Long Term Plan
KS3 Science

Groveside School

Year 8

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Unit	**Physics:** Waves	**Chemistry**: Periodic Table	**Biology:** Health and Human Systems	**Physics:** Electricity and Magnetism	**Chemistry:** Chemical Reactions	**Biology**: Respiration and Photosynthesis
NC/Qualification Objectives	Sound (longitudinal waves, frequency, amplitude, pitch, detection by ear/microphones) Light (reflection, refraction, dispersion, human eye, absorption and transmission) Wave properties (wavelength, frequency, speed, transverse vs longitudinal) Wave effects (superposition, echoes, uses of ultrasound, effects of light)	Periodic Table (groups and periods, metals and non-metals, physical/chemical properties) Elements, atoms and compounds (symbols, formulae, conservation of mass) Patterns in reactions (using the periodic table to predict properties) Properties of oxides (metal oxides vs non-metal oxides, acidity)	Gas exchange systems (structure and function of alveoli, breathing mechanism, lung volume, effects of exercise, smoking, asthma) Nutrition and digestion (balanced diet, food groups, digestive system organs, enzymes, bacteria in digestion) Skeletal and muscular systems (structure of skeleton, movement, antagonistic muscles, biomechanics, blood cell production)	Current (series vs parallel circuits, current flow, electrostatic charges, electric fields) Voltage and resistance (potential difference, resistance = V ÷ I, energy transfer in circuits) Magnetism (magnetic poles, fields, Earth's magnetism) Electromagnets (how they work, strength factors, applications such as motors and bells)	Chemical reactions as rearrangements of atoms (formulae, equations, conservation of mass) Acids and alkalis (neutralisation, pH scale, indicators, reactions with metals and bases) Types of reaction (combustion, thermal decomposition, displacement, oxidation) Energetics (exothermic and endothermic reactions, qualitative energy changes)	Cellular respiration (aerobic and anaerobic respiration, word equations, fermentation, energy release) Photosynthesis (word equation, reactants and products, leaf adaptations, importance for ecosystems) Interdependence of photosynthesis and respiration in organisms Role of photosynthesis in food security and maintaining oxygen and carbon dioxide balance
Enrichment/ Experiences	Use of instruments; visit from sound engineer	Visit to Science Museum chemistry exhibits	Dissection of a lung; Food test for starch/protein; guest talk from sports scientist/physiotherapist etc.	Power station Trip; Build simple motors/ speakers	Whoosh bottle; Elephants toothpaste	Botanical Gardens; yeast fermentation investigation

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Keystone Vocabulary	Vibration; Longitudinal wave; Volume: Pitch; Amplitude; Wavelength; Frequency; Vacuum; Oscilloscope; Absorption; Auditory range; Echo; Incident ray; Reflected ray; Normal line; Angle of reflection; Angle of refraction; refraction; Absorption; Scattering; Transparent; Translucent; Opaque; Convex lens; Retina; Ultrasound; Ultraviolet; Microphone; Loudspeaker; Pressure wave; Waves; Transverse wave; Transmission	Periodic Table; Physical Properties; Chemical Properties; Groups; Periods	Aerobic respiration; Anaerobic respiration; Fermentation; Fertilisers; Photosynthesis; Chlorophyll; Stoma	Potential difference (voltage); Resistance; Electrical conductor; Electrical insulator; Negatively charged; Positively charged; Electrons; Charged up; Electrostatic force; Current; In series; In parallel; Field; Electromagnet; Magnetic force; Permanent magnet; Magnetic poles.	Metals; Non-Metals; Displacement; Oxidation; Reactivity; pH; Indicators; Base; Concentration; Catalysts; Exothermic Reaction; Endothermic Reaction; Chemical Bond; Fuel; Chemical Reaction; Physical Change; Reactants; Products; Conserved	Aerobic Respiration; Anaerobic Respiration; Fertilisers; Photosynthesis; Chlorophyll; Stomata; Breathing; Trachea; Bronchi; Bronchioles; Alveoli; Ribs; Diaphragm; Lung Volume
Cross-curricular links	Link with music for sound waves				Links to mechanics – internal combustion engine.	
Scientific Enquiry/Skills	Disciplinary knowledge in science is cumulative. Knowledge is revisited and refined throughout the curriculum.					
	Students will have the opportunity to: Use a model to explain reflection, absorption and transmission of light. Use the particle model to explain the transfer of sound.	Students will have the opportunity to: Use data to describe a trend in physical properties.	Students will have the opportunity to: Evaluate a model for showing the mechanism of breathing. Make deductions from medical symptoms showing problems with the digestive system.	Students will have the opportunity to: Turn circuit diagrams into real series and parallel circuits, and vice versa. Identifying and using a range of techniques. Using scientific ideas to explain phenomena.	Students will have the opportunity to: Use particle diagrams to show what happens in a reaction.	Pupils will have the opportunity to: Use word equations to describe aerobic and anaerobic respiration. Ask questions based on observations of the real world related to plants and conditions require for growth.
Knowledge and Learning	**Know:** *Students will begin by looking at some basic ideas about waves. They will then be introduced to the idea of a wave with*	**Know:** *Students will build on previous knowledge of properties of different materials by exploring how these can be used to*	**Know:** *Breathing* In gas exchange, oxygen and carbon dioxide move between alveoli and the blood. Oxygen is	**Know:** *Students will build on prior knowledge of forces at a distance and gravity and magnetism and everyday life experience*	**Know:** *Building on the understanding of properties and changes in materials from previous*	***Know:*** *Respiration* *Respiration is a series of chemical reactions, in cells, that breaks down glucose to provide energy*

