Progression in Science at St Mary's Academy

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Working Scientifically	Early Years Understanding the World	Y1	Y2	Y3	Y4	Y5	Y6
Progression of Skills based on objectives from the National Curriculum	**22-36 Months:** Notices detailed features of objects in their environment. **30-50 Months:** Comments and asks questions about aspects of their familiar world such as the place where they live or the natural world. Can talk about some of the things they have observed such as plants, animals, natural and found objects. Talks about why things happen and how things work. Developing an understanding of growth, decay and changes over time. Shows care and concerns for living things and the environment. **40-60 Months:** Looks closely at similarities, differences, patterns and change. **ELG:** Know about similarities and differences in relation to places, objects, materials and living things. Talk about the features of their own immediate environment and how environments might vary from one another. Make observations of animals and plants and explain why some things occur, and talk about changes. **Exceeding:** Knows that the environment and living things are influenced by human activity. Describes some actions which people in their own community do that help to maintain the area they live in. Knows the properties of some materials and can suggest some of the purposes they are used for. Familiar with basic scientific concepts such as floating, sinking, experimentation.	Asks simple questions and recognised that they can be answered indifferent ways. Observes closely, using simple equipment. Performs simple tests. Identifies and classifies. Uses their observations and ideas to suggest answers to questions. Gather and record data to help in answering questions.		Asks relevant questions and using different types of scientific enquiries to answer them. Sets up simple practical enquiries, comparative and fair tests. Makes systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. Gathers, records, classifies and presents data in a variety of ways to help in answering questions. Records findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables. Reports on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. Uses results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. Identifies differences, similarities or changes related to simple scientific ideas and processes. Uses straight forward scientific evidence to answer questions or to support their findings.		Plans different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. Takes measurements, using a range of scientific equipment, within creasing accuracy and precision. Records data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, and bar and line graphs. Uses test results to make predictions to set up further comparative and fair tests. Reports and presents findings from enquiries, including conclusions, causal relationships and explanations of results, in oral and written forms such as displays and other presentations. Identifies scientific evidence that has been used to support or refute ideas or arguments.	

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Progression of Skills based on objectives from St Marys Science Curriculum	**PLEASE SEE ABOVE** **Take from Development Matters : Understanding the World**	Know that we can ask questions about the world and that when we observe the world to answer these questions, this is science. Know that we can use magnifying glasses to observe objects closely. Know that we can test our questions to see if they are true. Know that objects can be identified or sorted into groups based on their observable properties. Know that we can write down numbers and words or draw pictures to record what we find.		Know that we can ask questions and answer them by setting up different types of scientific enquiries. Know how to make relevant predictions that will be tested in a scientific enquiry. Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same. Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stop watches. Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw an eat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table. Know–with structured guidance-how to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion. Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry. Know that scientific enquiries can suggest relationships, but that they do not prove whether a prediction is true. Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary even, and that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry. Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect of changing sunlight on a plant–does this work with other plants /different types of light / etc). Know that they can draw conclusions from the findings of other scientists. Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry.		Know how to choose appropriate variables to test a hypothesis (e.g. plant height as a dependent variable when measuring effect of light on plant growth). Know how to identify conditions that were imperfectly controlled and can explain how these might affect results. Know how to accurately use further measuring devices, including digital and analogue scales, measuring cylinders and beakers, recognizing the relative accuracy of each device. Know how and when to repeat measurements, how to find an average of a set of measurements and how to recognize and remove outliers from a set of data, justifying the removal as a potential mis-measurement. Know how to independently write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion. Know how to present brief oral findings from an enquiry, speaking clearly and with confidence and using notes where necessary. Know examples of instances where scientific evidence has been used to support or refute ideas or arguments (e.g. fossil records as evidence of natural selection).	
Observing	Examine objects, when prompted. General sensory observations of animals and plants. Simple descriptions of the world around them.	**Expected** Identify, classify and describe a variety of plants, animals and materials Examine objects to note key features, e.g. observe growth of plants they have planted. Refine observations (more descriptive) **Greater Depth** Examines objects carefully, e.g. using a hand lens/ magnifying glass.	**Expected** Refined observations made through use of equipment (microscopes, magnifying glasses etc) Describe observations using scientific language. **Greater Depth** Observe carefully and suggest useful measurements, e.g. examine a leaf and suggest measuring its length.	**Expected** Uses a variety of equipment, as instructed, to help make observations e.g. using a hand lens to examine rocks. **Greater Depth** Uses a variety of equipment, as instructed, repeatedly and with care.	Develops relevant, testable questions, e.g. based on observations of animals. observing change over time, running comparative tests and conducting surveys. Make systematic and careful observations using a range of equipment, use various equipment, as instructed, e.g. a thermometer.	**Expected:** Make systematic and careful observations using a range of equipment,	**Expected:** Make systematic and careful observations using a range of equipment,
Researching	Looking at objects and pictures and discussing what they can see.	**Expected:** Engaging with texts and using a variety of sources to research (internet, library, databases)	**Expected:** Using research to inform discussion and decision making.	**Expected:** Collects evidence in a variety of contexts to answer a question or test an idea.	**Expected:** Collects evidence in a variety of contexts to test an idea or prediction based on their scientific knowledge and understanding.	**Expected:** Considers how scientists have combined evidence from observation and measurement with creative thinking to suggest new ideas and explanations for	**Expected:** Considers how scientists have combined evidence from observation and measurement with creative thinking to suggest new ideas and explanations for phenomena.

