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| Whole School Science Overview | | | | | | |
| Intent | | | | | | |
| We intend to build on children’s understanding of the world at the end of Reception by extending their knowledge of  biology, physics and chemistry through key stages 1 and 2 to enable pupils to be ready for science at secondary  school. Pupils will be taught essential aspects of the knowledge, methods, processes and uses of science and key  scientists from the past. Through building up a body of key foundational knowledge and concepts, pupils will be  encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about  natural phenomena. They will be encouraged to understand how science can be used to explain what is occurring,  predict how things will behave, and analyse causes. They will develop understanding through different types of  science enquiries that help them to answer scientific questions about the world around them.  The programmes of study describe a sequence of knowledge and concepts. It is important that pupils make progress  but the focus is also important to develop secure understanding of each key block of knowledge and concepts in  order to progress to the next stage. Pupils will be familiar with, and use, technical terminology accurately and  precisely. The programmes of study will link to their mathematical knowledge to their understanding of science,  including collecting, presenting and analysing data. Over the course of six year, pupils will develop greater  understanding of how to working scientifically. This includes observing over time; seeking patterns; identifying,  classifying | | | | | | |
| Investigations | | | | | | |
| It is essential that children experience and understand the full cycle of experimental science. This cycle is outlined  below. Specific skill elements of investigations are to be covered discretely across the curriculum however all children  should have the opportunity to work through the full process at least once a term this could be as part of the lessons  mapped out or as a distinct separate block. The investigation should link closely with the lesson plans. There are  numerous examples of fair tests in the scheme and these can be used as a starting point. Use Appendix A to see  skills progressions being taught. | | | | | | |
| Implementation | | | | | | |
|  | Autumn 1 | Autumn 2 | Spring 1 | Spring 2 | Summer 1 | Summer 2 |
| Reception  Theme: why things happen | Autumn – how trees, flowers, bushes change in autumn | Light and dark.  Change over time. | Hot and cold. Liquids and solids. | Spring. Growing plants form seeds. | Similarities and differences between animals. | Know about the impact of heat and warmth in summer on materials.  Difference and similarities in trees. |
| Year 1  Theme: different animals and their habitats.  Scientific observation. | Parts of the human body | Sense of smell, touch, sight, taste, hearing | Antarctic animals and their habitats | Materials and their properties linked to their function | The features and habitats of invertebrates | know the features of a bird, a human and shellfish |
| Year 2  Theme: sorting and classifying | Healthy eating and drinking. The effect of food and exercise on the body. | Materials – opaque and transparent. Properties of materials. | Invertebrates – molluscs, sponges, arachnids and insects. | Forces – push and pull. How forces make things move and change shape. | Definition and types of vegetable, fruit and herb. Germination. Parts of plant. | Reversible and irreversible change in cookery |
| Year 3  Theme: predicting and setting up an investigation to test the prediction | Rocks and minerals. Types of rock and what makes up soil. Fossils. | The human body: joints, skeleton and how to care for the body. Sugars, starches and carbohydrates. | Light – how shadows are formed. Opaque, translucent, transparent. Mirrors. How light travels. | Trees and plants. The functions of leaves and roots. Parts of flowers. | The force of magnetism. What is attracted to magnets? Poles. | Know how humans have gone into space |
| Year 4  Theme: fair tests | Sound and decibels.  Vibration, how sound travels. | Echoes. Sound in animals.  Pitch. | States of matter: solid, liquid and gases.  How gases expand. | Teeth – names, functions, tooth care, the process of digestion. | Electrical circuits, conductors and insulators. Bell, Faraday, and scientists. | Bubbles and solutions. Marie Curie. |
| Year 5  Theme: variables | The origin of species. Space – why we have a day, a year and tides in the Oceans. | Separating solids. Dissolving. Absorbency and hydrophobia. | Life cycles of butterflies; humans, mammals. The concept of becoming extinct. | The characteristics of gravity, water resistance and friction. Viscosity and air resistance. | DNA testing. Uniqueness of fingerprints. Eliminating possibilities through science testing. | Life cycle of a humans |
| Year 6 | Fungi and bacteria. The role of leaves in plants. Types of plant. | Nutrition. Vitamins. Circulatory systems of the body. | Evolution. Natural selection in species. Humbolt, Darwin and Goodall. | How light forms a rainbow. Rays of light and the idea of reflection and refraction. | Electricity: volts, amps, electrical symbols. Solving problems in circuits. | Know the process of human reproduction and development |

