SCIENCE PROGRESSION OF DISCIPLINARY AND SUBSTANTIVE STRANDS

DISCIPLINARY KNOWLEDGE

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Questioning 	Question why things happen. Ask questions to find out how things work.	Can ask simple questions. Can ask yes and no questions to sort and classify. Can raise own questions.	Can ask simple questions relevant to the topic. Know their questions can be answered in different ways. Can use a range of question stems.	Can raise questions and carry out tests with support to find things out. Can write a range of questions relevant to the topic. Can answer questions posed.	Can ask a range of questions to sort and classify. Can write a range of questions using own scientific knowledge. Can answer questions independently using secondary sources.	Use scientific experiences to explore ideas and raise different higher order questions. Can create further questions to investigate. Can raise questions and suggest reasons for similarities and differences	Can raise questions to further prove or disprove a scientific enquiry. Can raise questions about a range of phenomena.
Predicting 	Can make simple predictions based on comparisons e.g. float or sink.	Can make basic predictions over things they can see or their own ideas. Use some scientific vocabulary.	Draws knowledge from observations to make predictions. Can begin to test predictions and later answer questions.	Draws on knowledge to make predictions. Can add detail to their predictions. Make further predictions based on what's observed or tested.	Predictions are detailed and explain their thinking, they link to tests, data and use scientific language. Raise further predictions from results based on patterns.	Use subject knowledge, observations or previous learning to make predictions. Add detail and explanations. Can identify a range of variables which could affect their investigations.	Use test results to make predictions to set up further comparative tests. Uses evidence to support predictions. Develop predictions based on research and scientific knowledge.
Planning enquiries 	Test out ideas and take risks through trial and error. Engage in open ended activities. Choose resources they need for their activity from their environment. Find ways to solve problems.	Begin to recognise ways they may answer scientific questions. Experience different types of enquiry including practical activities. Use resources provided by the teacher and suggest some resources of their own e.g. pipettes.	Can plan and carry out simple tests linked to the different types of enquiry. They can carry out a simple comparative test using some of their own ideas. Can suggest their own resources to carry out tests.	Can set up practical enquiries using comparative and fair tests. Use a range of scientific enquiry. Can investigate and answer questions linked to a shared planning frame. Understand some of the variables needed to be controlled with support. Use a range of equipment e.g. thermometers and data loggers.	Can identify the type of enquiry needed to answer a question. Follow a plan to carry out observations and tests. Use a planning approach with more independence identifying variables and what needs measuring. Children choose their method to carry out their investigation.	Recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and changed. Understand what type of scientific enquiry is needed to answer and prove/disprove scientific questions or phenomenon.	Children choose the type of enquiry needed to carry out their investigation. Children can pose and answer their own questions, controlling variables where necessary independently. Decide whether sample size needs to be increased for validity. Identify a range of factors which may affect their investigation.
Observing and Measuring 	Observe and describe what they see using everyday language. Use equipment such as magnifying glasses and viewers. Take measurements by comparing and notice simple patterns e.g. bigger/smaller.	Can identify and group, compare and contrast using observations, video and photographs. Can observe changes over time and describe changes. Can use magnifying glasses, viewers and digital microscopes. Use simple measurement and equipment such as egg timers and stop watches. Use non-standard measures.	Observe closely and select the correct equipment. Can identify a range of plants using ID charts. Observe how plants and animals grow and record findings. Notice similarities and differences. Use observations and ideas to suggest answers to questions. Use standard units to estimate and measure. Use rulers, scales, thermometers and measuring vessels with a degree of accuracy.	Make systematic and careful observations. Select their own equipment for observing including digital cameras. Look for naturally occurring patterns. Collect data from their own observations. Can make observations and decide how to record them to answer a question. Take accurate measurements using standard units. Use a range of equipment and begin to read digital measurements from data loggers and stop watches	Make systematic and careful observations to ask questions and group objects using classification keys. Observe closely and explain processes. Identify similarities, differences or changes related to simple scientific ideas or processes. Take and record accurate measurements using standards units to 2dp. Use data loggers to record. Use volt metres and begin to gather repeat readings to increase accuracy.	Observe carefully and make comparisons. Observe changes over a period of time. Make decisions about what to observe to answer questions. Use observation skills and ID kits to identify plants and animals. Take repeat measurements where appropriate. Can find the average of data. Select measuring equipment and use accurately e.g. ruler, tape measure, trundle wheel, force metres.	Can make accurate drawings of plants and animals based on observations. Take measurements using a range of scientific equipment with increasing accuracy and precision, taking repeat readings where appropriate. When collecting measurements decide whether to increase sample size for validity and reliability. Record measurements to 3dp. Use protractors, rulers, force metres, volt meters accurately

