

Key Stage 3

Science National Curriculum KS3

ASDAN Science short Course

7	Topic	<u>Introduction to Secondary Science</u> <u>7F Acids and Alkalis</u> <u>7A Cells, tissues, organs and systems</u>	<u>7I Energy</u> <u>7B Sexual reproduction in animals</u>	<u>7J Current electricity</u> <u>7E Mixtures and separation</u>	<u>7G The particle model</u> <u>7C Muscles and bones</u>	<u>7K Forces</u> <u>7D Ecosystems</u>	<u>7H Atoms, elements and compounds</u> <u>7L Sound</u>
	Pupils will be taught.... (Core knowledge and concepts to be learned) NC Link	Cells and organisation: ▪ cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope ▪ the functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts	Reproduction: ▪ 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 Energy:	Pure and impure substances: ▪ the concept of a pure substance ▪ mixtures, including dissolving ▪ diffusion in terms of the particle model ▪ simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography ▪ the identification of pure substances. Current electricity: ▪ electric current, measured in amperes,	The skeletal and muscular systems: ▪ 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 ▪ the function of muscles and examples of	Relationships in an ecosystem: ▪ the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops ▪ the importance of plant reproduction through insect pollination in human food security ▪ how organisms affect, and are affected by, their environment, including the accumulation of toxic materials.	Atoms, elements and compounds: ▪ a simple (Dalton) atomic model ▪ differences between atoms, elements and compounds ▪ chemical symbols and formulae for elements and compounds ▪ conservation of mass changes of state and chemical reactions. Sound waves ▪ frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound ▪ sound needs a medium to

		<ul style="list-style-type: none"> the similarities and differences between plant and animal cells the role of diffusion in the movement of materials in and between cells the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms. <p>Acids and Alkalis: defining acids and alkalis in terms of neutralisation reactions</p> <ul style="list-style-type: none"> the pH scale for measuring acidity/alkalinity; and indicators reactions of acids with metals to produce a salt plus hydrogen reactions of acids with alkalis to produce a salt plus water 	<p>Calculation of fuel uses and costs in the domestic context</p> <ul style="list-style-type: none"> comparing energy values of different foods (from labels) (kJ) 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. 	<p>in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge</p> <ul style="list-style-type: none"> potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current differences in resistance between conducting and insulating components (quantitative). <p>Static electricity</p> <ul style="list-style-type: none"> separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects the idea of electric field, forces acting across the space between objects not in contact. 	<p>antagonistic muscles.</p> <p>The particulate nature of matter:</p> <ul style="list-style-type: none"> 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. <p>Physical changes:</p> <ul style="list-style-type: none"> conservation of material and of mass, and reversibility, in melting, freezing, evaporation, sublimation, condensation, dissolving similarities and differences, including density differences, between solids, liquids and gases Brownian motion in gases diffusion in liquids and gases driven by differences in concentration the difference between chemical and physical changes. 	<p>Forces:</p> <p>forces as pushes or pulls, arising from the interaction between two objects</p> <ul style="list-style-type: none"> using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces moment as the turning effect of a force 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 	<p>travel, the speed of sound in air, in water, in solids</p> <ul style="list-style-type: none"> sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal auditory range of humans and animals.
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					Particle model: <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. 		
	Pupils should be able to do... (Skills being developed) BSquared Steps 4-10	7F Acids and Alkalis: Demonstrates understanding of chemical reactions as the rearrangement of atoms Demonstrates understanding of defining acids and alkalis in terms of neutralisation reactions Demonstrates understanding of the pH scale for measuring acidity/alkalinity; and indicators Demonstrates understanding of reactions of acids	7I Energy: Demonstrates the ability to compare energy values of different foods (from labels) (kJ) Demonstrates the ability to compare power ratings of appliances in watts (W, kW) Demonstrates understanding that simple machines give bigger force but at the expense of smaller movement (and vice versa); product of force and displacement	7J Current electricity: Recognises the need for safety when using electricity Names the components in a circuit, e.g. bulb, motor, switch Creates simple electrical circuits using given equipment Recognises that the circuit has to be complete for electrical devices to work Suggests why it is important to have a	7G The particle model: Demonstrates understanding of the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure. Demonstrates understanding of diffusion in terms of the particle model Demonstrates understanding of changes of state in terms of the particle model Demonstrates	7K Forces: Includes related vocabulary to appropriately describe forces, e.g. push, pull, stop Demonstrates how air can move objects, e.g. uses large pieces of cardboard to create a force Examines objects that move using different means, e.g. wind up and push along toy or bicycle Describes what it feels like to run against and with	7H Atoms, elements and compounds: Suggests how they can test materials to check their properties Identifies, with reasons, whether changes in materials are reversible or not Recognises that mixing materials can cause change Gives examples of changes which cannot be reversed Understands and uses the terms correctly "insoluble", "soluble", "solution" Demonstrates understanding of the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure

		<p>with metals to produce a salt plus hydrogen Demonstrates understanding of reactions of acids with alka</p> <p>7A Cells, tissues: Demonstrates understanding of cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope Demonstrates understanding of the functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts Demonstrates understanding of the similarities and differences between plant and animal cells Demonstrates understanding of the role of diffusion in the movement of materials in and</p>	<p>unchanged Energy Demonstrates understanding of energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change. Demonstrates the ability to compare amounts of energy transferred (J, kJ, kW hour) Demonstrates the ability to calculate domestic fuel bills, fuel use and costs Calculates the uses and costs of fuels and energy resources Demonstrates understanding of the 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</p>	<p>mobile source of power, e.g. torch. Explains the function of a switch in a circuit Describes the difference between an electrical conductor and insulator, giving examples Identifies what makes a complete electrical circuit Checks components in the circuits one by-one to find a problem Recognises a circuit must have a power source, which is part of a complete loop, to work Draws their circuit using pictorial representation. Explains that their series circuit will pass through