

## Year 7 Curriculum Overview Plan: Subject Science

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p><b>Key Theme:</b> Matter 1 Organisms 1</p>	<p><b>Key Theme:</b> Force 1</p>	<p><b>Key Theme:</b> Genes 1</p>	<p><b>Key Theme:</b> Electromagnets 1</p>	<p><b>Key Theme:</b> Reactions 1</p>	<p><b>Key Theme:</b> Ecosystem 1</p>
<p><b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b></p> <ul style="list-style-type: none"> <li>the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density; the anomaly of ice-water transition</li> <li>atoms and molecules as particles</li> <li>the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure</li> <li>changes of state in terms of the particle model</li> <li>the concept of a pure substance</li> <li>the identification of pure substances</li> <li>mixtures, including dissolving</li> <li>diffusion in terms of the particle model</li> <li>simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography</li> </ul>	<p><b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b></p> <ul style="list-style-type: none"> <li>speed and the quantitative relationship between average speed, distance and time (<math>\text{speed} = \text{distance} \div \text{time}</math>)</li> <li>the representation of a journey on a distance-time graph</li> <li>relative motion: trains and cars passing one another</li> <li>forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only)</li> <li>change depending on direction of force and its size</li> <li>use and derive simple equations and carry out appropriate calculations</li> <li>forces as pushes or pulls, arising from the interaction between 2 objects</li> <li>non-contact forces: gravity forces acting at a distance on Earth and in space, forces between</li> </ul>	<p><b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b></p> <ul style="list-style-type: none"> <li>differences between species</li> <li>the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation</li> <li>the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material</li> <li>reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta</li> <li>present observations and data using appropriate methods,</li> </ul>	<p><b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b></p> <ul style="list-style-type: none"> <li>differences in resistance between conducting and insulating components (quantitative)</li> <li>electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge</li> <li>interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions</li> <li>potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current</li> <li>separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces</li> </ul>	<p><b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b></p> <ul style="list-style-type: none"> <li>the properties of metals and non-metals</li> <li>the chemical properties of metal and non-metal oxides with respect to acidity</li> <li>defining acids and alkalis in terms of neutralisation reactions</li> <li>the pH scale for measuring acidity/alkalinity; and indicators</li> <li>reactions of acids with metals to produce a salt plus hydrogen</li> <li>reactions of acids with alkalis to produce a salt plus water</li> <li>evaluate risks</li> </ul>	<p><b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b></p> <ul style="list-style-type: none"> <li>the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere</li> <li>the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops</li> <li>the importance of plant reproduction through insect pollination in human food security</li> <li>how organisms affect, and are affected by, their environment, including the accumulation of toxic materials</li> <li>apply sampling techniques</li> <li>use appropriate techniques, apparatus,</li> </ul>

<ul style="list-style-type: none"> <li>• use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety</li> <li>• the structure and functions of the human skeleton, to include support, protection, movement and making blood cells</li> <li>• biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles</li> <li>• the function of muscles and examples of antagonistic muscles</li> <li>• cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope</li> <li>• the functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts</li> <li>• the similarities and differences between plant and animal cells</li> <li>• the role of diffusion in the movement of materials in and between cells</li> </ul>	<p>magnets, and forces due to static electricity</p> <ul style="list-style-type: none"> <li>• gravity force, weight = mass x gravitational field strength (g), on Earth <math>g=10 \text{ N/kg}</math>, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and sun (qualitative only)</li> <li>• apply mathematical concepts and calculate results</li> <li>•</li> </ul>	<p>including tables and graphs</p>	<p>between charged objects</p> <ul style="list-style-type: none"> <li>• the idea of electric field, forces acting across the space between objects not in contact</li> <li>• evaluate data, showing awareness of potential sources of random and systematic error</li> </ul>		<p>and materials during fieldwork and laboratory work, paying attention to health and safety</p> <ul style="list-style-type: none"> <li>• reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms</li> <li>• present reasoned explanations, including explaining data in relation to predictions and hypotheses</li> </ul>
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<ul style="list-style-type: none"> <li>diffusion in liquids and gases driven by differences in concentration</li> <li>the structural adaptations of some unicellular organisms</li> <li>the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms</li> <li>make predictions using scientific knowledge and understanding</li> </ul>					
<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>describe the difference between an object and the material from which it is made</li> <li>identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock</li> <li>describe the simple physical properties of a variety of everyday materials</li> <li>compare and group together a variety of everyday materials on the basis of their simple physical properties</li> <li>compare and group materials together, according to whether they are solids, liquids or gases</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>compare how things move on different surfaces</li> <li>identify the effects of air resistance, water resistance and friction, that act between moving surfaces</li> <li>explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals</li> <li>describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets)</li> <li>explore and compare the differences between things that are living, dead, and things that have never been alive</li> <li>recognise that living things can be grouped in a variety of ways</li> <li>explore and use classification keys to help group, identify and</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit</li> <li>compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches</li> <li>use recognised symbols when representing a simple circuit in a diagram</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets</li> <li>give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>identify and name a variety of common wild and garden plants, including deciduous and evergreen trees</li> <li>identify and name a variety of common animals that are carnivores, herbivores and omnivores</li> <li>find out about and describe the basic needs of animals, including humans, for survival (water, food and air)</li> <li>construct and interpret a variety of food chains, identifying producers, predators and prey</li> <li>identify that most living things live in habitats to which they are suited and describe how</li> </ul>

<ul style="list-style-type: none"> <li>• observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)</li> <li>• identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature</li> <li>• use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating</li> <li>• demonstrate that dissolving, mixing and changes of state are reversible changes</li> <li>• identify that humans and some other animals have skeletons and muscles for support, protection and movement</li> <li>• identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense</li> <li>• describe the changes as humans develop to old age</li> </ul>		<p>name a variety of living things in their local and wider environment</p> <ul style="list-style-type: none"> <li>• describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird</li> <li>• describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals</li> <li>• give reasons for classifying plants and animals based on specific characteristics</li> <li>• notice that animals, including humans, have offspring which grow into adults</li> <li>• describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene</li> <li>• describe the changes as humans develop to old age</li> <li>• describe the life process of reproduction in some plants and animals</li> </ul>			<p>different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other</p> <ul style="list-style-type: none"> <li>• identify and name a variety of plants and animals in their habitats, including microhabitats</li> <li>• describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food</li> <li>• explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment</li> <li>• identify and describe the basic structure of a variety of common flowering plants, including trees</li> <li>• observe and describe how seeds and bulbs grow into mature plants</li> <li>• identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers</li> <li>• explore the part that flowers play in the life cycle of flowering</li> </ul>
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					<p>plants, including pollination, seed formation and seed dispersal</p> <ul style="list-style-type: none"> <li>describe the life process of reproduction in some plants and animals</li> </ul>
<p><b>Key Assessment Pieces:</b> Response Time: Extended Response, Paul the particle</p> <p>Matter 1 Quiz</p> <p>Response Time: Mixed response exam questions</p> <p>Organisms 1 Quiz</p>	<p><b>Key Assessment Pieces:</b> Response Time: Planning an investigation, calculating speed using speed equation.</p> <p>Forces 1 Quiz</p>	<p><b>Key Assessment Pieces:</b> Response Time: Calculating means and graph drawing</p> <p>Genes 1 Quiz</p>	<p><b>Key Assessment Pieces:</b> Response Time: Graph drawing and conclusion</p> <p>Electromagnets 1 Quiz</p>	<p><b>Key Assessment Pieces:</b> Response Time: Mixed response exam questions</p> <p>Reactions 1 Quiz</p>	<p><b>Key Assessment Pieces:</b> Response Time: Sampling Practical – Carrying out investigation, observation and recording of results.</p> <p>Ecosystems 1 Quiz</p>
<p><b>Tier 3 Vocabulary Vault:</b> Particle model</p> <ul style="list-style-type: none"> <li>Particle: A very tiny object such as an atom or molecule, too small to be seen with a microscope.</li> <li>Particle Model: A way to think about how substances behave in terms of small, moving particles.</li> <li>Diffusion: the process by which particles in liquids or gases spread out through random movement from a region where there are many particles to one where there are fewer.</li> <li>Gas pressure: Caused by collisions of particles with the walls of a container.</li> </ul>	<p><b>Tier 3 Vocabulary Vault:</b> Speed</p> <ul style="list-style-type: none"> <li>Speed: How much distance is covered in how much time.</li> <li>Average speed: The overall distance travelled divided by overall time for a journey.</li> <li>Relative motion: Different observers judge speeds differently if they are in motion too, so an object's speed is relative to the observer's speed.</li> <li>Acceleration: How quickly speed increases or decreases.</li> </ul> <p>Gravity</p> <ul style="list-style-type: none"> <li>Weight: The force of gravity on an object (N).</li> </ul>	<p><b>Tier 3 Vocabulary Vault:</b> Variation</p> <ul style="list-style-type: none"> <li>Species: A group of living things that have more in common with each other than with other groups.</li> <li>Variation: The differences within and between species.</li> <li>Continuous variation: Where differences between living things can have any numerical value.</li> <li>Discontinuous variation: Where differences between living things can only be grouped into categories.</li> </ul> <p>Human reproduction</p> <ul style="list-style-type: none"> <li>Gamete: The male gamete (sex cell) in</li> </ul>	<p><b>Tier 3 Vocabulary Vault:</b> Voltage and Resistance</p> <ul style="list-style-type: none"> <li>Potential difference (voltage): The amount of energy shifted from the battery to the moving charge, or from the charge to circuit components, in volts (V).</li> <li>Resistance: A property of a component, making it difficult for charge to pass through, in ohms (<math>\Omega</math>).</li> <li>Electrical conductor: A material that allows current to flow through it easily, and has a low resistance.</li> <li>Electrical insulator: A material that does not allow current to flow</li> </ul>	<p><b>Tier 3 Vocabulary Vault:</b> Metals/non-metals</p> <ul style="list-style-type: none"> <li>Metals: Shiny, good conductors of electricity and heat, malleable and ductile, and usually solid at room temperature.</li> <li>Non-metals: Dull, poor conductors of electricity and heat, brittle and usually solid or gaseous at room temperature.</li> <li>Displacement: Reaction where a more reactive metal takes the place of a less reactive metal in a compound.</li> <li>Oxidation: Reaction in which a substance combines with oxygen.</li> <li>Reactivity: The tendency of a substance</li> </ul>	<p><b>Tier 3 Vocabulary Vault:</b> Interdependence</p> <ul style="list-style-type: none"> <li>Food web: Shows how food chains in an ecosystem are linked.</li> <li>Food chain: Part of a food web, starting with a producer, ending with a top predator.</li> <li>Ecosystem: The living things in a given area, and their non-living environment.</li> <li>Environment: The surrounding air, water, and soil where an organism lives.</li> <li>Population: Group of the same species living in an area.</li> <li>Producer: Green plant or algae that makes its own food using sunlight.</li> </ul>

<ul style="list-style-type: none"> <li>• <b>Density:</b> How much matter there is in a particular volume, or how close the particles are.</li> <li>• <b>Evaporate:</b> Change from liquid to gas at the surface of a liquid, at any temperature.</li> <li>• <b>Boil:</b> Change from liquid to a gas of all the liquid when the temperature reaches boiling point.</li> <li>• <b>Condense:</b> Change of state from gas to liquid when the temperature drops to the boiling point.</li> <li>• <b>Melt:</b> Change from solid to liquid when the temperature rises to the melting point.</li> <li>• <b>Freeze:</b> Change from liquid to a solid when the temperature drops to the melting point.</li> <li>• <b>Sublime:</b> Change from a solid directly into a gas.</li> </ul> <p>Separating mixtures</p> <ul style="list-style-type: none"> <li>• <b>Solvent:</b> A substance, normally a liquid, that dissolves another substance.</li> <li>• <b>Solute:</b> A substance that can dissolve in a liquid.</li> <li>• <b>Dissolve:</b> When a solute mixes completely with a solvent.</li> <li>• <b>Solution:</b> Mixture formed when a solvent dissolves a solute.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Non-contact force:</b> One that acts without direct contact.</li> <li>• <b>Mass:</b> The amount of stuff in an object (kg).</li> <li>• <b>Gravitational field strength, g:</b> The force from gravity on 1 kg (N/kg).</li> <li>• <b>Derive:</b> calculate using measured data</li> </ul>	<p>animals is a sperm, the female an egg.</p> <ul style="list-style-type: none"> <li>• <b>Fertilisation:</b> Joining of a nucleus from a male and female sex cell.</li> <li>• <b>Ovary:</b> Organ which contains eggs.</li> <li>• <b>Testicle:</b> Organ where sperm are produced.</li> <li>• <b>Oviduct, or fallopian tube:</b> Carries an egg from the ovary to the uterus and is where fertilisation occurs.</li> <li>• <b>Uterus, or womb:</b> Where a baby develops in a pregnant woman.</li> <li>• <b>Ovulation:</b> Release of an egg cell during the menstrual cycle, which may be met by a sperm.</li> <li>• <b>Menstruation:</b> Loss of the lining of the uterus during the menstrual cycle</li> <li>• <b>Reproductive system:</b> All the male and female organs involved in reproduction.</li> <li>• <b>Penis:</b> Organ which carries sperm out of the male's body.</li> <li>• <b>Vagina:</b> Where the penis enters the female's body and sperm is received.</li> <li>• <b>Foetus:</b> The developing baby during pregnancy.</li> <li>• <b>Gestation:</b> Process where the baby develops during pregnancy.</li> </ul>	<p>easily, and has a high resistance.</p> <p><b>Current</b></p> <ul style="list-style-type: none"> <li>• <b>Negatively charged:</b> An object that has gained electrons as a result of the charging process.</li> <li>• <b>Positively charged:</b> An object that has lost electrons as a result of the charging process.</li> <li>• <b>Electrons:</b> Tiny particles which are part of atoms and carry a negative charge.</li> <li>• <b>Charged up:</b> When materials are rubbed together, electrons move from one surface to the other.</li> <li>• <b>Electrostatic force:</b> Non-contact force between two charged objects.</li> <li>• <b>Current:</b> Flow of electric charge, in amperes (A).</li> <li>• <b>In series:</b> If components in a circuit are on the same loop.</li> <li>• <b>In parallel:</b> If some components are on separate loops.</li> <li>• <b>Field:</b> The area where other objects feel an electrostatic force.</li> </ul>	<p>to undergo a chemical reaction.</p> <p><b>Acids and alkalis</b></p> <ul style="list-style-type: none"> <li>• <b>pH:</b> Scale of acidity and alkalinity from 0 to 14.</li> <li>• <b>Indicators:</b> Substances used to identify whether unknown solutions are acidic or alkaline.</li> <li>• <b>Base:</b> A substance that neutralises an acid - those that dissolve in water are called alkalis.</li> <li>• <b>Concentration:</b> A measure of the number of particles in a given volume.</li> <li>• <b>Hazard:</b> anything that may cause injury</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Consumer:</b> Animal that eats other animals or plants.</li> <li>• <b>Decomposer:</b> Organism that breaks down dead plant and animal material so nutrients can be recycled back to the soil or water.</li> </ul> <p><b>Plant reproduction</b></p> <ul style="list-style-type: none"> <li>• <b>Pollen:</b> Contains the plant male sex cells found on the stamens.</li> <li>• <b>Ovules:</b> Female sex cells in plants found in the ovary.</li> <li>• <b>Pollination:</b> Transfer of pollen from the male part of the flower to the female part of the flower on the same or another plant.</li> <li>• <b>Fertilisation:</b> Joining of a nucleus from a male and female sex cell.</li> <li>• <b>Seed:</b> Structure that contains the embryo of a new plant.</li> <li>• <b>Fruit:</b> Structure that the ovary becomes after fertilisation, which contains seeds.</li> <li>• <b>Carpel:</b> The female part of the flower, made up of the stigma where the Pollen lands, style and ovary.</li> </ul>
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<ul style="list-style-type: none"> <li>• Soluble: (insoluble) Property of a substance that will (will not) dissolve in a liquid.</li> <li>• Solubility: Maximum mass of solute that dissolves in a certain volume of solvent.</li> <li>• Pure substance: Single type of material with nothing mixed in.</li> <li>• Mixture: Two or more pure substances mixed together, whose properties are different to the individual substances.</li> <li>• Filtration: Separating substances using a filter to produce a filtrate (solution) and residue.</li> <li>• Distillation: Separating substances by boiling and condensing liquids.</li> <li>• Evaporation: A way to separate a solid dissolved in a liquid by the liquid turning into a gas.</li> <li>• Chromatography: Used to separate different coloured substances.</li> </ul> <p>Movement</p> <ul style="list-style-type: none"> <li>• Joints: Places where bones meet.</li> <li>• Bone marrow: Tissue found inside some bones where new blood cells are made.</li> <li>• Ligaments: Connect bones in joints.</li> </ul>		<ul style="list-style-type: none"> <li>• Placenta: Organ that provides the foetus with oxygen and nutrients and removes waste substances.</li> <li>• Amniotic fluid: Liquid that surrounds and protects the foetus.</li> <li>• Umbilical cord: Connects the foetus to the placenta.</li> <li>• Observation Information gathered by your senses</li> <li>• Data: measurements of quantities in an experiment; data can be recorded in a table and used to produce graphs</li> <li>• Bar chart/column graph - Displays the values of categories</li> <li>• Line graph - Shows the relationship between two continuous variables</li> </ul>			
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<ul style="list-style-type: none"><li>• Tendons: Connect muscles to bones.</li><li>• Cartilage: Smooth tissue found at the end of bones, which reduces friction between them.</li><li>• Antagonistic muscle pair: Muscles working in unison to create movement.</li></ul> <p>Cells</p> <ul style="list-style-type: none"><li>• Cell: The unit of a living organism, contains parts to carry out life processes.</li><li>• Uni-cellular: Living things made up of one cell.</li><li>• Multi-cellular: Living things made up of many types of cell.</li><li>• Tissue: Group of cells of one type.</li><li>• Organ: Group of different tissues working together to carry out a job.</li><li>• Diffusion: One way for substances to move into and out of cells.</li><li>• Structural adaptations: Special features to help a cell carry out its functions.</li><li>• Cell membrane: Surrounds the cell and controls movement of substances in and out.</li><li>• Nucleus: Contains genetic material (DNA)</li></ul>					
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which controls the cell's activities.