Recording 	Draw pictures or objects in their own environment. Can take photos of things that interest them. Can count results and start to make marks to record results. Can sort in at least 2 groups. Can create a class pictogram using pictures and objects.	Begin to show some accuracy in drawings, observations and use simple labels. Use scientific vocabulary provided by the teacher. Can complete a simple prepared table with some support and scaffolding. Can add marks to a chart to complete data.	Gather and record data to help answer questions. Record observations using photo video, drawings, labelled diagrams or in writing. Count results using tally charts. Use prepared tables to record results more independently. Use simple keys based on yes and no questions. Can sort into 2 groups with own categories and explain reason for choices. Record using prepared bar charts.	Record findings using scientific language, drawings and labelled diagrams including detailed labelling and written explanations based on observations. Can complete a table where they can add own headings and results. Use simple classification keys and Venn diagrams. Can use Carroll diagrams and give reasons for criteria. Can produce bar charts adding own axis labels and headings.	Record findings using systematic and careful observational drawings and labelled diagrams using scientific vocabulary. Children to present the same data in different ways. Can create own tables with headings. Can record using classification keys. Can use Venn and Carroll diagrams with accuracy. Can use discrete and continuous data using line/scatter graphs. Can construct bar chart independently.	Present results in a variety of ways to help answer questions. Can decide how to record from a range of approaches. Can record ideas using accurate diagrams using scientific language. Create own results table including cause and effect. Record results systematically and repeat readings. Use and develop classification keys. Can classify in a number of ways. Use line or scatter graphs to calculate range in a set of data using different scales. Can produce line graphs with various increments.	Record data and results with increasing complexity e.g. accuracy of measurements. Use scientific diagrams, models and labels accurately with clarity and using precise scientific language. Calculate mean and range of a set of data. Can use and produce classification keys independently by posing questions. Can independently collect data and produce scatter and line graphs. Can create bar charts and pie charts to present data.
Interpreting and Concluding 	Offer explanations for why things happen- making use of some recently introduced scientific vocabulary. Develop own narrative and explain by connecting ideas or events. Develop vocabulary which meets the breadth of their experiences.	Can use evidence from simple tests when answering questions. With help begin to notice patterns and relationships. Talk about what they have found out and how they found it out. Can make comparisons and recognise biggest/smallest, most effective/least effective from data. Can use simple models to explain processes e.g. seasonal changes, lifecycles.	Communicate findings to an audience using relevant scientific language and illustrations. Can identify casual relationships and patterns in results. Can identify which results do not fit the overall pattern and explain findings. Refers to the table of results when describing what has happened. Draws a basic conclusion (with support from the teacher) using own scientific knowledge, observations and comparisons. Uses results of investigations to answer enquiry questions.	Draws conclusions based on observations. Can compare something using results and the conclusion is consistent with the data. Able to adjust opinion and predictions based on results. Can give reasons for results including any anomalies. Use simple scientific language to discuss ideas and communicate their findings in ways appropriate for different audiences orally and written	Draws simple conclusions from results to answer questions and support their ideas. Look for casual relationships in data and identify evidence that refutes/supports ideas. Report on findings to an audience orally and in writing using appropriate scientific vocabulary for a range of audiences. Children use evidence to suggest values for different items tested using the same method. Draw conclusions based on straightforward evidence and current subject knowledge to support their findings, Suggest improvements and raise further questions.	Identify patterns and casual relationships that may be found in the natural environment. Children interpret data to generate simple comparative statements based on evidence. Use results to draw conclusions and can identify external factors that cannot be controlled e.g.temperature inside and outside. Use scientific language and illustrations to discuss, communicate and justify scientific ideas. Can use comparative statements to explain results and how things work.	Look for patterns and relationships using a suitable sample. Use oral and written forms such as displays to report conclusions, casual relationships and give an explanation of the degree of trust in their results. Makes suggestions for ideas that can be explored using pattern seeking. Can spot anomalies and identify results that do not fit the overall pattern. Use data to refute or support ideas or arguments. Focuses on scientific reasons for overall pattern rather than a comparison. Uses labelled diagrams to support their explanation. Use ideas from secondary sources to support their ideas, choosing appropriate websites. Create detailed models to explain processes such as circulatory system and lifecycles.