all components one after the other Describes the effect of changing components within a circuit Uses simple apparatus to construct and control a series</p>	<p>understanding of the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density; the anomaly of ice-water transition Demonstrates understanding of atoms and molecules as particles Demonstrates understanding of the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density; the anomaly of ice-water transition Demonstrates understanding of atoms and molecules as particles Demonstrates understanding of changes with temperature in motion and spacing of particles</p> <p>7C Muscles and bones: Names the parts of the human body they</p>	<p>the wind, and why it is more difficult Compares the strength needed to walk in water and the speed they can travel Recognises that it requires more effort to pull an object over some surfaces more than others Describes what a simple mechanism does, e.g. lifts Identifies simple levers Explains how they think a mechanism works Demonstrates how force can change the direction of an object Demonstrates how force can change the shape of an object Demonstrates how force can change the speed of an object Explores how the force of gravity affects everything on Earth, e.g. by trying to 'beat' gravity, keeping up a blown up balloon</p>	<p>Demonstrates understanding of a simple (Dalton) atomic model Demonstrates understanding of differences between atoms, elements and compounds</p> <p>7L Sound Demonstrates how to make high, low, soft and loud sounds with different classroom instruments Identifies if different sound sources can be heard through solid objects Associates vibrations they see to the sound they hear States what is vibrating when an instrument is played Explains that we hear sounds when they reach the ear Describes vibrations, e.g. after watching the surface of water move Predicts which instrument out of a group differing in size, makes low or high pitched sounds Suggests that the sound will stop when the vibrations stop Explains that sound becomes quieter as we move away from the source Explains that sound travels away from its source Simply explains the term "vibration" Recognises that vibrations</p>
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		<p>between cells</p> <p>Demonstrates understanding of the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms</p>	<p>reduce the temperature difference; use of insulators</p> <p>Demonstrates understanding of other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels</p> <p>Energy</p> <p>Demonstrates understanding of 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</p> <p>Demonstrates understanding of using physical processes and mechanisms, rather</p>	<p>circuit, and describes how the circuit may be affected when changes are made to it; and uses recognised symbols to represent simple series circuit diagrams</p> <p>Explains why a circuit does not work by looking at the circuit diagram</p> <p>Demonstrates understanding of electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge</p> <p>Demonstrates understanding of potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current</p> <p>Demonstrates understanding of</p>	<p>can see, e.g. knee, elbow</p> <p>Names and locates parts of the human body, including those related to the senses</p> <p>Compares or matches the body shape and skeleton of different animals</p> <p>Demonstrates understanding of biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles</p> <p>Demonstrates understanding of the function of muscles and examples of antagonistic muscles</p>	<p>in the air as long as possible</p> <p>Recognises and uses the term "balanced" force</p> <p>Gives a simple reason why different surfaces make it harder to slip on</p> <p>Relates how shape helps to lower air resistance, e.g. by examining photos of planes or rockets</p> <p>Relates the speed we can travel when swimming in water to when they walk through water</p> <p>Recognises that the surface area can affect the speed of an object dropping to Earth</p> <p>Describes a force as "balanced" as appropriate</p> <p>Describes the downward force as gravity</p> <p>Describes forces using the terms "friction", "water resistance" and "air resistance" correctly in context</p> <p>Shows the direction of different forces acting on objects in</p>	<p>can be seen, e.g. guitar strings</p> <p>Feels and simply describes vibrations, e.g. using a string telephone</p> <p>Recognises that sound can travel through air, walls, windows, etc.</p> <p>Recognises that sound travels to the ears from its source</p> <p>Describes the difference in vibrations made when a loud or soft noise is heard</p> <p>Recognises that sound travels to our ears</p> <p>Uses the idea that sounds are associated with vibrations, and that they require a medium to travel through, to explain how sounds are made and heard</p> <p>Describes the relationship between the pitch of a sound and the features of its source; and between the volume of a sound, the strength of the vibrations and the distance from its source</p> <p>Describes how a sound is made using scientific vocabulary</p> <p>Demonstrates understanding of frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound</p> <p>Demonstrates understanding that sound needs a medium</p>
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			<p>than energy, to explain the intermediate</p> <p>7B Sexual reproduction in animals: Names and compares sex/gender. Records the general order of the main changes that girls and boys experience in puberty Classifies changes in puberty which are different and similar in both sexes Identifies that puberty occurs so that the reproductive organs can become functional Relates technical terms and popular terms of male and female organs</p>	<p>differences in resistance between conducting and insulating components (quantitative) Demonstrates understanding of the magnetic effect of a current.</p> <p>7E Mixtures and separation: Separates mixtures, e.g. using a filter paper Separates some materials as directed, e.g. using sieves to separate soil and stones Identifies if a substance mixed with water can be separated by filtering or sieving Describes ways to separate different materials Compares a variety of materials using different properties, e.g. solubility,</p>		<p>diagrams using arrows Sorts objects to show which mechanism they use, e.g. lever, pulley, wedge Recognises that forces act in a particular direction Recognises forces acting on an object may be equal, causing the object to be static Recognises gravity causes objects to have weight Recognises that gravity exerts a downward force on all things Describes the effects of simple forces that involve contact (air and water resistance, friction) and gravity Identifies simple mechanisms, including levers, gears and pulleys that increase the effect of a force Demonstrates forces acting on a range of objects Explains that a</p>	<p>to travel, the speed of sound in air, in water, in solids Demonstrates understanding that sound is produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal Demonstrates understanding of the auditory range of humans and animals</p>
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				<p>conductivity</p> <p>Suggests ways to dissolve a substance</p> <p>Identifies and describes what happens when dissolving occurs in everyday situations; and describes how to compare separate mixtures and solutions into their components</p> <p>Identifies, with reasons, whether changes in materials are reversible or not</p> <p>Recognises that mixing materials can cause change</p> <p>Gives examples of changes which cannot be reversed</p> <p>Understands and uses the terms correctly "insoluble", "soluble", "Solution".</p> <p>Demonstrates</p>		<p>floating object is balancing water resistance and gravity</p> <p>Demonstrates understanding of forces as pushes or pulls, arising from the interaction between 2 objects</p> <p>Demonstrates understanding of using force arrows in diagrams, adding forces in 1 dimension, balanced and unbalanced forces</p> <p>Demonstrates understanding of moment as the turning effect of a force</p> <p>Demonstrates understanding that forces are measured in newtons, measurements of stretch or compression as force is changed</p> <p>Demonstrates understanding of noncontact forces: gravity forces acting at a distance on Earth</p>	
