Westfields JUNIOR SCHOOL

Science Curriculum
Progression of Skills and Knowledge

At Westfields Junior School, we give children a strong understanding of the world around them whilst acquiring specific skills and knowledge to help them to think scientifically, to gain an understanding of scientific processes and also an understanding of the uses and implications of Science, today and for the future.
To achieve this, lessons are planned to include engaging, practical hands on experiences that encourage curiosity and scientific enquiry. Our aim is that these stimulating and challenging experiences will help children secure and extend their scientific knowledge and understanding as well as their vocabulary to enable them to become scientists in the future.

The National Curriculum for Science	
Years 3 and 4	**Years 5 and 6**
The principal focus of science teaching in lower key stage 2 is to enable pupils to broaden their scientific view of the world around them. They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions. They should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out. 'Working scientifically' is described separately at the beginning of the programme of study, but must always be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content. Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word-reading and spelling knowledge.	The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings. 'Working and thinking scientifically' is described separately at the beginning of the programme of study, but must always be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content. Pupils should read, spell and pronounce scientific vocabulary correctly.

SKILLS	Progression of Skills			
	Year 3	Year 4	Year 5	Year 6
Working Scientifically	• Ask simple scientific questions e.g. 'which materials attract magnets?' • Set up simple enquiries and comparisons e.g. how water affects a plants life-cycle. • Make careful observations e.g. about animal skeletons, relating this to movement. • Take accurate measurements using: ✓ data loggers e.g. light for plant growth ✓ rulers e.g. height of plants • Record what I have found out using: ✓ scientific vocabulary ✓ drawings e.g. animal skeletons ✓ tables e.g. types and properties of rocks • Write what I have found out in a simple report e.g. about rocks or skeletons. • Present what I have found to the class orally e.g. about how water is transported by plants. • Use the results I have found to draw simple conclusions and make suggestions for improvement e.g. with shadows formed by sources of light. • Identify patterns in scientific ideas and processes by explaining similarities, differences and changes e.g. how the shape of an object changes the shape of a shadow. • Use the evidence from my own and other people's experiments to support what I have found.	• Ask relevant questions and make simple predictions e.g. what effects the temperature of water? • Set up enquiries and comparisons e.g. classifying and sorting vertebrates and invertebrates. • Discuss and set up simple fair tests e.g. the effect liquids have on the decay of teeth. • Make systematic and careful observations e.g. about teeth and what causes decay over a period of time and how food is digested. • Take accurate measurements using: ✓ thermometers e.g. when testing temperatures of water ✓ data loggers e.g. measuring sound around the school ✓ rulers e.g. height of plants ✓ timers e.g. rate of evaporation • Present my findings/data using: ✓ scientific vocabulary ✓ drawings and labelled diagrams e.g. drawing circuits, food chains and food digestion ✓ tables e.g. collecting results for plant experiment ✓ bar charts e.g. amount of water evaporated from each site ✓ keys e.g. classification branching databases • Record my results in a written report or explanation e.g. identifying best toothpaste and after making circuits • Deliver an oral report or presentation on my findings e.g. using classification keys.	• Ask relevant scientific questions and make predictions e.g. across topic on forces and material investigations. • Plan different kinds of fair experiments e.g. experiments on forces and changes of state. • Tell you how I control variables in my experiments e.g. discuss controls and fair testing during dissolving experiments. • Take accurate measurements choosing from a range of different scientific equipment e.g. cylinders, pipets, measuring spoons and beakers. • Tell you why it's important to take repeated measurements e.g. to look for margins of error and viability of tests. • Record data using: ✓ labelled scientific diagrams e.g. of the Earth Sun and Moon and Planets order from the sun ✓ classification keys e.g. materials ✓ tables e.g. balancing Newtons ✓ line graphs e.g. length of shadows over time • Make predictions about how other tests will work using my results e.g. by comparing how properties of similar materials are the same. • Present my findings in a written report with an introduction, conclusion and results e.g. about how solids, liquids and gasses can be separated from mixtures. • Present my findings in an oral presentation e.g. during animal life cycles.	• Ask relevant scientific questions and make predictions e.g. about the voltage of a circuits effect on the brightness of a bulb. • Plan different kinds of fair experiments e.g. when testing light and shadows. • Recognise why controlling variables is important and explain how I do this in my experiments e.g. through identifying fair testing. • Take accurate and precise measurements choosing a wide range of scientific equipment, justifying my choice e.g. and explaining how human error can be detrimental to the results of an experiment. • Take repeated measurements when appropriate e.g. to look for erroneous results that may affect conclusions. • Record data using: ✓ labelled scientific diagrams e.g. circulatory and digestive systems and how light travels ✓ classification keys e.g. animal types ✓ tables e.g. scientific investigations ✓ scatter graphs e.g. pulse v exercise time • Draw conclusions from my results and describe causal relationships in results e.g. how voltage affects the loudness of buzzers if it affects brightness of bulbs. • Explain the degree of trust in results e.g. by looking at a set of