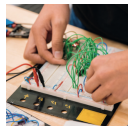
Evaluating 	Develop own narrative and explanations by connecting ideas or events. Talk about what they have found and say what worked well. Describe how things work in simple terms and make basic alterations and suggest things that did not work (e.g. this button does not work so press this one) Question why things happen. Come up with alternative ways of doing things through exploration. They can say or indicate by smiley faces/scale if they have achieved the learning objective.	With scaffolding and prompting can suggest simple improvements to their enquiries. Talk about some changes that could be made. Use simple success ladders to evaluate their tests or understanding against the learning objective.	With support can suggest improvements to their enquiries. Suggest some things that could be changed and evaluate why things went wrong. Use success ladders with multiple criteria to evaluate the test or their understanding against the learning objective.	Suggest improvements and raises further questions Use evidence and subject knowledge to refute statements. Make suggest improvements from enquiries. Make basic statements about what worked well and what they would change. Use success ladders confidently to evaluate their tests or understanding against multiple criteria and suggest simple next steps.	Evaluate and communicate their methods and findings. Suggest ways to improve what they have already done. Begin to evaluate different aspects of their enquiries such as equipment. Begin to understand how the enquiry improves outcomes from their questions. Use different charts to evaluate such as ranking scales, star diagrams and success ladders. Suggest points for development based on the weakest aspects.	Evaluate and decide when further observations, comparative and fair tests might be needed. Evaluate different aspects of their enquiries such as equipment and accuracy of measurements. State how the enquiry improves outcomes from their questions. Can relate their results to the question and state if their test has enabled them to answer it. Use a range of charts to evaluate such as ranking scales, star diagrams including those with negative numbers. Suggest next steps based on the weakest aspects and state how this will help them or the test progress or give different results.	Can describe and evaluate their own and other people's scientific ideas using evidence from a range of sources. Evaluate their choice of method, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources. Use scientific language and evaluate how their enquiry has answered the question.