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				<p>understanding of simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography</p> <p>Demonstrates understanding of the identification of pure substances.</p>		<p>and in space. Demonstrates understanding of 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</p> <p>Demonstrates understanding of force extension linear relation; Hooke's Law as a special case</p> <p>Demonstrates understanding of work done and energy changes on deformation</p> <p>7D Ecosystems: Suggests ways people have an effect on their surroundings</p> <p>Recognises that plants start food chains Orders simple three part food chains Explains simply what a ngs</p>	
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						es throughout the school year Explores the dependency between animals	
	Key Terminology	amoeba cell wall cells chloroplasts concentration diffusion euglena flagellum leaf cell microscope nerve cell nucleus observation organisms red blood cell root hair cell specialised cell sperm cell unicellular acid alkali base concentrated corrosive dilute indicator litmus neutral neutralisation	chemical store conduction conductor convection convection current dissipated elastic store energy energy resources energy store equilibrium fossil fuel gear gravitational potential store infrared radiation insulator joules adolescence anther carpel cervix cilia condom contraception contraceptive pill ejaculation embryo fertilisation	ammeter amps atom attract battery cell conductor core current electric charge electrical field electromagnet electron insulator lightning magnetic field magnetic field lines magnetic material magnetise motor negative chromatogram chromatography dissolve distillation filtering filtrate filtration impure	alveolus antagonistic muscles bone cartilage condense diaphragm (breathing) exhale gas exchange inhale joint ligament lungs multicellular organism newton organ organ system respiration respiratory system ribcage skeleton tendon boiling boiling point change of state collide condensation diffusion evaporate	air resistance balanced compress contact force deform drag force driving force elastic limit electrostatic force equilibrium extension field friction gravity Hooke's Law interaction pair kilogram (kg) lubrication magnetic force mass newton (N) aerobic respiration algae anaerobic respiration bioaccumulation chemosynthesis chlorophyll co-exist community	amplifier amplify amplitude audible range auditory canal auditory nerve cochlea compression crest decibel diaphragm ear eardrum echo energy hertz incident wave infrasound inner ear kilohertz longitudinal loudness acid rain chemical property density displace displacement reaction group halogen

		pH scale salt universal indicator	foetus filament fluid sac fruit gametes germination implantation menstrual cycle ovary	insoluble mixture pure residue saturated solution solubility solute solution solvent	freezing gas liquid material melting melting point mixture particle property solid states of matter sublime	consumer deficiency ecosystem fermentation fertiliser food chain food web habitat haemoglobin interdependence magnesium niche nitrates	metal metalloid noble gases non-metal period physical property reactive unreactive
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8	Topic	<u>8A Food and nutrition</u> <u>8E Combustion</u>	<u>8I Fluids</u> <u>8B Plants and reproduction</u>	<u>8F The periodic table</u> <u>8J Light</u>	<u>8C Breathing and respiration</u> <u>8G Metals and their use</u>	<u>8K Energy transfers</u> <u>8D Unicellular organisms</u>	<u>8H Rocks</u> <u>8L Earth and space</u>
	Pupils will be taught... (Core knowledge and concepts to be learned) NC Link	Nutrition and digestion: ▪ 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	Pressure in fluids: ▪ atmospheric pressure, decreases with increase of height as weight of air above decreases with height ▪ pressure in liquids, increasing with depth; upthrust effects, floating and sinking ▪ pressure measured by ratio of force over area – acting normal	The Periodic Table: ▪ the varying physical and chemical properties of different elements ▪ the principles underpinning the Mendeleev Periodic Table ▪ the Periodic Table: periods and groups; metals and non-metals ▪ how patterns in reactions can be	Gas exchange systems: ▪ 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	Energetics: ▪ energy changes on changes of state (qualitative) ▪ exothermic and endothermic chemical reactions (qualitative). Energy changes and transfers ▪ simple machines give bigger force but at the expense of smaller	Earth and atmosphere: ▪ the composition of the Earth ▪ the structure of the Earth ▪ the rock cycle and the formation of igneous, sedimentary and metamorphic rocks ▪ Earth as a source of limited resources and the efficacy of recycling ▪ the carbon cycle ▪ the composition of the atmosphere ▪ the production of carbon

		<ul style="list-style-type: none"> 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 plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots. <p>Health:</p> <ul style="list-style-type: none"> the effects of recreational drugs (including substance misuse) on behaviour, health and life processes. <p>Chemical reactions:</p>	<p>to any surface.</p> <p>Plant reproduction:</p> <ul style="list-style-type: none"> reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. 	<p>predicted with reference to the Periodic Table</p> <ul style="list-style-type: none"> the properties of metals and non-metals the chemical properties of metal and non-metal oxides with respect to acidity. <p>Waves:</p> <p>Observed waves</p> <ul style="list-style-type: none"> waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition. <p>Energy and waves</p> <ul style="list-style-type: none"> pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound; waves transferring information for conversion to electrical signals by microphone. <p>Light waves</p> <ul style="list-style-type: none"> the similarities and differences between light waves and waves in matter light waves travelling through a vacuum; speed of light the transmission of 	<p>movement of gases, including simple measurements of lung volume</p> <ul style="list-style-type: none"> the impact of exercise, asthma and smoking on the human gas exchange system the role of leaf stomata in gas exchange in plants. <p>Cellular respiration:</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 	<p>movement (and vice versa): product of force and displacement unchanged</p> <ul style="list-style-type: none"> heating and thermal equilibrium: temperature difference between two 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 other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels. <p>Changes in systems:</p> <ul style="list-style-type: none"> energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change comparing the starting with the final conditions of a system and describing increases 	<p>dioxide by human activity and the impact on climate.</p> <p>Space physics:</p> <ul style="list-style-type: none"> 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) 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.