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						phenomena.	
Questioning	**Expected:** Asks questions about aspects of their familiar world. (How, why). Understand that questions can be answered by testing. **Answering Questions:** Offers way of gathering evidence to answer a question. (with prompting). Develops their explanations by connecting ideas or events.	**Expected** Asks questions about their world and the world around them (what I can see, smell, taste, touch etc) Asks simple questions that can be tested, e.g. about plants growing in their habitat. (With prompting) **Answering Questions**: Offer ways of gathering evidence to answer a question, e.g. by deciding on the best material to use for a particular application. Collects evidence to try and answer a question **Greater Depth** Asks simple questions that can be tested. **Answering Questions:** Suggests different ways of answering question.	**Expected:** Asks simple questions that can be tested, e.g. about the local environment and how organisms depend on each other. Begin to ask questions with relevance to a topic. Increasingly asking about unknown phenomena. **Answering questions**: Suggest different ways of answering a question, e.g. testing the suitability of materials for different purposes. **Greater Depth** Develops relevant, testable questions, with support. **Answering Questions:** Plans an enquiry, such as a comparative or fair test in order to answer a question	**Expected** Develops relevant, testable questions, with support, e.g. what happens to shadows when the light source moves. **Answering Questions:** Plans enquiry, such as comparative or fair test in order to be able to answer a question, e.g. comparing the effect of different factors on plant growth. **Greater Depth** Develops relevant, testable questions. **Answering Questions:** Plans investigations using different types of scientific enquiry in order to answer questions.	**Expected** Develops relevant, testable questions, e.g. based on observations of animals. **Answering Questions:** Plans investigations using different types of scientific enquiry, e.g. exploring various materials by observing change over time, running comparative tests and conducting surveys. **Greater Depth** Develops a range of relevant testable questions. **Answering Questions:** Answers questions using evidence gathered from different types of scientific enquiry.	**Expected** **Answering Questions:** Answers questions using evidence gathered from different types of scientific enquiry, with support, e.g. comparing life cycles of different plants using change over time, surveys and secondary research. **Greater Depth** **Answering Questions:** Answers questions using evidence gathered from different types of scientific enquiry.	**Expected:** **Answering Questions:** Answers questions using evidence gathered from different types of scientific enquiry, e.g. operation of circulatory system from experiment, survey and secondary research. **Greater Depth** **Answering Questions:** Suggest which type of enquiry is likely to be more successful at providing answers to a particular question.
Planning and Conducting	**Expected:** Understand that questions can be answered by testing Generating a variety of ideas for testing/ gathering evidence (not always realistic/ appropriate and may need prompting) Recognises simple scientific tests	**Expected** Asks simple questions that can be tested, e.g. about plants growing in their habitat (sometimes may need prompts) Identify an appropriate approach to answer/ gather evidence to answer a set question. For example by deciding best material to use for a particular application Conducts simple tests, with support, e.g. comparing the properties of different materials. **Greater Depth** Asks simple questions that can be tested, (without prompts) Suggests different ways of answering questions Conducts simple tests. Recognise different ways to answer a question.	**Expected** Asks simple questions that can be tested, e.g. about the local environment and how organisms depend on each other (without prompts) Suggests different ways of answering questions, e.g. testing the suitability of materials for different purposes Beginning to refine ideas – only changing one factor. Conducts simple tests, e.g. setting up comparative tests to show that plants need water and light. **Greater Depth** Plan an enquiry, such as a comparative or fair test Conduct a series of simple tests.	**Expected** Develop relevant testable questions, e.g. what happens to shadows when the light source moves (This is developed with adult support). Plan an enquiry, such as a comparative or fair test, e.g. comparing the effect of different factors on plant growth Sets up a comparative test .e.g. how far things move on different surfaces **Greater Depth** Develop relevant testable questions (Independently) Plan investigations using different types of scientific enquiry. Set up comparative and fair tests.	**Expected** Develop their own relevant, testable questions, e.g. based on observations of animals. Plan investigations using different types of scientific enquiry, e.g. exploring various materials by observing change over time, running comparative tests and conducting surveys. Sets up comparative and fair tests, e.g. finding patterns in the sounds made by elastic bands of different thicknesses. Uses a variety of equipment, as instructed, repeatedly and with care, e.g. thermometers. **Greater Depth** Develop a range of relevant testable questions. Answer questions using evidence gathered from different types of scientific enquiry. (With Support). Identify and manage variables. (With prompting). Selects and uses a variety of equipment repeatedly and with care, e.g. measuring jug to measure volume, and discuss alternatives.	**Expected** Answer questions using evidence gathered from different types of scientific enquiry, e.g. comparing life cycles of different plants using change over time, surveys and secondary research. (With Support). Identifies and manages variables, e.g. when exploring falling paper cones. (With prompts). Following discussion of alternatives, selects appropriate equipment, e.g. using a shadow stick and measuring length and angle of shadow. **Greater Depth** Answers questions using evidence gathered from different types of scientific enquiry. Identifies and manages variables. Uses appropriate equipment to take measurements, such as distance travelled.	**Expected** Answers questions using evidence gathered from different types of scientific enquiry, e.g. operation of circulatory system from experiment, survey and secondary research. Identifies and manages variables, e.g. distances and sizes in shadow formation. Uses appropriate equipment, to take measurements, such as distance travelled by light. **Greater Depth** Suggests which type of enquiry is likely to be more successful at providing answers to a particular question. Identifies and manages variables and recognises variables that cannot be easily managed.

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Measuring	**Expected:** Simple comparative vocabulary – bigger, smaller. Measure by direct comparison. Non-standard units of measurement.	**Expected** Standard units of measurement. Use simple equipment to measure length, time, capacity, weight).	**Expected** Selects most appropriate measurement and equipment. E.g. after careful observation they suggest useful measurements, e.g. examine a leaf and suggest measuring its length. Uses a variety of standard units of measurement. e.g. cm. Uses scientific vocabulary to aid measurement. **Greater Depth** Suggests measurements based on observations, e.g. examine a leaf and suggest measuring its length. Uses a variety of 'measuring' equipment, with assistance, e.g. a thermometer.	**Expected** Uses standard measurements when taking measurements, e.g. measuring distances between a light source and an object. Makes systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers **Greater Depth** Recognises the importance of using standard units and measure accurately. Takes accurate measurements using standard units, where appropriate	**Expected** Recognises the importance of using standard units and measures accurately, e.g. measuring temperature when investigating its effect on washing drying. Solves problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate (Maths) Uses, reads, writes and converts between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places (Maths) **Greater Depth** Takes measurements that are precise as well as accurate.	**Expected** Takes measurements that are precise as well as accurate, e.g. measuring the force needed to pull different shapes of boat through the water. Knows how to perform and process repeat readings/ measurements, e.g. when timing falling objects. **Greater Depth** Considers how by modifying instruments or techniques, measurements can be improved. Identifies situations in which taking repeat readings will improve the quality of evidence.	**Expected** Considers how by modifying instrument or technique, measurements can be improved, e.g. when recording route of light rays. Identifies situations in which taking repeat readings will improve the quality of evidence, e.g. investigating the behaviour of components in a circuit. **Greater Depth** Evaluates different techniques, with reference to accuracy and precision. Explains why repeatedly taking repeat readings is of little value.
Reporting/ Recording	**Expected:** Recognises the purpose of an experiment. Talks about objects and events. Makes simple recordings – pictures/images.	**Expected:** Using precise scientific vocabulary to describe an event. Complete pre-prepared tables and graphs. Simple labels for diagrams. Identifies what might usefully be recorded, e.g. drawing structures of plants or recording changing day length (with support). **Greater Depth** Identifies and groups key outcomes from an enquiry.	**Expected:** Create own charts and tables. Clearly labelled diagrams using scientific vocabulary. e.g. recording plants changing over time, starting from seed or bulb.	**Expected** Draws and labels diagrams, e.g. to show how water travels in a plant (with prompting). Uses tables to record evidence, e.g. recording what happens when various rocks are rubbed together (with prompting). Gathers and displays evidence in a variety of ways, e.g. about the ways that magnets behave in relation to each other. (With prompting). **Greater Depth** Uses words, writing and diagrams to record findings. Uses a variety of ways to record, group and display evidence.	**Expected** Uses words and diagrams to record findings, e.g. how habitats change during the year. Uses a variety of ways to record evidence, e.g. comparing the teeth of herbivores and carnivores. Uses a variety of ways to record, group and display evidence, e.g. grouping and classifying various materials. **Greater depth** Starts to use labelled diagrams to show more complex outcomes. Uses a variety of ways to record complex evidence. (With prompting). Uses line graph to record basic data.	**Expected** Uses labelled diagrams to show more complex outcomes, e.g. comparing the time of day at different places on the earth. Uses various ways to record complex evidence, e.g. when investigating how gears and levers enable a small force to have a larger effect. (With prompting). Uses a line graph to record basic data, e.g. length and mass of a baby as it grows. **Greater depth** Use labelled diagrams to show complex outcomes. Uses various ways, as appropriate, to record complex evidence. Uses line graphs to display complex data.	**Expected** Uses labelled diagrams to show complex outcomes, e.g. relating specific adaptations of organisms to environmental factors. Uses a variety of ways, as appropriate, to record complex evidence, e.g. in the construction of a key to aid plant identification. Uses line graphs to display complex data, e.g. size of object in relation to the size of the shadow it casts. **Greater depth** Evaluates the best way of displaying and presenting key findings. Explains why a labelled diagram may be particularly effective. Evaluates various ways of recording complex data. Explains the advantages of using line graphs.
Interpret	**Expected:** Notices 'which worked best' – simple comparative statements. Answers initial question simply. **Greater Depth** Collects data, when prompted. Suggests answers to enquiry questions using data, with prompting.	**Expected** Considers what results show – why did X happen? Answers initial question using results. Collects data, e.g. comparing and contrasting familiar plants. Suggests answers to enquiry questions using data, e.g. describe how to group plants. Identifies key findings from an enquiry, e.g. noting how plants have changed over time.	**Expected** Explain outcomes and how they were achieved. Relate results to initial question using scientific vocabulary. Collects data relevant to the answering of questions, e.g. seeing how the shapes of some materials can be changed. Identify patterns in data and explain.	**Expected** Indicates findings from an enquiry that could be reported, e.g. answering questions about how rocks are formed. Recognises patterns that relate to scientific ideas, e.g. investigating the behaviour of magnets. (With prompting). **Greater Depth** Presents findings either in writing or orally.	**Expected** Recognises patterns that relate to scientific ideas, e.g. finding out which materials make better earmuffs. **Greater Depth** Arranges data to make clear key characteristics.	**Expected** See Evaluating and concluding Indicates why some results may not be entirely trustworthy, e.g. when timing falling objects. (with support) (In conclusions) **Greater Depth** Indicates how trustworthy they are. (In conclusions)	See evaluating and Concluding Indicates how trustworthy they are, e.g. in relating brightness of bulb to voltage supplied. (In conclusions) Greater Depth Indicates, if appropriate, why the results may not be entirely trustworthy. (In conclusions)

