

Year 8 Curriculum Overview Plan: Subject Science

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p>Key Theme: Earth 1 Energy 1</p>	<p>Key Theme: Organisms 2</p>	<p>Key Theme: Waves 1</p>	<p>Key Theme: Matter 2</p>	<p>Key Theme: Forces 2</p>	<p>Key Theme: Ecosystems 2</p>
<p>Key Concepts, Knowledge & Skills to be Embedded:</p> <ul style="list-style-type: none"> the composition of the Earth the structure of the Earth the rock cycle and the formation of igneous, sedimentary and metamorphic rocks our sun as a star, other stars in our galaxy, other galaxies the seasons and the Earth's tilt, day length at different times of year, in different hemispheres the light year as a unit of astronomical distance comparing energy values of different foods (from labels) (kJ) 	<p>Key Concepts, Knowledge & Skills to be Embedded:</p> <ul style="list-style-type: none"> the structure and functions of the gas exchange system in humans, including adaptations to function 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 the impact of exercise, asthma and smoking on the human gas exchange system present observations and data using appropriate methods, including tables and graphs 	<p>Key Concepts, Knowledge & Skills to be Embedded:</p> <ul style="list-style-type: none"> frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound sound needs a medium to travel, the speed of sound in air, in water, in solids sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal 	<p>Key Concepts, Knowledge & Skills to be Embedded:</p> <ul style="list-style-type: none"> a simple (Dalton) atomic model chemical symbols and formulae for elements and compounds the periodic table: periods and groups; metals and non-metals the principles underpinning the Mendeleev periodic table how patterns in reactions can be predicted with reference to the periodic table the varying physical and chemical properties of different elements understand and use SI units and IUPAC (International Union of Pure and Applied 	<p>Key Concepts, Knowledge & Skills to be Embedded:</p> <ul style="list-style-type: none"> 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 forces measured in newtons, measurements of stretch or compression as force is changed force-extension linear relation; Hooke's Law as a special case opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface 	<p>Key Concepts, Knowledge & Skills to be Embedded:</p> <ul style="list-style-type: none"> aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life a word summary for aerobic respiration the process of anaerobic respiration in humans and micro-organisms, including fermentation, and a word summary for anaerobic respiration the differences between aerobic and anaerobic respiration in terms of the reactants, the products formed and the implications for the organism

<ul style="list-style-type: none"> comparing power ratings of appliances in watts (W, kW) comparing amounts of energy transferred (J, kJ, kW hour) domestic fuel bills, fuel use and costs fuels and energy resources undertake basic data analysis including simple statistical techniques energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged heating and thermal equilibrium: temperature difference between 2 objects leading to energy transfer from the hotter to the 	<ul style="list-style-type: none"> the content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed calculations of energy requirements in a healthy daily diet the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases 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) the importance of bacteria in the human digestive system the effects of recreational drugs (including substance misuse) on behaviour, health and life processes 	<ul style="list-style-type: none"> the auditory range of humans and animals the similarities and differences between light waves and waves in matter light waves travelling through a vacuum; speed of light colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition 	<p>Chemistry) chemical nomenclature</p> <ul style="list-style-type: none"> 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 differences between atoms, elements and compounds conservation of mass changes of state and chemical reactions undertake basic data analysis including simple statistical techniques. 	<ul style="list-style-type: none"> using force arrows in diagrams, adding forces in 1 dimension, balanced and unbalanced forces moment as the turning effect of a force pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility atmospheric pressure, decreases with increase of height as weight of air above decreases with height pressure in liquids, increasing with depth; up thrust effects, floating and sinking pressure measured by ratio of force over area – acting normal to any surface use and derive simple equations and carry out appropriate calculations 	<ul style="list-style-type: none"> plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots the reactants in, and products of, photosynthesis, and a word summary for photosynthesis the adaptations of leaves for photosynthesis the role of leaf stomata in gas exchange in plants evaluate data, showing awareness of potential sources of random and systematic error – pond weed experiment make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements
--	---	--	---	---	--