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		<ul style="list-style-type: none"> chemical reactions as the rearrangement of atoms representing chemical reactions using formulae and using equations combustion, thermal decomposition, oxidation and displacement reactions what catalysts do. 		<p>light through materials: absorption, diffuse scattering and specular reflection at a surface</p> <p>11</p> <p>Science – key stage 3</p> <ul style="list-style-type: none"> 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 light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection. 	<p>the implications for the organism.</p> <p>Metals and their uses:</p> <ul style="list-style-type: none"> Properties and reactivities of metals Metal extraction 	<p>and decreases in the amounts of energy associated with movements, temperatures, changes in positions in a field, in elastic distortions and in chemical compositions</p> <ul style="list-style-type: none"> using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes. <p>Unicellular organisms:</p> <ul style="list-style-type: none"> the structural adaptations of some unicellular organisms 	
	<p>Pupils should be able to do... (Skills being developed) BSquared</p>	<p>8A Food and nutrition: Lists what all animals and</p>	<p>8I Fluids: Demonstrates understanding of pressure in liquids,</p>	<p>8F The periodic table: Demonstrates understanding of</p>	<p>8C Breathing and respiration Demonstrates understanding of</p>	<p>8K Energy transfers: Demonstrates understanding that</p>	<p>8H Rocks: Gives examples of where they have seen erosion in their environment Suggests a</p>

	Steps 4-10	<p>humans need to live, e.g. air, food, water Explores what benefit each food groups have to the human body Simply describes the process of food digestion using given vocabulary Explains in simple terms why exercise is a healthy activity Explores what benefit each food groups have to the human body Describes the importance of exercise, balanced diet and hygiene for humans Demonstrates understanding of 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)</p> <p>8E Combustion: Recognises that</p>	<p>increasing with depth; upthrust effects, floating and sinking Demonstrates understanding of atmospheric pressure, decreases with increase of height as weight of air above decreases with height Demonstrates understanding of pressure measured by ratio of force over area – acting normal to any surface</p> <p>8B Plants and reproduction: Explains the role of different parts of a plant simply, e.g. roots anchor plant Explains that most seeds and bulbs grow under soil, e.g. with no sunlight Suggests what might happen if a basic requirement for germination is taken away, based on their prior</p>	<p>the varying physical and chemical properties of different elements Demonstrates understanding of differences between atoms, elements and compounds Demonstrates understanding of the varying physical and chemical properties of different elements Demonstrates understanding of the properties of metals and non-metals Demonstrates understanding of the principles underpinning the Mendeleeev periodic table Demonstrates understanding of the periodic table: periods and groups; metals and non-metals Demonstrates understanding of how patterns in reactions can be predicted with</p>	<p>aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life Provides a word summary for aerobic respiration Demonstrates understanding of aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life Provides a word summary for aerobic respiration Demonstrates understanding of the structure and functions of the gas exchange system in humans, including adaptations to function Demonstrates understanding of</p>	<p>simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged Demonstrates understanding of the 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 Demonstrates understanding of other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring,</p>	<p>reason why rocks have eroded Suggests why soil is necessary to different living things Compares and describes different soil Groups fossils into mould, casts and resin with support Selects a criteria to classify rocks Lists different ways we use different types of rocks Suggests what might happen to a building in their locality over time in respect of erosion Lists forces that affect landscapes Suggests reasons why cliffs and mountains may change shape over time Compares a range of different rocks over time, e.g. by looking at photographs of cliffs or mountains Explains why and how we use rocks in different ways Simply defines and finds examples of erosion and weathering Describes how soil is made Lists some organic matter that may make up soil Gives reasons why types of rocks are used for specific purposes based on their investigations Identifies that there are many layers of different rocks Describes simply how</p>
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		<p>some changes may result in a new material, e.g. in cooking</p> <p>Recognises that some changes are permanent, and others are not</p> <p>Identifies, with reasons, whether changes in materials are reversible or not</p> <p>Recognises that mixing materials can cause change</p> <p>Gives examples of changes which cannot be reversed</p> <p>Demonstrates understanding of combustion, thermal decomposition, oxidation and displacement reactions</p> <p>Demonstrates understanding of representing chemical reactions using formulae and using equations</p>	<p>knowledge Uses the term "germination" mostly correctly</p> <p>Observes and describes the changes to seeds and bulbs as they grow into plants</p> <p>Observes and orders the life cycle of a seed</p> <p>Lists what plants need to survive, e.g. nutrition</p> <p>Describes the function of different parts of flowering plants and trees</p> <p>Describes the life cycle of a plant</p> <p>Explores how some plants reproduce, e.g. by planting and growing potatoes</p> <p>Predicts how different conditions may affect seed growth</p> <p>Explains simply why seeds need to be dispersed</p> <p>Looks for patterns in colours or textures of flowers when discussing how the seeds are dispersed</p> <p>Relates the terms "pollen" and</p>	<p>reference to the periodic table</p> <p>Demonstrates understanding of the chemical properties of metal and nonmetal oxides with respect to acidity</p> <p>8J Light:</p> <p>Demonstrates how to use a mirror to look around corners</p> <p>Sorts objects into transparent, translucent and opaque using a light source to test them</p> <p>Makes simple connections between a light source making its own light and a reflector needing light to glow</p> <p>Experiments how shadows change by moving the torch nearer and further from the object</p> <p>Represents the light they have reflected using arrows away from the light source</p> <p>Examines a selection of light sources and names</p>	<p>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</p> <p>Structure and Function of</p> <p>Demonstrates understanding of the impact of exercise, asthma and smoking on the human gas exchange system</p> <p>8G Metals and their use</p> <p>Suggests ways to identify materials more specifically, e.g. types of metal</p> <p>Classifies the properties of a material using scientific vocabulary</p> <p>Demonstrates understanding of the properties of metals and</p>	<p>metabolism of food, burning fuels</p> <p>8D Unicellular organisms:</p> <p>Demonstrates understanding of cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope</p> <p>Demonstrates understanding of the role of diffusion in the movement of materials in and between cells</p> <p>Demonstrates understanding of the structural adaptations of some unicellular organisms</p> <p>Demonstrates understanding of the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms</p>	<p>sedimentary rock is formed, e.g. by sequencing information</p> <p>Demonstrates a basic understanding about the process of changes a fossil went through to be formed</p> <p>Groups and identifies rocks in different ways according to their properties, based on first-hand observation</p> <p>Compares physical properties of rocks</p> <p>Lists some elements that soil contains, e.g. worn down rock, humus, water and air</p> <p>Describes uses for rocks, e.g. tools in the Stone Age</p> <p>Suggests why not all living things that die become fossilised</p> <p>Describes the difference between sedimentary and igneous rock</p> <p>8L Earth and space:</p> <p>States how many hours there are in one day</p> <p>Gives a simple reason why the shadow has changed position</p> <p>Describes the changes in shadows throughout the day</p> <p>Describes the rotation of the Earth in simple terms, e.g. on a slant or axis</p> <p>Classifies planets by properties they have researched, e.g. those which have Moons</p>