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		Greater Depth Can collect data relevant to the answering of questions. Answers enquiry questions using data and ideas. Identifies and groups key outcomes from an enquiry.	Identifies and groups key outcomes from enquiry, e.g. describing conditions in different habitats and how these affect the numbers and types of organisms. Collect s data relevant to the answering of questions, e.g. seeing how the shapes of some materials can be changed. **Greater Depth** Suggests what an enquiry shows (when prompted) Recognise patterns that relate to scientific ideas, when prompted. Suggests what an enquiry shows, with support.	Recognises patterns that relate to scientific ideas.			
Evaluating and Concluding Evaluating and Concluding	**Expected:** With prompting, suggest answers to enquiry questions using data. Develops their explanations by connecting ideas or events.	**Expected** Suggest answers to enquiry questions using data, e.g. describe how to group plants. Identifies key findings from an enquiry, e.g. noting how plants have changed over time. Identifying how their investigation worked – what worked well, what didn't? Notice anything that affected results i.e. changes in temperature etc. **Greater Depth** Answers enquiry questions using data and ideas. Identifies and groups key outcomes from an enquiry.	**Expected** Suggest how to improve experiment. Identifies if it was effective and link to scientific knowledge. Able to identify what they have learnt from investigation. Answers enquiry questions using data and ideas, e.g. to help decide how the properties of certain materials make them suitable for certain applications. **Greater Depth** Uses evidence to produce simple conclusion, with support. Suggests how an investigation could be extended. (With prompting)	**Expected** Uses evidence to produce a simple conclusion, e.g. the changes that occur when rocks are in water. (With support) Writes a conclusion based on evidence, e.g. exploring the strengths of different magnets. (with support) Suggests how an investigation could be extended, e.g. suggesting creative uses for different magnets. **Greater Depth** Uses evidence to produce a simple conclusion. Writes a conclusion based on evidence. Uses evidence to suggest further relevant investigations.	**Expected** Uses evidence to produce a simple conclusion, e.g. the effect of temperature on various substances. Writes a conclusion based on evidence, e.g. effect on brightness of bulbs if more cells are added. Uses evidence to suggest further relevant investigations, e.g. making own instruments, using ideas about pitch and volume. **Greater Depth** Demonstrates/ shows how evidence supports a conclusion. Suggests further relevant comparative or fair tests. Writes a conclusion using evidence and identifying causal links. (with support)	**Expected** Demonstrates/ shows how evidence supports a conclusion, e.g. researching gestation periods of various mammals and relating them to adult mass. Writes a conclusion using evidence and identifying causal links, e.g. investigating what makes a parachute fall quicker. (with support) **S**uggests further relevant comparative or fair tests, e.g. when testing materials for various properties to determine their suitability for an application. **Greater Depth** Identifies how an idea is supported or refuted by evidence. Uses evidence to suggest further comparative or fair tests that would develop the investigation. Writes a conclusion using evidence and identifying causal links.	**Expected** Identifies how an idea is supported or refuted by evidence, e.g. selective breeding to produce animals or plants with desirable characteristics. Writes a conclusion using evidence and identifying causal links, e.g. in the design of a periscope. Uses evidence to suggest further comparative or fair tests that would develop the investigation, e.g. in the design of rear view mirrors for cars. **Greater Depth** Suggests how factors other than evidence may support or oppose an idea. Evaluates which further comparative or fair tests would be particularly useful. Suggests possible limits to causal relationships.

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Biology	Early Years	Y1	Y2	Y3	Y4	Y5	Y6
Animals Including Humans (Progression of Knowledge From NC).		• identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals • identify and name a variety of common animals that are carnivores, herbivores and omnivores • describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets) • identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	• notice that animals, including humans, have offspring which grow into adults • find out about and describe the basic needs of animals, including humans, for survival (water, food and air) • describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene	• identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat • identify that humans and some other animals have skeletons and muscles for support, protection and movement	• identify the different types of teeth in humans and their simple functions • construct and interpret a variety of food chains, identifying producers, predators and prey • describe the simple functions of the basic parts of the digestive system in humans	• describe the changes as humans develop to old age	• identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood • recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function • describe the ways in which nutrients and water are transported within animals, including humans

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Animals Including Humans
(Progression of Knowledge From St Mary's Science Curriculum.)