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| Science Skills Progression | | | | | | |
|  | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
| Planning and  Communication  and Sources | draw simple pictures  talk about what they see and do use simple charts to communicate findings identify key features ask questions | describe their observations using some scientific vocabulary use a range of simple texts to find information suggest how to find things out identify key features ask questions | use pictures, writing,  diagrams and tables as directed by their teacher use simple texts, directed  by the teacher, to find information suggest how to find things out identify key features ask questions record their observations in written, pictorial and diagrammatic forms select the appropriate format to record their observations | record observations,  comparisons and  measurements using  tables and bar charts  begin to plot points to form a simple graph use graphs to point out and interpret patterns in their data select information from a range of sources provided for them | record observations  systematically use appropriate scientific language and conventions to communicate  quantitative and  qualitative data select a range of appropriate sources of information including books, | choose scales for graphs which show data and features effectively identify measurements and observations which do not fit into the main pattern begin to explain anomalous data use appropriate ways to communicate quantitative data using scientific language |
| Enquiring and  Testing and  Obtaining and  Presenting Evidence | test ideas suggested to them say what they think will happen use first hand experiences to answer questions begin to compare some living things | use simple equipment  provided to aid observation compare objects, living things or events make observations relevant to their task begin to recognise when a test or comparison is unfair  use first hand experiences to answer questions | put forward own ideas about how to find the answers to questions recognise the need to collect data to answer questions carry out a fair test with support recognise and explain why it is a fair test with help, pupils begin to realise that scientific  ideas are based on  evidence | with help, pupils begin to realise that scientific ideas are based on evidence show in the way they perform their tasks how to vary one factor while keeping others the same decide on an appropriate approach in their own investigations to answer questions describe which factors they are varying and which will remain the same and say why | use previous knowledge and experience combined with experimental evidence to provide scientific explanations  recognise the key factors to be considered in carrying out a fair test | describe evidence for a scientific idea use scientific knowledge to identify an approach for an investigation explain how the interpretation leads to new ideas |
| Observing and  Recording | make observations using appropriate senses record observations communicate  observations orally, in drawing, labelling, simple writing and using ICT | respond to questions  asked by the teacher  ask questions collect and record data (supported by the teacher) suggest how they could collect data to answer questions begin to select equipment from a limited range | make relevant  observations measure using given equipment  select equipment from a limited range | carry out measurement  accurately make a series of observations,  comparisons and  measurements select and use suitable equipment make a series of observations and measurements adequate for the task | make a series of observations, comparisons and measurements with  increasing precision  select apparatus for a  range of tasks plan to use apparatus effectively begin to make repeat  observations and  measurements systematically | measure quantities with precision using fine scale divisions select and use  information effectively  make enough measurements or  observations for the  required task |
| Considering  Evidence and  Evaluating | make simple comparisons  and groupings say what has happened say whether what has  happened was what  they expected | say what has happened  say what their observations show and whether it was what they expected begin to draw simple conclusions and explain what they did begin to suggest improvements in their work | begin to offer explanations for what they see and communicate in a  scientific way what they have found out  begin to identify patterns in recorded measurements  suggest improvements in their work evaluate their findings | predict outcomes using  previous experience and knowledge and compare with actual results begin to relate their conclusions to scientific knowledge and understanding  suggest improvements in their work, giving reasons | make predictions based  on their scientific  knowledge and  understanding draw conclusions that are  consistent with the  evidence relate evidence to scientific knowledge and understanding  offer simple explanations for any differences in their results make practical  suggestions about how  their working methods  could be improved | make reasoned suggestions on how to  improve working methods show how interpretation of evidence leads to new ideas explain conclusions, showing understanding of scientific ideas |