- Vacuole: Area in a cell that contains liquid, and can be used by plants to keep the cell rigid and store substances.
- Mitochondria: Part of the cell where energy is released from food molecules.
- Cell wall: Strengthens the cell. In plant cells it is made of cellulose.
- Chloroplast: Absorbs light energy so the plant can make food.
- Cytoplasm: Jelly-like substance where most chemical processes happen.
- Immune system: Protects the body against infections.
- Reproductive system: Produces sperm and eggs, and is where the foetus develops.
- Digestive system: Breaks down and then absorbs food molecules.
- Circulatory system: Transports substances around the body.
- Respiratory system: Replaces oxygen and removes carbon dioxide from blood.
- Muscular skeletal system: Muscles and bones working together

<p>to cause movement and support the body.</p> <ul style="list-style-type: none"> <li>Prediction: statement that forecasts what would happen under particular conditions, based on scientific experiment and knowledge</li> </ul>					
<p><b>Reading Exposure:</b>  DARTs: States of Matter  DEAR: Desalinating Water  DEAR: Sabre Tooth Tiger  Skeleton  DARTs: Joints</p>	<p><b>Reading Exposure:</b>  DEAR: Worms going to the ISS  DARTs: Being an astronaut reading task</p>	<p><b>Reading Exposure:</b>  DARTs: Biodiversity Reading Activity  DARTs: Contraceptives  DEAR: Breastfeeding During Lockdown  DEAR: Contraception for Poorer Countries</p>	<p><b>Reading Exposure:</b>  DARTs: Circuit symbols  DEAR: Grenfell Tower</p>	<p><b>Reading Exposure:</b>  DEAR: The Changing Colour of the Statue of Liberty</p>	<p><b>Reading Exposure:</b>  DEAR: How Humans Brought Change to a Tropical Paradise  Red squirrel article</p>
<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Low-stakes quizzing</li> <li>Modelling</li> <li>Videos</li> <li>Practicals</li> <li>Interleaving Working Scientifically</li> <li>Retrieval questions</li> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Low-stakes quizzing</li> <li>Practicals</li> <li>Interleaving Working Scientifically</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Low-stakes quizzing</li> <li>Calculations</li> <li>Matching activities</li> <li>Practicals</li> <li>Interleaving Working Scientifically</li> <li>Retrieval questions</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Drawing graphs</li> <li>Low-stakes quizzing</li> <li>Interleaving Working Scientifically</li> <li>Retrieval questions</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Low-stakes quizzing</li> <li>Practicals</li> <li>Interleaving Working Scientifically</li> <li>Modelling</li> <li>Retrieval questions</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Low-stakes quizzing</li> <li>Practicals</li> <li>True/false quizzes</li> <li>Interleaving Working Scientifically</li> <li>Retrieval questions</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Low-stakes quizzing</li> <li>Storyboarding</li> <li>Practicals</li> <li>Interleaving Working Scientifically</li> <li>Retrieval questions</li> </ul>

• Retrieval questions					
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## Year 8 Curriculum Overview Plan: Subject Science

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<b>Key Theme:</b> Matter 1 Earth 1	<b>Key Theme:</b> Organisms 2	<b>Key Theme:</b> Energy 1	<b>Key Theme:</b> Matter 2	<b>Key Theme:</b> Waves 1 Forces 2	<b>Key Theme:</b> Ecosystems 2
<b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b> <ul style="list-style-type: none"> <li>the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density; the anomaly of ice-water transition</li> <li>atoms and molecules as particles</li> <li>the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure changes of state in terms of the particle model</li> <li>the concept of a pure substance</li> <li>the identification of pure substances</li> <li>mixtures, including dissolving</li> <li>diffusion in terms of the particle model</li> <li>simple techniques for separating mixtures: filtration, evaporation,</li> </ul>	<b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b> <ul style="list-style-type: none"> <li>the structure and functions of the gas exchange system in humans, including adaptations to function</li> <li>the mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases, including simple measurements of lung volume</li> <li>the impact of exercise, asthma and smoking on the human gas exchange system</li> <li>present observations and data using appropriate methods, including tables and graphs</li> <li>the content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed</li> </ul>	<b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b> <ul style="list-style-type: none"> <li>comparing energy values of different foods (from labels) (kJ)</li> <li>comparing power ratings of appliances in watts (W, kW)</li> <li>comparing amounts of energy transferred (J, kJ, kW hour)</li> <li>domestic fuel bills, fuel use and costs</li> <li>fuels and energy resources</li> <li>undertake basic data analysis including simple statistical techniques</li> <li>energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change</li> <li>simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged</li> </ul>	<b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b> <ul style="list-style-type: none"> <li>a simple (Dalton) atomic model</li> <li>chemical symbols and formulae for elements and compounds</li> <li>the periodic table: periods and groups; metals and non-metals</li> <li>the principles underpinning the Mendeleev periodic table</li> <li>how patterns in reactions can be predicted with reference to the periodic table</li> <li>the varying physical and chemical properties of different elements</li> <li>understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature</li> <li>understand that scientific methods and theories develop as earlier explanations are modified to take</li> </ul>	<b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b> <ul style="list-style-type: none"> <li>frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound</li> <li>sound needs a medium to travel, the speed of sound in air, in water, in solids</li> <li>sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal</li> <li>the auditory range of humans and animals</li> <li>the similarities and differences between light waves and waves in matter</li> <li>light waves travelling through a vacuum; speed of light</li> </ul>	<b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b> <ul style="list-style-type: none"> <li>aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life</li> <li>a word summary for aerobic respiration</li> <li>the process of anaerobic respiration in humans and micro-organisms, including fermentation, and a word summary for anaerobic respiration</li> <li>the differences between aerobic and anaerobic respiration in terms of the reactants, the products formed and the implications for the organism</li> <li>plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots</li> </ul>

<p>distillation and chromatography</p> <ul style="list-style-type: none"> <li>• use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety</li> <li>• the composition of the Earth</li> <li>• the structure of the Earth</li> <li>• the rock cycle and the formation of igneous, sedimentary and metamorphic rocks</li> <li>• our sun as a star, other stars in our galaxy, other galaxies</li> <li>• the seasons and the Earth's tilt, day length at different times of year, in different hemispheres</li> <li>• the light year as a unit of astronomical distance</li> </ul>	<ul style="list-style-type: none"> <li>• calculations of energy requirements in a healthy daily diet</li> <li>• the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases</li> <li>• the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts)</li> <li>• the importance of bacteria in the human digestive system</li> <li>• the effects of recreational drugs (including substance misuse) on behaviour, health and life processes</li> <li>• ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience</li> </ul>	<ul style="list-style-type: none"> <li>• heating and thermal equilibrium: temperature difference between 2 objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference; use of insulators</li> <li>• other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels</li> <li>• identify further questions arising from their results</li> </ul>	<p>account of new evidence and ideas, together with the importance of publishing results and peer review</p> <ul style="list-style-type: none"> <li>• differences between atoms, elements and compounds</li> <li>• conservation of mass changes of state and chemical reactions</li> <li>• undertake basic data analysis including simple statistical techniques.</li> </ul>	<ul style="list-style-type: none"> <li>• colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection</li> <li>• waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition</li> <li>• forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water</li> <li>• forces measured in newtons, measurements of stretch or compression as force is changed</li> <li>• force-extension linear relation; Hooke's Law as a special case</li> <li>• opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface</li> <li>• using force arrows in diagrams, adding forces in 1 dimension,</li> </ul>	<ul style="list-style-type: none"> <li>• the reactants in, and products of, photosynthesis, and a word summary for photosynthesis</li> <li>• the adaptations of leaves for photosynthesis</li> <li>• the role of leaf stomata in gas exchange in plants</li> <li>• evaluate data, showing awareness of potential sources of random and systematic error – pond weed experiment</li> <li>• make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements</li> </ul>
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				<ul style="list-style-type: none"> <li>balanced and unbalanced forces</li> <li>moment as the turning effect of a force</li> <li>pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility</li> <li>atmospheric pressure, decreases with increase of height as weight of air above decreases with height</li> <li>pressure in liquids, increasing with depth; upthrust effects, floating and sinking</li> <li>pressure measured by ratio of force over area – acting normal to any surface</li> <li>use and derive simple equations and carry out appropriate calculations</li> </ul>	
<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>describe the difference between an object and the material from which it is made</li> <li>identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock</li> <li>describe the simple physical properties of a variety of everyday materials</li> <li>compare and group together a variety of</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>the structure and functions of the human skeleton, to include support, protection, movement and making blood cells</li> <li>biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles</li> <li>the role of diffusion in the movement of</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</li> <li>identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density; the anomaly of ice-water transition</li> <li>atoms and molecules as particles</li> <li>the properties of the different states of matter (solid, liquid and gas) in terms of the</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>recognise that they need light in order to see things and that dark is the absence of light</li> <li>notice that light is reflected from surfaces</li> <li>recognise that light from the sun can be dangerous and that there are ways to protect their eyes</li> <li>recognise that shadows are formed when the light from a light source</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene</li> <li>find out and describe how plants need water, light and a suitable temperature to grow and stay healthy</li> <li>identify and describe the functions of different parts of flowering plants: roots,</li> </ul>

<p>everyday materials on the basis of their simple physical properties</p> <ul style="list-style-type: none"> <li>• compare and group materials together, according to whether they are solids, liquids or gases</li> <li>• observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)</li> <li>• identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature</li> <li>• use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating</li> <li>• demonstrate that dissolving, mixing and changes of state are reversible changes</li> <li>• compare and group together different kinds of rocks on the basis of their appearance and simple physical properties</li> </ul>	<p>materials in and between cells</p> <ul style="list-style-type: none"> <li>• diffusion in liquids and gases driven by differences in concentration</li> <li>• the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms</li> <li>• identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat</li> <li>• describe the simple functions of the basic parts of the digestive system in humans</li> <li>• identify the different types of teeth in humans and their simple functions</li> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant</li> </ul>	<p>particle model, including gas pressure</p> <ul style="list-style-type: none"> <li>• changes of state in terms of the particle model</li> <li>• the concept of a pure substance</li> </ul>	<p>is blocked by an opaque object</p> <ul style="list-style-type: none"> <li>• find patterns in the way that the size of shadows change</li> <li>• recognise that light appears to travel in straight lines</li> <li>• use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye</li> <li>• explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes</li> <li>• use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them</li> <li>• find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching</li> <li>• compare how things move on different surfaces</li> <li>• notice that some forces need contact between 2 objects, but magnetic forces can act at a distance</li> </ul>	<p>stem/trunk, leaves and flowers</p> <ul style="list-style-type: none"> <li>• explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant</li> <li>• investigate the way in which water is transported within plants</li> </ul>
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<ul style="list-style-type: none"> <li>describe in simple terms how fossils are formed when things that have lived are trapped within rock</li> <li>recognise that soils are made from rocks and organic matter</li> <li>observe changes across the 4 seasons</li> <li>observe and describe weather associated with the seasons and how day length varies</li> <li>describe the movement of the Earth and other planets relative to the sun in the solar system</li> <li>describe the movement of the moon relative to the Earth</li> <li>describe the sun, Earth and moon as approximately spherical bodies</li> <li>use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky</li> </ul>				<ul style="list-style-type: none"> <li>identify the effects of air resistance, water resistance and friction, that act between moving surfaces</li> <li>recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect</li> <li>speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time)</li> <li>the representation of a journey on a distance-time graph</li> <li>relative motion: trains and cars passing one another</li> <li>forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only)</li> <li>change depending on direction of force and its size</li> <li>forces as pushes or pulls, arising from the interaction between 2 objects</li> <li>non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets, and forces due to static electricity</li> </ul>	
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<p><b>Key Assessment Pieces:</b> Response Time: Extended Response, Paul the particle</p> <p>Matter 1 Quiz</p> <p>Response Time: Extended Response - Rock cycle</p> <p>Earth 1 Quiz</p>	<p><b>Key Assessment Pieces:</b> Response Time: practical – effect of exercise on breathing rate observation, recording data and conclusion</p> <p>Organisation 2 Quiz</p>	<p><b>Key Assessment Pieces:</b> Response Time: Graph drawing</p> <p>Energy 1 Quiz</p>	<p><b>Key Assessment Pieces:</b> Response Time: Extended Response – development of the periodic table</p> <p>Matter 2 Quiz</p>	<p><b>Key Assessment Pieces:</b> Response Time: Calculations – speed of sound including echoes</p> <p>Waves 1 Quiz</p> <p>Response Time: Hooke’s law, conclusion using supplied data and evaluation of practical setup</p> <p>Forces 2 Quiz</p>	<p><b>Key Assessment Pieces:</b> Response Time: Evaluation of growing plant needs and the green house.</p> <p>Ecosystems 2 Quiz</p>
<p><b>Tier 3 Vocabulary Vault:</b> Particle model</p> <ul style="list-style-type: none"> <li>Particle: A very tiny object such as an atom or molecule, too small to be seen with a microscope.</li> <li>Particle Model: A way to think about how substances behave in terms of small, moving particles.</li> <li>Diffusion: the process by which particles in liquids or gases spread out through random movement from a</li> </ul>	<p><b>Tier 3 Vocabulary Vault:</b> Breathing</p> <ul style="list-style-type: none"> <li>Breathing: The movement of air in and out of the lungs.</li> <li>Trachea (windpipe): Carries air from the mouth and nose to the lungs.</li> <li>Bronchi: Two tubes which carry air to the lungs.</li> <li>Bronchioles: Small tubes in the lung.</li> <li>Alveoli: Small air sacs found at the end of each bronchiole.</li> </ul>	<p><b>Tier 3 Vocabulary Vault:</b> Energy costs</p> <ul style="list-style-type: none"> <li>Power: How quickly energy is transferred by a device (watts).</li> <li>Energy resource: Something with stored energy that can be released in a useful way.</li> <li>Non-renewable: An energy resource that cannot be replaced and will be used up.</li> <li>Renewable: An energy resource that can be replaced and will not</li> </ul>	<p><b>Tier 3 Vocabulary Vault:</b> Periodic table</p> <ul style="list-style-type: none"> <li>Periodic table: Shows all the elements arranged in rows and columns.</li> <li>Physical properties: Features of a substance that can be observed without changing the substance itself.</li> <li>Chemical properties: Features of the way a substance reacts with other substances.</li> <li>Groups: Columns of the Periodic table.</li> </ul>	<p><b>Tier 3 Vocabulary Vault:</b> Sound</p> <ul style="list-style-type: none"> <li>Vibration: A back and forth motion that repeats.</li> <li>Longitudinal wave: Where the direction of vibration is the same as that of the wave.</li> <li>Volume: How loud or quiet a sound is, in decibels (dB).</li> <li>Pitch: How low or high a sound is. A low (high) pitch sound has a low (high) frequency.</li> </ul>	<p><b>Tier 3 Vocabulary Vault:</b> Respiration</p> <ul style="list-style-type: none"> <li>Aerobic respiration: Breaking down glucose with oxygen to release energy and producing carbon dioxide and water.</li> <li>Anaerobic respiration (fermentation): Releasing energy from the breakdown of glucose without oxygen, producing lactic acid (in animals) and ethanol and carbon dioxide (in</li> </ul>