		herbivorous animals eats plants; a carnivorous animal eats other animals; omnivorous animals eat both animals and plants a trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; a robin is an example of a bird; a rabbit and a human are examples of a mammal a cat is an example of a carnivore; that a rabbit is an example of a herbivore. many humans are examples of omnivores (though not vegetarians or vegans). fish, amphibians, reptiles, birds and mammals are similar in that they have internal skeletons and organs; these are known as vertebrates, which means they are animals that have a back bone. fish are different in having gills so that they can breathe under water and scaly skin. amphibians are different in that they begin their lives with gills but then develop lungs and breath on land. reptiles are different in that they breath air and have scaly skin. birds are different to other animals in that they have feathers and wings. mammals are different to other animals in that they have fur/hair and they feed milk to their young. feet, legs, arms, hands, torso, head, skin, ears, eyes, nose, mouth and tongue are part so the body and identify them. eyes are associated with sight, ears with sound, nose with smell, tongue with taste and skin with touch.	animals produce offspring that grow into adults. animals, including humans, need food, water and air to survive. basic food groups: fruit and vegetables, carbohydrates, protein, dairy, fat and sugary foods. more than half of our diet should be made up of carbohydrates, fruit and vegetables. fats and sugary foods should be eaten rarely and in small amounts. people need to exercise often to help their body stay strong and fit. keeping clean, including washing and brushing teeth, is an important part of staying health.	animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. proteins are good for growth, carbohydrates for energy and fruit and vegetables provide vitamins and minerals which help keep us healthy(e.g. calcium for healthy bones and teeth). getting the right amount of each food group (including over half of the diet made up of fruit, vegetables and carbohydrates) is called a balanced diet. lack of a nutrient can cause ill health; for example, a lack of vitamin D leads to a disease called rickets. excesses of a food group can cause ill health, such as tooth decay due to excess sugar NB–some food groups are difficult to afford for some families so sensitivity is required in teaching this area. excess fat from fatty foods such as butter and cheese-and created in the body from excess calories–builds up in the body and can cause obesity. excess body fat can lead to heart disease and increases the strain on joints and growing bones. animals, including humans, have a skeleton made up of solid objects. some animals (such as insects) have an exoskeleton–a solid covering on the outside of their body. many invertebrates (such as earthworms and slugs) have water held inside by muscles which act like a skeleton. skeletons provide support for muscles and protect the body; for example, the ribcage protects the vital organs in the human body. human skeletons are made up of bones and cartilage. muscles can only contract, so they must be arranged in pairs in the body so that as one contracts the other loosens.	food passes through the body with the nutrients being extracted and the waste products excreted, and that this process is called digestion. the process of digestion involves breaking complex foodstuffs into simpler building blocks that can be absorbed by the body. the process of digestion begins with food being chewed in the mouth by the teeth and saliva added. a human has three types of teeth–incisors, canines and molars–and that these each perform different functions. incisors slice food, canines tear food (especially meat) and that molars grind food. children develop an initial set of teeth which are gradually replaced between the ages of 6 and 12. food is squeezed down the esophagus towards the stomach in a wave-like action called peristalsis. the stomach releases acid and enzymes to continue breaking down the food; the stomach is an organ; an organ is a part of living thing that is self-contained and has a specific important job. further enzymes and bile break down the food further as it moves through the duodenum towards the small intestine. the small intestine adds more enzymes and then absorbs the nutrients. the large intestine absorbs water from the undigested food. undigested food is stored in the rectum before being excreted through a muscle called the anus. food chain traces the path of energy through a habitat. all energy for a food chain initially comes from the Sun which is absorbed and turned into energy by plants which are called producers. consumers take in energy by eating. an animal that is eaten by another is called prey, and that an animal that eats other animals is called a predator. the first consumer in a food chain is called a primary consumer, the second is called a secondary consumer and above it is called a tertiary consumer. the arrows in a food chain show the direction that energy is travelling through a habitat.	humans go through stages of development; they begin as fertilized eggs and then develop in to embryos before developing into babies; once they are born, these newborn babies become infants (roughly2 months to 2 years) then into young children(roughly 2-12 years old); children develop into adults during adolescence(roughly 12-16 years old) at which age they become physically capable of reproduction; as adults develop into old age (roughly 55+ years old)they experience changes in their body which require them to move more carefully and rest more frequently.	heart and lungs are organs protected by the rib cage. blood travels around the body transporting nutrients that have been absorbed into the blood stream from digestion; blood also carries oxygen around the body which is used to power the body; this use of oxygen to create energy is called respiration. heart beats, pumping blood around the body and that blood vessels carry the blood; arteries carry blood away from the heart; veins carry blood towards the heart; capillaries are tiny blood vessels that connect arteries and veins. heart is composed of four chambers: two atria and two ventricles; the aorta is the largest artery in the body and most major arteries branch off from it. when we exercise, our heart beats more frequently so that the oxygen that is used around the body can be replenished; it returns to a resting heart rate afterwards; fitter people tend to have lower resting heart rates. drugs are chemicals that have an impact on the natural chemicals in a person's; know that drugs can be harmful or helpful, depending on what they are and how they are used; know that all drugs can be harmful if over used. Paracetamol and aspirin are examples of drugs that can be helpful as a painkiller. Cannabis and cocaine are examples of illegal drugs that can have serious negative effects. Alcohol and tobacco are examples of drugs that are legal to adults but that can have serious negative effects, such as liver disease and lung disease, respectively.

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Animals, Including Humans: Progression of Skills : Life exists in a variety of forms and goes through cycles – Animals		**Expected** Name a variety of common animals. Identify and group a range of familiar animals. **Greater Depth** Identify common features of the main groups of vertebrates. Suggest whether an unfamiliar animal might be a carnivore, herbivore or omnivore.	**Expected** Describe the relationship between adult animals and their offspring. Identify human's basic needs. **Greater Depth** Compare and contrast adults and their offspring for different animals. Suggest how the basic needs of different animals influences their choice of habitat.	**Expected** Describe why animals depend on the correct nutrition. **Greater Depth** Explain why a varied diet is important.		**Expected** Identify similarities and differences in two different life cycles, e.g. sparrow and butterfly, with reference to eggs and intermediate stages. Describe the changes as humans develop to old age, e.g. trends in changes to size, weight, mobility etc. **Greater Depth** Suggest similarities in the life cycles of a number of vertebrates, e.g. comparison of dog, human and bird embryos. Suggest why some of the changes that take place in humans happen, e.g. suggest why babies have disproportionately large heads compared to adults.	
Animals Including Humans: Progression of Skills: The human body has a number of systems, each with its own function		**Expected** Identify key features of a range of common animals. Relate each of the human senses to organs. **Greater Depth** Compare key features of familiar and unfamiliar animals. Suggest how the senses are used in an activity such as eating.	**Expected** Describe the importance of a healthy diet and exercise. **Greater Depth** Suggest effects of poor diet and hygiene.	**Expected** Explain which parts of the skeleton provide support and protection, and how they allow for movement. **Greater Depth** Compare the ways that the skeletons of different animals provide support, protection and movement.	**Expected** Identify what each of the principal organs in the digestive system do. Describe the function of each type of tooth in the human skull. Use a food chain to represent predator-prey relationships. **Greater Depth** Explain why the simple functions of the basic parts of the digestive system in humans are necessary. Explain why humans have different types of teeth. Suggest what might happen in a food chain if the population of one of the organisms changes.	**Expected** Describe in sequence the stages of reproduction in some plants and animals, e.g. dog and a thistle. **Greater Depth** Compare the process of reproduction in animals and plants, e.g. compare and contrast fertilisation.	**Expected** Describe what heart, blood vessels and blood do, e.g. carry oxygen to all parts of the body. Suggest how their bodies are affected by substances and actions, e.g. that a high fat diet coupled with little exercise is likely to lead to obesity. Describe with aid of diagrams the route that water takes within animals, e.g. through the human body. **Greater Depth** Explain some characteristics of the heart, blood vessels and blood, e.g. explain that the arteries are thicker because they carry blood at a higher pressure. Explain how decisions about lifestyle can affect the quality of life, e.g. recognise that making excessive use of convenience foods may introduce more additives into the diet. Compare the ways in which nutrients and water are transported in two animals that are quite different.