<p>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"> • other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels • identify further questions arising from their results 	<ul style="list-style-type: none"> • ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience 				
<p>Links to Prior Learning:</p> <ul style="list-style-type: none"> • compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • describe in simple terms how fossils are formed when things that have lived are trapped within rock • recognise that soils are made from rocks and organic matter 	<p>Links to Prior Learning:</p> <ul style="list-style-type: none"> • the structure and functions of the human skeleton, to include support, protection, movement and making blood cells • biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles 	<p>Links to Prior Learning:</p> <ul style="list-style-type: none"> • recognise that they need light in order to see things and that dark is the absence of light • notice that light is reflected from surfaces • recognise that light from the sun can be dangerous and that there are ways to protect their eyes • recognise that shadows are formed 	<p>Links to Prior Learning:</p> <ul style="list-style-type: none"> • the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density; the anomaly of ice-water transition • atoms and molecules as particles • the properties of the different states of matter (solid, liquid 	<p>Links to Prior Learning:</p> <ul style="list-style-type: none"> • find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching • compare how things move on different surfaces • notice that some forces need contact between 2 objects, 	<p>Links to Prior Learning:</p> <ul style="list-style-type: none"> • describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene • find out and describe how plants need water, light and a suitable temperature to grow and stay healthy • identify and describe the functions of

<ul style="list-style-type: none"> • observe changes across the 4 seasons • observe and describe weather associated with the seasons and how day length varies • describe the movement of the Earth and other planets relative to the sun in the solar system • describe the movement of the moon relative to the Earth • describe the sun, Earth and moon as approximately spherical bodies • use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky • explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object 	<ul style="list-style-type: none"> • the role of diffusion in the movement of materials in and between cells • diffusion in liquids and gases driven by differences in concentration • the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms • 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 • describe the simple functions of the basic parts of the digestive system in humans • identify the different types of teeth in humans and their simple functions 	<p>when the light from a light source is blocked by an opaque object</p> <ul style="list-style-type: none"> • find patterns in the way that the size of shadows change • recognise that light appears to travel in straight lines • 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 • 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 • use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them 	<p>and gas) in terms of the particle model, including gas pressure</p> <ul style="list-style-type: none"> • changes of state in terms of the particle model • the concept of a pure substance 	<p>but magnetic forces can act at a distance</p> <ul style="list-style-type: none"> • identify the effects of air resistance, water resistance and friction, that act between moving surfaces • recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect • speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time) • the representation of a journey on a distance-time graph • relative motion: trains and cars passing one another • forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only) 	<p>different parts of flowering plants: roots, stem/trunk, leaves and flowers</p> <ul style="list-style-type: none"> • 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 • investigate the way in which water is transported within plants
---	---	--	---	---	--

<ul style="list-style-type: none"> • 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 • 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 				<ul style="list-style-type: none"> • change depending on direction of force and its size • forces as pushes or pulls, arising from the interaction between 2 objects • non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets, and forces due to static electricity • gravity force, weight = mass x gravitational field strength (g), on Earth $g=10 \text{ N/kg}$, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and sun (qualitative only) 	
<p>Key Assessment Pieces: Response Time: Extended Response - Rock cycle</p> <p>Earth 1 Quiz</p> <p>Response Time: Graph drawing</p>	<p>Key Assessment Pieces: Response Time: practical – effect of exercise on breathing rate observation, recording data and conclusion</p> <p>Organisation 2 Quiz</p>	<p>Key Assessment Pieces: Response Time: Calculations – speed of sound including echoes</p> <p>Waves 1 Quiz</p>	<p>Key Assessment Pieces: Response Time: Extended Response – development of the periodic table</p> <p>Matter 2 Quiz</p>	<p>Key Assessment Pieces: Response Time: Hooke’s law, conclusion using supplied data and evaluation of practical setup</p> <p>Forces 2 Quiz</p>	<p>Key Assessment Pieces: Response Time: Evaluation of growing plant needs and the green house.</p> <p>Ecosystems 2 Quiz</p>