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			<p>"pollination" to plant life cycles</p> <p>Describes and labels a flowering plant, giving an explanation of the functions of the main parts, e.g. flower, leaves, root</p> <p>Observes and makes detailed drawings of parts of a flower</p> <p>Gives examples of and can explain the importance of seed dispersal</p> <p>Explains how the size, shape or colour etc. of a seed affects how it is dispersed</p> <p>Names, locates and describes the functions of the main parts of plants, including those involved in reproduction</p>	<p>what is making the light, e.g. flame</p> <p>Explains that there needs to be a light source to make a shadow</p> <p>Recognises that light travels from its source</p> <p>Groups natural and man-made light sources</p> <p>Recognises and uses the terms "transparent" and "opaque"</p> <p>Manipulates a mirror to find different parts of the classroom which are out of sight</p> <p>Recognises that a shiny object needs a light source to shine</p> <p>Draws a picture of themselves with their shadow (without any features) in the correct position</p> <p>Demonstrates how light travels from its source</p> <p>Gives examples of primary light sources</p> <p>Suggests ways to protect our eyes from the Sun</p> <p>Sorts objects or</p>	<p>non-metals</p> <p>Demonstrates understanding of the order of metals and carbon in the reactivity series</p> <p>Demonstrates understanding of the use of carbon in obtaining metals from metal oxides</p>		<p>Compares and discusses photos of different planets in the Solar System</p> <p>Recognises the Sun is a star</p> <p>States that the Sun provides light and warmth</p> <p>Recites the names in order of the four planets closest to the Sun</p> <p>Recites the months of the year (in order)</p> <p>Identifies hot and cold places on globe</p> <p>Describes how the shadow's measurements have changed when measuring over time</p> <p>Describes why planet Earth is conducive to life</p> <p>Describes a planet or moon's movement correctly, using the term "orbit"</p> <p>States that the Sun is the centre of our Solar System</p> <p>States that the Earth orbits the Sun once a year</p> <p>States that 1 year = 365 days or 52 weeks or 12 months</p> <p>Recites the order of the planets in our solar system, e.g. by creating a rhyme to help them remember</p> <p>States that it takes 24 hours for the Earth to spin on its axis</p> <p>Explains why day and night occur</p> <p>Explains how shadows change length throughout the day</p> <p>States that the Moon</p>
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				<p>materials into transparent, translucent and opaque Recognises that shiny objects are not light sources Recognises that light is reflected off different objects Explains how light is reflected off mirrors to create reflections of reflections Gives examples of materials that reflect light Explains why it is dangerous to look at the Sun directly Recognises that when it is dark, there is no light source Uses the idea that light from light sources, or reflected light, travels in straight lines and enters our eyes to explain how we see objects and the shape of shadows Recognises that we need light to see Makes comparative statements about the brightness of a shadow Lists some materials which</p>			<p>orbits the Earth approximately every 28 days Describes the phases of the Moon using given terms, e.g. full, new, waning Explains that the Moon reflects the Sun's light Describes some effects of the earth spinning on its axis Predicts when shadows will be longest or shortest Describes the shapes and relative movements of the Sun, Moon, Earth and other planets in the solar system; and explains the apparent movement of the Sun across the sky in terms of the Earth's rotation and that this results in day and night States that the Earth, Sun and Moon are approximately spherical</p>
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				<p>reflect light into the eyes Explains the movement of light and the reflection of light in a periscope</p> <p>Describes the difference in the size of a pupil in different amounts of light Uses the idea that light from light sources, or reflected light, travels in straight lines and enters our eyes to explain shadows</p> <p>Demonstrates understanding of the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface Uses a 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</p> <p>Demonstrates</p>			
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				<p>understanding of light transferring energy from source to absorber, leading to chemical and electrical effects; photosensitive material in the retina and in cameras</p> <p>Demonstrates understanding of colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection</p>			
	Key Terminology	<p>addiction</p> <p>alcoholic</p> <p>anus</p> <p>balanced diet</p> <p>bile</p> <p>carbohydrase</p> <p>carbohydrate</p> <p>catalyst</p> <p>deficiency</p> <p>depressant</p> <p>digestion</p> <p>digestive system</p> <p>drug</p>	<p>air resistance</p> <p>balanced</p> <p>drag</p> <p>force</p> <p>friction</p> <p>gravitational field</p> <p>strength</p> <p>gravity</p> <p>lubrication</p> <p>newton (N)</p> <p>newtonmeter</p> <p>pull</p> <p>push</p>	<p>absorb</p> <p>angle of incidence</p> <p>angle of reflection</p> <p>convex</p> <p>cornea</p> <p>dispersion</p> <p>emit</p> <p>eye</p> <p>filter</p> <p>frequency</p> <p>image</p> <p>incident ray</p> <p>inverted</p>	<p>alveolus</p> <p>antagonistic muscles</p> <p>asthma</p> <p>biomechanics</p> <p>bone</p> <p>bone marrow</p> <p>cartilage</p> <p>circulatory system</p> <p>condense</p> <p>diaphragm (breathing)</p> <p>digestive system</p> <p>exhale</p>	<p>adaptations (cell)</p> <p>amoeba</p> <p>binary fission</p> <p>cell</p> <p>cell membrane</p> <p>cell wall</p> <p>chloroplast</p> <p>concentration</p> <p>cytoplasm</p> <p>diffusion</p> <p>egg cell</p> <p>euglena</p> <p>flagellum</p>	<p>atmosphere</p> <p>biological weathering</p> <p>carbon cycle</p> <p>carbon store</p> <p>cementation</p> <p>chemical weathering</p> <p>climate change</p> <p>combustion</p> <p>compaction</p> <p>crust</p> <p>deforestation</p> <p>deposition</p> <p>durable</p>

		<p>enzyme ethanol fibre food test gullet hypothesis large intestine lipase</p> <p>Combustion Complete Endothermic Energy Exothermic Hazard Incomplete oxidation Oxygen Product Radiation Reactant Thermal</p>	<p>reaction resistive force streamlined water resistance Weight</p> <p>ovary (plant) ovule petal pollen pollination seed seed dispersal sepal</p>	<p>iris law of reflection lens light-time luminous opaque optic nerve pixel plane primary colour prism pupil reflect refraction retina secondary colour source spectrum specular reflection tertiary colour translucent transmit transparent vacuum virtual wave</p> <p>acid rain chemical property group halogen metal metalloid noble gases non-metal period physical property reactive</p>	<p>gas exchange gas exchange system inhale ligament lungs lung volume multicellular organism musculoskeletal system newton organ organ system reproductive system ribcage skeleton trachea tendon tissue</p> <p>actual yield catalyst catalytic converter chemical (property) displacement reaction ductile electrolysis hardness malleable percentage yield physical (property) reacting mass reactive relative mass theoretical yield transition metal unreactive</p>	<p>leaf cell microscope mitochondria nerve cell nucleus observation organism red blood cell respiration root hair cell specialised cell sperm cell unicellular vacuole</p> <p>chemical store conduction conductor convection convection current dissipated elastic store electromagnetic electromagnetic spectrum energy energy resources energy store equilibrium fossil fuel fuels gravitational potential store infrared radiation insulator joules kilojoules</p>	<p>eclipse erosion freeze-thaw global warming greenhouse effect greenhouse gas igneous inner core lava magma mantle metamorphic outer core planet physical weathering porous radiation recycling respiration rock cycle seasons sediment sedimentary space transport troposphere uplift weathering</p>
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				unreactive		kilowatt hours kilowatts kinetic store law of conservation of energy lever non-renewable nuclear nuclear power station power rating uranium radiation ramp renewable simple machine temperature thermal imaging camera thermal power station	
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9	Topic	9A Genetics and evolution 9E Making materials	9I Forces and motion 9B Plant growth	9F Reactivity 9J Force fields and electromagnets	ASDAN Science Short course		
	Pupils will be taught... (Core knowledge and concepts to be learned) NC Link	Inheritance, chromosomes, DNA and genes: ▪ heredity as the process by which genetic information is transmitted from one	Photosynthesis: ▪ the reactants in, and products of, photosynthesis, and a word summary for photosynthesis ▪ the dependence of almost all life on Earth	Magnetism ▪ magnetic poles, attraction and repulsion ▪ magnetic fields by plotting with compass, representation by field lines ▪ Earth's	Learners must present evidence of their activities in an organised portfolio or e-portfolio. This will contain: <ul style="list-style-type: none"> a record of challenges completed, with supporting evidence for each challenge recording documents, showing how learners have planned and 		

		<p>generation to the next</p> <ul style="list-style-type: none"> ▪ 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 ▪ differences between species ▪ the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation ▪ the variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection ▪ changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully 	<p>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</p> <ul style="list-style-type: none"> ▪ the adaptations of leaves for photosynthesis. <p>Describing motion:</p> <ul style="list-style-type: none"> ▪ speed and the quantitative relationship between average speed, distance and time ($\text{speed} = \text{distance} \div \text{time}$) ▪ the representation of a journey on a distance-time graph ▪ relative motion: trains and cars passing one another. <p>Forces</p> <ul style="list-style-type: none"> ▪ force-extension linear relation; Hooke's Law as a special case ▪ work done and energy changes on deformation 	<p>magnetism, compass and navigation</p> <ul style="list-style-type: none"> ▪ the magnetic effect of a current, electromagnets, D.C. motors (principles only). <p>Reactivity:</p> <p>the order of metals and carbon in the reactivity series</p>	<p>reviewed their activities</p> <ul style="list-style-type: none"> • summary of achievement, highlighting skills development • personal statement <p>The Short Course is split into six modules:</p> <ul style="list-style-type: none"> • Human machine • Forces and motion • Chemical change • Biological challenges • Space physics • Performance in sport
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		<p>and reproduce, which in turn may lead to extinction</p> <ul style="list-style-type: none"> the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material. <p>Materials:</p> <ul style="list-style-type: none"> the order of metals and carbon in the reactivity series the use of carbon in obtaining metals from metal oxides properties of ceramics, polymers and composites (qualitative). 	<ul style="list-style-type: none"> non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets and forces due to static electricity. <p>Balanced forces</p> <ul style="list-style-type: none"> opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface. <p>Forces and motion</p> <ul style="list-style-type: none"> forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only) change depending on direction of force and its size. 		
	<p>Pupils should be able to do... (Skills being developed) BSquared</p>	<p>9A Genetics and evolution: Identifies similar features when comparing photos of their family Points out the differences in offspring to the parent animal, e.g. colours of kittens in a litter Identifies that</p>	<p>9I Forces and motion: Notes how fast a pendulum swings at different lengths Describes what it feels like to run against and with the wind, and why it is more difficult Compares the</p>	<p>9F Reactivity: Identifies, with reasons, whether changes in materials are reversible or not Recognises that mixing materials can cause change Gives examples of changes which</p>	<p>The Science Short Course, developed in association with the Centre for Science Education, accredits up to 60 hours of science studies and activities. It is designed to support learners working towards science GCSEs, while maintaining their curiosity about the subject. Learners develop their personal and employability skills – as well as their science knowledge and understanding.</p>

		<p>some people have different coloured hair or eyes to their parents</p> <p>Organises events in their own life in sequence</p> <p>Identifies that fossils are found underground</p> <p>Makes comparisons between fossils</p> <p>Suggests that a fossil shows the remains of a plant or animal</p> <p>Includes vocabula</p> <p>Recognises that all living things produce their own kind</p> <p>Suggests a reason why an animal has a certain attribute</p> <p>Links animals to their environment based on its features</p> <p>Describes how some familiar things change over time</p> <p>Suggests what information we can learn about animals from fossilised footprints or teeth</p> <p>Suggests how different animals have adapted to their environment, e.g. a giraffe</p>	<p>strength needed to walk in water and the speed they can travel</p> <p>Recognises that it requires more effort to pull an object over some surfaces more than others</p> <p>Describes what a simple mechanism does, e.g. lifts</p> <p>Identifies simple levers</p> <p>Explains how they think a mechanism works</p> <p>Demonstrates how force can change the direction of an object</p> <p>Demonstrates how force can change the shape of an object</p> <p>Demonstrates how force can change the speed of an object</p> <p>Explores how the force of gravity affects everything on Earth, e.g. by trying to 'beat' gravity, keeping up a blown up balloon in the air as long as possible</p> <p>Recognises and</p>	<p>cannot be reversed</p> <p>Demonstrates understanding of chemical reactions as the rearrangement of atoms</p> <p>Demonstrates understanding of defining acids and alkalis in terms of neutralisation reactions</p> <p>Demonstrates understanding of the pH scale for measuring acidity/alkalinity; and indicators</p> <p>Demonstrates understanding of representing chemical reactions using formulae and using equations</p> <p>Demonstrates understanding of combustion, thermal decomposition, oxidation and displacement reactions</p> <p>Demonstrates understanding of reactions of acids with metals to produce a salt plus</p>	
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		<p>Explains simply how their own lives are different to those in the past</p> <p>Suggests how different parts of animals help them to survive, e.g. tusks, whiskers or claws</p> <p>Makes simple judgements on how different dinosaurs lived using fossils as evidence, e.g. sharp teeth = carnivore</p> <p>Creates a simple three tier family tree using given information</p> <p>Follows a simple family tree</p> <p>Suggests why or how a plant has adapted to survive in different conditions, e.g. seaweed or cactus</p> <p>Identifies animals from the same habitat and lists similar adaptations they have made to survive there</p> <p>Recognises that the term "species" means a group of animals or plants that share the same</p>	<p>uses the term "balanced" force</p> <p>Gives a simple reason why different surfaces make it harder to slip on</p> <p>Relates how shape helps to lower air resistance, e.g. by examining photos of planes or rockets</p> <p>Relates the speed we can travel when swimming in water to when they walk through water</p> <p>Recognises that the surface area can affect the speed of an object dropping to Earth</p> <p>Describes a force as "balanced" as appropriate</p> <p>Describes the downward force as gravity</p> <p>Describes forces using the terms "friction", "water resistance" and "air resistance" correctly in context</p> <p>Shows the direction of different forces acting on objects in diagrams using arrows</p> <p>Sorts objects to show which</p>	<p>hydrogen</p> <p>Demonstrates understanding of reactions of acids with alkalis to produce a salt plus water</p> <p>Demonstrates understanding of what catalysts do</p> <p>9J Force fields and electromagnets:</p> <p>Manipulates magnets to make them repel or attract each other</p> <p>Lists objects in the setting that are magnetic</p> <p>Notes that a magnet is not touching the object to move it</p> <p>States that different poles attract and like poles repel</p> <p>Names the poles on a magnet as north and south</p> <p>Describes the effect of forces that act at a distance (magnetic forces, including those between like and unlike poles)</p> <p>Describes</p>	
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		<p>characteristics</p> <p>Defines the term "evolution"</p> <p>Describes features or characteristics which can be inherited</p> <p>Explores how and why some animals metamorphosis at particular points in their life</p> <p>Examines the reasons why or how animals hibernate</p> <p>Examines different strategies animals use to survive, e.g. migration</p> <p>Describes how fossils are formed</p> <p>Suggests how palaeontologists find out about things which have lived long ago</p> <p>Recognises that the past can be divided into different periods</p> <p>Uses the basic ideas of inheritance, variation and adaptation to describe how living things have changed over time and evolved; and</p>	<p>mechanism they use, e.g. lever, pulley, wedge</p> <p>Identifies simple mechanisms, including levers, gears and pulleys that increase the effect of a force</p> <p>Demonstrates forces acting on a range of objects</p> <p>Explains that a floating object is balancing water resistance and gravity</p> <p>Recognises that forces act in a particular direction</p> <p>Recognises forces acting on an object may be equal, causing the object to be static</p> <p>Recognises gravity causes objects to have weight</p> <p>Recognises that gravity exerts a downward force on all things</p> <p>Describes the effects of simple forces that involve contact (air and water resistance, friction) and gravity</p>	<p>magnetism using the terms "attraction" and "repulsion"</p> <p>Demonstrates understanding of noncontact forces: gravity forces acting at a distance on Earth and in space, forces between magnets</p> <p>Demonstrates understanding of the separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects</p> <p>Demonstrates understanding of the idea of electric field, forces acting across the space between objects not in contact</p> <p>Demonstrates understanding of magnetic poles, attraction and repulsion</p> <p>Demonstrates understanding of magnetic fields by</p>	
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		<p>provides evidence for evolution</p> <p>Recognises that it takes many generations to develop adaptation</p> <p>Recognises that evolution is a result of adaptation</p> <p>Identifies how different living things have adapted to their environment</p> <p>Recognises that fossils are a record of evolution</p> <p>Recognises that offspring are not identical to their parents and can give examples to back up their view</p> <p>Describes a change over time as a variation or adaptation</p> <p>Suggest why an animal has evolved a certain feature, e.g. giraffe's neck</p> <p>Suggests reasons why a living thing became extinct, e.g. mammoth</p> <p>Understands the heredity process by</p>	<p>Demonstrates understanding of speed and the quantitative relationship between average speed, distance and time (speed = distance \div time)</p> <p>Demonstrates understanding of the representation of a journey on a distance-time graph</p> <p>Demonstrates understanding of forces as pushes or pulls, arising from the interaction between 2 objects</p> <p>Demonstrates understanding of using force arrows in diagrams, adding forces in 1 dimension, balanced and unbalanced forces</p> <p>Demonstrates understanding of moment as the turning effect of a force</p> <p>Demonstrates understanding that forces are measured in</p>	<p>plotting with compass, representation by field lines</p> <p>Demonstrates understanding of the Earth's magnetism, compass and navigation</p> <p>Demonstrates understanding of Brownian motion in gases</p> <p>Demonstrates understanding of diffusion in liquids and gases driven by differences in concentration</p> <p>Demonstrates understanding of the difference between chemical and physical changes</p>	
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		<p>which genetic information is transmitted from a generation</p> <p>Demonstrates understanding of differences between species</p> <p>Demonstrates understanding of 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</p> <p>Demonstrates understanding of 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</p> <p>Demonstrates understanding of the variation between individuals within a species</p>	<p>newtons, measurements of stretch or compression as force is changed</p> <p>Demonstrates understanding of noncontact forces: gravity forces acting at a distance on Earth and in space, forces between magnets, and forces due to static electricity</p> <p>Demonstrates understanding that forces are needed to cause objects to stop or start moving, or to change their speed or direction of motion</p> <p>Demonstrates understanding of relative motion: trains and cars passing one another</p> <p>Motion and forces - Forces</p> <p>Demonstrates understanding of forces: associated with deforming objects; stretching and squashing – springs; with rubbing</p>		
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		<p>being continuous or discontinuous, to include measurement and graphical representation of variation</p> <p>Demonstrates understanding of the variation between species and between individuals of the same species meaning some organisms compete more successfully, which can drive natural selection</p> <p>Demonstrates understanding of the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material</p> <p>9E Making materials</p> <p>Suggests a type of material that could be used to make an object based on what they have found out Gives reasons why materials are used</p>	<p>and friction between surfaces, with pushing things out of the way; resistance to motion of air and water</p> <p>Demonstrates understanding of force extension linear relation; Hooke's Law as a special case</p> <p>Demonstrates understanding of work done and energy changes on deformation</p> <p>Motion and forces - Pressure in fluids</p> <p>Demonstrates understanding of atmospheric pressure, decreases with increase of height as weight of air above decreases with height</p> <p>Demonstrates understanding of pressure measured by ratio of force over area – acting normal to any surface</p> <p>Demonstrates understanding of opposing forces</p>		