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Biology	Early Years	Y1	Y2	Y3	Y4	Y5	Y6
Living things and their Habitats (Progress of knowledge From NC).			• explore and compare the differences between things that are living, dead, and things that have never been alive • identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other • identify and name a variety of plants and animals in their habitats, including microhabitats • describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food		• recognise that living things can be grouped in a variety of ways • explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment • recognise that environments can change and that this can sometimes pose dangers to living things	• describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • describe the life process of reproduction in some plants and animals	• describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals • give reasons for classifying plants and animals based on specific characteristics
Living things and their Habitats (Progression of Knowledge From St Mary's Science Curriculum.)			living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things. most living things live in habitats to which they are adapted and provide them with what they need to survive. name a variety of plants and animals in their habitats, including microhabitats. that polar bears are an example of an animal adapted to its environment–thick fur for warmth and oily paw pads to ensure that they don't freeze to the ice. that sharks are another example–smooth skin and streamlined shape for quick swimming; and gills for breathing under water. cacti are an example of a plant adapted to its environment–thick skin keeps a store of water safe; sharp spikes keep animals from stealing the water. pine trees have thick bark and pine cones to protect against cold winters. woodlice live under logs–an example of a microhabitat-as they need somewhere dark and damp so that they do not dry out. frogs can live in ponds–an example of a microhabitat-as they water in which to lay their eggs (frogspawn). plants absorb energy from the Sun; that this energy is consumed by herbivorous animals; and that carnivorous animals eat other animals. the arrows on a food chain show the direction that the energy travels.		a variety of living things in their local and wider environment. animals can be grouped based on their physical characteristics(e.g. vertebrates and invertebrates) and based on their behaviour (e.g. herbivores, carnivores and omnivores). living things are divided into kingdoms: the animal kingdom, plants, fungi, bacteria, and single-celled organisms. a species is a group of living things have many similarities that can reproduce together produce offspring. a classification key uses questions to sort and identify different living things. how to use a classification key to identify and group living things. how to create a classification key to sort plants on the school premises. changes to the environment can make it more difficult for animals to survive and reproduce; in extreme cases this leads to extinction, where an entire species dies. human activity–such as climate change caused by pollution-can change the environment for many living things, endangering their existence. the polar bear is a famous example of climate change endangering the existence of a species; as the climate changes and gets warmer, the sea ice on which polar bears live reduces in amount making it harder for them to survive and reproduce.	the life cycle of a living thing is a series of stages of development starting with a fertilized egg in animals or a seed in many plants. in most mammals (e.g. dogs)a fertilized egg develops in the womb into an embryo and is then born and fed on milk before it is weaned onto the food that is adapted to eat; it then develops to maturity in a period called adolescence after which it can reproduce and the cycle can begin again. in amphibians (e.g. frogs)a fertilized egg develops into an embryo and then hatches into a tadpole; the tadpole develops adult characteristics, metamorphoses into the adult form after which it can reproduce and the cycle can begin again. in many insects (e.g. butterflies)a fertilized egg develops into wingless feeding form called a larva(caterpillar); the larva feeds then later becomes a pupa (chrysalis) with a protective cocoon; inside this cocoon, the pupa metamorphoses into the adult butterfly after which it can reproduce and the cycle can begin again. in birds (e.g. robins) a fertilized egg hatches in a nest (a hatchling) and is fed by its parents until it is ready to fly (i.e. becomes a fledgling); it then leaves the nest and grows into an adult after which it can reproduce and the cycle can begin again.	living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals use their knowledge to give reasons for classifying plants and animals based on specific characteristics. there are three types of micro-organism: viruses, fungi and bacteria; of these three, viruses are often not really considered to be alive by many scientists mainly because they don't have the 'machinery' to reproduce inside them. that germs are disease-causing bacterial. an arthropod is an invertebrate with a hard, external skeleton and jointed limbs. insects are a type of arthropod; their bodies consist of six legs, a head, a thorax and an abdomen; most insects also have a pair of antennae and a pair of wings. an arachnid (e.g. spider) is a type of arthropod with eight legs and no antennae or wings. a crustacean is a type of arthropod with two pairs of antennae (e.g. woodlouse). a myriapod is an arthropod with a flat and long or cylindrical body and many legs (e.g. centipede).
Living things and their Habitats Progression of skills: Living things can be classified according to observable features					**Expected** Suggest different ways of sorting the same group of living things, e.g. grouping birds according to where they live, what they eat and size of adults. Use classification keys to group and identify members from a range of familiar and less familiar living things. **Greater Depth** Suggest why some ways of grouping living things may be more useful than others, e.g. why grouping by number of legs is an easy aid to identification. Devise own classification keys to group living things.		**Expected** Use similarities and differences in observable features to decide how living things should be grouped e.g. a cat is a mammal because it is warm blooded and gives birth to live young. Explain why certain features are useful in classifying living things, e.g. backbones in animals and flowers in plants. **Greater Depth** Explore why some living things, such as the duck billed platypus, don't neatly fit into one group. Explain why other features are less useful as a basis for classification, such as size or colour.

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Living things and their Habitats: Progression of skills: Habitats provide living things with what they need			**Expected** Explain how, for a named animal or plant, it gets what it needs from its habitat and other living things that are there. Identify a range of living things in habitats of various sizes. Construct a simple food chain and identify what is eating what. Explore and identify what plants need to thrive. **Greater Depth** Explain why there may be a limit as to how many of a certain living thing can live in a particular area. Identify a range of living things and suggest why they may be found in that habitat. Suggest, within a simple food chain, what might happen if one of the living things becomes scarce. Identify the effects of a shortage of each of the things that plants need to grow and stay healthy	**Expected** Explain what all plants need to flourish and recognise how these requirements vary in amount. **Greater Depth** Compare the requirements of different plants and link these to particular habitats.	**Expected:** Describe examples of living things that are threatened by changes to environments, e.g. owls and habitat loss. **Greater Depth** Describe examples of living things adapting to environmental change, e.g. urban foxes, and examples of extinction due to environmental change.		
Evolution and Inheritance (Progress of knowledge From NC).							• recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago • recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution
Evolution and Inheritance (Progress of Knowledge from St Mary's Curriculum)							all life on Earth began from a single point around 4.5billion years ago. animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. living things changes over time and that this gradual change is called evolution. natural selection is the cause of changes in a species; natural selection works as across a species, there is natural variation within a species; there is also competition to survive and reproduce and that members of a species with advantageous characteristics survive and reproduce-these characteristics are passed down to their offspring; members of a species with less advantageous characteristics do not survive and reproduce–these characteristics are not passed down to offspring. offspring are of the same kind but vary and are not identical to their parents. Charles Darwin posited this theory of evolution by natural selection. the gradual change of species over millions of years can be observed by looking at examples of fossil.

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Living things exhibit variation and adaptation and these may lead to evolution.							**Expected:** Use fossils as evidence that living things have changed over time, e.g. explain that these have died out and others have taken their place. Describe examples of a living thing that has adapted to live in a particular habitat and evolved as a result, e.g. a polar bear or cactus. **Greater Depth:** Suggest possible reasons for changes to living things over time, e.g. why penguins can't fly but are good at swimming. Recognise that selective breeding may result in offspring with certain features, e.g. pedigree dogs with a certain shape or colour. Give examples of living things that have evolved in different ways, e.g. different types of finch.

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Biology	Early Years	Y1	Y2	Y3	Y4	Y5	Y6
Plants (Progress of knowledge From NC).		• identify and name a variety of common wild and garden plants, including deciduous and evergreen trees • identify and describe the basic structure of a variety of common flowering plants, including trees	• observe and describe how seeds and bulbs grow into mature plants • find out and describe how plants need water, light and a suitable temperature to grow and stay healthy	• identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers • explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant • investigate the way in which water is transported within plants • explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal			
Plants : (Progress of knowledge from St Marys Curriculum).		Know a rose bush, a sunflower and a dandelion by sight. Know an oak tree, a birch tree and a horse chestnut tree by sight. Know a variety of common wild and garden plants, including deciduous and evergreen trees. Know that evergreen trees maintain their leaves throughout the year and that deciduous trees shed their leaves in autumn. Know that flowering plants consist of roots, stem, leaves and flowers, and that a tree's stem is called a trunk.	seeds and bulbs need to be buried underground in soil and that they will grow into adult plants under the right conditions (water, warmth). plants that are deprived of light, food or air will not grow and will die. plants produce offspring that grow into adults.	the roots collect water and minerals from the soil, and hold the plant firmly in the ground. the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. different parts of plants have one or more functions (jobs). the roots collect water and minerals from the soil, and hold the plant firmly in the ground. the stem holds up the leaves so that they can gather light to make food and holds up the flowers so that they can receive pollen and disperse their fruits; know that the stem also transports water and minerals from the roots to the other parts of the plant. leaves make food by trapping light and using its energy to turn carbon dioxide and water into carbohydrates. function of a flower is reproduction, where flowers of the same kind exchange pollen– made by an anther–in a process called fertilisation, and a structure in the flower's ovary called an ovule becomes a seed; the ovary then becomes a fruit which helps the seed leave the plant in a process called dispersal.			
Plants >: Progression of Skills: Life exists in a variety of forms and goes through cycles – Plants		**Expected** Identify a range of local plants. Name parts of a range of familiar plants. Compare and contrast a collection of items, sorting into categories: 'living', 'dead' and 'things that have never been alive'. **Greater Depth** Identify and notice similarities between various local plants. Identify and notice similarities in the structure of various local plants. Research further examples to add to the categories: 'living', 'dead' and 'things that have never been alive'.	**Expected:** Describe stages of development of a full grown plant. **Greater Depth** Compare and contrast the growth patterns of different types of plants.	**Expected:** Describe what each part of a flowering plant does. Explain, with the aid of a diagram or plant, how water is carried up from the soil. Explain how pollination, seed formation and seed dispersal play a role in the reproduction of flowering plants. **Greater Depth** Suggest why parts may vary in size and shape from one species of flowering plant to another. Suggest how this process might vary from one type of plant to another. Suggest why pollination, seed formation and seed dispersal may vary from one type of plant to another.			