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| **Assessment points** | |
| **Reception** | |
| Autumn 1 | know about growth, decay and changes over time. Talk about some of the things they have observed such as plants, animals, natural and found objects. |
| * comment and ask questions about the trees, bushes, flowers and plants at the school. * know how to use a magnifier and understand what it does * know that some things change over time |
| Autumn 2 | know how torches, lights, candles and other light sources give off light. Know how the light changes in the autumn. |
| * know that the Sun gives out light, and that it is dark at night because there is no sunlight. * know that we use electric lights in our homes to see when it is dark. Know that fire gives out light. Know that most things that give out light also give out heat. * know what a shadow is * know that things reflect light. |
| Spring 1 | know about solids and liquids from practical activities. Talk about why something has happened using correct vocabulary |
| * know what happens when cold things warm up * know how to look closely at cold things and talk about what they see * know what happens when warm things are cooled down * know what we wear to keep cool and keep warm |
| Spring 2 | know how to design practical, attractive environments: taking care of the flowerbeds and vegetable patch. know what a healthy meal would look like |
| * know what a seed is * know that plants grow from seed * know the conditions for plants to grow and how plants change * know that fruit and vegetables help to keep people healthy * know how fruit and vegetables change when they are heated or dried * know that some foods we have to have very little of or we will become unhealthy |
| Summer 1 | know about the similarities and difference in living things. From observations of animals, talk about why things are happening. |
| * know how animals are different * know how cats are similar but also different to each other * know how dogs are similar but also different to each other * know how to care for pets |
| Summer 2 | know about how trees are similar and different to each other. Explain how they change. |
| * know about how the summer effects trees * know about how the summer effects plants and how to care for plants |

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| **Assessment points** | |
| **Year 1** | |
| Autumn 1 | know the names of the main parts of the body and how to measure them |
| * know the names of parts of a head * know the parts of an eye * know the names of parts of the body * know that a X-Ray can show inside the body * know that inside our bodies there is a skeleton |
| Autumn 2 | know about how people live with and without five of our senses |
| * know about how we are able to smell things * know about how we are able to taste things * know about how we are able to touch things * know about how we are able to hear things * know about how we are able to see things |
| Spring 1 | know about how humans would have to adapt to be able to survive in the Antarctic |
| * know about some of the animals that live in the Antarctic * know about what Antarctic animals eat * know about the structure of an Antarctic animal |
| Spring 2 | know how to use the properties of materials to make a strudy forest shelter |
| * know that materials have different properties * know that some materials are sturdy to use for shelter * know that some materials float and some sink |
| Summer 1 | know how to describe an invertebrate using correct vocabulary |
| * know how to sort animals into invertebrates and non-invertebrates * know how to treat and handle invertebrates * know what invertebrates eat |
| Summer 2 | know the features of birds, shellfish and the similarities and differences to humans |
| * know about seagull habitats, what they eat and why they are seen at the seaside * know about puffin habitats, what they eat and why they are seen at the seaside * know about crab habitats, what they eat and why they are seen at the seaside |

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| **Assessment points** | |
| **Year 2** | |
| Autumn 1 | know how to describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene |
| * know how germs are spread * know about eating five a day * know the impact of exercise on the body |
| Autumn 2 | know what are the properties of materials and why they are chosen for items at home and in class |
| * know what transparent and opaque means * know how to sort and classify objects into groups * know the properties of ice * know how to use a microscope |
| Spring 1 | know how to use a decision tree to identify invertebrates |
| * know the main body parts of an invertebrate * know what an arachnid is * know what a sponge is * know what an insect is * know what a mollusc is |
| Spring 2 | know that forces can make objects change shape |
| * know that something moves because a force acts on it * know how the force of air can make things move * know that pull and push are forces * know how to sort and classify forces into pull and push |
| Summer 1 | know the names of the main parts of a plant |
| * know the definition of vegetable * know the definition of fruit * know the definition of herb * know what germination means |
| Summer 2 | know that in cookery some changes are reversible and some are not |
| * know simple hygiene rules in the kitchen * know that vegetables can change when they are cooked and this change is usually irreversible * know how dough changes and that it is irreversible |