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	regard to how sound spreads out from a source, and how sound travels as a wave. Following on from this students will extend work on sound sources to include frequency of vibrations, and how vibrations transmitted through the air are detected by microphones and the ear.	*group chemicals before learning what a group and period are within the periodic table. They will then identify metals and non-metals on the periodic table before looking at their properties and the different physical and chemical properties of different elements.* Further extending this unit students will learn about chemical symbols and formulae for different elements and compounds. This will build into representing chemical reactions as equations using formulae which will demonstrate conservation of mass. The unit finishes by looking at the properties oxides, both metal and non-metal oxides, and how they affect acidity as well as how patterns in reactions can be predicted using the periodic table.	transported to cells for aerobic respiration and carbon dioxide, a waste product of respiration, is removed from the body. Breathing occurs through the action of muscles in the ribcage and diaphragm. The amount of oxygen required by body cells determines the rate of breathing. *Digestion* The body needs a balanced diet with carbohydrates, lipids, proteins, vitamins, minerals, dietary fibre and water, for its cells' energy, growth and maintenance. Organs of the digestive system are adapted to break large food molecules into small ones which can travel in the blood to cells and are used for life processes. Facts: Iron is a mineral important for red blood cells; Calcium is a mineral needed for strong teeth and bones; Vitamins and minerals are needed in small amounts to keep the body healthy.	*around static electricity. This will develop into understanding and applying ideas of current charge and voltage through building and testing circuits to measure current and potential difference. Magnetism is then explored, building on their understanding of magnetic poles, attraction and repulsion as well as magnetic and non-magnetic materials.* Core material in this unit involves looking at the separation of charges when objects are rubbed together and exploring the idea of an electric field. Students will explore forces as pushes or pulls arising from the interaction between two objects, and non-contact forces. Further extending this topic to focus on magnetism, exploring magnetic poles, attraction and repulsion. Magnetic fields by plotting with a compass and the earth's magnetism. This will then be further extended by observing the magnetic effect of a current, electromagnets and D.C. motors.	*learning, students will be able to explain that some changes result in the formation of new materials, including changes associated with the action of an acid on bicarbonate of soda.* The core material of the unit will look at Chemical change, reactions being the rearrangement of atoms and how to represent reactions using formulae and equations. Specific reactions will include the pH scale and indicators, Combustion and Thermal decomposition. Further extending their knowledge student will then go on to explore displacement reactions and neutralisation, finally looking at the energetics of reactions.	*and form new molecules. Most living things use aerobic respiration but switch to anaerobic respiration, which provides less energy, when oxygen is unavailable.* *Photosynthesis* *Plants and algae do not eat, but use energy from light, together with carbon dioxide and water to make glucose (food) through photosynthesis. They either use the glucose as an energy source, to build new tissue, or store it for later use. Plants have specially adapted organs that allow them to obtain resources needed for photosynthesis.*
Curriculum End Point / Goal	Pupils will continue to develop a deeper understanding of a range of **scientific ideas** in the subject disciplines. The awareness of **big ideas** underpinning **scientific knowledge** and understanding are developing. Pupils will be encouraged to relate scientific explanations to **phenomena** in the world around them. Pupils will **evaluate** their results and identify further **questions** arising from them. Their use of scientific **vocabulary** deepens with consistency.					