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Physics	Early Years	Y1	Y2	Y3	Y4	Y5	Y6
Light and Sound (Progress of knowledge From NC).				• recognise that they need light in order to see things and that dark is the absence of light • notice that light is reflected from surfaces • recognise that light from the sun can be dangerous and that there are ways to protect their eyes • recognise that shadows are formed when the light from a light source is blocked by a solid object • find patterns in the way that the size of shadows change	**Sound** • identify how sounds are made, associating some of them with something vibrating • recognise that vibrations from sounds travel through a medium to the ear • find patterns between the pitch of a sound and features of the object that produced it • find patterns between the volume of a sound and the strength of the vibrations that produced it • recognise that sounds get fainter as the distance from the sound source increases		• recognise that light appears to travel in straight lines • use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye • explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes • use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them
Light and Sound (Progress of knowledge from St Marys Curriculum).				light is a form of energy. energy comes in different forms and can be neither created nor destroyed, only changed from one form to another. we need light to see things and that darkness is the absence of light. light travels in straight lines. (Built on further in Y6 curriculum). light is reflected when it travels from a light source and then 'bounces' off an object or surface. everything that we can see is either a light source or something that is reflecting light from a light source into our eyes. the Sun is a light source, but that the Moon is not and is merely reflecting light from the Sun. many light sources give off light and heat. Know that the Sun gives off light and heat when hydrogen turns into helium. filaments in traditional bulbs heat up until they glow, giving off light and heat. fluorescent bulbs glow when electricity adds energy to a gas within the bulb. sunglasses can protect eyes from sun light but looking at the Sun directly–even with sunglasses–can damage the eyes. opaque objects block light creating shadows and that light passes through transparent objects. opacity/transparency and reflectiveness are properties of a material. shadows are formed when the light from a light source is blocked by an opaque object. as objects move towards a light source, the size of the shadow increases. show the changing of shadow size by drawing a diagram with straight lines representing light.	sound is generated when an object vibrates; some of the energy from the vibrating object is transferred to the air, making the air particles move. energy comes in different forms and can be neither created nor destroyed, only changed from one form to another. sound is a form of energy that transfers in a longitudinal wave-like that seen in a slinky-nota transverse wave-like that seen in water ripples. sound travels through a medium (e.g. particles in the air) and thus sounds does not travel through a vacuum which has no particles in it at all. longitudinal sound waves are detected in the ear by humans and that the brain interprets this as the sounds we hear. sound travels at different speeds through different objects; it travels at around 340 metres per second in air, much slower than light travels; this is why we often hear thunder after we see lightning as the light reaches our eye before the sound reaches our ears. pitch is how high or low a sound is and that this is determined by how many vibrations per second are being made by the vibrating object; the number of vibrations per second is called frequency. identify patterns between the pitch of a sound and features of the object that produced it. volume is how loud or quiet a sound is and that this is determined by the amount of energy in the wave (e.g. from how hard or soft a percussion instrument is hit). find patterns between the volume of a sound and the strength of the vibrations that produced it). the volume of a sound is quieter if the listener is further away from the object.		translucent objects allow some light to pass through, but some of the light changes direction as it passes through the object; this means that an something seen through a translucent object is not clearly defined. when light passes from one medium to another (e.g. from air to water), it changes direction; this is called refraction; this happens because light travels at different speeds in different media. white light comprises all the colours of light. white light refracted by two surfaces in a prism will spread out so that all of its constituent colours can be seen; this array of colours is called a spectrum; it happens because the different colours of that constitute white light travel at different speeds. how to draw a diagram to show why the shape of a shadow will match the shape of an object. when light reflects off an object, the angle of incidence is equal to the angle of reflection. a periscope takes advantage of the predictable angles of incidence and reflection to allow an image to be shown to a viewer.

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				data loggers can keep track of light levels and that this can be plotted on a graph to show how this changes over the course of a day. (NB: the Sun and the Moon are capitalized when being discussed in an astronomical context.)			
Light & sound can be reflected & absorbed and enable us to see & hear				**Expected:** Relate being able to see to the presence of light. Describe how some objects reflect light. Explain how shadows are made. Describe how to change the size of a shadow. **Greater Depth:** Recognise that some surfaces are better at reflecting light than others. Explain why sunlight can be dangerous and how types of protection works. Suggest how light is travelling to form a shadow. Relate position of an object and position of a screen to the size of the shadow.	**Expected:** Describe the role of a medium in the transmission of sound. Describe the effect of moving further from the source of a sound. Explain with reference to a particular object how the pitch of the sound can be changed. Explain with reference to a particular object how the volume of the sound can be changed. **Greater Depth:** Compare the effectiveness of different media in terms of their ability to transmit sound. Explain with reference to examples how sounds get fainter as the distance from the source increases. Identify generic features that cause the pitch of a note to be changed. Identify generic features that cause the volume of a note to be changed.		**Expected:** Draw diagrams using straight lines showing light travelling to the eye. Explain how we can see an object by referring to light travelling into the eye. Draw a diagram showing an object, shadow and light to relate object shape to shadow shape. **Greater Depth:** Draw diagrams using straight lines showing light reflecting off objects and into the eye. Refer to the idea that some objects may be better reflectors than others. Use a diagram to explain that although a shadow is the same shape as the object, it may not be the same size.

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Physics	Early Years	Y1	Y2	Y3	Y4	Y5	Y6
Electricity (Progress of knowledge from N. Curriculum).					• identify common appliances that run on electricity • construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers • identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery • recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit • recognise some common conductors and insulators, and associate metals with being good conductors.		• associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit • compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches • use recognised symbols when representing a simple circuit in a diagram
Electricity : (Progress of knowledge from St Marys Curriculum).					name of common appliances that run on electricity. electrical energy is one of many forms of energy. static electricity is an imbalance of charged particles on a material; it does not operate by flowing around a complete circuit. current electricity is the flow of charged particles called electrons around a circuit. electrical current flows well through some materials, called electrical conductors, and poorly through other materials, called electrical insulators, and can recognise some common examples of each. conductors have free electrons and that when electrical current flows around a conductor the electrons move. electrical conductivity (how well a material conducts electricity) is an example of a property. metals are good electrical conductors. a chemical reaction inside a cell produces the charged particles that can flow around a circuit. more than one cell lined up to work together is called a battery. electrical current can flow if there is a complete circuit. wires–which contain a conductor inside them, usually made of metal–can allow electrical current to flow around a circuit. basic electrical parts, including cells, wires, bulbs, switches and buzzers. when electrical current flows through a circuit, components within that circuit–such as buzzers which make a noise and bulbs which emit light–begin to work. switch functions by completing or breaking a complete circuit and associate this with whether or not a lamp lights in a simple series circuit. construct a simple series electrical circuit using components. Know that exposure to high levels of electrical current can be dangerous.		voltage is a measure of the power of a cell to produce electricity; it is a measure of the 'push' of electric current, not the size of the electric current. as the number and voltage of cells in a circuit increases, the brightness of a bulb or the volume of a buzzer will increase (though too high a voltage may 'blow' the bulb or buzzer). how to draw simple circuit diagrams. know the recognized symbols for a battery, bulb, motor, buzzer and wire. predicts whether components will function in a given circuit, depending on whether or not the circuit is complete; whether or not a switch is in an on or off position; and whether or not there is a cell to provide electrical current to the circuit. two bulbs in a circuit can be wired up to create a series circuit or a parallel circuit; if one bulb blows in a series circuit the other will not shine as the circuit has been broken; in contrast, if one bulb blows in a parallel circuit, there will still be a complete circuit for the other bulb so it will continue to shine; use this. explain the advantages of using parallel circuits (e.g. in the lighting in homes).
Electricity can make circuits work and can be controlled to perform useful functions					**Expected:** List examples of appliances that run on electricity. Construct a simple circuit and name its components. Sort materials into conductors and insulators, identifying metals as conductors. Predict whether a particular arrangement of components will result in a bulb lighting. Predict how the operation of a switch will affect bulbs lighting. **Greater Depth:** Compare and contrast appliances that run on mains electricity with those that run on batteries. Identify the functions of components within a circuit. Investigate graphite as a conductor and relate to other materials. Explain why certain arrangements will not result in the bulb lighting.		**Expected:** Explain how number and voltage of cells affects the lamp or buzzer. Explain the use of switches, how bulbs can be made brighter and buzzers made louder. Represent a circuit that has been constructed using symbols. **Greater Depth** Relate the number or voltage of cells to the number and operation of bulbs or buzzers that can be run from them. Explain the effect of changing the order of the components in a circuit. Design circuits using symbols.

