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Year 9	**Golden Treads:** State the big ideas that will be taught across the year (Threshold concepts) forces and motion, the cellular basis of life, chemical reactions, waves, heredity and life cycles, particles and structure, earth in space, dynamic earth, organisms and their environment, variation adaptions and evolution.			**Enrichment:** What is offered through the year to support learning in the classroom?		**Review and evaluation:** Give date for review of the curriculum
	Topics	**Assessment**	**Substantive Knowledge**	**Disciplinary Knowledge**	**Misconceptions**	**Key Vocabulary**	**Knowledge tracking**
Term 1	Scientific Skills	Practical assessment	Application of safety Scaffolded investigation Drawing graphs & conclusions	**RP Shark diffusion investigation**	Measuring Cylinder and beaker can be used for the same thing Liquids have an amount rather than volume .	Risk assessment; hazard; precaution; variables; conclusion; evaluate.	PL KS3: In year 8, students took part in a scientific skills topic building on the scientific skills learnt in year 7. This included a recap of safety in a lab, a slightly scaffolded investigation and extension on data analysis involving learning how to draw lines of best fit and make conclusions from data. FL KS4: reliability and reproducibility; precise & accuracy; errors
	Biochemistry		Photosynthesis and plant structure Leaves Aerobic respiration Anaerobic respiration	**RP testing a leaf for starch**	Respiration is synonymous with breathing. Plants obtain their energy directly from the sun. Plants produce oxygen for our benefit.	Photosynthesis; palisade cell; chloroplast; chlorophyll; sunlight; Respiration; aerobic; anaerobic; energy; lactic acid	PL KS2: Structure and function of plants; life cycle of a flowering plants; transport system in plants; respiration. KS3: Function of mitochondria
	Periodic table		Atoms, elements and compounds. Mixtures. The development of the model of the atom. Relative electrical charges of subatomic particles. Size and mass of atoms.		Confusion between the difference between neutron and nucleus. Student also confuse the term nucleus in chemistry and biology.	Atom Element Compound	
Term 2	**More about forces**		Moments Deformation Non-contact forces & Gravity Investigation/Application	**RP Extension of an elastic band** **RP Design a marble run**	Force is a property of an object. An object has force, and when it runs out of force it stops moving.	Force; weight; turning effect; moment; deformation; elastic potential energy; Hooke's Law	PL KS2: Materials; magnets; gravity. KS3 Y7: Forces – push 7 pull; balanced & unbalanced forces; air resistance & friction Y8: Forces and motion; speed; distance/time graphs

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							FL – Physics paper 2 Forces and motion
	Waves		**Observed waves** **Sound waves** **Sound Transmission** **Uses of waves**	**RP Observing waves in water**	When a wave moves, particles move along with the wave from the point of transmission to the point of reception.	Transverse; longitudinal; wave; frequency; amplitude; pitch; volume; medium	PL KS2: Sound KS3: Light waves FL KS4: Physics paper 2 Waves
	Understanding chemical reactions		Oxidation reaction Extraction of metals from their ore Exothermic reactions (e.g. Combustion) Role of catalysts	**RP Extracting Copper from Copper carbonate** **RP Exothermic & endothermic reactions** **RP Temperature changes in different fuels**	Exothermic reactions are accompanied by increase in energy while endothermic reactions are accompanied by decrease in energy	Displacement; oxidation; ore; thermal decomposition; exothermic; endothermic; combustion	PL KS3: Substances and mixtures; Chemical change; Elements and compounds. FL KS4: Chemistry Paper 1 Chemical change; Chemistry Paper 2 Rate and extent of chemical change
Term 3	**Biodiversity and human Impacts**		Biodiversity Human impacts Conservation & gene banks	**Research skills**	Species have always gone extinct so we do not need to worry about a few animals or plants disappearing. Losing a species does not effect humans	Biodiversity; species; extinction; endangered; conservation; genetic material; gene bank	PL KS2: Plant and Animal adaptations and that adaptation may lead to evolution Fl KS4: Biology Paper 2 Ecology: Adaptations; biodiversity; Ecological studies; Human impact on the environment
	More electric circuits		Resistance Magnets Electromagnets Energy & power	**RP resistance of a wire** **RP plotting magnetic fields** **RP Electromagnet**	Energy is a thing and object or something that is tangible. Larger magnets are stronger than smaller magnets, All metals are attracted to a magnet	Resistance; current; magnetic field; electromagnet; energy; power;	PL KS2: Forces and magnets; Electricity; Electricity PL KS3: Electric Circuits FL KS4: Physics Paper 1 Electricity
Term 4	**Acids and alkalis**		Indicators pH Reactions of acids & metals Neutralisation	RP Acids and metals RP Neutralisation RP Acids and metal carbonates	Neutralisation means an acid breaking down	Acid; alkalis; indictors; pH scale; chemical reaction; neutralisation; displacement	PL KS3 The particulate nature of matter; Atom, elements and compounds; Pure and impure substances; Chemical reactions; Energetics FL KS4: Chemical Changes; Energy changes in chemistry; Rate and extent of chemical change; Chemical analysis

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	Inheritance and the genome		**Evolution and Natural selection** **Inheritance** **DNA structure** **Genome**	**RP Extracting DNA**	Traits are developed by individuals in response to the needs of the individual.	DNA; genetic material; genes; chromosomes; inheritance	Pl KS3: Reproduction in humans and plants; Variation FL KS4: Biology paper 2 Inheritance and evolution
Term 5	**Health and infectious diseases**		Diseases Pathogens Prevention & treatment	**RP Transmission of disease trough touch (UV powder)** **RP Growing bacteria from our environment**	All microbes are harmful You always catch an infection from a dirty environment or hospital	pathogens transmission;	PL KS3: Y7 the content of a healthy human diet and why each is important; calculations of energy requirements in a healthy daily diet; the tissues and organs of the human digestive system, including adaptations to function and enzymes as biological catalysts; the importance of bacteria in the human digestive system Y8: mental and physical health, consequences of an imbalanced diet, disease and drugs FL KS4: Biology paper 1 Infection and response Organisation
	Designing materials		climate change and carbon cylce Fossil fuels Plastics and natural materials	**Making cement**	Climate change and the ozone layer are the same thing Glass, cotton and silk as natural materials	Polymer Decomposers Combustion	Earths chemistry
	Energy		**Energy changes in a system, and the ways energy is stored before and after such changes** *Energy stores and* systems. Changes in energy Energy changes in systems Power	Required practical – specific Heat capacity. AT 1 and 5 Investigating thermal insulators AT 1 and 5	**heat as an intangible substance that can flow into and out of objects**	Efficiency Dissipated Electrostatic System Conductivity Absorb/ emit Renewable Reliability Geothermal Hydroelectric biofuel	Prior learning – Particle model and energy term 1 Year 10, Forces and energy stores Year 9 term 1, Forces and energy stores Year7 term 3. Leading onto- forces, waves and electromagnetism in Year 11

			Conservation and dissipation of energy Energy transfers in a system Efficiency **National and global energy resources**		**hot object can 'heat up' another object, and think of heat as something that can move from one object to another** **Many students think that objects of different materials in the same room will have different temperatures** **the temperature of boiling water will continue to rise if it is heated, and that the temperature of a sample of ice will fall if more ice is added**		

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