SUBSTANTIVE KNOWLEDGE

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
BIOLOGY							
Animals Including Humans	 Can name a range of animals e.g. farm/jungle. Can group using basic characteristics e.g. land/sea, 4 legs, can fly/cant fly. Can name and point to different body parts e.g. head, body, tummy, knees, legs, arms, toes, eyes, ears, mouth, nose, hair, fingers. Know basic senses e.g. touch, taste, hear, see.	 Can name a range of animals which include animals from each of the vertebrate groups. Understand and categorise animals who are herbivore, carnivore and omnivore. Describe and compare animals based on observable characteristics. Know terms: reptile, amphibian, mammal. Can name, draw and label parts of the human body and say what sense is associated. Can name the 5 senses.	 Can describe how animals change as they get older. Know names of animals and their offspring e.g. goat- Kid. Can order the lifecycle of different animals e.g. butterfly. Can explain what humans and animals need to survive e.g. food, sleep, exercise, water, shelter. Know about microorganisms and how to keep hygienic. Understand the term balanced diet and can identify some food groups. Understand the effects of exercise on the body. Know terms: offspring, nutrition, reproduce, exercise, hygiene, microorganism, germs.	 Can name the main bones in the skeletal system such as skull, ribs, humerus, vertebrae, pelvis, ulna, carpals, radius, femur, phalanges, patella, tibia, tarsals, fibula, metatarsals. Know the function of the skeletal system. Can describe how muscles and joints help to move. See similarities and differences in skeletons can classify into endoskeleton, exoskeleton and hydrostatic skeleton. Can name different nutrients found in food. Know the different food groups and why we need to eat a balanced diet.	 Can identify and label and draw main parts of the digestive system and explain the process. Know the different types of teeth in their mouth: molars, pre molars, canines and incisors and their function. Can identify animals and classify based on their teeth whether they are herbivore, omnivore and carnivore. Can order and draw a range of lifecycles and food chains. Can identify the producer, predators and prey.	 Can explain the changes that take place in boys and girls during puberty. Can explain how a baby changes physically as it grows and what it is able to do at each stage. Understand that different animals have different gestation periods. Know the importance of physical and mental health.	 Can identify, label and draw parts of the circulatory system e.g. heart, blood vessels, capillaries, arteries, blood. Understand the function of the different parts. Understand how nutrients are transported around the body within animals and humans. Know the impact of a balanced diet, exercise and lifestyle on the way their body's function. Recognise the impact on all body systems learned so far.
Living Things and Their Habitats & Evolution and Inheritance	 Can name some plants and animals. Can explore habitats and know where some animals live. Can compare and describe plants and animals.	Know common plants and trees (plants) Identify and name common animals (animals) Know herbivore, carnivore and omnivore (animals) Describe and compare variety of animals (animals)	 Can find a range of items which are dead, living and never been alive. Know what a habitat and micro habitat is and identify animals which live in different habitats. Can talk about features of animals and plants and how they are suited to live in particular habitats. Can construct a simple food chain using terms producer, prey, predator, energy. Can identify different sources of food and understand where food comes from.	Identify and describe functions of different plants. (Plants) Identify and describe different animals and how they are adapted to live in different environments. Understand the term climate (Animals) Can explain how a fossil is formed (Rocks).	 Can name living things in a range of habitats, giving key features that helped identify them. Can give examples of how an environment might change both naturally and due to human impact. Explain how changes in environment can be dangerous to animals and lead to extinction. Know that some animals hibernate.	 Describe the lifecycles of mammals, amphibians and insects using diagrams. Can describe similarities and differences between them. Understand the term reproduction in plants and animals.	 Can give examples in the five vertebrate groups and some in the invertebrate group. Can give key characteristics of these groups. Can give examples of flowering and non-flowering plants. Can identify unknown plants using ID and classification charts. Can explain why animals belong to groups. Know that C. Linnaeus classify plants and animals. Can explain the process of evolution and give examples of how plants and animals are suited/adapted to their environment. Give examples of how animals have evolved over time. Understand that fossils give us evidence of the past and know the process of fossilisation.

Plants	 Make observations and drawings of plants. Know similarities and differences between the natural world and contrasting environments. Can plant seeds and care for growing plants. Understand basic plant lifecycle. Know leaf, stem, petals.	 Can name common plants and describe the basic parts of flowering plants (deciduous/evergreen) Can describe kkey features of trees and plants e.g. shapes of leaves, colour of flower, blossom. Can use photos to talk about how plants change. Can talk about plant lifecycles. Know basic parts of plant e.g. leaf, stem, petal, flower, stalk, bud, roots, fruit, bark, blossom.	 Can describe how plants have grown from seeds and bulbs and how they have developed over time. Know conditions for plant growth. Can spot similarities and differences in bulbs and seeds. Confident in ordering parts of the plant lifecycle. Know all parts of the plant and their function. Know terms: light, shade, sun, warm, grow, healthy, growth, germinate.	 Can explain the function of the parts of a flowering plant. Can explain the life cycle of a flowering plant lifecycle including pollination, seed formation, seed dispersal and germination. Know different methods of seed dispersal. Know the requirements of plant growth and how water is transported through the plant. Know how the sun helps plants photosynthesis. Know terms: photosynthesis, pollen, pollination, absorb, nutrients, reproduce, germination, stamen and style.	Can classify plants in different ways (Living things)	Can explain the lifecycles and processes of a range of different plants and trees. Can use ID guides to identify plants. (Living things)	Can classify plants in different ways using observable characteristics/ similarities and differences. Give reasons for classifying plants based on characteristics (Living things)
CHEMISTRY							
Materials & Rocks	 Can talk about the similarities and differences between materials. Can describe using basic words. They can group materials based on how they feel or look like.	 Can label a picture of an object based on what it is made of. Can describe the properties of materials. Can sort materials using its properties. Know terms: wood, plastic, glass, metal, water and rock.	 Compare the suitability of different materials including wood, metal, plastic , glass, brick, rock, paper, cardboard, water. Know that shapes of solid objects can be changed by squashing, bending, twisting and stretching. Can describe similarities and differences.	 Compare and group types of rock and give physical features of each. Explain how a fossil is formed. Explain that soils are made from rocks and also contain living/dead matter. Classify rocks in a variety of ways using scientific vocabulary. Test properties of rocks. Describe materials using transparent, translucent and opaque.	 Can name properties of solids, liquids and gasses. Can explain process of melting and freezing. Know the terms evaporation and condensation. Can describe the water cycle. Know materials have different melting points. Can test a variety of materials to answer questions.	 Can explain every day uses of materials. Can explain what dissolving is. Can name equipment for filtering and sieving. Know how to recover substances from solutions or mixtures by evaporation, filtering or sieving. Can describe reversible and non-reversible changes to materials and give examples.	Recognise that things have changed over time and fossils provide information about living things that inhabited the Earth millions of years ago. (Evolution and Inheritance)

