Twin Oaks
Primary School

Science curriculum and progression framework

National Curriculum

At Twin Oaks, we provide a good-quality science education which provides the foundations for understanding the world through biology, chemistry and physics. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They are encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes. At Twin Oaks, we encourage the children to question and wonder about the world around them and how the STEM subjects play a crucial part in their everyday lives.

Alongside the knowledge of the science curriculum, teachers will ensure that children are able to demonstrate and embed their skills through the working scientifically element of the curriculum. Children should be taking part in engaging, practical activities to cement their understanding of age-appropriate content. Within science lessons, teachers will explore the scientific achievements of a diverse range of significant figures and will consider introducing both scientists who are currently practicing as well as those from historical contexts.

When being taught a Science lesson or unit, children will be made aware of the three areas of science; Physics, Chemistry and Biology and where the content they are being taught fits into this. Each year group will have access to content from at least two of the areas and the opportunity to use all of their working scientifically skills each year. The progression for these skills is outlined below.

Year Group	**Physics**		**Biology**			**Chemistry**		
	Materials / States of Matter	Rocks and fossils	Living Things / Evolution	Animals including humans	Plants	Electricity / Light / Sound	Seasonal changes/ Space / day and night	Forces
Year 1	*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.			*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 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	*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 changes across the four seasons. *Observe and describe weather associated with the seasons and how day length varies.	
Year 2	*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		*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	*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.	*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			

			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.					
Year 3		*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.		*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 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.	**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 an opaque object. *Find patterns in the way that the size of shadows change.		*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
Year 4	*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.		*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 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.		**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 in a simple series circuit. *Recognise some common conductors and insulators, and associate metals with being good conductors. **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.		
Year 5	*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.		*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 the changes as humans develop to old age			*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.	*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.

	*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							
Year 6			**Living things** *Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals. *Give reasons for classifying plants and animals based on specific characteristics.	*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.		**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		

			Evolution *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.			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.		

Working Scientifically skills and progression.

All children are given regular opportunities to plan, carry out and evaluate a range of scientific tests and investigations.

Year group	Planning investigations	Conducting experiments	Recording results	Reporting findings	Conclusions and predictions
1	*Pupil can, with prompting, ask simple questions that can be tested, e.g. about plants growing in their habitat *Pupil can offer ways of gathering evidence to answer a question, e.g. by deciding on the best material to use for a particular application	*Pupil can examine objects to note key features, e.g. observe growth of plants they have planted. *Pupil can examine objects to note key features, e.g. observe growth of plants they have planted.	*Pupil can, with prompting, identify what might usefully be recorded, e.g. drawing structures of plants or recording changing day length.	*Pupil can identify key findings from an enquiry, e.g. noting how plants have changed over time.	*Pupil can collect data, e.g. comparing and contrasting familiar plants *Pupil can suggest answers to enquiry questions using data, e.g. describe how to group plants.
2	*Pupil can ask simple questions that can be tested, e.g. about the local environment and how organisms depend on each other. *Pupil can suggest different ways of answering a question, e.g. testing the suitability of materials for different purposes.	*Pupil can examine carefully, e.g. using a hand lens.	*Pupil can, with assistance, draw and label diagrams, e.g. recording plants changing over time, starting from seed or bulb.	*Pupil can identify and group key outcomes from enquiry, e.g. describing conditions in different habitats and how these affect the numbers and types of organisms	*Pupil can collect data relevant to the answering of questions, e.g. seeing how the shapes of some materials can be changed. *Pupil can collect data relevant to the answering of questions, e.g. seeing how the shapes of some materials can be changed.
3	*Pupil can, with support, develop relevant, testable questions, e.g. what happens to shadows when the light source moves. *Pupil can plan enquiry, such as comparative or fair test, e.g. comparing the effect of different factors on plant growth *Pupil can set up a comparative test, e.g. how far things move on different surfaces.	*Pupil can use various equipment, as instructed, e.g. using a hand lens to examine rocks *. Pupil can use standard measurements when taking measurements, e.g. measuring distances between a light source and an object.	*Pupil can, with prompting, draw and label diagrams, e.g. to show how water travels in a plant. *Pupil can, with prompting, use tables to record evidence, e.g. recording what happens when various rocks are rubbed together *Pupil can, with prompting, gather and display evidence in various ways, e.g. about the ways that magnets behave in relation to each other.	*Pupil can, with prompting, write a conclusion based on evidence, e.g. exploring the strengths of different magnets. *Pupil can indicate findings from an enquiry that could be reported, e.g. answering questions about how rocks are formed	* Pupil can, with prompting, recognise patterns that relate to scientific ideas, e.g. investigating the behaviour of magnets. *Pupil can, with support, use evidence to produce a simple conclusion, e.g. the changes that occur when rocks are in water. *Pupil can suggest how an investigation could be extended, e.g. suggesting creative uses for different magnets.
4	*Pupil can develop relevant, testable questions, e.g. based on observations of animals. *Pupil can plan investigations using different types of scientific enquiry, e.g. exploring various materials by observing	*Pupil can use various equipment, as instructed, repeatedly and with care, e.g. thermometers. *Pupil can recognise the importance of using standard units and measures accurately, e.g. measuring temperature when	*Pupil can use words and diagrams to record findings, e.g. how habitats change during the year. *Pupil can use various ways to record evidence, e.g. comparing	*Pupil can write a conclusion based on evidence, e.g. effect on brightness of bulbs if more cells are added. *Pupil can present findings either in writing or orally,	*Pupil can recognise patterns that relate to scientific ideas, e.g. finding out which materials make better earmuffs *Pupil can use evidence to produce a simple conclusion,

