Rattlesden C of E Primary Academy

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Progression of working scientifically skills and sticky knowledge

	EYFS	KS1	Lower KS2	Upper KS2
PLAN	Choose the resources they need for their chosen activities and say when they do or don't need help.	Ask simple questions and recognising that they can be answered in different ways.	Ask relevant questions and using different types of scientific enquiries to answer them. Set up simple practical enquiries, comparative and fair tests.	Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
DO	Know about similarities and differences in relation to places, objects, materials and living things. Make observations of animals and plants. Explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function. Select and use technology for particular purposes.	Observe closely, using simple equipment. Perform simple tests. Identify and classify.	Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, use a range of equipment, including thermometers and data loggers.	Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
RECORD	Represent their own ideas, thoughts and feelings through design and technology, art, music, dance, role play and stories.	Gather and record data to help in answering questions.	Gather, record, classify and present data in a variety of ways to help in answering question.s Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.	Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.

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REVIEW	Talk about the features of their own immediate environment and how environments might vary from one another. Explain why some things occur and talk about changes.	Use their observations and ideas to suggest answers to questions.	Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. Identify differences, similarities or changes related to simple scientific ideas and processes. Use straightforward scientific evidence to answer questions or to support their findings.	Use test results to make predictions to set up further comparative and fair tests. Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations. Identify scientific evidence that has been used to support or refute ideas or arguments. Use straightforward scientific evidence to answer questions or to support their findings.
APPROACHES TO ENQUIRY		Children should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including (1) observing changes over a period of time, (2) noticing patterns, (3) grouping and classifying things, (4) carrying out simple comparative tests and (5) finding things out using secondary sources of information.	Children should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including (1) observing changes over time, (2) noticing patterns, (3) grouping and classifying things, (4) carrying out simple fair tests and (5) finding things out using secondary sources of information.	Children should select the most appropriate ways to answer science questions using different types of scientific enquiry, including (1) observing changes over different periods of time, (2) noticing patterns, (3) grouping and classifying things, (4) carrying out fair tests and (5) finding things out using a wide range of secondary sources of information.

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Sticky knowledge		**Year 1 Plants** • Plants grow from seeds/bulbs • Plants need light and water to grow and survive • Plants are important • We can eat lots of plants **Year 2 Plants** • Plants grow from seeds/bulbs • Plants need light, water and warmth to grow and survive • Flowers make seeds to make more plants (reproduce) • Plants are important • We need plants to survive (to clean air, to eat) • We can eat different parts of the plants (leaves, stems, roots, seeds, fruit) **Year 1 Animals inc. humans** • There are many different animals with different characteristics. • Animals have senses to help individuals survive. When animals sense things they are able to respond. • Animals need food to survive. • Animals need a variety of food to help them grow, repair their bodies, be active and stay healthy.	**Year 3 Plants** • Plants are producers, they make their own food. •Their leaves absorb sunlight and carbon dioxide •Plants have roots, which provide support and draw water from the soil • Flowering plants have specific adaptations which help it to carry out pollination, fertilisation and seed production •Seed dispersal improves a plants chances of successful reproduction •Seeds/bulbs require the right conditions to germinate and grow. •Seeds contain enough food for the plant's initial growth **Year 3 Animals inc. humans** • Different animals are adapted to eat different foods. • Many animals have skeletons to support their bodies and protect vital organs. • Muscles are connected to bones and move them when they contract. • Movable joints connect bones.	**Year 5 Animals inc. humans** • Different animals mature at different rates and live to different ages. • Puberty is something we all go through, a process which prepares our bodies for being adults, and reproduction • Hormones control these changes, which can be physical and/or emotional.

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		Year 2 Animals inc. humans • Animals move in order to survive. •Different animals move in different ways to help them survive. • Exercise keeps animal's bodies in good condition and increases survival chances. • All animals eventually die. • Animals reproduce when they reach maturity. • Animals grow until maturity and then do not grow any larger. **Year 1 – (ENERGY) Seasons and How they Change** • Weather can change • There are lots of different types of weather: Rain, Sun, Cloud, Wind, Snow, etc • Days are longer and hotter in the summer • Days are shorter and colder in the winter • There are four seasons: Spring, Summer, Autumn, Winter **Year 1 – Materials** • There are many different materials that have different describable and measurable properties. • Materials that have similar properties are grouped into metals, rocks, fabrics, wood, plastic and ceramics (including glass). • The properties of a material determine whether they are suitable for a purpose. **Year 2 – Materials**	**Year 4 Animals inc. humans** • Animals have teeth to help them eat. • Different types of teeth do different jobs. • Food is broken down by the teeth and further in the stomach and intestines where nutrients go into the blood. • The blood takes nutrients around the body. • Nutrients produced by plants move to primary consumers then to secondary consumers through food chains. **Year 3 – Materials (Rocks & Soils)** • There are different types of rock. • There are different types of soil. • Soils change over time. • Different plants grow in different soils. • Fossils tell us what has happened before. • Fossils provide evidence. • Palaeontologists use Fossils to find out about the past.	**Year 6 Animals inc. humans** • The heart pumps blood around the body. • Oxygen is breathed into the lungs where it is absorbed by the blood. • Muscles need oxygen to release energy from food to do work. (Oxygen is taken into the blood in the lungs; the heart pumps the blood through blood vessels to the muscles; the muscles take oxygen and nutrients from the blood.) **Year 5 – Materials (Mixtures & Separation)** • When two or more substances are mixed and remain present the mixture can be separated. • Some changes can be reversed, and some cannot. • Materials change state by heating and cooling. **Year 5 – Materials (Changes)**

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		• Materials can be changed by physical force (twisting, bending, squashing and stretching) <u>Year 2 – Living Things & their Habitats</u> • Some things are living, some were once living but now dead and some things never lived. • There is variation between living things. • Different animals and plants live in different places. Living things are adapted to survive in different habitats. • Environmental change can affect plants and animals that live there.	• Fossils provide evidence that living things have changed over time. <u>Year 4 – Materials - Solids, Liquids & Gases</u> • Solids, liquids and gases are described by observable properties. • Materials can be divided into solids, liquids and gases. • Heating causes solids to melt into liquids and liquids evaporate into gases. d) Cooling causes gases to condense into liquids and liquids to freeze into solids. • The temperature at which given substances change state is always the same. <u>Year 4 – Living Things & their Habitats</u> • Living things can be divided into groups based upon their characteristics • Environmental change affects different habitats differently • Different organisms are affected differently by environmental change • Different food chains occur in different habitats • Human activity significantly affects the	• All matter (including gas) has mass. • Sometimes mixed substances react to make a new substance. These changes are usually irreversible. • Heating can sometimes cause materials to change permanently. When this happens, a new substance is made. These changes are not reversible. • Indicators that something new has been made are: The properties of the material are different (colour, state, texture, hardness, smell, temperature) • If it is not possible to get the material back easily it is likely that it is not there anymore and something new has been made (irreversible change) <u>Year 5– Living Things & their Habitats</u> • Different animals mature at different rates and live to different ages. • Some organisms reproduce sexually where offspring inherit information from both parents. • Some organisms reproduce asexually by making a copy of a single parent.

			environment <u>Year 4 – Electricity</u> • A source of electricity (mains of battery) is needed for electrical devices to work. • Electricity sources push electricity round a circuit. • More batteries will push the electricity round the circuit faster.	• Environmental change can affect how well an organism is suited to its environment. • Different types of organisms have different life cycles. <u>Year 6– Living Things & their Habitats</u> • Variation exists within a population (and between offspring of some plants) – NB: this Key Idea is duplicated in Year 6 Evolution and Inheritance. • Organisms best suited to their environment are more likely to survive long enough to reproduce. • Organisms that are best adapted to reproduce are more likely to do so. • Organisms reproduce and offspring have similar characteristic patterns. • Competition exists for resources and mates. <u>Year 6 – Electricity</u> • Batteries are a store of energy. This energy pushes electricity around the circuit. When the battery's energy is gone it stops pushing. Voltage measures the 'push.' • The greater the current flowing through a device the harder it works.

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			• Devices work harder when more electricity goes through them. • A complete circuit is needed for electricity to flow and devices to work. • Some materials allow electricity to flow easily and these are called conductors. Materials that don't allow electricity to flow easily are called insulators. <u>Year 3 – Forces (& Magnetism)</u> • Pushing and pulling can make things move faster or slower. • Pushing and pulling can make things move or stop. • Things can move in different ways. • Larger masses take bigger pushes and pulls to move or stop them. • Pushing and pulling can change the shape of things. • Bigger pushes and pulls have bigger effects. • Magnets exert attractive and repulsive forces on each other. • Magnets exert non-contact forces, which work through some materials. • Magnets exert attractive forces on some materials. • Magnet forces are affected by	• Current is how much electricity is flowing round a circuit. • When current flows through wires heat is released. The greater the current, the more heat is released. <u>Year 5 – Forces</u> • Air resistance and water resistance are forces against motion caused by objects having to move air and water out of their way. • Friction is a force against motion caused by two surfaces rubbing against each other. • Some objects require large forces to make them move; gears, pulley and levers can reduce the force needed to make things move

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			magnet strength, object mass, distance from object and object material. <u>Year 3 – (ENERGY) Light & Sight</u> • There must be light for us to see. Without light it is dark. • We need light to see things even shiny things. • Transparent materials let light travel through them, and opaque materials don't let light through. • Beams of light bounce off some materials (reflection). • Shiny materials reflect light beams better than non-shiny materials. • Light comes from a source <u>Year 4 – (ENERGY) Sound</u> • Sound travels from its source in all directions and we hear it when it travels to our ears. • Sound travel can be blocked. • Sound spreads out as it travels. • Changing the shape, size and material of an object will change the sound it produces. • Sound is produced when an object vibrates. • Sound moves through all materials by	<u>Year 6 – (ENERGY) Light and Sight</u> • Animals see light sources when light travels from the source into their eyes. • Animals see objects when light is reflected off that object and enters their eyes. • Light reflects off all objects (unless they are black). Non-shiny surfaces scatter the light, so we do not see the beam. • Light travels in straight lines. <u>Year 6 – Evolution & Inheritance</u> • Life cycles have evolved to help organisms survive to adulthood. • Over time the characteristics that are most suited to the environment become increasingly common. NB: The following could be duplicated in Year 6 Living things and their habitats. • Organisms best suited to their environment are more likely to survive long enough to reproduce. Organisms that are best adapted to reproduce are more likely to do so.

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			making them vibrate. • Changing the way an object vibrates changes its sound. • Bigger vibrations produce louder sounds and smaller vibrations produce quieter sounds. • Faster vibrations (higher frequencies) produce higher pitched sounds	• Organisms reproduce and offspring have similar characteristic patterns. • Variation exists within a population (and between offspring of some plants) • Competition exists for resources and mates <u>Year 5 – Earth & Space</u> • Stars, planets and moons have so much mass they attract other things, including each other due to a force called gravity. Gravity works over distance. • Objects with larger masses exert bigger gravitational forces. • Objects like planets, moons and stars spin. • Smaller mass objects like planets orbit large mass objects like stars. • Stars produce vast amounts of heat and light. • All other objects are lumps of rock, metal or ice and can be seen because they reflect the light of stars.