PHYSICS

Forces & Electricity	 Shows skills in making toys work by pressing parts or lifting flaps to achieve effects such as sound, movement or new images. Understand push and pull.	Understand the terms push and pull. Can move objects by applying a force such as pushing a car.	Know how different materials can be changed by applying a force such as squashing, bending, twisting and stretching.	 Compare how things move on different surfaces. Can give examples of forces in everyday life. Name a range of magnets. Know that magnets have a north and south pole. Can show how the poles attract and repel. Can draw diagrams to show the attraction and repulsion between poles of magnets. Can name magnetic and non-magnetic materials.	 Electricity- can name the components in a circuit. Can make a simple circuit. Can control a circuit using a switch. Can name some conductors and insulators. Can use drawings to represent their circuits. Can describe how a circuits works. Can name some appliances that run on battery/mains. Know how to make a bulb brighter.	 Can explain the effects of gravity acting on an unsupported object. Can give examples of friction, water resistance and air resistance. Can give examples of the benefits of high/low friction, water resistance and air resistance. Can demonstrate how pulleys, levers and gears work. Know that these systems can make lifting heavy objects easier.	 Understand different forces and can apply this knowledge across different subjects e.g. geography. Electricity- Understand voltage and amps. Know how to make bulbs brighter, buzzers louder. Can label and name components in a circuit. Can draw circuits using symbols. Make circuits to solve particular problems such as a quiet and a loud burglar alarm.
Seasonal Changes Light Sound Earth and Space	 Know the four seasons Can experience different seasons and describe how they feel. Can comment on the environment e.g. leaves on the ground. Can name some clothes they may wear. Know some weather e.g. rain, wind, sun, snow, cloud. Understand the terms night/day	 Can name the four seasons and identify in the year when they occur. Can observe and describe the weather in different seasons. Can describe days being longer in summer and shorter in winter. Compare seasons.	Know that the sun rises and sets. Understand that we have night and day. Know why the sun helps plants grow. (plants) Know that it is dangerous to look at the sun (animals)	 Light- Can describe how we see objects in light and describe dark as the absence of light. Know it is dangerous to look at the sun. Understand the term ultra violet. Know the terms transparent, translucent and opaque. Can describe how shadows are formed Predict which materials will be more/less visible. Know the term reflective and why reflective materials are useful.	 Sound- Can describe different types of objects producing different sounds. Know that sound is caused by vibrations. Can describe how sound travels through different mediums e.g air, water, metal. Can find patterns between pitch and volume and the features of the objects producing it. Know that sounds get fainter as the distance from the sound increases.	 Earth and space- Know how the earth and moon move. Know different planets in the solar system. Can understand night and day by explaining the rotation of the earth on its axis. Understand why shadows change using scientific vocabulary and the position of the sun. Can explain how a sundial works. Can explain why we have time zones.	 Light- Can describe using diagrams how light travels in straight lines, either from sources or reflected from other objects into our eyes. Can explain how we see things and can label basic parts of the eye and explain their function. Can describe with diagrams how light travels past translucent or opaque objects to form shadows of the same shape. Know how to change the size of shadows by moving objects closer/further from light source.