		• Use evidence from results and scientific concepts to give a conclusion and make predictions for new values e.g. how the size of an instrument changes pitch. • Evaluate the experiment and suggest improvements/raise further questions e.g. experimenting with tooth decay and when growing plants in different conditions. • Identify patterns in scientific ideas and processes by explaining similarities, differences and changes by creating what if scenarios for a range of investigations e.g. when investigating food webs and chains. • Use the evidence from my own and other people's experiments to support what I have found to describe the changes to the environment due to humanities impact e.g. when investigating food webs and chains.	• Tell you about other experiments that have been done to support or disprove ideas e.g. investigating earlier experiments about gravity and our Earth • Distinguishing Pseudoscience from science- Flat earth Society • Safety in science- care with looking at the Sun	data and spotting errors or ways to improve the reliability. • Present my findings in a written report with an introduction, conclusion and results e.g. about the effect of drugs or diet on the body. • Present my findings in an oral presentation with an introduction, conclusion and results e.g. about genetics and evolution. • Identify scientific evidence that has been used to support or refute ideas or arguments e.g. by looking at famous scientific discoveries throughout history • Safety in science- identifying the dangers and safe use of electricity

KNOWLEDGE	Progression of Knowledge			
	Year 3	Year 4	Year 5	Year 6
Living Things and their Habitats		• Recognise that living things can be grouped in a variety of ways. • Understand and classify vertebrates and invertebrates. • Understand and classify flowering and non-flowering plants. • 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. • Understand examples of human impact (both positive and negative) on environments.	• 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. • Describe the life process of reproduction in some animals. • Find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall.	• 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. • Classify animals into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals). • Give reasons for classifying plants and animals based on specific characteristics. • Find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification.
Plants	• 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 (lifecycles).			

Animal including Humans	• Identify that animals, including humans, need the right types and amount of nutrition. • Identify that animals, including humans, 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 explain how different parts of the body have special functions.	• 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.	• Describe the changes as humans develop from birth to old age.	• Identify and name the main parts of the human circulatory system. • Explain 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				• 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. • Understand that variation in offspring over time can make animals more or less able to survive in particular environments. • Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. • Find out about the work of palaeontologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution.

Rocks	• Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. • Explore how and why rocks might have changed over time. • Identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them. • 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. • Explore different kinds of rocks and soils, including those in the local environment. • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.			
Light	• Recognise that we need light in order to see things. • Recognise that dark is the absence of light. • Explain that light is reflected from surfaces. • Recognise that light from the sun can be dangerous and that there are ways to protect our 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.			

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 but 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 of the poles are facing.		• Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. • Find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation. • Identify the effects of air resistance. • Identify the effects of water resistance. • Identify the effects of friction that acts between moving surfaces. • Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect.	
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. • Measure or research the temperature at which this happens in degrees Celsius (°C). • Know what evaporation and condensation are. • Identify the part played by evaporation and condensation in the water cycle. • Associate the rate of evaporation with temperature.		

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. • Find out how the pitch and volume of sounds can be changed in a variety of ways. • Recognise that sounds get fainter as the distance from the sound source increases.		
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 associate metals with being good conductors. • Recognise some common insulators.		• 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 ✓ the on/off position of switches • Use recognised symbols when representing a simple circuit in a diagram.

Materials			• Compare and group together everyday materials on the basis of their hardness. • Compare and group together everyday materials on the basis of their solubility. • Compare and group together everyday materials on the basis of their transparency. • Compare and group together everyday materials on the basis of their conductivity (electrical and thermal). • Compare and group together everyday materials on the basis of their 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.	

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.	