Energy 1 Quiz					
<p>Tier 3 Vocabulary Vault: Earth structure</p> <ul style="list-style-type: none"> • Rock cycle: Sequence of processes where rocks change from one type to another. • Weathering: The wearing down of rock by physical, chemical or biological processes. • Erosion: Weathering of rock and its movement by water, ice or wind (transportation). • Minerals: Chemicals that rocks are made from. • Sedimentary rocks: Formed from layers of sediment, and which can contain fossils. Examples are limestone, chalk and sandstone. • Igneous rocks: Formed from cooled magma, with minerals arranged in crystals. Examples are granite, basalt and obsidian. • Metamorphic rocks: Formed from existing 	<p>Tier 3 Vocabulary Vault: Breathing</p> <ul style="list-style-type: none"> • Breathing: The movement of air in and out of the lungs. • Trachea (windpipe): Carries air from the mouth and nose to the lungs. • Bronchi: Two tubes which carry air to the lungs. • Bronchioles: Small tubes in the lung. • Alveoli: Small air sacs found at the end of each bronchiole. • Ribs: Bones which surround the lungs to form the ribcage. • Diaphragm: A sheet of muscle found underneath the lungs. • Lung volume: Measure of the amount of air breathed in or out. • Observation-Information gathered by your senses • Data: measurements of quantities in an experiment; data can be recorded in a 	<p>Tier 3 Vocabulary Vault: Sound</p> <ul style="list-style-type: none"> • Vibration: A back and forth motion that repeats. • Longitudinal wave: Where the direction of vibration is the same as that of the wave. • Volume: How loud or quiet a sound is, in decibels (dB). • Pitch: How low or high a sound is. A low (high) pitch sound has a low (high) frequency. • Amplitude: The maximum amount of vibration, measured from the middle position of the wave, in metres. • Wavelength: Distance between two corresponding points on a wave, in metres. • Frequency: The number of waves produced in one second, in hertz. 	<p>Tier 3 Vocabulary Vault: Periodic table</p> <ul style="list-style-type: none"> • Periodic table: Shows all the elements arranged in rows and columns. • Physical properties: Features of a substance that can be observed without changing the substance itself. • Chemical properties: Features of the way a substance reacts with other substances. • Groups: Columns of the Periodic table. • Periods: Rows of the Periodic table. • 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 • Evidence Information from an observation or 	<p>Tier 3 Vocabulary Vault: Contact forces</p> <ul style="list-style-type: none"> • Equilibrium: State of an object when opposing forces are balanced. • Deformation: Changing shape due to a force. • Linear relationship: When two variables are graphed and show a straight line which goes through the origin, and they can be called proportional. • Newton: Unit for measuring forces (N). • Resultant force: Single force which can replace all the forces acting on an object and have the same effect. • 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. 	<p>Tier 3 Vocabulary Vault: Respiration</p> <ul style="list-style-type: none"> • Aerobic respiration: Breaking down glucose with oxygen to release energy and producing carbon dioxide and water. • Anaerobic respiration (fermentation): Releasing energy from the breakdown of glucose without oxygen, producing lactic acid (in animals) and ethanol and carbon dioxide (in plants and microorganisms). <p>Photosynthesis</p> <ul style="list-style-type: none"> • Fertilisers: Chemicals containing minerals that plants need to build new tissues. • Photosynthesis: A process where plants and algae turn carbon dioxide and water into glucose and release oxygen. • Chlorophyll: Green pigment in plants and algae which absorbs light energy.