<p>region where there are many particles to one where there are fewer.</p> <ul style="list-style-type: none"> <li>Gas pressure: Caused by collisions of particles with the walls of a container.</li> <li>Density: How much matter there is in a particular volume, or how close the particles are.</li> <li>Evaporate: Change from liquid to gas at the surface of a liquid, at any temperature.</li> <li>Boil: Change from liquid to a gas of all the liquid when the temperature reaches boiling point.</li> <li>Condense: Change of state from gas to liquid when the temperature drops to the boiling point.</li> <li>Melt: Change from solid to liquid when the temperature rises to the melting point.</li> <li>Freeze: Change from liquid to a solid when the temperature drops to the melting point.</li> <li>Sublime: Change from a solid directly into a gas.</li> </ul> <p>Separating mixtures</p> <ul style="list-style-type: none"> <li>Solvent: A substance, normally a liquid, that dissolves another substance.</li> </ul>	<ul style="list-style-type: none"> <li>Ribs: Bones which surround the lungs to form the ribcage.</li> <li>Diaphragm: A sheet of muscle found underneath the lungs.</li> <li>Lung volume: Measure of the amount of air breathed in or out.</li> <li>Observation- Information gathered by your senses</li> <li>Data: measurements of quantities in an experiment; data can be recorded in a table and used to produce graphs</li> <li>Bar chart/column graph - Displays the values of categories</li> <li>Line graph - Shows the relationship between two continuous variables</li> <li>Line of best fit - A straight or curved line drawn to show the pattern of data points</li> </ul> <p>Digestion</p> <ul style="list-style-type: none"> <li>Enzymes: Substances that speed up the chemical reactions of digestion.</li> <li>Dietary fibre: Parts of plants that cannot be digested, which helps the body eliminate waste.</li> <li>Carbohydrates: The body's main source of energy. There are two</li> </ul>	<p>run out. Examples are solar, wind, waves, geothermal and biomass.</p> <ul style="list-style-type: none"> <li>Fossil fuels: Non-renewable energy resources formed from the remains of ancient plants or animals. Examples are coal, crude oil and natural gas.</li> <li>Data: measurements of quantities in an experiment; data can be recorded in a table and used to produce graphs</li> </ul> <p>Energy transfer</p> <ul style="list-style-type: none"> <li>Thermal energy store: Filled when an object is warmed up.</li> <li>Chemical energy store: Emptied during chemical reactions when energy is transferred to surroundings.</li> <li>Kinetic energy store: Filled when an object speeds up.</li> <li>Gravitational potential energy store: Filled when an object is raised.</li> <li>Elastic energy store: Filled when a material is stretched or compressed.</li> <li>Dissipated: Become spread out wastefully..</li> </ul>	<ul style="list-style-type: none"> <li>Periods: Rows of the Periodic table.</li> <li>SI unit: standard units of measurement, one per quantity, used by all physicists; all SI units are derived from seven 'base' units that have precise definitions</li> <li>Evidence Information from an observation or experiment that supports an idea</li> <li>Journal Magazine which publishes science research for others to read</li> <li>Peer review: scientific findings are scrutinised by independent experts before they can be published</li> </ul> <p>Elements</p> <ul style="list-style-type: none"> <li>Elements: what all substances are made up of, and which contain only one type of atom.</li> <li>Atom: The smallest particle of an element that can exist.</li> <li>Molecules: Two to thousands of atoms joined together. Most non-metals exist either as small or giant molecules.</li> <li>Compound: Pure substances made up of two or more elements strongly joined together.</li> </ul>	<ul style="list-style-type: none"> <li>Amplitude: The maximum amount of vibration, measured from the middle position of the wave, in metres.</li> <li>Wavelength: Distance between two corresponding points on a wave, in metres.</li> <li>Frequency: The number of waves produced in one second, in hertz.</li> <li>Vacuum: A space with no particles of matter in it.</li> <li>Oscilloscope: Device able to view patterns of sound waves that have been turned into electrical signals.</li> <li>Absorption: When energy is transferred from sound to a material.</li> <li>Auditory range: The lowest and highest frequencies that a type of animal can hear.</li> <li>Echo: Reflection of sound waves from a surface back to the listener.</li> </ul> <p>Light</p> <ul style="list-style-type: none"> <li>Incident ray: The incoming ray.</li> <li>Reflected ray: The outgoing ray.</li> <li>Normal line: From which angles are</li> </ul>	<p>plants and microorganisms).</p> <p>Photosynthesis</p> <ul style="list-style-type: none"> <li>Fertilisers: Chemicals containing minerals that plants need to build new tissues.</li> <li>Photosynthesis: A process where plants and algae turn carbon dioxide and water into glucose and release oxygen.</li> <li>Chlorophyll: Green pigment in plants and algae which absorbs light energy.</li> <li>Stomata Pores in the bottom of a leaf which open and close to let gases in and out.</li> </ul>
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<ul style="list-style-type: none"> <li>• Solute: A substance that can dissolve in a liquid.</li> <li>• Dissolve: When a solute mixes completely with a solvent.</li> <li>• Solution: Mixture formed when a solvent dissolves a solute.</li> <li>• Soluble: (insoluble) Property of a substance that will (will not) dissolve in a liquid.</li> <li>• Solubility: Maximum mass of solute that dissolves in a certain volume of solvent.</li> <li>• Pure substance: Single type of material with nothing mixed in.</li> <li>• Mixture: Two or more pure substances mixed together, whose properties are different to the individual substances.</li> <li>• Filtration: Separating substances using a filter to produce a filtrate (solution) and residue.</li> <li>• Distillation: Separating substances by boiling and condensing liquids.</li> <li>• Evaporation: A way to separate a solid dissolved in a liquid by the liquid turning into a gas.</li> <li>• Chromatography: Used to separate different coloured substances.</li> </ul>	<p>types: simple (sugars) and complex (starch).</p> <ul style="list-style-type: none"> <li>• Lipids: (fats and oils) A source of energy. Found in butter, milk, eggs, nuts.</li> <li>• Protein: Nutrient your body uses to build new tissue for growth and repair. Sources are meat, fish, eggs, dairy products, beans, nuts and seeds.</li> <li>• Stomach: A sac where food is mixed with acidic juices to start the digestion of protein and kill microorganisms.</li> <li>• Small intestine: Upper part of the intestine where digestion is completed and nutrients are absorbed by the blood.</li> <li>• Large intestine: Lower part of the intestine from which water is absorbed and where faeces are formed.</li> <li>• Gut bacteria: Microorganisms that naturally live in the intestine and help food break down.</li> <li>• Observation- Information gathered by your senses</li> </ul>		<ul style="list-style-type: none"> <li>• Chemical formula: Shows the elements present in a compound and their relative proportions.</li> <li>• Polymer: A molecule made of thousands of smaller molecules in a repeating pattern. Plastics are man-made polymers, starch is a natural polymer.</li> <li>• Data: measurements of quantities in an experiment; data can be recorded in a table and used to produce graphs</li> <li>• Mean: average value calculated by adding up all the values in a data set then dividing by the number of values</li> </ul>	<p>measured, at right angles to the surface.</p> <ul style="list-style-type: none"> <li>• Angle of reflection: Between the normal and reflected ray.</li> <li>• Angle of incidence: Between the normal and incident ray.</li> <li>• Refraction: Change in the direction of light going from one material into another.</li> <li>• Absorption: When energy is transferred from light to a material.</li> <li>• Scattering: When light bounces off an object in all directions.</li> <li>• Transparent: A material that allows all light to pass through it.</li> <li>• Translucent: A material that allows some light to pass through it.</li> <li>• Opaque: A material that allows no light to pass through it.</li> <li>• Convex lens: A lens that is thicker in the middle which bends light rays towards each other.</li> <li>• Concave lens: A lens that is thinner in the middle which spreads out light rays.</li> <li>• Retina: Layer at the back of the eye with light detecting cells and where image is formed.</li> </ul> <p>Contact forces</p>	
Earth structure					

<ul style="list-style-type: none"> <li>• Rock cycle: Sequence of processes where rocks change from one type to another.</li> <li>• Weathering: The wearing down of rock by physical, chemical or biological processes.</li> <li>• Erosion: Weathering of rock and its movement by water, ice or wind (transportation).</li> <li>• Minerals: Chemicals that rocks are made from.</li> <li>• Sedimentary rocks: Formed from layers of sediment, and which can contain fossils. Examples are limestone, chalk and sandstone.</li> <li>• Igneous rocks: Formed from cooled magma, with minerals arranged in crystals. Examples are granite, basalt and obsidian.</li> <li>• Metamorphic rocks: Formed from existing rocks exposed to heat and pressure over a long time. Examples are marble, slate and schist.</li> <li>• Strata: Layers of sedimentary rock.</li> </ul> <p>Universe</p> <ul style="list-style-type: none"> <li>• Galaxy: Collection of stars held together by gravity. Our galaxy is called the Milky Way.</li> </ul>				<ul style="list-style-type: none"> <li>• Equilibrium: State of an object when opposing forces are balanced.</li> <li>• Deformation: Changing shape due to a force.</li> <li>• Linear relationship: When two variables are graphed and show a straight line which goes through the origin, and they can be called proportional.</li> <li>• Newton: Unit for measuring forces (N).</li> <li>• Resultant force: Single force which can replace all the forces acting on an object and have the same effect.</li> <li>• Friction: Force opposing motion which is caused by the interaction of surfaces moving over one another. It is called 'drag' if one is a fluid.</li> <li>• Tension: Force extending or pulling apart.</li> <li>• Compression: Force squashing or pushing together.</li> <li>• Contact force: One that acts by direct contact.</li> <li>• Accuracy: how close a measurement is to its true value</li> <li>• Precision: how closely grouped a set of repeated measurements are</li> </ul>	
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<ul style="list-style-type: none"> <li>• Light year: Distance light travels in a year (over 9 million, million kilometres).</li> <li>• Stars: Bodies which give out light, and which may have a solar system of planets.</li> <li>• Orbit: Path taken by a satellite, planet or star moving around a larger body. Earth completes one orbit of the Sun every year.</li> <li>• Exoplanet: Planet that orbits a star outside our solar system.</li> </ul>				<ul style="list-style-type: none"> <li>• Reproducible: A measurement is reproducible if the investigation is repeated by another person, or by using different equipment or techniques, and the same results are obtained.</li> <li>• Repeatable: A measurement is repeatable if the original experimenter repeats the investigation using same method and equipment and obtains the same results.</li> </ul> <p>Pressure</p> <ul style="list-style-type: none"> <li>• Fluid: A substance with no fixed shape, a gas or a liquid.</li> <li>• Pressure: The ratio of force to surface area, in <math>N/m^2</math>, and it causes stresses in solids.</li> <li>• Upthrust: The upward force that a liquid or gas exerts on a body floating in it.</li> <li>• Atmospheric pressure: The pressure caused by the weight of the air above a surface.</li> <li>• Derive: calculate using measured data</li> </ul>	
<p><b>Reading Exposure:</b> DARTs: States of Matter</p>	<p><b>Reading Exposure:</b> DEAR: Attacking Asthma</p>	<p><b>Reading Exposure:</b> DARTS: Energy Resources</p>	<p><b>Reading Exposure:</b></p>	<p><b>Reading Exposure:</b></p>	<p><b>Reading Exposure:</b></p>

<p>DEAR: Desalinating Water</p> <p>DARTs (Structure of the Earth) Evaluating Evidence Files (Moon Landings) DEAR: Beginning of the Universe DEAR: Rusting of Rocks (Challenge)</p>	<p>DEAR: Unknown Dangers of Extreme Diets DARTs: Food Groups</p>	<p>DEAR: A Role Model</p>	<p>DARTs: Development of the Periodic Table</p>	<p>DEAR: Breaking the sound barrier</p> <p>DEAR: Air pressure and how it Affects the Weather</p>	<p>DEAR: Sea Slugs who Sheepishly Photosynthesise</p>
<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>• Do it Now starter activities</li> <li>• Educake retrieval homework</li> <li>• Low-stakes quizzing</li> <li>• Modelling</li> <li>• Videos</li> <li>• Practicals</li> <li>• Interleaving Working Scientifically</li> <li>• Retrieval questions</li> </ul> <ul style="list-style-type: none"> <li>• Do it Now starter activities</li> <li>• Educake retrieval homework</li> <li>• Low-stakes quizzing</li> <li>• Modelling</li> <li>• Practicals</li> <li>• Interleaving Working Scientifically</li> <li>• Retrieval questions</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>• Do it Now starter activities</li> <li>• Educake retrieval homework</li> <li>• Low-stakes quizzing</li> <li>• Practicals</li> <li>• Interleaving Working Scientifically</li> <li>• Retrieval questions</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>• Do it Now starter activities</li> <li>• Educake retrieval homework</li> <li>• Low-stakes quizzing</li> <li>• Calculations</li> <li>• Videos</li> <li>• Practicals</li> <li>• Interleaving Working Scientifically</li> <li>• Retrieval questions</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>• Do it Now starter activities</li> <li>• Educake retrieval homework</li> <li>• Low-stakes quizzing</li> <li>• Practicals</li> <li>• Interleaving Working Scientifically</li> <li>• Retrieval questions</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>• Do it Now starter activities</li> <li>• Educake retrieval homework</li> <li>• Low-stakes quizzing</li> <li>• Practicals</li> <li>• Interleaving Working Scientifically</li> <li>• Retrieval questions</li> </ul> <ul style="list-style-type: none"> <li>• Do it Now starter activities</li> <li>• Educake retrieval homework</li> <li>• Low-stakes quizzing</li> <li>• Practicals</li> <li>• Interleaving Working Scientifically</li> <li>• Retrieval questions</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>• Do it Now starter activities</li> <li>• Educake retrieval homework</li> <li>• Low-stakes quizzing</li> <li>• Practicals</li> <li>• Interleaving Working Scientifically</li> <li>• Retrieval questions</li> </ul>