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					Explain how altering the location of a switch affects the operation of the circuit.		

Physics	Early Years	Y1	Y2	Y3	Y4	Y5	Y6
Forces and Magnets (Progress of knowledge From NC).				• notice that some forces need contact between 2 objects, but magnetic forces can act at a distance • observe how magnets attract or repel each other and attract some materials and not others • compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials • describe magnets as having 2 poles • predict whether 2 magnets will attract or repel each other, depending on which poles are facing • compare how things move on different surfaces		• explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • identify the effects of air resistance, water resistance and friction, that act between moving surfaces • recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect	
Forces and Magnets : (Progress of knowledge from St Marys Curriculum).				a force can be thought of as a push or a pull. there are three types of contact force: impact forces (when two surfaces collide), frictional forces (when two surfaces are already in contact) and strain forces (when an elastic material is stretched or squashed). objects move differently on rough and smooth surfaces; objects resist movement more on rough surfaces because there is higher friction as the object moves. there are non-contact forces that can act between objects without them touching and that magnetism is an example of a non-contact force, thus acting at a distance. magnets have two poles called north and south. like poles (south-south and north-north) of two magnets repel each other and that opposite poles of two magnets (north-south) attract each other. there is a magnetic field around a magnet which is strongest at each pole. some materials are magnetic, meaning that they are attracted to a magnet, while other materials are non-magnet. compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet.		a force is measured in a unit called Newtons, named after a British scientist called Sir Isaac Newton who discovered lots about gravity and how planets move. pull forces can be measured using a device called a force meter. the amount of matter (stuff) in an object is its mass. gravity is a force that acts between all objects in the universe, but that it acts much more strongly between objects that have more mass and that are close together. unsupported objects are pulled towards the Earth by the force of gravity. acceleration is a change in speed and that unbalanced forces acting on an object cause it to accelerate. air resistance is a force felt by an object as it moves through the air; it is caused by the object bumping into the gas particles that make up air; the quicker an object moves, the more gas particles it bumps into and the more air resistance it experiences. a falling object will accelerate until its air resistance matches the gravitational force pulling it down; at this point, the object will continue to move at this speed (called its terminal velocity) without getting any quicker or slowing down. a parachute's shape increases the air resistance that a falling object experiences, giving it a much	

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						lower terminal velocity. water resistance is a force felt by an object as it moves through water; it is caused by the object bumping into the water particles. the shape of an object determines how much air resistance or water resistance it experiences; shapes of object that experience little air resistance or water resistance are described as streamlined. draw a force diagram with arrows representing the different forces acting on an object. a lever is a rigid length pivoting around a fulcrum. a pulley is a wheel with a fulcrum that supports a moving cable or belt. a gear is a rotating wheel with cut teeth that mesh with the teeth of another gear so that turning one gear turns an adjacent gear in the opposite direction. gears, levers and pulleys are simple machines that used to allow a smaller force to have a greater effect; they do this by moving a smaller force over a longer distance at one end of the machine, which the machine turns into a larger forcer over a small distance at the other end.	
There are contact and non-contact forces; these affect the motion of objects.				**Expected:** Describe how magnets attract or repel each other, and attract magnetic materials. Group materials on the basis of testing for being magnetic. Describe and identify the poles of a magnet. Predict outcomes of a particular arrangement of magnets. **Greater Depth:** Explore whether some magnets are stronger than others. Identify some applications of magnets and magnetic materials. Explore the similarities and differences between the two poles. Apply ideas about the interaction of magnets to contexts such as toys.		**Expected:** Describe how some devices may turn a smaller force into a larger one. **Greater Depth:** Explain, with reference to everyday contexts, why a force multiplier might be useful.	

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Physics	Early Years	Y1	Y2	Y3	Y4	Y5	Y6
Physics:(Progress of knowledge From NC).		**Seasonal Changes** Pupils should be taught to: • observe changes across the 4 seasons • observe and describe weather associated with the seasons and how day length varies				**Earth and Space** Pupils should be taught to: • describe the movement of the Earth and other planets relative to the sun in the solar system • describe the movement of the moon relative to the Earth • describe the sun, Earth and moon as approximately spherical bodies • use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky	
Physics		days are longer in the summer and shorter in winter. weather changes through the year, getting hotter in the summer and colder in the winter. the winter is likely to bring ice on the ground when water freezes due to the cold. the Earth orbits the Sun with one orbit constituting a year of 365/366 days. (NB: the Sun and the Earth are capitalized when being discussed in an astronomical context.)				the universe comprises all matter and space in existence. a celestial body is a large object in the universe. a star is an exceptionally hot ball of gas, originally made from hydrogen and helium. the Sun is a star. a planet(e.g. Earth)is defined as a spherical celestial body that orbits a star and that has cleared the neighbourhood of its orbit of other objects, some of which crash into the planet and others that become moons of that planet. it was once thought that everything orbited the Earth, but that scientists like Copernicus and Galileo used telescopes and measurement to show that the Earth orbited the Sun. there are eight major planets in our solar system: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune. the universe is utterly vast and that our solar system makes up a tiny fraction of the universe. a satellite orbits a planet and that moons are natural satellites. the Moon orbits the Earth roughly every 28 days. as the Moon orbits the Sun, different parts of it are lit up by the Sun, which is why we see a different shape lit up on the Moon as the lunar cycle progresses. humans have sent man-made satellites into orbit that assist with telecommunication. planets in the solar system orbit the Sun and that the further away they are from the Sun, the longer their orbit. the Earth spins around an imaginary line through its centre called an axis and that this axis is tilted relative to the Earth's orbit. night and day are the result of the Earth rotating on its axis. the tilt of the Earth towards and away from the Sun's light as the Earth orbits the Sun leads to the seasons as during winter the light is spread over a wider area. a solar eclipse occurs when the Moon is between the Sun and the Earth, casting a shadow on the Earth; a lunar eclipse occurs when the Earth is between the Sun and the Moon, casting a shadow on the Moon.	
Day, night, month, season		**Expected:** Describe seasonal changes. Relate weather patterns and day length to seasons.				**Expected :** Draw a diagram or use a model to describe the Moon's orbit around the Earth. Describe the Sun, Earth & Moon as spheres.	

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		Greater Depth: Recognise changes within seasons as well as between seasons. Make and test predictions relating to changing day length and weather patterns.				Use a diagram or model to explain why the Sun seems to travel across the sky, and what causes day and night. **Greater Depth:** Identify that the further out a planet is, the longer its orbit is around the Sun. Relate the Moon's orbit of the Earth to the Earth's orbit of the Sun. Recognise that many heavenly bodies are approximately spherical. Explain the effect of a planet in the solar system rotating at a different rate to Earth.	