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		<p>for specific purpose</p> <p>Describes the properties of materials Explains why an object is made from a specific material/s, based on their understanding of their properties</p> <p>Recognises the common materials an object is made from</p> <p>Describes similarities and differences between materials</p> <p>Explores if solid objects made from a variety of materials can have their shape changed, e.g. through bending or squashing</p> <p>Identifies and groups everyday materials</p> <p>Suggests another use for a material</p> <p>Suggests alternative materials for an object to be made from</p> <p>Recognises how some materials are obtained, e.g. quarrying, fishing</p>	<p>and equilibrium: weight held by stretched spring or supported on a compressed surface</p> <p>Demonstrates understanding of change depending on direction of force and its size</p> <p>9B Plant growth: Records the different types of vegetation in one place, e.g. the grounds around the setting over a period of time</p> <p>Explains the role of different parts of a plant simply, e.g. roots anchor plant</p> <p>Explains that most seeds and bulbs grow under soil, e.g. with no sunlight</p> <p>Suggests what might happen if a basic requirement for germination is taken away, based on their prior knowledge</p> <p>Uses the term "germination" mostly correctly</p> <p>Observes and</p>		
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		<p>Explains simply why the properties of a material make it suitable or unsuitable for a purpose</p> <p>Describes the properties of materials using appropriate vocabulary, e.g. absorbent, rigid, transparent</p> <p>Suggests how the uses for different materials may change in the future</p> <p>Lists different materials an object can be made from and why</p> <p>Suggests ways to identify materials more specifically, e.g. types of metal</p> <p>Classifies the properties of a material using scientific vocabulary</p> <p>Discusses how to improve a material, e.g. wrapping foil around a cup to keep temperature longer</p> <p>Includes scientific vocabulary when</p>	<p>describes the changes to seeds and bulbs as they grow into plants</p> <p>Observes and orders the life cycle of a seed</p> <p>Lists what plants need to survive, e.g. nutrition</p> <p>Gives examples of different plants found in different habitats</p> <p>Discusses evidence that shows that some plants do not need soil to grow, e.g. photographs of tropical orchids</p> <p>Investigates how plants transport water, e.g. using dye and white flowers</p> <p>Describes the function of different parts of flowering plants and trees</p> <p>Describes the life cycle of a plant</p> <p>Explores how some plants reproduce, e.g. by planting and growing potatoes</p> <p>Describes the basic needs of plants for survival and the impact of</p>		
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		<p>giving reasons why an object is made from a specific material</p> <p>Identifies a wide variety of different materials Groups a wide variety of different materials</p> <p>Groups and identifies materials in different ways according to their properties, based on first-hand observation; and justifies the use of different everyday materials for different uses, based on their properties</p> <p>Demonstrates understanding of the order of metals and carbon in the reactivity series</p> <p>Demonstrates understanding of the use of carbon in obtaining metals from metal oxides</p> <p>Demonstrates understanding of properties of ceramics, polymers and composites (qualitative)</p>	<p>changing these and the main changes as seeds and bulbs grow into mature plants</p> <p>Predicts how different conditions may affect seed growth</p> <p>Explores the requirements for life and growth for different types of plants</p> <p>Explains simply why seeds need to be dispersed Looks for patterns in colours or textures of flowers when discussing how the seeds are dispersed</p> <p>Classifies plants into broad groups using observable features</p> <p>Names, locates and describes the main parts of a plant involved in transporting water and nutrients</p> <p>Relates the terms "pollen" and "pollination" to plant life cycles</p> <p>Relates the term "photosynthesis" to plant nutrients and</p>		
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			<p>growth</p> <p>Describes and labels a flowering plant, giving an explanation of the functions of the main parts, e.g. flower, leaves, root</p> <p>Observes and makes detailed drawings of parts</p> <p>Identifies that photosynthesis happens to every plant</p> <p>Suggests how environmental changes could affect different plant life</p> <p>Demonstrates a basic understanding of the relationship between plants using carbon dioxide and creating oxygen</p> <p>Gives examples of and can explain the importance of seed dispersal</p> <p>Explains how the size, shape or colour etc. of a seed affects how it is dispersed</p> <p>Names, locates and describes the</p>		
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			<p>functions of the main parts of plants, including those involved in reproduction</p> <p>Demonstrates understanding of the reactants in, and products of, photosynthesis, and a word summary for photosynthesis</p> <p>Demonstrates understanding of 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</p> <p>Demonstrates understanding of the adaptations of leaves for photosynthesis</p>		
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	<p>Why are we doing this now?</p> <p>How does it build on prior learning?</p>	<p>9A - To build upon previous knowledge studied in topic 7D and 8B.</p> <p>9E - To build upon previous knowledge studied in topic 7G, 7H, 8E and 8H.</p>	<p>9I - To build upon previous knowledge studied in topic 7DI and 8B.</p> <p>9B - To build upon previous knowledge studied in topic 7I, 7K, 7D, 8E, 8I and 8K.</p>	<p>9F - To build upon previous knowledge studied in topic 7I, 7G, 7H, 8E, 8I, 8F, 8G and 8H.</p> <p>9J - To build upon previous knowledge studied in topic 7J, 7K, 8L and 9I.</p>	<p>To reaffirm knowledge learned throughout KS3.</p> <p>To introduce some KS4 content through the use of portfolio based evidence and practical learning.</p> <p>To develop skills associated with KS4 learning and respective qualifications.</p>
	<p>Key Terminology</p>	<p>adaptation chromosome competition continuous variation discontinuous variation DNA evolution extinct fossil gene gene bank interdependence natural selection species variation</p> <p>carbon fibre ceramic composite displace displacement (reaction) natural polymer ore polymer reactivity series</p>	<p>acceleration atmospheric pressure average speed centre of gravity centre of mass compressed density distance-time graph gas pressure incompressible instantaneous speed law of moments liquid pressure metres per second moment newton metres newtons per metre squared pivot pressure relative motion speed</p> <p>aerobic respiration algae anaerobic respiration chlorophyll</p>	<p>balanced symbol equation biofuel carbon neutral chemical reaction combustion conservation of mass endothermic exothermic hydrocarbon physical change product ratio reactant word equation</p> <p>demagnetise direct current (DC) domain earthing electric field electromagnet induction electromagnetism generator induced magnet induction</p>	<p>accurate analyse bar chart categoric conclusion confidence continuous control variable data dependent variable discrete evaluate independent variable investigation line graph line of best fit mean observation outlier pie chart plan precise prediction random error range repeatable reproducible</p>

		<p>synthetic polymer</p> <p>unreactive</p>	<p>chloroplast</p> <p>consumer</p> <p>deficiency</p> <p>fermentation</p> <p>fertiliser</p> <p>guard cells</p> <p>haemoglobin</p> <p>magnesium</p> <p>microorganism</p> <p>mitochondria</p> <p>nitrates</p> <p>oxygen debt</p> <p>phosphates</p> <p>photosynthesis</p> <p>plasma</p> <p>potassium</p> <p>producer</p> <p>stomata</p>	<p>ion</p> <p>light dependent resistor</p> <p>lightning</p> <p>magnetic field</p> <p>magnetise</p> <p>motor</p> <p>national grid</p> <p>permanent magnet</p>	<p>risk assessment</p> <p>spread</p> <p>systematic error</p> <p>uncertainty</p> <p>variable</p>
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