## Year 9 Curriculum Overview Plan: Subject Science

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p><b>Key Theme:</b> Electromagnets 2 Earth 2</p>	<p><b>Key Theme:</b> Genes 2</p>	<p><b>Key Theme:</b> Reactions 2 Energy 2</p>	<p><b>Key Theme:</b> Waves 2</p>	<p><b>Key Theme:</b> 4.1 Cells</p>	<p><b>Key Theme:</b> 5.1 Atoms and PT 6.1 Energy</p>
<p><b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b></p> <ul style="list-style-type: none"> <li>magnetic poles, attraction and repulsion</li> <li>magnetic fields by plotting with compass, representation by field lines</li> <li>Earth's magnetism, compass and navigation</li> <li>the magnetic effect of a current, electromagnets, DC motors (principles only)</li> <li>evaluate risks</li> <li>select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables</li> <li>the composition of the atmosphere</li> <li>the production of carbon dioxide by human activity and the impact on climate</li> <li>present reasoned explanations, including explaining data in</li> </ul>	<p><b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b></p> <ul style="list-style-type: none"> <li>the variation between species and between individuals of the same species meaning some organisms compete more successfully, which can drive natural selection</li> <li>changes in the environment which may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction</li> <li>understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review</li> <li>heredity as the process by which genetic information is</li> </ul>	<p><b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b></p> <ul style="list-style-type: none"> <li>exothermic and endothermic chemical reactions (qualitative)</li> <li>representing chemical reactions using formulae and using equations</li> <li>what catalysts do</li> <li>combustion, thermal decomposition, oxidation and displacement reactions</li> <li>chemical reactions as the rearrangement of atoms</li> <li>the difference between chemical and physical changes</li> <li>representing chemical reactions using formulae and using equations</li> <li>understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature</li> <li>work done and energy changes on deformation</li> </ul>	<p><b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b></p> <ul style="list-style-type: none"> <li>waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition</li> <li>the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface</li> <li>use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye</li> <li>light transferring energy from source to absorber, leading to chemical and electrical effects; photosensitive material in the retina and in cameras</li> </ul>	<p><b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b></p> <ul style="list-style-type: none"> <li>cells as the basic structural unit of all organisms; adaptations of cells related to their functions; the main sub-cellular structures of eukaryotic and prokaryotic cells</li> <li>stem cells in animals and meristems in plants</li> <li>the need for transport systems in multicellular organisms, including plants</li> </ul>	<p><b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b></p> <ul style="list-style-type: none"> <li>a simple model of the atom consisting of the nucleus and electrons, relative atomic mass, electronic charge and isotopes</li> <li>the number of particles in a given mass of a substance</li> <li>the modern Periodic Table, showing elements arranged in order of atomic number</li> <li>position of elements in the Periodic Table in relation to their atomic structure and arrangement of outer electrons</li> <li>properties and trends in properties of elements in the same group</li> <li>characteristic properties of metals and non-metals</li> <li>chemical reactivity of elements in relation to their position in the Periodic Table</li> <li>separation techniques for mixtures of substances: filtration,</li> </ul>

<p>relation to predictions and hypotheses</p> <ul style="list-style-type: none"> <li>• Earth as a source of limited resources and the efficacy of recycling</li> <li>• properties of ceramics, polymers and composites (qualitative)</li> <li>• the order of metals and carbon in the reactivity series</li> <li>• the use of carbon in obtaining metals from metal oxides</li> <li>• interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions</li> </ul>	<p>transmitted from one generation to the next</p> <ul style="list-style-type: none"> <li>• 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</li> </ul>	<ul style="list-style-type: none"> <li>• comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with movements, temperatures, changes in positions in a field, in elastic distortions and in chemical compositions</li> <li>• using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes</li> <li>• apply mathematical concepts and calculate results</li> <li>• internal energy stored in materials</li> <li>• energy changes on changes of state (qualitative)</li> <li>• conservation of material and of mass, and reversibility, in melting, freezing, evaporation, sublimation, condensation, dissolving</li> <li>• changes with temperature in motion and spacing of particles</li> <li>• similarities and differences, including density differences, between solids, liquids and gases</li> </ul>			<p>crystallisation, chromatography, simple and fractional distillation</p> <ul style="list-style-type: none"> <li>• energy changes in a system involving heating, doing work using forces, or doing work using an electric current: calculating the stored energies and energy changes involved</li> <li>• power as the rate of transfer of energy</li> <li>• conservation of energy in a closed system, dissipation</li> <li>• calculating energy efficiency for any energy transfers</li> <li>• renewable and non-renewable energy sources used on Earth, changes in how these are used</li> </ul>
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		<ul style="list-style-type: none"> <li>Brownian motion in gases</li> <li>make predictions using scientific knowledge and understanding</li> </ul>			
<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>observe how magnets attract or repel each other and attract some materials and not others</li> <li>compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials</li> <li>describe magnets as having 2 poles</li> <li>predict whether 2 magnets will attract or repel each other, depending on which poles are facing</li> <li>identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>recognise that environments can change and that this can sometimes pose dangers to living things</li> <li>recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago</li> <li>recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents</li> <li>identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</li> <li>explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda</li> <li>observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)</li> </ul> <p>identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature</p>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound</li> <li>the similarities and differences between light waves and waves in matter</li> <li>light waves travelling through a vacuum; speed of light</li> <li>colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope</li> <li>the functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts</li> <li>the similarities and differences between plant and animal cells</li> <li>the role of diffusion in the movement of materials in and between cells</li> <li>diffusion in liquids and gases driven by differences in concentration</li> <li>the structural adaptations of some unicellular organisms</li> <li>the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>a simple (Dalton) atomic model</li> <li>chemical symbols and formulae for elements and compounds</li> <li>the periodic table: periods and groups; metals and non-metals</li> <li>the principles underpinning the Mendeleev periodic table</li> <li>how patterns in reactions can be predicted with reference to the periodic table</li> <li>the varying physical and chemical properties of different elements</li> <li>differences between atoms, elements and compounds</li> <li>conservation of mass changes of state and chemical reactions</li> <li>the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density; the anomaly of ice-water transition</li> <li>atoms and molecules as particles</li> </ul>

					<ul style="list-style-type: none"><li>• the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure</li><li>• changes of state in terms of the particle model</li><li>• the concept of a pure substance</li><li>• the identification of pure substances</li><li>• mixtures, including dissolving</li><li>• diffusion in terms of the particle model</li><li>• simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography</li> <li>• energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change</li><li>• simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged</li><li>• heating and thermal equilibrium: temperature difference between 2 objects leading to energy transfer from the hotter</li></ul>
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					<p>to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference; use of insulators</p> <ul style="list-style-type: none"> <li>• other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels</li> <li>• work done and energy changes on deformation</li> <li>• comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with movements, temperatures, changes in positions in a field, in elastic distortions and in chemical compositions</li> <li>• using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes.</li> </ul>
<p><b>Key Assessment Pieces:</b> Response Time: Exam Q: Mixed response Questions</p> <p>Electromagnets 2 Quiz</p>	<p><b>Key Assessment Pieces:</b> Response Time: Extended response - evolution and natural selection</p> <p>Genes 2 Quiz</p>	<p><b>Key Assessment Pieces:</b> Response Time: Mixed response questions</p> <p>Reactions 2 Quiz</p>	<p><b>Key Assessment Pieces:</b> Response Time: Calculating frequency, wave speed, including re-arranging and converting units</p> <p>Waves 2 Quiz</p>	<p><b>Key Assessment Pieces:</b> 4.1 Cells</p> <ul style="list-style-type: none"> <li>• Response Time: Exchange Materials</li> <li>• Extended Response</li> <li>• End of Topic Quiz</li> </ul>	<p><b>Key Assessment Pieces:</b> 5.1 Atoms and PT</p> <ul style="list-style-type: none"> <li>• Response Time: Mixed Response Exam Questions</li> <li>• End of Topic Quiz</li> </ul>

<p>Response Time: Extended Response - Analysis of data – effect of pollution/humans on climate</p> <p>Earth 2 Quiz</p>		<p>Response Time: Calculating work done, including rearranging and converting units</p> <p>Energy 2 Quiz</p>			<p>6.1 Energy</p> <ul style="list-style-type: none"> <li>• Response Time: SHC Method Extended Response</li> <li>• End of Topic Quiz</li> </ul>
<p><b>Tier 3 Vocabulary Vault:</b> Electromagnets</p> <ul style="list-style-type: none"> <li>• Electromagnet: A non-permanent magnet turned on and off by controlling the current through it.</li> <li>• Solenoid: Wire wound into a tight coil, part of an electromagnet.</li> <li>• Core: Soft iron metal which the solenoid is wrapped around.</li> </ul> <p>Magnets</p> <ul style="list-style-type: none"> <li>• Magnetic force: Non-contact force from a magnet on a magnetic material.</li> <li>• Permanent magnet: An object that is magnetic all of the time.</li> <li>• Magnetic poles: The ends of a magnetic field, called north-seeking (N) and south-seeking poles (S).</li> <li>• Hazard: anything that may cause injury</li> <li>• Independent variable: quantity in an experiment that is changed or selected by the experimenter</li> <li>• Dependent variable: quantity in an</li> </ul>	<p><b>Tier 3 Vocabulary Vault:</b> Evolution</p> <ul style="list-style-type: none"> <li>• Population: Group of organisms of the same kind living in the same place.</li> <li>• Natural selection: Process by which species change over time in response to environmental changes and competition for resources.</li> <li>• Extinct: When no more individuals of a species remain.</li> <li>• Biodiversity: The variety of living things. It is measured as the differences between individuals of the same species, or the number of different species in an ecosystem.</li> <li>• Competition: When two or more living things struggle against each other to get the same resource.</li> <li>• Evolution: Theory that the animal and plant species living today descended from species that existed in the past.</li> <li>• Evidence Information from an observation or</li> </ul>	<p><b>Tier 3 Vocabulary Vault:</b> Chemical energy</p> <ul style="list-style-type: none"> <li>• Catalysts: Substances that speed up chemical reactions but are unchanged at the end.</li> <li>• Exothermic reaction: One in which energy is given out, usually as heat or light.</li> <li>• Endothermic reaction: One in which energy is taken in, usually as heat.</li> <li>• Chemical bond: Force that holds atoms together in molecules.</li> </ul> <p>Types of reaction</p> <ul style="list-style-type: none"> <li>• Fuel: Stores energy in a chemical store which it can release as heat.</li> <li>• Chemical reaction: A change in which a new substance is formed.</li> <li>• Physical change: One that changes the physical properties of a substance, but no new substance is formed.</li> <li>• Reactants: Substances that react together, shown before the arrow in an equation.</li> <li>• Products: Substances formed in a chemical</li> </ul>	<p><b>Tier 3 Vocabulary Vault:</b> Wave effects</p> <ul style="list-style-type: none"> <li>• Ultrasound: Sound waves with frequencies higher than the human auditory range.</li> <li>• Ultraviolet (UV): Waves with frequencies higher than light, which human eyes cannot detect.</li> <li>• Microphone: Turns the pressure wave of sound hitting it into an electrical signal.</li> <li>• Loudspeaker: Turns an electrical signal into a pressure wave of sound.</li> <li>• Pressure wave: An example is sound, which has repeating patterns of high-pressure and low-pressure regions.</li> </ul> <p>Wave properties</p> <ul style="list-style-type: none"> <li>• Waves: Vibrations that transport energy from place to place without transporting matter.</li> <li>• Transverse wave: Where the direction of vibration is perpendicular to that of the wave.</li> <li>• Transmission: Where waves travel through a medium rather than</li> </ul>	<p><b>Tier 3 Vocabulary Vault:</b></p> <ul style="list-style-type: none"> <li>• Adult cell cloning</li> <li>• Adult stem cells</li> <li>• Amino acids</li> <li>• ATP</li> <li>• Bacteria</li> <li>• Cell cycle</li> <li>• Cell membrane</li> <li>• Cellulose</li> <li>• Chlorophyll</li> <li>• Chloroplast</li> <li>• Clone</li> <li>• Daughter cells</li> <li>• Differentiation</li> <li>• Embryonic stem cells</li> <li>• Eukaryotic cells</li> <li>• Exchange surfaces</li> <li>• Field of view</li> <li>• Flaccid</li> <li>• Gills</li> <li>• Graticule</li> <li>• Magnification</li> <li>• Meristem</li> <li>• Micrograph</li> <li>• Microorganisms</li> <li>• Mineral ions</li> <li>• Mitochondria</li> <li>• Mitosis</li> <li>• Nitrates</li> <li>• Nuclear transfer</li> <li>• Order of magnitude</li> <li>• Osmosis</li> <li>• Partially permeable membrane</li> <li>• Phloem</li> </ul>	<p><b>Tier 3 Vocabulary Vault:</b></p> <ul style="list-style-type: none"> <li>• Alkali metals</li> <li>• Alpha particles</li> <li>• Atom</li> <li>• Atomic number</li> <li>• Boiling point</li> <li>• Carbon-14</li> <li>• Chemical properties</li> <li>• Compound</li> <li>• Distillation</li> <li>• Electronic structure</li> <li>• Electrons</li> <li>• Elements</li> <li>• Evaporation</li> <li>• Filtration</li> <li>• Group</li> <li>• Group 1</li> <li>• Group 7</li> <li>• Halogens</li> <li>• Ions</li> <li>• Isotopes</li> <li>• kilogram (kg)</li> <li>• Lustrous</li> <li>• Mass</li> <li>• Mass number</li> <li>• Metallic properties</li> <li>• Metals</li> <li>• Molecule</li> <li>• Negative ion</li> <li>• Neutron particle</li> <li>• Non-metals</li> <li>• Nucleus</li> <li>• Period</li> <li>• Periodic table</li> <li>• Positive ion</li> </ul>

