Substantive and Disciplinary Knowledge- Science

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Substantive: Biology	**Animals, plants and people** **ELG: Explore the natural world around them, making observations and drawing pictures of animals and plants.**	**Animals including humans** Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. **Plants** Identify and name a variety of common plants, including garden plants, wild plants and trees, and those classified as deciduous and evergreen. Identify and describe the basic structure of a variety of common flowering plants, including roots, stem/trunk, leaves and flowers.	**All living things and their habitat** 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 micro habitats. 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. **Animal including humans** 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. **Plants** Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.	**Animals including humans** 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 animals have skeletons and muscles for support, protection and movement. **Plants** Identify and describe the functions of different parts of flowering plants: roots, stem, 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.	**Animals including humans** Describe the simple functions of the basic parts of the digestive system in humans. 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. **All living things** 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.	**Animals including humans** Describe the changes as humans develop to old age. **Living things and their habitats** 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.	**Animals including humans** 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. **Evolution and inheritance** Recognize that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. Recognize that living things have changed over time and that fossils provide information about living things that inhabited the earth millions of years ago. Identify how animals are adapted to suit their environment in different ways and that adaptation may lead to evolution. **Living things and their habitats** 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.

Substantive: Chemistry	**Materials** **ELG: Understand some important processes and changes in the natural world around them, including changing states of matter.** Know about similarities and differences in relation to objects, materials and living things Talk about the different textures of materials.	**Every day material** 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.	**Use of everyday materials** 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** 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** 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.** 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.	

Substantive: Physics	**Seasons** **ELG: Understand some important processes and changes in the natural world around them, including the seasons.** **ELG: Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.** Comments and asks questions about aspects of their familiar world such as the natural world. Observe the weather daily and discuss changes over time.	**Seasonal Change** Observe changes across the four seasons. Observe and describe weather associated with the seasons and how day length varies.		**Forces and magnets** Compare how things move on different surfaces. Notice that some forces need contact between two 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 two poles. Predict whether two magnets will attract or repel each other, depending on which poles are facing. **Light** 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.	**Electricity** 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 **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.	**Forces** 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 force and motion can be transferred through mechanical devices such as gears, pulleys, levers and springs, allow a smaller force to have a greater effect. **Earth and Space** 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.	**Electricity** 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. **Light** 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.

Scientific Enquiry skills		Explore the world around them and raise their own simple questions. Experience different types of science enquiries, including practical activities. Begin to recognise different ways in which they might answer scientific questions. Talk about what they have found out and how they found it out. With help, they should record and communicate their findings in a range of ways and begin to use simple scientific language.	Raise their own relevant questions about the world around them. Should be given a range of scientific experiences including different types of science enquiries to answer questions. Start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions. Take accurate measurements using standard units learn how to use a range of (new) equipment, such as data loggers / thermometers appropriately. Use relevant simple scientific language to discuss their ideas and communicate their findings in ways that are appropriate for different audiences, including oral and written explanations, displays or presentations of results and conclusions.	Use their science experiences to explore ideas and raise different kinds of questions. Select and plan the most appropriate type of scientific enquiry to use to answer scientific questions. Look for different causal relationships in their data and identify evidence that refutes or supports their ideas. Decide how to record data and results of increasing complexity from a choice of familiar approaches: scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas, use oral and written forms such as displays and other presentations to report conclusions, causal relationships and explanations of degree of trust in results.
	Disciplinary: Observing	**EYFS** Talks about why things happen and how things work Looks closely at similarities, difference, patterns and change **KS1** Use simple measurements and equipment (e.g. hand lenses, egg timers) to gather data. Record simple data. Observe closely using simple equipment with help, observe changes over time. Use their observations and ideas to suggest answers to questions.	**LKS2** Make systematic and careful observations. Collect and record data from their own observations and measurements in a variety of ways: notes, bar charts and tables, standard units, drawings, labelled diagrams, keys and help to make decisions about how to analyse this data. With support, they should identify new questions arising from the data, making predictions for new values within or beyond the data they have collected and finding ways of improving what they have already done. Help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used.	**UKS2** Take repeat measurements where appropriate. Use their results to make predictions and identify when further observations, comparative and fair tests might be needed. Choose the most appropriate equipment to make measurements with increasing precision and explain how to use it accurately. Make their own decisions about what observations to make, what measurements to use and how long to make them for.

	Disciplinary- Pattern Spotting	**EYFS** Looks closely at similarities, difference, patterns and change **KS1** With guidance, they should begin to notice patterns and relationships. Experience different types of science enquiries, including practical activities.	**LKS2** With support, they should identify new questions arising from the data, making predictions for new values within or beyond the data they have collected and finding ways of improving what they have already done. With help, pupils should look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions. Begin to look for naturally occurring patterns and relationships and decide what data to collect to identify them.	**UKS2** Continue to develop and imbed the skills learnt in LSK and take repeat measurements where appropriate.
	Disciplinary- Grouping		**LKS2** Talk about criteria for grouping, sorting and classifying; and use simple keys	**UKS2** Use and develop keys and other information records to identify classify and describe living things and materials, and identify patterns that might be found in the natural environment.
	Disciplinary- Comparative and fair testing	**KS1** Carry out simple tests.	**LKS2** Set up simple practical enquiries, comparative and fair tests. With support, they should identify new questions arising from the data, making predictions for new values within or beyond the data they have collected and finding ways of improving what they have already done. Recognise when a simple fair test is necessary and help to decide how to set it up.	**UKS2** Recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why.
	Disciplinary - Secondary sources	**KS1** Ask people questions and use simple secondary sources to find answers.	**LKS2** Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigation.	**UKS2** Identify scientific evidence that has been used to support or refute ideas or arguments. Talk about how scientific ideas have developed over time. Recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact.