting, freezing, evaporation, condensation, sublimation) Conservation of mass in physical changes Internal energy and heating (link to energy transfer to particles) Expansion and changes in density with heating Pressure in gases and the effect of temperature/volume changes	Properties of metals, ceramics, polymers, composites (related to uses) Reactivity series (ordering metals by reactivity, reactions with acids and carbon) Extraction of metals using carbon from metal oxides Properties and uses of polymers Material choices and applications (link to sustainability and environment)	Variation (continuous and discontinuous, data handling and graphs) Inheritance (DNA, genes, chromosomes; role of Watson, Crick, Wilkins, Franklin) Heredity as transmission of genetic information from one generation to the next Evolution by natural selection (adaptation, competition, extinction) Biodiversity and its importance (gene banks, conservation)
Enrichment/ Experiences		Walk on nature reserve looking at rock formation	Gathering and dissecting flowers on the nature reserve.		Making concrete, slime	Extracting DNA from peas.
Keystone Vocabulary	Weight; non-contact force; Mass; Gravitational field strength; Field	Rock Cycle; Weathering; Erosion; Minerals; Sedimentary Rocks;	Pollen; Ovules; Pollination; Fertilisation; Seed; Fruit; Carpel; Layer; Cell; Fertilisation;	Particle Model; Separating Mixtures; Periodic Table; Elements	Metals; Ceramics; Polymers; Composites	Species; Variation; Continuous Variation; Discontinuous Variation;

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		Igneous Rocks; Metamorphic Rocks; Strata; Global Warming; Fossil Fuels; Carbon Sink; Greenhouse Effect	sperm; period; menstruation; ovulate; gestation; Placenta; Amniotic fluid.			Population; Natural Selection; Extinct; Biodiversity; Competition; Evolution; Inherited Characteristics; DNA; Chromosomes; Gene
Scientific Enquiry/skills	Disciplinary knowledge in science is cumulative. Knowledge is revisited and refined throughout the curriculum.					
	Pupils will have the opportunity to: Make deductions from observation data of planets, stars and galaxies.	Pupils will have the opportunity to: Explain the properties of rocks using a cooling model.	Students will have the opportunity to: Make and record observations related to flower structure and relate to the mode of pollination.	Pupils will have the opportunity to: Select, plan and carry out the most appropriate types of scientific enquiries to test predictions, Apply mathematical concepts and calculate results. Use and derive simple equations and carry out appropriate calculations.	Pupils will have the opportunity to: Interpret observations and data, use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety, where appropriate, make predictions using scientific knowledge and understanding, present observations and data using appropriate methods, including tables and graphs.	Pupils will have the opportunity to: Find out why scientists Watson, Crick and Franklin were so important.
Knowledge and Learning	**Know:** *Pupils will build on prior learning around the explanation for day and night, using ideas about the eath's tilt. This then builds into looking at how weight varies under different gravities.* Pupils will describe how the Earth's tilt and movement around the sun leads to changes in day length and seasons.	**Know:** In this unit pupils will develop a deeper understanding of the structure of the Earth and that it is made up of layers. They will then retrieve knowledge about the different types of rocks and build a deeper understanding of how they are formed. Using this knowledge pupils will recognise that fossil fuels and ores are finite	**Know:** *Students previously learned about the structure of flowering plants the stages of plant reproduction. Here, students explore different mechanisms of pollination, including the adaptations for each.* Students will the look at different methods of seed dispersal, and analyse experimental data and	**Know:** *Pupils will explore the common characteristics of each state of matter and use the particle model studied in chemistry as a way in to understand density. The evidence for the movement of particles in gases will also studied. Pupils will then go on to expand their understanding of states of matter, changes of state and reversible and non-*	**Know:** *Pupils will build on their understanding of properties of materials from KS2. Pupils will relate the properties of metals to their uses. They will then use information from observations to produce an order of reactivity for metals and carbon. Core learning will be completed by relating the properties*	**Know:** This unit begins by exploring the variation between individuals within a species, identifying variation as being continuous or discontinuous before measuring and graphically representation of variation and exploring the differences between species. Moving on from variation, pupils will progress from

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	Leading on from this Pupils will explore gravity and weight. Looking at how gravity changes on different planets and how this affects weight. They will then go on to explore how gravitational forces exist between the Earth and the Sun and the Earth and the Moon. Finally in this topic pupils will extend their perspective beyond the solar system and placing the Sun in the context of other stars. Before developing their understanding of distance and scale.	resources for which humans must find alternatives, which will also help reduce the impact on the Earth. Moving on to the atmosphere pupils will build on the knowledge of the requirements of plants, animals and humans for life, and developing a deeper understanding of the composition of air. This will allow them to look at the processes involved in the release and removal of carbon dioxide in the atmosphere. Linking together respiration, combustion, photosynthesis and decomposition.	methods linked with seed dispersal. Following on from plant reproduction, students will look at Human reproduction. They will learn about male and female reproductive parts and compare reproductive organs in plants and animals. Students will describe the changes occurring in puberty before looking in more detail at the menstrual cycle and links to infertility. Finally, they will explore the development of the foetus, the role of the mother in this and factors which affect foetal development.	*reversible changes. They will develop ideas from the particle model studied in chemistry, by relating changes of state to the particle model, and exploring how this model explains conservation of mass in physical changes.* Building on the core learning pupils will relate changes of state to the transfer of energy to particles, and develop the concept that heating increases the internal energy of a material. Ideas about the particle model and energy transfer are also used to explain why solids and liquids expand and become less dense when heated.	*of ceramics and composites to their uses.* The core learning in this unit if further extended by pupils exploring uses of the reactivity series in using carbon to extract metals from metal oxides, then also leading to an examination of the properties of polymers.	Key Stage 2, where pupils recognised that living things have changed over time and that animals and plants are adapted to suit their environment, to exploring how organisms change through natural selection, driven by competition and evolution. Inheritance is then explored through looking at a simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model. Leading on to the exploration od heredity as the process by which genetic information is transmitted from one generation to the next.
Curriculum End Point / Goal	Pupils will use **modelling** and **abstract ideas** to **develop and evaluate explanations**. They should have a deepening understanding that science is about working objectively, **modifying explanations** to take account of new evidence and ideas and subjecting results to **peer review**. Pupils will develop their use of scientific vocabulary, including the use of scientific nomenclature and units and **mathematical representations**.					