<p>experiment that is measured for each change in the independent variable</p> <ul style="list-style-type: none"> <li>Control variable: quantity in an experiment that is kept constant while the independent variable is changed and the dependent variable is measured</li> <li>Repeatable</li> <li>A measurement is repeatable if the original experimenter repeats the investigation using same method and equipment and obtains the same results.</li> <li>Prediction</li> <li>A prediction is a statement suggesting what will happen in the future, based on observation, experience or a hypothesis</li> <li>Anomaly(outlier): A piece of data that does not fit the pattern</li> </ul> <p>Climate</p> <ul style="list-style-type: none"> <li>Global warming: The gradual increase in surface temperature of the Earth.</li> <li>Fossil fuels: Remains of dead organisms that are burned as fuels, releasing carbon dioxide.</li> </ul>	<p>experiment that supports an idea</p> <ul style="list-style-type: none"> <li>Journal Magazine which publishes science research for others to read</li> <li>Peer review: scientific findings are scrutinised by independent experts before they can be published</li> </ul> <p>Inheritance</p> <ul style="list-style-type: none"> <li>Inherited characteristics: Features that are passed from parents to their offspring.</li> <li>DNA: A molecule found in the nucleus of cells that contains genetic information.</li> <li>Chromosomes: Thread-like structures containing tightly coiled DNA.</li> <li>Gene: A section of DNA that determines an inherited characteristic.</li> </ul>	<p>reaction, shown after the reaction arrow in an equation.</p> <ul style="list-style-type: none"> <li>Conserved: When the quantity of something does not change after a process takes place.</li> <li>SI unit: standard units of measurement, one per quantity, used by all physicists; all SI units are derived from seven 'base' units that have precise definitions</li> </ul> <p>Work</p> <ul style="list-style-type: none"> <li>Work: The transfer of energy when a force moves an object, in joules.</li> <li>Lever: A type of machine which is a rigid bar that pivots about a point.</li> <li>Input force: The force you apply to a machine.</li> <li>Output force: The force that is applied to the object moved by the machine.</li> <li>Displacement: The distance an object moves from its original position.</li> <li>Deformation: When an elastic object is stretched or squashed, which requires work.</li> </ul> <p>Heating &amp; cooling</p> <ul style="list-style-type: none"> <li>Thermal conductor: Material that allows</li> </ul>	<p>being absorbed or reflected.</p>	<ul style="list-style-type: none"> <li>Plasmid</li> <li>Plasmolysis/ Plasmolysed</li> <li>Prokaryota</li> <li>Prokaryotic cells</li> <li>Resolving power</li> <li>Ribosome</li> <li>Root hair cells</li> <li>Scale bar</li> <li>Scanning Electron Microscope (SEM)</li> <li>Specialised</li> <li>Stem cells</li> <li>Surface area to volume ratio</li> <li>Therapeutic cloning</li> <li>Tissue</li> <li>Transmission Electron Microscope (TEM)</li> <li>Turgid</li> <li>Umbilical cord</li> <li>Urea</li> </ul>	<ul style="list-style-type: none"> <li>Protons</li> <li>Relative Atomic Mass</li> <li>Single covalent bond</li> <li>Soluble</li> <li>Solution</li> <li>Solvent</li> <li>Stable electronic structure</li> <li>Sub-atomic particles</li> <li>Conservation of energy</li> <li>Dissipation</li> <li>Distance</li> <li>Efficiency</li> <li>Elastic potential energy</li> <li>Energy store</li> <li>Energy transfer</li> <li>Gravitational field strength</li> <li>Gravitational potential energy</li> <li>Gravity, force due to</li> <li>Insulator (thermal)</li> <li>Joule</li> <li>Kinetic energy</li> <li>Non-renewable resource</li> <li>Potential energy</li> <li>Power (energy transfer)</li> <li>Renewable resource</li> <li>Specific Heat Capacity</li> <li>Thermal conductivity</li> <li>Thermal energy</li> <li>Work done</li> </ul>
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<ul style="list-style-type: none"> <li>• Carbon sink: Areas of vegetation, the ocean or the soil, which absorb and store carbon.</li> <li>• Greenhouse effect: When energy from the sun is transferred to the thermal energy store of gases in Earth's atmosphere.</li> <li>• Data: measurements of quantities in an experiment; data can be recorded in a table and used to produce graphs</li> <li>• Prediction: What you think will happen in an experiment</li> <li>• Hypothesis: An explanation you can test which includes a reason and a 'science idea'</li> </ul> <p>Earth resources</p> <ul style="list-style-type: none"> <li>• Natural resources: Materials from the Earth which act as raw materials for making a variety of products.</li> <li>• Mineral: Naturally occurring metal or metal compound.</li> <li>• Ore: Naturally occurring rock containing sufficient minerals for extraction.</li> <li>• Extraction: Separation of a metal from a metal compound.</li> </ul>		<p>heat to move quickly through it.</p> <ul style="list-style-type: none"> <li>• Thermal insulator: Material that only allows heat to travel slowly through it.</li> <li>• Temperature: A measure of the motion and energy of the particles.</li> <li>• Thermal energy: The quantity of energy stored in a substance due to the vibration of its particles.</li> <li>• Conduction: Transfer of thermal energy by the vibration of particles.</li> <li>• Convection: Transfer of thermal energy when particles in a heated fluid rise.</li> <li>• Radiation: Transfer of thermal energy as a wave.</li> <li>• Prediction: What you think will happen in an experiment</li> <li>•</li> </ul>			
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<ul style="list-style-type: none"> <li>• Recycling: Processing a material so that it can be used again.</li> <li>• Electrolysis: Using electricity to split up a compound into its elements.</li> <li>• Valid conclusion: A conclusion supported by valid data, obtained from an appropriate experimental design and based on sound reasoning.</li> <li>• Data: measurements of quantities in an experiment; data can be recorded in a table and used to produce graphs</li> <li>• Observation: Information gathered by your senses</li> <li>• Pattern: Trend in data</li> <li>• Measurement: magnitude(size) of an object</li> </ul>					
<p><b>Reading Exposure:</b>  DEAR: Animals that use the Magnetic Field of Earth</p> <p>DEAR: Last Refuge for Polar Bears</p>	<p><b>Reading Exposure:</b>  DEAR: Alfred Russel Wallace: The Unsung Hero</p>	<p><b>Reading Exposure:</b>  DEAR: Hot Food at the Press of a Button</p> <p>DEAR: What if all Plate Tectonics Movement Stopped Forever</p>	<p><b>Reading Exposure:</b>  DARTs: Describing Waves and the EM Spectrum  DEAR: Dissecting the Magic Behind the Looking Glass</p>	<p><b>Reading Exposure:</b>  DEAR: Bacteria in Antarctica</p>	<p><b>Reading Exposure:</b>  DEAR: Putting Distillation out of Business</p> <p>DEAR: 5 Exciting Energy Innovations in 2020  DARTs: Energy Resources</p>
<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>• Do it Now starter activities</li> <li>• Educake retrieval homework</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>• Do it Now starter activities</li> <li>• Educake retrieval homework</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>• Do it Now starter activities</li> <li>• Educake retrieval homework</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>• Do it Now starter activities</li> <li>• Educake retrieval homework</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>• Do it Now starter activities</li> <li>• Educake retrieval homework</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>• Do it Now starter activities</li> <li>• Educake retrieval homework</li> </ul>

<ul style="list-style-type: none"> <li>• Low-stakes quizzing</li> <li>• Practicals</li> <li>• Interleaving Working Scientifically</li> <li>• Modelling</li> <li>• Retrieval questions</li>   <li>• Do it Now starter activities</li> <li>• Educake retrieval homework</li> <li>• Low-stakes quizzing</li> <li>• Practicals</li> <li>• Interleaving Working Scientifically</li> <li>• Retrieval questions</li> </ul>	<ul style="list-style-type: none"> <li>• Low-stakes quizzing</li> <li>• Practicals</li> <li>• Interleaving Working Scientifically</li> <li>• Retrieval questions</li> </ul>	<ul style="list-style-type: none"> <li>• Low-stakes quizzing</li> <li>• Practicals</li> <li>• Interleaving Working Scientifically</li> <li>• Videos</li> <li>• Retrieval questions</li>   <li>• Do it Now starter activities</li> <li>• Educake retrieval homework</li> <li>• Low-stakes quizzing</li> <li>• Practicals</li> <li>• Interleaving Working Scientifically</li> <li>• Calculations</li> <li>• Retrieval questions</li> </ul>	<ul style="list-style-type: none"> <li>• Low-stakes quizzing</li> <li>• Practicals</li> <li>• Interleaving Working Scientifically</li> <li>• Retrieval questions</li> </ul>	<ul style="list-style-type: none"> <li>• Low-stakes quizzing</li> <li>• Practicals</li> <li>• Interleaving Working Scientifically</li> <li>• Retrieval questions</li> <li>• Extended response</li> </ul>	<ul style="list-style-type: none"> <li>• Low-stakes quizzing</li> <li>• Practicals</li> <li>• Interleaving Working Scientifically</li> <li>• Retrieval questions</li> <li>• Extended response</li>   <li>• Do it Now starter activities</li> <li>• Educake retrieval homework</li> <li>• Low-stakes quizzing</li> <li>• Practicals</li> <li>• Interleaving Working Scientifically</li> <li>• Retrieval questions</li> <li>• Graph drawing</li> </ul>
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## Year 10 Curriculum Overview Plan: Subject Science

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p><b>Key Theme:</b> 4.2 Organisation 6.2 Electricity</p>	<p><b>Key Theme:</b> 5.2 Structures and Bonding 6.3 Particle Model of Matter</p>	<p><b>Key Theme:</b> 4.3 Infection and Response 5.3 Quantitative Chemistry</p>	<p><b>Key Theme:</b> 6.4 Atomic structure 4.4 Bioenergetics</p>	<p><b>Key Theme:</b> 5.4 Chemical Change 6.5 Forces</p>	<p><b>Key Theme:</b> 4.5 Homeostasis and Response 5.5 Energy Changes</p>
<p><b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b></p> <ul style="list-style-type: none"> <li>• enzymes</li> <li>• factors affecting the rate of enzymatic reactions</li> <li>• carbohydrates, proteins, nucleic acids and lipids as key biological molecules</li> <li>• the relationship between the structure and functions of the human circulatory system</li> <li>• the relationship between health and disease</li> <li>• non-communicable diseases</li> <li>• the impact of lifestyle factors on the incidence of non-communicable diseases</li> <li>• measuring resistance using p.d. and current measurements</li> <li>• exploring current, resistance and voltage relationships for different circuit elements; including</li> </ul>	<p><b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b></p> <ul style="list-style-type: none"> <li>• changes of state of matter in terms of particle kinetics, energy transfers and the relative strength of chemical bonds and intermolecular forces</li> <li>• types of chemical bonding: ionic, covalent, and metallic</li> <li>• bulk properties of materials related to bonding and intermolecular forces</li> <li>• bonding of carbon leading to the vast array of natural and synthetic organic compounds that occur due to the ability of carbon to form families of similar compounds, chains and rings</li> <li>• structures, bonding and properties of diamond, graphite, fullerenes and graphene</li> <li>• balanced chemical equations, ionic equations and state symbols</li> </ul>	<p><b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b></p> <ul style="list-style-type: none"> <li>• communicable diseases including sexually transmitted infections in humans (including HIV/AIDs)</li> <li>• bacteria, viruses and fungi as pathogens in animals and plants</li> <li>• body defences against pathogens and the role of the immune system against disease</li> <li>• reducing and preventing the spread of infectious diseases in animals and plants</li> <li>• the process of discovery and development of new medicines</li> <li>• the number of particles in a given mass of a substance</li> <li>• determination of empirical formulae from the ratio of atoms of different kinds</li> <li>• balanced chemical equations, ionic equations and state symbols</li> </ul>	<p><b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b></p> <ul style="list-style-type: none"> <li>• the nuclear model and its development in the light of changing evidence</li> <li>• masses and sizes of nuclei, atoms and small molecules</li> <li>• differences in numbers of protons, and neutrons related to masses and identities of nuclei, isotope characteristics and equations to represent changes</li> <li>• radioactive nuclei: emission of alpha or beta particles, neutrons, or gamma-rays, related to changes in the nuclear mass and/or charge</li> <li>• radioactive nuclei: emission of alpha or beta particles, neutrons, or gamma-rays, related to changes in the nuclear mass and/or charge</li> <li>• radioactive materials, half-life, irradiation, contamination and their</li> </ul>	<p><b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b></p> <ul style="list-style-type: none"> <li>• balanced chemical equations, ionic equations and state symbols</li> <li>• the chemistry of acids; reactions with some metals and carbonates</li> <li>• pH as a measure of hydrogen ion concentration and its numerical scale</li> <li>• electrolysis of molten ionic liquids and aqueous ionic solutions</li> <li>• reduction and oxidation in terms of loss or gain of oxygen.</li> <li>• extraction and purification of metals related to the position of carbon in a reactivity series</li> <li>• forces and fields: electrostatic, magnetic, gravity</li> <li>• forces as vectors</li> <li>• calculating work done as force x distance; elastic and inelastic stretching</li> </ul>	<p><b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b></p> <ul style="list-style-type: none"> <li>• principles of nervous coordination and control in humans</li> <li>• the relationship between the structure and function of the human nervous system</li> <li>• the relationship between structure and function in a reflex arc</li> <li>• principles of hormonal coordination and control in humans</li> <li>• hormones in human reproduction, hormonal and non-hormonal methods of contraception</li> <li>• Measurement of energy changes in chemical reactions (qualitative)</li> <li>• Bond breaking, bond making, activation energy and reaction profiles (qualitative)</li> </ul>

<p>their graphical representations</p> <ul style="list-style-type: none"> <li>• quantity of charge flowing as the product of current and time</li> <li>• drawing circuit diagrams; exploring equivalent resistance for resistors in series</li> <li>• the domestic a.c. supply; live, neutral and earth mains wires, safety measures</li> <li>• power transfer related to p.d. and current, or current and resistance</li> <li>• how transformers are used in the national grid and the reasons for their use</li> </ul>	<ul style="list-style-type: none"> <li>• pressure in fluids acts in all directions: variation in Earth's atmosphere with height, with depth for liquids, up-thrust force (qualitative)</li> <li>• relating models of arrangements and motions of the molecules in solid, liquid and gas phases to their densities</li> <li>• melting, evaporation, and sublimation as reversible changes</li> <li>• calculating energy changes involved on heating, using specific heat capacity; and those involved in changes of state, using specific latent heat</li> <li>• links between pressure and temperature of a gas at constant volume, related to the motion of its particles (qualitative)</li> </ul>	<ul style="list-style-type: none"> <li>• quantitative interpretation of balanced equations</li> <li>• concentrations of solutions in relation to mass of solute and volume of solvent</li> </ul>	<p>associated hazardous effects, waste disposal</p> <ul style="list-style-type: none"> <li>• the importance of cellular respiration; the processes of aerobic and anaerobic respiration</li> <li>• photosynthesis as the key process for food production and therefore biomass for life</li> <li>• the process of photosynthesis</li> <li>• factors affecting the rate of photosynthesis</li> </ul>	<ul style="list-style-type: none"> <li>• speed of sound, estimating speeds and accelerations in everyday contexts</li> <li>• interpreting quantitatively graphs of distance, time, and speed</li> <li>• acceleration caused by forces; Newton's First Law</li> <li>• weight and gravitational field strength</li> <li>• decelerations and braking distances involved on roads, safety</li> </ul>	
<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>• the content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed</li> <li>• calculations of energy requirements in a healthy daily diet</li> <li>• the consequences of imbalances in the diet, including obesity,</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>• representing chemical reactions using formulae and using equations</li> <li>• what catalysts do</li> <li>• combustion, thermal decomposition, oxidation and displacement reactions</li> <li>• chemical reactions as the rearrangement of atoms</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>• the impact of exercise, asthma and smoking on the human gas exchange system</li> <li>• the content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed</li> <li>• the consequences of imbalances in the diet,</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>• a simple (Dalton) atomic model</li> <li>• chemical symbols and formulae for elements and compounds</li> <li>• the periodic table: periods and groups; metals and non-metals</li> <li>• the principles underpinning the Mendeleev periodic table</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>• the properties of metals and non-metals</li> <li>• the chemical properties of metal and non-metal oxides with respect to acidity</li> <li>• defining acids and alkalis in terms of neutralisation reactions</li> <li>• the pH scale for measuring acidity/alkalinity; and indicators</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>• the structure and functions of the human skeleton, to include support, protection, movement and making blood cells</li> <li>• biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles</li> </ul>