<p>rocks exposed to heat and pressure over a long time. Examples are marble, slate and schist.</p> <ul style="list-style-type: none"> • Strata: Layers of sedimentary rock. <p>Universe</p> <ul style="list-style-type: none"> • Galaxy: Collection of stars held together by gravity. Our galaxy is called the Milky Way. • Light year: Distance light travels in a year (over 9 million, million kilometres). • Stars: Bodies which give out light, and which may have a solar system of planets. • Orbit: Path taken by a satellite, planet or star moving around a larger body. Earth completes one orbit of the Sun every year. • Exoplanet: Planet that orbits a star outside our solar system. <p>Energy costs</p>	<p>table and used to produce graphs</p> <ul style="list-style-type: none"> • Bar chart/column graph - Displays the values of categories • Line graph - Shows the relationship between two continuous variables • Line of best fit - A straight or curved line drawn to show the pattern of data points <p>Digestion</p> <ul style="list-style-type: none"> • Enzymes: Substances that speed up the chemical reactions of digestion. • Dietary fibre: Parts of plants that cannot be digested, which helps the body eliminate waste. • Carbohydrates: The body's main source of energy. There are two types: simple (sugars) and complex (starch). • Lipids: (fats and oils) A source of energy. Found in butter, milk, eggs, nuts. • Protein: Nutrient your body uses to 	<ul style="list-style-type: none"> • Vacuum: A space with no particles of matter in it. • Oscilloscope: Device able to view patterns of sound waves that have been turned into electrical signals. • Absorption: When energy is transferred from sound to a material. • Auditory range: The lowest and highest frequencies that a type of animal can hear. • Echo: Reflection of sound waves from a surface back to the listener. <p>Light</p> <ul style="list-style-type: none"> • Incident ray: The incoming ray. • Reflected ray: The outgoing ray. • Normal line: From which angles are measured, at right angles to the surface. • Angle of reflection: Between the normal and reflected ray. 	<p>experiment that supports an idea</p> <ul style="list-style-type: none"> • Journal Magazine which publishes science research for others to read • Peer review: scientific findings are scrutinised by independent experts before they can be published <p>Elements</p> <ul style="list-style-type: none"> • Elements: what all substances are made up of, and which contain only one type of atom. • Atom: The smallest particle of an element that can exist. • Molecules: Two to thousands of atoms joined together. Most non-metals exist either as small or giant molecules. • Compound: Pure substances made up of two or more elements strongly joined together. • Chemical formula: Shows the elements 	<ul style="list-style-type: none"> • Tension: Force extending or pulling apart. • Compression: Force squashing or pushing together. • Contact force: One that acts by direct contact. • Accuracy: how close a measurement is to its true value • Precision: how closely grouped a set of repeated measurements are 	<ul style="list-style-type: none"> • Stomata Pores in the bottom of a leaf which open and close to let gases in and out.
---	--	---	--	---	---

<ul style="list-style-type: none"> • Power: How quickly energy is transferred by a device (watts). • Energy resource: Something with stored energy that can be released in a useful way. • Non-renewable: An energy resource that cannot be replaced and will be used up. • Renewable: An energy resource that can be replaced and will not run out. Examples are solar, wind, waves, geothermal and biomass. • Fossil fuels: Non-renewable energy resources formed from the remains of ancient plants or animals. Examples are coal, crude oil and natural gas. • Data: measurements of quantities in an experiment; data can be recorded in a table and used to produce graphs • 	<p>build new tissue for growth and repair. Sources are meat, fish, eggs, dairy products, beans, nuts and seeds.</p> <ul style="list-style-type: none"> • Stomach: A sac where food is mixed with acidic juices to start the digestion of protein and kill microorganisms. • Small intestine: Upper part of the intestine where digestion is completed and nutrients are absorbed by the blood. • Large intestine: Lower part of the intestine from which water is absorbed and where faeces are formed. • Gut bacteria: Microorganisms that naturally live in the intestine and help food break down. • Observation- Information gathered by your senses 	<ul style="list-style-type: none"> • Angle of incidence: Between the normal and incident ray. • Refraction: Change in the direction of light going from one material into another. • Absorption: When energy is transferred from light to a material. • Scattering: When light bounces off an object in all directions. • Transparent: A material that allows all light to pass through it. • Translucent: A material that allows some light to pass through it. • Opaque: A material that allows no light to pass through it. • Convex lens: A lens that is thicker in the middle which bends light rays towards each other. • Concave lens: A lens that is thinner in the middle which 	<p>present in a compound and their relative proportions.</p> <ul style="list-style-type: none"> • Polymer: A molecule made of thousands of smaller molecules in a repeating pattern. Plastics are man-made polymers, starch is a natural polymer. • Data: measurements of quantities in an experiment; data can be recorded in a table and used to produce graphs • Mean: average value calculated by adding up all the values in a data set then dividing by the number of values 	<ul style="list-style-type: none"> • 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. • Repeatable: A measurement is repeatable if the original experimenter repeats the investigation using same method and equipment and obtains the same results. <p>Pressure</p> <ul style="list-style-type: none"> • Fluid: A substance with no fixed shape, a gas or a liquid. • Pressure: The ratio of force to surface area, in N/m^2, and it causes stresses in solids. • Up thrust: The upward force that a liquid or gas exerts on a body floating in it. 	
---	---	---	---	---	--