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| **Assessment points** | |
| **Year 3** | |
| Autumn 1 | know how to set up a soil experiment |
| * know how to set up a scientific test * know what a mineral and an ore is * know the names of different types of rock |
| Autumn 2 | know how humans and animals move |
| * know how to test for starch and acid * know how to test for sugar * know the importance of carbohydrates in our bodies * know that bone is living tissue and how to look after them * know what a joint in the skeleton is |
| Spring 1 | know how to set up a test and make a prediction about how mirrors behave |
| * understand the concept of reflection * understand that light comes from different sources and travels in straight lines * Know why shadows are formed |
| Spring 2 | * know the terms for parts of a tree |
| * know the function and purpose of roots * know the importance of water for hydrating flowers and plants * know the function and purpose of leaves * know the function and purpose of pollen |
| Summer 1 | know how magnets attract magnetic metal |
| * know that magnets produce a force * know how to set up a magnet experiment * know that magnets usually have two poles |
| Summer 2 | know that humans have gone into space in rockets |
| * know about space travel and facts about the moon * know that the Earth and moon orbit the Sun |

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| **Assessment points** | |
| **Year 4** | |
| Autumn 1 | know that light and sound travel at different speeds |
| * know that sounds is produce by vibrations * know how to set up a fair sound test * know how we hear things and how sound travels * know that we measure sound in decibells |
| Autumn 2 | know that light and sound travel at different speeds |
| * know that the longer the vibration the lower the pitch * know that animals have different hearing to humans * know what makes an echo |
| Spring 1 | know how to set up a fair test to show how gases can expand |
| * know that materials can exist in more than one state * know that water can exist in three different states * know the concept of boiling point and freezing point * know the names and characteristics of some gases |
| Spring 2 | know about the route from our mouths and teeth through to our stomachs. Know the process of digestion. |
| * know the names of our teeth and their function * know how to look after the health of their teeth * know how teeth and gums decay * know the names of our teeth and their function |
| Summer 1 | know what an insulator is and does |
| * know what appliances use electricity * know that there needs to be a power source for electricity * know what a conductor is * know how to create a functioning electric circuit |
| Summer 2 | know the different parts of a bubble and how to create a fair test |
| * know how to make a fair test to create bubbles * know how to make a fair test to make bubbles last longer and to test the impact of the size of the blower |

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| **Assessment points** | |
| **Year 5** | |
| Autumn 1 | know how the Moon is important to the Earth |
| * know the Earth is in an orbit * know the Earth rotates on an axis which causes day and night * know the Earth orbits the Sun in a year |
| Autumn 2 | know how to identify variables in an experiement involving materials |
| * know that some materials are natural and some are man-made * know that some materials are absorbent * know how foam is used in modern life * know that some materials are hydrophobic * know that some materials are stretchy * know what happens in the process of dissolving in water * know how to separate a solution |
| Spring 1 | know the concept of becoming extinct |
| * know what a life cycle is * know the life cycle of a butterfly and a frog * know the life cycle of a chicken * know the life cycle of humans |
| Spring 2 | know the characteristics of air resistance |
| * know about the characteristics of the force of gravity * know the characteristics of water resistance * know the characteristics of friction. * know how to test viscocity |
| Summer 1 | know the concept of chromatography |
| * know that fingerprints are unique * know what DNA is and how it can be used * know how to use scientific testing to eliminate possibilities |
| Summer 2 | know the life cycle of a human |
| * know how humans change from birth * know what happens in puberty * know what happens from puberty to old age |

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| **Assessment points** | |
| **Year 6** | |
| Autumn 1 | know the function of leaves |
| * know how to complete a classification branching tree * know the characteristics of fungi * know how bacteria multiply |
| Autumn 2 | know about nutrients and nutrition |
| * know the function of the heart and circulatory system * know how to test and measure pulse rates * know the function and characteristics of the lungs * know the effect of smoking on the body * know the impact of different vitamins on the body |
| Spring 1 | know about natural selection |
| * know about the theory of evolution * know that genes are handed down from our parents * know how animals and plants adapt to their environments |
| Spring 2 | know how rainbows are formed |
| * know how to control a variable in an experiment and draw conclusions from the data * know about how rays of light act * know about why people need to wear glasses |
| Summer 1 | know that electricity comes from many sources |
| * know electrical symbols * know how to solve problems in electrical circuits |
| Summer 2 | Know the process of human reproduction and development |
| * know the names of parts of the human body in relation to reproduction and puberty * know that some people are intersex or different genders * know the science behind how bodies change in puberty * Know the science behind human reproduction |