<ul style="list-style-type: none"> <li>starvation and deficiency diseases</li> <li>the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts)</li> <li>the importance of bacteria in the human digestive system</li> <li>the effects of recreational drugs (including substance misuse) on behaviour, health and life processes</li> <li>differences in resistance between conducting and insulating components (quantitative)</li> <li>electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge</li> <li>potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current</li> </ul>	<ul style="list-style-type: none"> <li>the difference between chemical and physical changes</li> <li>representing chemical reactions using formulae and using equations</li> <li>representing chemical reactions using formulae and using equations</li> <li>chemical reactions as the rearrangement of atoms</li> <li>the difference between chemical and physical changes</li> <li>representing chemical reactions using formulae and using equations</li> <li>conservation of mass changes of state and chemical reactions</li> </ul>	<p>including obesity, starvation and deficiency diseases</p> <ul style="list-style-type: none"> <li>the effects of recreational drugs (including substance misuse) on behaviour, health and life processes</li> <li>representing chemical reactions using formulae and using equations</li> <li>chemical reactions as the rearrangement of atoms</li> <li>the difference between chemical and physical changes</li> <li>conservation of material and of mass, and reversibility, in melting, freezing, evaporation, sublimation, condensation, dissolving</li> </ul>	<ul style="list-style-type: none"> <li>how patterns in reactions can be predicted with reference to the periodic table</li> <li>the varying physical and chemical properties of different elements</li> <li>aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life</li> <li>a word summary for aerobic respiration</li> <li>the process of anaerobic respiration in humans and micro-organisms, including fermentation, and a word summary for anaerobic respiration</li> <li>the differences between aerobic and anaerobic respiration in terms of the reactants, the products formed and the implications for the organism</li> <li>plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots</li> </ul>	<ul style="list-style-type: none"> <li>reactions of acids with metals to produce a salt plus hydrogen</li> <li>reactions of acids with alkalis to produce a salt plus water</li> <li>speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time)</li> <li>the representation of a journey on a distance-time graph</li> <li>relative motion: trains and cars passing one another</li> <li>forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only)</li> <li>change depending on direction of force and its size</li> <li>forces as pushes or pulls, arising from the interaction between 2 objects</li> <li>non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets, and forces due to static electricity</li> <li>gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg,</li> </ul>	<ul style="list-style-type: none"> <li>the function of muscles and examples of antagonistic muscles</li> <li>exothermic and endothermic chemical reactions (qualitative)</li> <li>representing chemical reactions using formulae and using equations</li> <li>what catalysts do</li> <li>combustion, thermal decomposition, oxidation and displacement reactions</li> <li>chemical reactions as the rearrangement of atoms</li> <li>the difference between chemical and physical changes</li> <li>representing chemical reactions using formulae and using equations</li> </ul>
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<ul style="list-style-type: none"> <li>• separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects</li> <li>• the idea of electric field, forces acting across the space between objects not in contact</li> </ul>			<ul style="list-style-type: none"> <li>• the reactants in, and products of, photosynthesis, and a word summary for photosynthesis</li> <li>• the adaptations of leaves for photosynthesis</li> <li>• the role of leaf stomata in gas exchange in plants</li> </ul>	<p>different on other planets and stars; gravity forces between Earth and Moon, and between Earth and sun (qualitative only)</p> <ul style="list-style-type: none"> <li>• forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water</li> <li>• forces measured in newtons, measurements of stretch or compression as force is changed</li> <li>• force-extension linear relation; Hooke's Law as a special case</li> <li>• opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface</li> <li>• using force arrows in diagrams, adding forces in 1 dimension, balanced and unbalanced forces</li> <li>• moment as the turning effect of a force</li> <li>• atmospheric pressure, decreases with increase of height as weight of air above decreases with height</li> </ul>	
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				<ul style="list-style-type: none"> <li>pressure in liquids, increasing with depth; upthrust effects, floating and sinking pressure measured by ratio of force over area – acting normal to any surface</li> </ul>	
<b>Key Assessment Pieces:</b> 4.2 Organisation <ul style="list-style-type: none"> <li>Response Time: Blood flow</li> <li>End of Topic Quiz</li> </ul> 6.2 Electricity <ul style="list-style-type: none"> <li>Response Time: Thermistor Extended Response</li> <li>End of Topic Quiz</li> </ul>	<b>Key Assessment Pieces:</b> 5.2 Structures and Bonding <ul style="list-style-type: none"> <li>Response Time: Structures and Bonding Review Mixed Response Questions</li> <li>End of Topic Quiz</li> </ul> 6.3 Particle model of matter <ul style="list-style-type: none"> <li>Response Time: Density Graph Drawing and Density Extended Response</li> <li>End of Topic Quiz</li> </ul>	<b>Key Assessment Pieces:</b> 4.3 Infection and Response <ul style="list-style-type: none"> <li>Response Time: Human Defence System Extended Response</li> <li>End of Topic Quiz</li> </ul> 5.3 Quantitative Chemistry <ul style="list-style-type: none"> <li>Response Time: Quantitative Chemistry Mixed Response Questions</li> <li>End of Topic Quiz</li> </ul>	<b>Key Assessment Pieces:</b> 6.4 Atomic Structure <ul style="list-style-type: none"> <li>Response Time: Alpha, Beta and Gamma Extended Response</li> <li>End of Topic Quiz</li> </ul> 4.4 Bioenergetics <ul style="list-style-type: none"> <li>Response Time: Anaerobic Respiration Extended Response</li> <li>End of Topic Quiz</li> </ul>	<b>Key Assessment Pieces:</b> 5.4 Chemical Change <ul style="list-style-type: none"> <li>Response Time: Making Salts Extended Response</li> <li>End of Topic Quiz</li> </ul> 6.5 Forces <ul style="list-style-type: none"> <li>Response Time: Distance-time Graph Analysis and Calculations Mixed Response</li> <li>End of Topic Quiz</li> </ul>	<b>Key Assessment Pieces:</b> 4.5 Homeostasis and Response <ul style="list-style-type: none"> <li>Response Time: Reflex Arc Extended Response</li> <li>End of Topic Quiz</li> </ul> 5.5 Energy Changes <ul style="list-style-type: none"> <li>Response Time: Mixed Response Exam Questions</li> <li>End of Topic Quiz</li> </ul>
<b>Tier 3 Vocabulary Vault:</b> <ul style="list-style-type: none"> <li>Absorption</li> <li>Active site</li> <li>Alveolus (plural alveoli)</li> <li>Amylase</li> <li>Aorta</li> <li>Arteries</li> <li>Artificial heart</li> <li>Artificial pacemaker</li> <li>Atrium (plural atria)</li> <li>Benedict's test</li> <li>Benign tumour</li> <li>Bile</li> <li>Biological catalysts</li> <li>Biuret reagent</li> <li>Body Mass Index (BMI)</li> <li>Bronchus (plural bronchi)</li> <li>Capillaries</li> </ul>	<b>Tier 3 Vocabulary Vault:</b> <ul style="list-style-type: none"> <li>Allotropes</li> <li>Alloy</li> <li>Carbon</li> <li>Compound</li> <li>Conductors</li> <li>Covalent bonds</li> <li>Delocalised electrons</li> <li>Dot and Cross</li> <li>Electrostatic attraction</li> <li>Fullerenes</li> <li>Giant covalent</li> <li>Giant ionic lattice</li> <li>Graphite</li> <li>Hardness</li> <li>Ionic bond</li> <li>Ionic equation</li> <li>Ionises</li> <li>Ions</li> </ul>	<b>Tier 3 Vocabulary Vault:</b> <ul style="list-style-type: none"> <li>Agar plate</li> <li>Antibacterial chemicals</li> <li>Antibiotic</li> <li>Antibody</li> <li>Antimicrobial resistance (AMR)</li> <li>Antiretroviral drugs</li> <li>Antiseptic</li> <li>Antitoxins</li> <li>Antivirals</li> <li>Aseptic technique</li> <li>Aspirin</li> <li>Autoclave</li> <li>Bacteria</li> <li>Binary fission</li> <li>Colony</li> <li>Communicable disease</li> <li>Complex diseases</li> </ul>	<b>Tier 3 Vocabulary Vault:</b> <ul style="list-style-type: none"> <li>Activity</li> <li>Alpha particle</li> <li>Atomic number</li> <li>Background radiation</li> <li>Cancer</li> <li>Cell (living things)</li> <li>Chain reaction</li> <li>Conservation of mass</li> <li>Contamination (radioactivity)</li> <li>Count rate</li> <li>Decay (radioactive)</li> <li>Dose (radiation)</li> <li>Electron</li> <li>Emission</li> <li>Energy level</li> <li>Gamma radiation</li> <li>Half-life</li> </ul>	<b>Tier 3 Vocabulary Vault:</b> <ul style="list-style-type: none"> <li>Acids</li> <li>Alkalis</li> <li>Anion</li> <li>Anode</li> <li>Base</li> <li>Cathode</li> <li>Charge(s)</li> <li>Conductors</li> <li>Direct current</li> <li>Displacement reaction</li> <li>Electrode</li> <li>Electrolysis</li> <li>Electrolyte</li> <li>Electrostatic attraction</li> <li>Half equation</li> <li>Indicator</li> <li>Insoluble salt</li> <li>Limiting reactant</li> </ul>	<b>Tier 3 Vocabulary Vault:</b> <ul style="list-style-type: none"> <li>Abstinence</li> <li>ADH (antidiuretic hormone)</li> <li>Adrenal medulla</li> <li>Adrenaline</li> <li>Barrier methods of contraception</li> <li>Blood sugar level</li> <li>Central nervous system (CNS)</li> <li>Cervix</li> <li>Combined contraceptive pill</li> <li>Condom</li> <li>Cooling</li> <li>Coordination centre</li> <li>Dehydration</li> <li>Effector</li> </ul>