	change over time, running comparative tests and conducting surveys. *Pupil can set up comparative and fair tests, e.g. finding patterns in the sounds made by elastic bands of different thicknesses.	investigating its effect on washing drying	the teeth of herbivores and carnivores. *Pupil can use various ways to record, group and display evidence, e.g. grouping and classifying various materials.	e.g. relating to investigating which materials are conductors	e.g. the effect of temperature on various substances. *Pupil can use evidence to suggest further relevant investigations, e.g. making own instruments, using ideas about pitch and volume
5	*Pupil can, with support, can 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. *Pupil can, with support, can 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.	*Pupil can, following discussion of alternatives, selects appropriate equipment, e.g. using a shadow stick and measuring length and angle of shadow *Pupil can take measurements that are precise as well as accurate, e.g. measuring the force needed to pull different shapes of boat through the water. *Pupil can know how to process repeat readings, e.g. when timing falling objects.	*Pupil can start to use labelled diagrams to show more complex outcomes, e.g. comparing the time of day at different places on the earth. *Pupil can, with prompting, use various ways to record complex evidence, e.g. when investigating how gears and levers enable a small force to have a larger effect. *Pupil can use a line graph to record basic data, e.g. length and mass of a baby as it grows.	*Pupil can use a line graph to record basic data, e.g. length and mass of a baby as it grows. *Pupil can, with support, display and present key findings from enquiries orally and in writing, e.g. suggesting reasons for similarities and differences between various animals. *Pupil can, with support, indicate why some results may not be entirely trustworthy, e.g. when timing falling objects.	*Pupil can show how evidence supports a conclusion, e.g. researching gestation periods of various mammals and relating them to adult mass. *Pupil can suggest further relevant comparative or fair tests, e.g. when testing materials for various properties to determine their suitability for an application.
6	*Pupil can answer questions using evidence gathered from different types of scientific enquiry, e.g. operation of circulatory system from experiment, survey and secondary research *Pupil can identify and manage variables, e.g. distances and sizes in shadow formation.	*Pupil can use appropriate equipment, such as meter rule, to take measurements, such as distance travelled by light. *Pupil can consider how by modifying instrument or technique, measurements can be improved, e.g. when recording route of light rays *Pupil can identify situations in which taking repeat readings will improve the quality of evidence, e.g. investigating the behaviour of components in a circuit.	*Pupil can use labelled diagrams to show complex outcomes, e.g. relating specific adaptations of organisms to environmental factors *Pupil can use various ways, as appropriate, to record complex evidence, e.g. in the construction of a key to aid plant identification. *Pupil can use line graphs to display complex data, e.g. size of object in relation to the size of the shadow it casts.	*Pupil can write a conclusion using evidence and identifying causal links, e.g. in the design of a periscope *Pupil can display and present key findings from enquiries orally and in writing, e.g. deciding how well classifications fit unfamiliar animals and plants *Pupil can, in conclusions, indicate how trustworthy they are, e.g. in relating brightness of bulb to voltage supplied.	*Pupil can identify how an idea is supported or refuted by evidence, e.g. selective breeding to produce animals or plants with desirable characteristics. *Pupil can use evidence to suggest further comparative or fair tests that would develop the investigation, e.g. in the design of rear view mirrors for cars.