<p>Energy transfer</p> <ul style="list-style-type: none"> • Thermal energy store: Filled when an object is warmed up. • Chemical energy store: Emptied during chemical reactions when energy is transferred to surroundings. • Kinetic energy store: Filled when an object speeds up. • Gravitational potential energy store: Filled when an object is raised. • Elastic energy store: Filled when a material is stretched or compressed. • Dissipated: Become spread out wastefully. 		<p>spreads out light rays.</p> <ul style="list-style-type: none"> • Retina: Layer at the back of the eye with light detecting cells and where image is formed. 		<ul style="list-style-type: none"> • Atmospheric pressure: The pressure caused by the weight of the air above a surface. • Derive: calculate using measured data 	
<p>Reading Exposure: DARTs (Structure of the Earth) Evaluating Evidence Files (Moon Landings) DEAR: Beginning of the Universe DEAR: Rusting of Rocks (Challenge) DARTS: Energy Resources DEAR: A Role Model</p>	<p>Reading Exposure: DEAR: Attacking Asthma DEAR: Unknown Dangers of Extreme Diets DARTs: Food Groups</p>	<p>Reading Exposure: DEAR: Breaking the sound barrier</p>	<p>Reading Exposure: DARTs: Development of the Periodic Table</p>	<p>Reading Exposure: DEAR: Air pressure and how it Affects the Weather</p>	<p>Reading Exposure: DEAR: Sea Slugs who Sheepishly Photosynthesise</p>

<p>Strategies to enable new concepts, knowledge & skills to embed in long-term memory:</p> <ul style="list-style-type: none"> • Do it Now starter activities • Educake retrieval homework • Low-stakes quizzing • Modelling • Practicals • Interleaving Working Scientifically • Retrieval questions <ul style="list-style-type: none"> • Do it Now starter activities • Educake retrieval homework • Low-stakes quizzing • Calculations • Videos • Practicals • Interleaving Working Scientifically • Retrieval questions 	<p>Strategies to enable new concepts, knowledge & skills to embed in long-term memory:</p> <ul style="list-style-type: none"> • Do it Now starter activities • Educake retrieval homework • Low-stakes quizzing • Practicals • Interleaving Working Scientifically • Retrieval questions 	<p>Strategies to enable new concepts, knowledge & skills to embed in long-term memory:</p> <ul style="list-style-type: none"> • Do it Now starter activities • Educake retrieval homework • Low-stakes quizzing • Practicals • Interleaving Working Scientifically • Retrieval questions 	<p>Strategies to enable new concepts, knowledge & skills to embed in long-term memory:</p> <ul style="list-style-type: none"> • Do it Now starter activities • Educake retrieval homework • Low-stakes quizzing • Practicals • Interleaving Working Scientifically • Retrieval questions 	<p>Strategies to enable new concepts, knowledge & skills to embed in long-term memory:</p> <ul style="list-style-type: none"> • Do it Now starter activities • Educake retrieval homework • Low-stakes quizzing • Practicals • Interleaving Working Scientifically • Retrieval questions 	<p>Strategies to enable new concepts, knowledge & skills to embed in long-term memory:</p> <ul style="list-style-type: none"> • Do it Now starter activities • Educake retrieval homework • Low-stakes quizzing • Practicals • Interleaving Working Scientifically • Retrieval questions
---	---	---	---	---	---