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Chemistry	Early Years	Y1	Y2	Y3	Y4	Y5	Y6
Materials and their Properties: (Progress of knowledge From NC).		**Everyday materials** Pupils should be taught to: • distinguish between an object and the material from which it is made • identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock • describe the simple physical properties of a variety of everyday materials; • compare and group together a variety of everyday materials on the basis of their simple physical properties	**Uses of everyday materials** Pupils should be taught to: • identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching	**Rocks** Pupils should be taught to: • compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • describe in simple terms how fossils are formed when things that have lived are trapped within rock • recognise that soils are made from rocks and organic matter	**States of matter** Pupils should be taught to: • compare and group materials together, according to whether they are solids, liquids or gases • observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) • identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature	**Properties and changes of materials** Pupils should be taught to: • compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets • know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution • use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • demonstrate that dissolving, mixing and changes of state are reversible changes explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda	
Materials and their Properties (Progress of knowledge from St Marys Curriculum).		that matter (stuff) is made from tiny building blocks. an object is made from/of a material. difference between an object and the material that it is made from. distinguish between materials made of wood, plastic, glass, metal, water, rock. materials can be hard, soft, strong, weak, absorbent, heavy, light, solid and runny, smooth and rough; these descriptions denote the physical properties of a material. compare and group together a variety of everyday materials on the basis of their simple physical properties.	materials can have useful properties for a given job (including being waterproof, strong, hard, soft, flexible, rigid, light or heavy). many types of plastic are waterproof, that steel (a type of metal) is strong, that rock is hard, that cotton wool is soft, that rubber is flexible, that rock is rigid, that polystyrene (a type of plastic) is light and that iron (a type of metal) is heavy. compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. when objects move across a surface there is friction when they rub against each other and that sometimes this friction is larger or smaller. applying forces to objects can change their shape (squashing, bending, twisting and stretching).	compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. there are three kinds of rocks: igneous, sedimentary and metamorphic. the Earth has a solid crust made up of tectonic plates with molten rock beneath. granite and basalt are types of igneous rock and that igneous rocks form from molten rock below the Earth's crust. limestone and sandstone are types of sedimentary rock which form when small, weathered fragments of rock or shell settle and stick together, often in layers. marble and slate are types of metamorphic rock which form when rocks in Earth's crust get squashed and heated in processes such as when tectonic plates press against each other. fossils form when a plant or animal dies and is quickly covered with silt or mud so that it cannot be rotted by microbes or eaten by scavenging animals; in time layers of sediment build, squashing the mud and turning it to stone around the dead plant or animal; the materials in the body are replaced by minerals that flow in water through the rock, leaving a rock in the shape of the animal or plant that was once there. soil is made from tiny particles of rock broken down by the action of weather (weathering) and organic matter.	things are composed of a material in one of three states of matter: solid, liquid or gas and that materials can be grouped according to their state. things are made of particles (tiny building blocks) and that these are organized differently in different states. materials can change state when temperature changes and measure or research the temperature at which this happens in degrees Celsius (°C). there are bonds between the particles (building blocks) in a solid; as temperature increases, these bonds are somewhat overcome as the particles absorb energy and solids can change into liquids; with a further increase in temperature, the particles become even more energetic and the bonds are overcome entirely so the liquid changes into a gas. when solids turn into liquids, this is called melting and that the reverse process is called freezing. when liquids turn into gases, this is called evaporation and that the reverse process is called condensation. when a solid turns into a gas without passing through the liquid state, this is called sublimation. the melting point of water is 0oC and that the boiling point of water is 100oC. water flows around our world in a continuous process called the water cycle. along with evaporation, water on the Earth's surface moves to the air in a	materials can be compared and sorted in a variety of ways based on their properties including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. in some solid materials the bonds between particles break when surrounded by a liquid; this allows the liquid to absorb the solid; when this happens, the solid is called a solute, the liquid is called a solvent and the result is a solution; when a solid does dissolve in a liquid it is described as being soluble in that solvent (e.g. sugar in water); when it cannot it is insoluble (e.g. sand in water). a given amount of solvent can only absorb a certain amount of solid before no more will dissolve; when this happens the liquid is said to be saturated. when a solvent is evaporated from a solution, the original solute is left behind; the remaining solid will often form crystals–the slower the solvent evaporates, the larger the crystals that will be formed. how to dissolve and a solute in a solvent and then how to evaporate the solvent to recover the solute. demonstrate that a reversible change is one that can be reversed and that examples of this are mixing, dissolving and changes of state where no chemical reaction takes place. an irreversible change is one that cannot be reversed and that examples of this often involve a chemical change where a new material is made, often a gas (e.g.	

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				process called transpiration in which water turns into water vapour (gas) on the surface of leaves on plants. rain condenses in clouds and falls to earth as rain, snow or hail in a process called precipitation. water flows across the land in rivers and streams in a process called surface run-off and under the ground as ground water.	burning, boiling an egg, the reaction of bicarbonate of soda and acid). filtering allows solids and liquids to be separated and that sieving allows solids made up of different sizes parts to be separated. how to separate a mixture of sand, salt and small stones by sieving (to remove the small stones),followed by dissolving in water (so the salt is absorbed), followed by filtering to remove the sand from the mixture, followed finally by evaporation of the water to recover the salt. materials' different properties can be tested through acting upon them, including testing to find whether materials are magnetic, thermally conductive and electrically conductive; the various properties of different materials make them suitable for a given function. explain orally and in writing the reasons why various materials are suited or unsuited to a function, based on evidence from comparative and fair tests.	
Different rocks have different properties and the formation of soil & fossils can be explained.				**Expected:** Explain how fossils are formed. Describe how soil is made. **Greater Depth:** Explain the importance of studying fossils. Compare different soils in terms of composition.			
Materials have physical properties which can be investigated and compared		**Expected :** Correctly identify both object and material. Identify and name a range of materials. Describe a range of properties of a variety of materials. Classify a variety of materials into groups based on physical properties. **Greater Depth:** Compare the same object made from different materials in terms of its effectiveness. Identify typical uses of a range of materials. Compare the physical properties of different everyday materials. Use simple physical properties to suggest classification of materials.	**Expected:** Describe changes achieved by applying forces in different directions. **Greater Depth:** Identify that some changes to shapes are permanent and others are temporary, and that this can influence their uses.	**Expected:** Examine and test rocks, grouping them according to the results. **Greater Depth:** Suggest uses for different kinds of rocks based on their properties.	**Expected:** Group materials according to their state of matter. **Greater Depth:** Recognise that some materials (e.g. toothpaste) cannot be easily classified as solid, liquid or gas.	**Expected:** Test and sort a range of materials based on their physical properties. Describe how some materials, e.g. sugar, will dissolve and can be retrieved. Justify separation techniques proposed, with reference to materials being separated. Show how the original materials can be retrieved from each of these changes. Identify reactants and products of chemical changes and recognise these as being irreversible. **Greater Depth:** Suggest why those properties might influence the selection of those materials for certain uses. Identify that some soluble materials are more soluble than others.	

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						Explain why a particular separation method might be more effective. Classify various processes relating to materials as reversible or irreversible. Provide examples of when changes being irreversible are a good thing, e.g. making bricks, or not, e.g. non-biodegradable plastic bags.	
The physical properties of materials determine their uses.			**Expected:** Select and justify a material for a particular use. **Greater Depth:** For particular materials in particular uses, identify limitations as well as suitability.			**Expected:** Use evidence to justify the selection of a material for a purpose. **Greater Depth:** Suggest limitations of the uses of selected materials based on test results.	
Materials can exist in different states and that these states can sometimes be changed				**Expected:** Describe how evaporation and condensation happen in the water cycle, and how temperature affects evaporation. Identify changes of state and research values of degrees Celsius at which changes happen. **Greater Depth:** Apply the relationship between rate of evaporation with temperature to everyday contexts. Suggest patterns in which kinds of materials change state at higher or lower temperatures.			