<ul style="list-style-type: none"> <li>• Capillary network</li> <li>• Carbohyrase</li> <li>• Carbohydrates</li> <li>• Carcinogen</li> <li>• Causal mechanism</li> <li>• Cilia</li> <li>• Collision theory</li> <li>• Companion cells</li> <li>• Coronary artery</li> <li>• Coronary Heart Disease</li> <li>• Denatured</li> <li>• Depression</li> <li>• Diarrhoea</li> <li>• Double circulatory system</li> <li>• Emulsify</li> <li>• Enzymes</li> <li>• Epidermal tissues</li> <li>• Extracellular digestion</li> <li>• Flaccid</li> <li>• Goblet cells</li> <li>• Guard cells</li> <li>• Haemoglobin</li> <li>• Health</li> <li>• Iodine</li> <li>• Lignin</li> <li>• Lipases</li> <li>• Lock and key</li> <li>• Lumen</li> <li>• Malignant tumour</li> <li>• Metabolism</li> <li>• Mineral deficiency</li> <li>• Mineral ions</li> <li>• Non-communicable disease</li> <li>• Optimum</li> <li>• Organ</li> <li>• Organ system</li> <li>• Oxyhaemoglobin</li> <li>• Pacemaker</li> <li>• Palisade mesophyll</li> </ul>	<ul style="list-style-type: none"> <li>• kinetic energy</li> <li>• Metallic bonding</li> <li>• Negative ion</li> <li>• Polymer</li> <li>• Positive ion</li> <li>• Single covalent bond</li> <li>• Atmospheric pressure</li> <li>• Change of state</li> <li>• Density</li> <li>• Fluid</li> <li>• Gas</li> <li>• Latent heat</li> <li>• Liquid</li> <li>• Micrometer</li> <li>• Particle model</li> <li>• pascal</li> <li>• Pressure</li> <li>• Solid</li> <li>• Specific Heat Capacity</li> <li>• Specific latent heat</li> <li>• Specific latent heat of fusion</li> <li>• Specific latent heat of vaporisation</li> <li>• State of matter</li> <li>• Temperature</li> <li>• Vernier calipers</li> </ul>	<ul style="list-style-type: none"> <li>• Culture</li> <li>• Culture medium</li> <li>• Culture solutions</li> <li>• Diarrhoea</li> <li>• Digitalis</li> <li>• Disc-diffusion</li> <li>• Dose</li> <li>• Double-blind trial</li> <li>• Ebola</li> <li>• Efficacy</li> <li>• Epidemic</li> <li>• Fungicide</li> <li>• Gonorrhoea</li> <li>• HIV (human immunodeficiency virus)</li> <li>• Immune system</li> <li>• Immunity</li> <li>• Incubation</li> <li>• Inoculating loop</li> <li>• Malaria</li> <li>• Microorganisms</li> <li>• MRSA</li> <li>• Nutrient broth</li> <li>• Optimum dose</li> <li>• Pandemic</li> <li>• Pathogen</li> <li>• Penicillin</li> <li>• Petri dish</li> <li>• Phagocyte</li> <li>• Phagocytosis</li> <li>• Placebo</li> <li>• Preclinical testing</li> <li>• Protist</li> <li>• Pruning</li> <li>• Rose black spot</li> <li>• Salmonella</li> <li>• Sexually Transmitted Disease (STD)</li> <li>• Spores</li> <li>• Sterilise</li> </ul>	<ul style="list-style-type: none"> <li>• Hazard</li> <li>• Ionisation</li> <li>• Irradiation</li> <li>• Isotopes</li> <li>• Mass number</li> <li>• Net decline</li> <li>• Neutron</li> <li>• Nuclear decay</li> <li>• Nuclear equation</li> <li>• Nuclear model</li> <li>• Nucleus</li> <li>• Penetrating power</li> <li>• Plum pudding model</li> <li>• Proton</li> <li>• Radiation</li> <li>• Radioactivity</li> <li>• Radiotherapy</li> <li>• Random (radioactive decay)</li> <li>• Sievert</li> <li>• Tracer</li> <li>• Aerobic respiration</li> <li>• Anaerobic respiration</li> <li>• Basal metabolic rate</li> <li>• Chlorophyll</li> <li>• Chloroplast</li> <li>• Endothermic reaction</li> <li>• Ethanol</li> <li>• Exothermic reaction</li> <li>• Fermentation</li> <li>• Fertiliser</li> <li>• Haemoglobin</li> <li>• Lactic acid</li> <li>• Limiting factor</li> <li>• Mitochondria</li> <li>• Oxyhaemoglobin</li> <li>• Photosynthesis</li> <li>• Rate</li> <li>• Rate of photosynthesis</li> <li>• Respiration</li> </ul>	<ul style="list-style-type: none"> <li>• Lysis</li> <li>• Metal halide</li> <li>• Molten</li> <li>• Neutral</li> <li>• Neutralisation</li> <li>• Oxidation</li> <li>• Physical property</li> <li>• Precipitate</li> <li>• Product</li> <li>• Reduction</li> <li>• Strength (of an acid)</li> <li>• Activation energy</li> <li>• Combustion</li> <li>• Acceleration</li> <li>• Air resistance</li> <li>• Average speed</li> <li>• Braking distance</li> <li>• Centre of mass</li> <li>• Closed system</li> <li>• Component (forces)</li> <li>• Compress</li> <li>• Conservation of momentum</li> <li>• Contact force</li> <li>• Deceleration</li> <li>• Displacement</li> <li>• Distance</li> <li>• Distance–time graph</li> <li>• Elastic deformation</li> <li>• Equilibrium</li> <li>• Extension</li> <li>• Force</li> <li>• Free body (force) diagram</li> <li>• Friction force</li> <li>• Gravity, force due to</li> <li>• Inelastic deformation</li> <li>• Inertia</li> <li>• Inertial mass</li> <li>• Limit of proportionality</li> </ul>	<ul style="list-style-type: none"> <li>• Endocrine gland</li> <li>• Endocrine system</li> <li>• Environmental change</li> <li>• Fertility drug</li> <li>• Follicle</li> <li>• FSH (follicle stimulating hormone)</li> <li>• Glucagon</li> <li>• Glucose tolerance test</li> <li>• Gonorrhoea</li> <li>• HIV (human immunodeficiency virus)</li> <li>• Homeostasis</li> <li>• Hormone</li> <li>• Insulin</li> <li>• In-Vitro Fertilisation (IVF)</li> <li>• Iris</li> <li>• IUD (intrauterine device)</li> <li>• IVF cycle</li> <li>• LH (luteinising hormone)</li> <li>• Menstrual cycle</li> <li>• motor neurone</li> <li>• Myelin sheath</li> <li>• Negative feedback</li> <li>• Nervous system</li> <li>• Neurone</li> <li>• Oestrogen</li> <li>• Ovulation</li> <li>• Peripheral Nervous System (PNS)</li> <li>• Pituitary gland</li> <li>• Progesterone</li> <li>• progestogen-only pill (or mini pill or POP)</li> <li>• Reaction time</li> <li>• Receptors</li> <li>• Reflex action</li> </ul>
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<ul style="list-style-type: none"> <li>• Peristalsis</li> <li>• Phenolphthalein indicator</li> <li>• Plant organ system</li> <li>• Plasma</li> <li>• Platelets</li> <li>• Potometer</li> <li>• Proteases</li> <li>• Pulmonary artery</li> <li>• Pulmonary vein</li> <li>• Qualitative reagents</li> <li>• Rate</li> <li>• Red blood cells</li> <li>• Risk factor</li> <li>• Secondary tumour</li> <li>• Secrete</li> <li>• Sieve plates</li> <li>• Sphere</li> <li>• Spongy mesophyll layer</li> <li>• Starch</li> <li>• Statins</li> <li>• Stents</li> <li>• Stomata (singular stoma)</li> <li>• Surface area to volume ratio</li> <li>• Trachea</li> <li>• Translocation</li> <li>• Transpiration</li> <li>• Turgid</li> <li>• Valves</li> <li>• Vascular bundle (veins)</li> <li>• Veins</li> <li>• Vena cava</li> <li>• Ventilate</li> <li>• Ventricles</li> <li>• Xylem</li>   <li>• Alternating current (a.c.)</li> <li>• Ammeter</li> </ul>		<ul style="list-style-type: none"> <li>• Tobacco Mosaic Virus (TMV)</li> <li>• Vaccination</li> <li>• Vaccine</li> <li>• Vector</li> <li>• Zones of inhibition</li>   <li>• Avogadro's constant</li> <li>• Balanced symbol equation</li> <li>• Concentration</li> <li>• Conservation of mass</li> <li>• Empirical formula</li> <li>• Force</li> <li>• Mole</li> <li>• Molecular formula</li> <li>• Pharmaceuticals</li> <li>• Precipitation reaction</li> <li>• Product</li> <li>• Relative Formula Mass</li> </ul>		<ul style="list-style-type: none"> <li>• Magnitude</li> <li>• Momentum</li> <li>• Newton</li> <li>• Newton's first law</li> <li>• Newton's laws of motion</li> <li>• Newton's second law</li> <li>• Newton's third law</li> <li>• Newtonmeter</li> <li>• Non-contact force</li> <li>• Non-uniform motion</li> <li>• Reaction time</li> <li>• Resolving (forces)</li> <li>• Resultant force</li> <li>• Scalar quantity</li> <li>• Speed</li> <li>• Spring constant</li> <li>• Stopping distance</li> <li>• Stretching</li> <li>• Tension</li> <li>• Terminal velocity</li> <li>• Thinking distance</li> <li>• Uniform motion</li> <li>• Vector quantity</li> <li>• Velocity</li> <li>• Velocity–time graph</li> <li>• Weight</li> <li>• Work done</li> </ul>	<ul style="list-style-type: none"> <li>• Reflex arc</li> <li>• Relay neurone</li> <li>• Retina</li> <li>• Rods</li> <li>• Secondary sex characteristics</li> <li>• Sensory neurone</li> <li>• Sexually Transmitted Disease (STD)</li> <li>• Spermicide</li> <li>• Synapse</li> <li>• Target organ</li> <li>• Testosterone</li> <li>• Thermoregulatory centre</li> <li>• Thyroid gland</li> <li>• Thyroxine</li> <li>• Type 1 diabetes</li> <li>• Type 2 diabetes</li> <li>• Vasoconstriction</li> <li>• Vasodilation</li>   <li>• Activation energy</li> <li>• Combustion</li> <li>• Conservation of energy</li> <li>• Endothermic reaction</li> <li>• Energy</li> <li>• Exothermic reaction</li> <li>• Explosion</li> <li>• Joule</li> <li>• Melting point</li> <li>• Thermal decomposition</li> <li>• Thermal energy</li> </ul>
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<ul style="list-style-type: none"><li>• Ampere</li><li>• Cell (electric circuits)</li><li>• circuit diagram</li><li>• Circuit symbol</li><li>• Conductivity (thermal)</li><li>• Conductor</li><li>• Conservation of electric charge</li><li>• Coulomb</li><li>• Current (electric)</li><li>• Diode</li><li>• Direct current (d.c.)</li><li>• Earth (electrical)</li><li>• Electric charge</li><li>• Electric current</li><li>• Electrical power</li><li>• Electron</li><li>• Global warming</li><li>• Insulator (electrical)</li><li>• Light-Dependent Resistor (LDR)</li><li>• Light-Emitting Diode (LED)</li><li>• Live wire</li><li>• National Grid</li><li>• Neutral wire</li><li>• Ohm</li><li>• Ohm's law</li><li>• Ohmic resistor</li><li>• Parallel (circuit)</li><li>• Potential difference (p.d.)</li><li>• Resistance</li><li>• Resistor</li><li>• Series (circuit)</li><li>• Step-down transformer</li><li>• Step-up transformer</li><li>• Thermistor</li><li>• Transformer</li><li>• Volt</li><li>• Voltage</li></ul>					
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<ul style="list-style-type: none"> <li>Voltmeter</li> <li>Watt</li> </ul>					
<p><b>Reading Exposure:</b> DEAR: 3D heart scans on the NHS to speed up disease diagnosis</p> <p>DEAR: How do Christmas lights work?</p>	<p><b>Reading Exposure:</b> DEAR: Graphene the wonder material</p> <p>DEAR: Ideal Gas Laws of Stellar Structures</p>	<p><b>Reading Exposure:</b> DEAR: How the Measles Vaccine May Help Protect Against COVID</p> <p>DEAR: Beecroft Catalogue of Chemicals</p>	<p><b>Reading Exposure:</b> DEAR: Chernobyl nuclear reactions start up again</p> <p>DEAR: Exercise and metabolism link study</p>	<p><b>Reading Exposure:</b> DEAR: Magnesium flakes v Epsom salts what is the difference?</p> <p>DEAR: How roller coasters work</p>	<p><b>Reading Exposure:</b> DEAR: Innovative non-invasive brain stimulation DEAR: Research into autonomic nervous system in sleepwalkers</p> <p>DEAR: Fusion Energy is Coming</p>
<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Low-stakes quizzing</li> <li>Modelling</li> <li>Practicals</li> <li>Interleaving Working Scientifically</li> <li>Extended response</li> <li>Retrieval questions</li> </ul> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Calculations</li> <li>Modelling</li> <li>Low-stakes quizzing</li> <li>Practicals</li> <li>Graph drawing</li> <li>Interleaving Working Scientifically</li> <li>Retrieval questions</li> <li>Extended response</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Low-stakes quizzing</li> <li>Novel situations</li> <li>Practicals</li> <li>Interleaving Working Scientifically</li> <li>Retrieval questions</li> <li>Extended response</li> </ul> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Novel situations</li> <li>Low-stakes quizzing</li> <li>Practicals</li> <li>Interleaving Working Scientifically</li> <li>Retrieval questions</li> <li>Extended response</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Low-stakes quizzing</li> <li>Novel situations</li> <li>Interleaving Working Scientifically</li> <li>Retrieval questions</li> <li>Extended response</li> </ul> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Novel situations</li> <li>Low-stakes quizzing</li> <li>Practicals</li> <li>Interleaving Working Scientifically</li> <li>Retrieval questions</li> <li>Extended response</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Low-stakes quizzing</li> <li>Practicals</li> <li>Interleaving Working Scientifically</li> <li>Modelling</li> <li>Retrieval questions</li> <li>Extended response</li> </ul> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Low-stakes quizzing</li> <li>Practicals</li> <li>Graph analysiss</li> <li>Interleaving Working Scientifically</li> <li>Retrieval questions</li> <li>Extended response</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Low-stakes quizzing</li> <li>Practicals</li> <li>Interleaving Working Scientifically</li> <li>Retrieval questions</li> <li>Extended response</li> </ul> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Low-stakes quizzing</li> <li>Calculations</li> <li>Practicals</li> <li>Interleaving Working Scientifically</li> <li>Retrieval questions</li> <li>Extended response</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Low-stakes quizzing</li> <li>Practicals</li> <li>Interleaving Working Scientifically</li> <li>Retrieval questions</li> <li>Extended response</li> </ul> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Low-stakes quizzing</li> <li>Calculations</li> <li>Practicals</li> <li>Interleaving Working Scientifically</li> <li>Retrieval questions</li> </ul>

## Year 11 Curriculum Overview Plan: Subject Science

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<b>Key Theme:</b> 6.6 Waves 4.7 Ecology	<b>Key Theme:</b> 5.6 Rates of Reaction 5.7 Organic Chemistry 4.6 Inheritance, Variation and Evolution	<b>Key Theme:</b> 5.8 Chemical Analysis 5.9 Chemistry of the atmosphere	<b>Key Theme:</b> 6.7 Magnetism and Electromagnetism	<b>Key Theme:</b> 5.10 Using Resources	<b>Key Theme:</b> Revision
<b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b> <ul style="list-style-type: none"> <li>• amplitude, wavelength, frequency, relating velocity to frequency and wavelength</li> <li>• transverse and longitudinal waves</li> <li>• electromagnetic waves, velocity in vacuum; waves transferring energy; wavelengths and frequencies from radio to gamma-rays</li> <li>• velocities differing between media: absorption, reflection, refraction effects</li> <li>• production and detection, by electrical circuits, or by changes in atoms and nuclei</li> <li>• production and detection, by electrical circuits, or by changes in atoms and nuclei</li> <li>• uses in the radio, microwave, infra-red, visible, ultra-violet, X-ray and gamma-ray regions, hazardous effects on bodily tissues</li> </ul>	<b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b> <ul style="list-style-type: none"> <li>• factors that influence the rate of reaction: varying temperature or concentration, changing the surface area of a solid reactant or by adding a catalyst</li> <li>• factors affecting reversible reactions</li> <li>• bonding of carbon leading to the vast array of natural and synthetic organic compounds that occur due to the ability of carbon to form families of similar compounds, chains and rings</li> <li>• fractional distillation of crude oil and cracking to make more useful materials</li> <li>• the genome as the entire genetic material of an organism</li> <li>• how the genome, and its interaction with the environment, influence</li> </ul>	<b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b> <ul style="list-style-type: none"> <li>• identification of common gases</li> <li>• distinguishing between pure and impure substances</li> <li>• evidence for composition and evolution of the Earth's atmosphere since its formation</li> <li>• evidence, and uncertainties in evidence, for additional anthropogenic causes of climate change</li> <li>• potential effects of, and mitigation of, increased levels of carbon dioxide and methane on the Earth's climate</li> <li>• common atmospheric pollutants: sulfur dioxide, oxides of nitrogen, particulates and their sources</li> </ul>	<b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b> <ul style="list-style-type: none"> <li>• forces and fields: electrostatic, magnetic, gravity</li> <li>• exploring the magnetic fields of permanent and induced magnets, and the Earth's magnetic field, using a compass</li> <li>• magnetic effects of currents, how solenoids enhance the effect</li> </ul>	<b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b> <ul style="list-style-type: none"> <li>• life cycle assessment and recycling to assess environmental impacts associated with all the stages of a product's life</li> <li>• the viability of recycling of certain materials</li> <li>• carbon compounds, both as fuels and feedstock, and the competing demands for limited resources</li> </ul>	<b>Key Concepts, Knowledge &amp; Skills to be Embedded:</b> External Examinations

<ul style="list-style-type: none"> <li>• levels of organisation within an ecosystem</li> <li>• some abiotic and biotic factors which affect communities; the importance of interactions between organisms in a community</li> <li>• how materials cycle through abiotic and biotic components of ecosystems</li> <li>• the role of microorganisms (decomposers) in the cycling of materials through an ecosystem</li> <li>• organisms are interdependent and are adapted to their environment</li> <li>• the importance of biodiversity</li> <li>• methods of identifying species and measuring distribution, frequency and abundance of species within a habitat</li> <li>• positive and negative human interactions with ecosystems</li> </ul>	<p>the development of the phenotype of an organism</p> <ul style="list-style-type: none"> <li>• the potential impact of genomics on medicine</li> <li>• most phenotypic features being the result of multiple, rather than single, genes</li> <li>• single gene inheritance and single gene crosses with dominant and recessive phenotypes</li> <li>• sex determination in humans</li> <li>• genetic variation in populations of a species</li> <li>• the process of natural selection leading to evolution</li> <li>• the evidence for evolution</li> <li>• developments in biology affecting classification</li> <li>• the importance of selective breeding of plants and animals in agriculture</li> <li>• the uses of modern biotechnology including gene technology; some of the practical and ethical considerations of modern biotechnology</li> </ul>				
<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>• frequencies of sound waves, measured in hertz (Hz); echoes,</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>• representing chemical reactions using</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>• the concept of a pure substance</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>• magnetic poles, attraction and repulsion</li> </ul>	<p><b>Links to Prior Learning:</b></p> <ul style="list-style-type: none"> <li>• Earth as a source of limited resources and the efficacy of recycling</li> </ul>	<p><b>Links to Prior Learning:</b> External Examinations</p>

<p>reflection and absorption of sound</p> <ul style="list-style-type: none"> <li>• sound needs a medium to travel, the speed of sound in air, in water, in solids</li> <li>• sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal</li> <li>• the auditory range of humans and animals</li> <li>• the similarities and differences between light waves and waves in matter</li> <li>• light waves travelling through a vacuum; speed of light</li> <li>• colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection</li> <li>• waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition</li> <li>• the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface</li> </ul>	<p>formulae and using equations</p> <ul style="list-style-type: none"> <li>• what catalysts do</li> <li>• combustion, thermal decomposition, oxidation and displacement reactions</li> <li>• chemical reactions as the rearrangement of atoms</li> <li>• the difference between chemical and physical changes</li> <li>• representing chemical reactions using formulae and using equations</li> <li>• the composition of the Earth</li> <li>• Earth as a source of limited resources and the efficacy of recycling</li> <li>• differences between species</li> <li>• the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation</li> <li>• the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material</li> <li>• reproduction in humans (as an example of a</li> </ul>	<ul style="list-style-type: none"> <li>• the identification of pure substances</li> </ul>	<ul style="list-style-type: none"> <li>• magnetic fields by plotting with compass, representation by field lines</li> <li>• Earth's magnetism, compass and navigation</li> <li>• the magnetic effect of a current, electromagnets, DC motors (principles only)</li> </ul>	<ul style="list-style-type: none"> <li>• properties of ceramics, polymers and composites (qualitative)</li> <li>• the composition of the Earth</li> <li>• the structure of the Earth</li> <li>• the rock cycle and the formation of igneous, sedimentary and metamorphic rocks</li> </ul>	
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<ul style="list-style-type: none"> <li>• use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye</li> <li>• light transferring energy from source to absorber, leading to chemical and electrical effects; photosensitive material in the retina and in cameras</li> <li>• the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere</li> <li>• the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops</li> <li>• the importance of plant reproduction through insect pollination in human food security</li> <li>• how organisms affect, and are affected by, their environment,</li> </ul>	<p>mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta</p> <ul style="list-style-type: none"> <li>• the variation between species and between individuals of the same species meaning some organisms compete more successfully, which can drive natural selection</li> <li>• changes in the environment which may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction</li> <li>• heredity as the process by which genetic information is transmitted from one generation to the next</li> <li>• a simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the</li> </ul>				
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<p>including the accumulation of toxic materials</p> <ul style="list-style-type: none"> <li>• apply sampling techniques</li> <li>• use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety</li> <li>• reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms</li> <li>• present reasoned explanations, including explaining data in relation to predictions and hypotheses</li> </ul>	<p>development of the DNA model</p>				
<p><b>Key Assessment Pieces:</b> 6.6 Waves</p> <ul style="list-style-type: none"> <li>• Response Time: Ripple Tank Required Practical Extended Response</li> <li>• End of Topic Quiz</li> </ul> <p>4.7 Ecology</p> <ul style="list-style-type: none"> <li>• Response Time: Carbon Cycle Extended Response</li> <li>• End of Topic Quiz</li> </ul>	<p><b>Key Assessment Pieces:</b> 5.6 Energy Changes</p> <ul style="list-style-type: none"> <li>• Response Time: Rate of Reaction Extended Response</li> <li>• End of Topic Quiz</li> </ul> <p>5.7 Organic Chemistry</p> <ul style="list-style-type: none"> <li>• Response Time: Fractional Distillation of Crude Oil Extended Response</li> <li>• End of Topic Quiz</li> </ul>	<p><b>Key Assessment Pieces:</b> 5.8 Chemical Analysis</p> <ul style="list-style-type: none"> <li>• Response Time: RP12 Chromatography Mixed Response Questions</li> <li>• End of Topic Quiz</li> </ul> <p>5.9 Chemistry of the atmosphere</p> <ul style="list-style-type: none"> <li>• Response Time: Earth's Atmosphere Response Time</li> <li>• End of Topic Quiz</li> </ul>	<p><b>Key Assessment Pieces:</b> 6.7 Magnetism and Electromagnetism</p> <ul style="list-style-type: none"> <li>• Response Time: Mixed Response Exam Questions</li> <li>• End of Topic Quiz</li> </ul>	<p><b>Key Assessment Pieces:</b> 5.10 Using Resources</p> <ul style="list-style-type: none"> <li>• Response Time: Life Cycle Assessment Data Response Time</li> <li>• End of Topic Quiz</li> </ul>	<p><b>Key Assessment Pieces:</b> External Examinations</p>

	<p>4.6 Homeostasis and Response</p> <ul style="list-style-type: none"> <li>• Response Time: Mixed Response Exam Questions</li> <li>• End of Topic Quiz</li> </ul>				
<p><b>Tier 3 Vocabulary Vault:</b></p> <ul style="list-style-type: none"> <li>• Absorption</li> <li>• Amplitude</li> <li>• Angle of incidence</li> <li>• Boundary</li> <li>• Compression</li> <li>• CT (or CAT) scan</li> <li>• Distance</li> <li>• Echo</li> <li>• Electromagnetic (EM) spectrum</li> <li>• Filter (optical)</li> <li>• Frequency</li> <li>• Hertz</li> <li>• Incident ray</li> <li>• Infrared radiation</li> <li>• Longitudinal wave</li> <li>• Medium (pl. Media)</li> <li>• Microwave</li> <li>• Oscilloscope</li> <li>• Period</li> <li>• radio waves</li> <li>• Rarefaction</li> <li>• Ray diagram</li> <li>• Real image</li> <li>• Refraction</li> <li>• Scattering</li> <li>• Speed of light</li> <li>• Time period</li> <li>• Transmission</li> <li>• Transverse wave</li> <li>• Ultraviolet radiation</li> <li>• Visible light</li> <li>• Wave</li> </ul>	<p><b>Tier 3 Vocabulary Vault:</b></p> <ul style="list-style-type: none"> <li>• Activation energy</li> <li>• biological catalyst</li> <li>• Catalyst</li> <li>• Collision</li> <li>• Concentration</li> <li>• Enzymes</li> <li>• Equilibrium</li> <li>• Le Châtelier’s principle</li> <li>• Optimum conditions</li> <li>• Product</li> <li>• Rate of reaction</li> <li>• Reactants</li> <li>• Reversible reaction</li> <li>• Alkanes</li> <li>• Alkenes</li> <li>• Carbon</li> <li>• Cracking</li> <li>• Diesel oil</li> <li>• Distillation</li> <li>• Evaporation</li> <li>• Fractional distillation</li> <li>• Homologous series</li> <li>• Hydrocarbons</li> <li>• Petrol</li> <li>• Refine</li> <li>• Saturated hydrocarbon</li> <li>• Unsaturated hydrocarbon</li> <li>• Alleles</li> <li>• Antimicrobial resistance (AMR)</li> </ul>	<p><b>Tier 3 Vocabulary Vault:</b></p> <ul style="list-style-type: none"> <li>• Chromatography</li> <li>• Greenhouse gas</li> <li>• Mobile phase</li> <li>• R<sub>f</sub></li> <li>• Stationary phase</li> <li>• Acid rain</li> <li>• Carbon dioxide (CO<sub>2</sub>)</li> <li>• Carbon footprint</li> <li>• Exhaust gases</li> <li>• Global warming</li> <li>• Incomplete combustion</li> <li>• Limewater</li> <li>• Particulates</li> <li>• Pollutants</li> <li>• Pollute</li> <li>• Pollution</li> </ul>	<p><b>Tier 3 Vocabulary Vault:</b></p> <ul style="list-style-type: none"> <li>• Compass (magnetic)</li> <li>• Electromagnet</li> <li>• Fleming’s left-hand rule</li> <li>• Induced magnet</li> <li>• Induced potential difference</li> <li>• Magnet</li> <li>• Magnetic field</li> <li>• Magnetic flux density</li> <li>• Motor effect</li> <li>• Permanent magnet</li> <li>• Pole (magnetic)</li> <li>• soft iron core</li> <li>• Solenoid</li> <li>• Tesla</li> </ul>	<p><b>Tier 3 Vocabulary Vault:</b></p> <ul style="list-style-type: none"> <li>• Aggregate</li> <li>• Aquifer</li> <li>• Bioleaching</li> <li>• Chlorination</li> <li>• Decay</li> <li>• Diesel oil</li> <li>• Formulation</li> <li>• Fossil fuels</li> <li>• Life Cycle Assessments (LCAs)</li> <li>• Non-renewable</li> <li>• Pharmaceuticals</li> <li>• Phytomining</li> <li>• Potable water</li> <li>• Pure</li> <li>• Renewable energy</li> <li>• Renewable resource</li> <li>• Reservoir</li> <li>• Sea water</li> <li>• Sedimentation</li> <li>• Solar energy</li> <li>• Water conservation</li> <li>• Water resources</li> </ul>	<p><b>Tier 3 Vocabulary Vault:</b> External Examinations</p>

<ul style="list-style-type: none"> <li>• Wavelength</li> <li>• X-ray</li>   <li>• Abiotic Factor</li> <li>• Acid rain</li> <li>• Adaptation</li> <li>• Apex predator</li> <li>• Behaviour</li> <li>• Biodiversity</li> <li>• Biomass</li> <li>• Biotic factor</li> <li>• Camouflage</li> <li>• Carbon cycle</li> <li>• Carbon sink</li> <li>• Community</li> <li>• Competition</li> <li>• Compost</li> <li>• Conservation</li> <li>• Cycle, predator–prey relationships</li> <li>• Decomposer</li> <li>• Deforestation</li> <li>• Demographic</li> <li>• Distribution</li> <li>• Ecosystem</li> <li>• Epiphyte</li> <li>• Extremophile</li> <li>• Functional adaptation</li> <li>• Global warming</li> <li>• Habitat</li> <li>• Indicator species</li> <li>• Interdependence</li> <li>• Interspecific competition</li> <li>• Intraspecific competition</li> <li>• Monocultures</li> <li>• Mulch</li> <li>• Out of phase</li> <li>• Palaeontologists</li> <li>• Parasitism</li> </ul>	<ul style="list-style-type: none"> <li>• Aphids (greenfly)</li> <li>• Archaea</li> <li>• Asexual reproduction</li> <li>• Bacteria</li> <li>• Binomial system</li> <li>• Breed</li> <li>• Carrier</li> <li>• Charles Darwin</li> <li>• Chromosomes</li> <li>• Clone</li> <li>• Complex diseases</li> <li>• Cystic fibrosis</li> <li>• Daughter cells</li> <li>• Disease resistance</li> <li>• DNA (deoxyribonucleic acid)</li> <li>• Domain</li> <li>• Dominant</li> <li>• Dominant hand</li> <li>• Double helix</li> <li>• Embryo screening</li> <li>• Embryo transplants</li> <li>• Embryonic stem cells</li> <li>• Environmental variation</li> <li>• Eugenics</li> <li>• Evolution</li> <li>• Evolutionary tree</li> <li>• Extinction</li> <li>• Family tree</li> <li>• Fossil</li> <li>• Fossil record</li> <li>• Fraction (in genetics)</li> <li>• Gametes</li> <li>• Gene</li> <li>• Gene theory</li> <li>• Gene therapy</li> <li>• Genetic code</li> <li>• Genetic cross</li> <li>• Genetic engineering</li> <li>• Genetic marker</li> <li>• Genome</li> </ul>				
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<ul style="list-style-type: none"> <li>• Peatlands</li> <li>• Population</li> <li>• Prey</li> <li>• Primary consumer</li> <li>• Producers</li> <li>• Pyramid of biomass</li> <li>• Quadrat</li> <li>• Radiometric dating</li> <li>• Rate</li> <li>• Regeneration</li> <li>• Run-off</li> <li>• Sampling techniques</li> <li>• Secondary consumer</li> <li>• Secrete</li> <li>• Self-supporting ecosystem</li> <li>• Sewage</li> <li>• Structural adaptation</li> <li>• Sustainable</li> <li>• Transect</li> <li>• Trophic</li> <li>• Tundra</li> <li>• Warning colouration</li> <li>• Yield</li> </ul>	<ul style="list-style-type: none"> <li>• Genome editing</li> <li>• Genotype</li> <li>• GM crops</li> <li>• Golden rice</li> <li>• Gregor Mendel</li> <li>• Heterozygous</li> <li>• Homozygous</li> <li>• Hybrid</li> <li>• Inbreeding</li> <li>• Interbreeding</li> <li>• Invasive species</li> <li>• Kingdom</li> <li>• Mathematical model</li> <li>• Meiosis</li> <li>• Melanism</li> <li>• Mendelian inheritance</li> <li>• Migration patterns</li> <li>• Missing links</li> <li>• Mixed population</li> <li>• MRSA</li> <li>• Mutation</li> <li>• Natural selection</li> <li>• Non-coding DNA</li> <li>• Nucleic acid</li> <li>• Order</li> <li>• Phenotype</li> <li>• Polydactyly</li> <li>• Polymer</li> <li>• Probability</li> <li>• Prokaryota</li> <li>• Proportion (in genetics)</li> <li>• Punnett square</li> <li>• Recessive</li> <li>• Selective breeding</li> <li>• Sex chromosomes</li> <li>• Sex determination</li> <li>• Sexual reproduction</li> <li>• Speciation</li> <li>• Species</li> <li>• Three-domain system</li> </ul>				
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	<ul style="list-style-type: none"> <li>Variation</li> <li>X-chromosomes</li> <li>Y-chromosomes</li> <li>Zygote</li> </ul>				
<p><b>Reading Exposure:</b> DEAR Weird space radio signal tracked to its source for the first time</p> <p>DEAR: Shrew brain shrinks during winter</p>	<p><b>Reading Exposure:</b> DEAR: Electrostatic field powers up reaction rate</p> <p>DEAR: History and Future of plastics</p> <p>DEAR: From wild animals to domesticated pets</p>	<p><b>Reading Exposure:</b> DEAR: Chromatography and Forensics</p> <p>DEAR: Trees4travel carbon offset scheme debate</p>	<p><b>Reading Exposure:</b> DEAR: World's most powerful magnet</p>	<p><b>Reading Exposure:</b> DEAR: Using Resources Charity Water</p>	<p><b>Reading Exposure:</b> External Examinations</p>
<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Low-stakes quizzing</li> <li>Calculations</li> <li>Practicals</li> <li>Interleaving Working Scientifically</li> <li>Retrieval questions</li> <li>Extended response</li> </ul> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Low-stakes quizzing</li> <li>Modelling</li> <li>Practicals</li> <li>Interleaving Working Scientifically</li> <li>Extended response</li> <li>Retrieval questions</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Low-stakes quizzing</li> <li>Practicals</li> <li>Interleaving Working Scientifically</li> </ul> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Low-stakes quizzing</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Calculations</li> <li>Low-stakes quizzing</li> <li>Practicals</li> <li>Interleaving Working Scientifically</li> <li>Retrieval questions</li> <li>Extended response</li> </ul> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Low-stakes quizzing</li> <li>Novel situations</li> <li>Practicals</li> <li>Interleaving Working Scientifically</li> <li>Retrieval questions</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b></p> <ul style="list-style-type: none"> <li>Do it Now starter activities</li> <li>Educake retrieval homework</li> <li>Low-stakes quizzing</li> <li>Calculations</li> <li>Practicals</li> <li>Interleaving Working Scientifically</li> <li>Retrieval questions</li> <li>Extended response</li> </ul>	<p><b>Strategies to enable new concepts, knowledge &amp; skills to embed in long-term memory:</b> External Examinations</p>	

	<ul style="list-style-type: none"><li>• Modelling</li><li>• Practicals</li><li>• Interleaving Working Scientifically</li><li>• Retrieval questions</li><li>• Extended response</li></ul>	<ul style="list-style-type: none"><li>• Extended response</li></ul>			
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