Science at West Chiltington Community School

First and foremost, children at our school should be immersed in a range of experiences which awaken their natural curiosity in the world. Alongside the structured and progressive teaching of knowledge, they should be **empowered** with the skills, language and mind-set to, "work scientifically" themselves. They need to know that science can be used to explain phenomena including some of those most pressing problems of our times. They also need to know that science can be used to predict how and why things behave as they do. Throughout their learning, they need to be shown real life applications for science and its power to improve lives.

Scientific Enquiry

KS 1	asking simple questions and recognising that they can be answered in different ways observing closely, using simple equipment performing simple tests identifying and classifying using their observations and ideas to suggest answers to questions gathering and recording data to help in answering questions.
Lower KS 2	asking relevant questions and using different types of scientific enquiries to answer them setting up simple practical enquiries, comparative and fair tests making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
Upper KS 2	During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content: planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs using test results to make predictions to set up further comparative and fair tests

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	reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations identifying scientific evidence that has been used to support or refute ideas or arguments.

Programmes of Study: When allocating these across years and key stages, give careful consideration to-

- The level of challenge- eg-children may quickly grasp the content of the curriculum relating to plants in year 1 and be perfectly ready to understand knowledge and concepts set out for year 2;
- Ways in which the programme of study can be accessed through scientific enquiry;
- How the level of independence children demonstrate in enquiry links to their levels of resilience;

	Plants, animals, humans and evolution	Suggested time allocation (not inc time for teaching sci enquiry)	Potential subject assessment opportunities	Working scientifically connections to our DNA
R	Children will know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes. They make observations of animals and plants and explain why some things occur and talk about changes.	Ongoing through play.	Observations. Photos.	Being independent in their own enquiry. Finding what works and what doesn't. Through play.
1	**Plants:** 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. **Animals, including humans:** 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,	2-3 lessons 3-4 lessons	Physical sorting and discussion. Labelling. Comparing.	Identifying and classifying. Secondary research. Teaching a lot of new vocabulary to empower them to explain the world around them. Often something they can make their own. Understanding that learning about plants and animals is science. Making the science within explicit.

	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.	This could form part of a larger topic.	Sensory activities and investigations.	Linked to wellbeing. Starting to understand what experiences for other people might be like (e.g. hard of hearing)
2	**Living things and their habitats:** 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. **Plants:** 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. **Animals 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.	This could be a focus for several lessons and perhaps part of a wider study. 1-2 lessons More time could be spent on this, particularly the learning about exercise, correct diet and hygiene.	Photographs and videos discussions. Debates including listening and responding to other's points. Creating their own imaginary creatures and describing their adaptations and place within a food chain. Drawings/diagrams/photos. Explain how the diagram works. Spoken or written explanations. Art Design/pack a survival kit. Keep and analyse a fitness/food diary.	Sorting and classifying. Making use of direct experience and working outside. Secondary research. Empowerment to be able to articulate the arguments against habitat destruction. Beginning to understand their own role in caring for the world. Teaching responsibility to look after our own bodies. Resilience in exercise and unhealthy food. Relationships – encouraging one another and being supportive when doing physical activity.
3	**Plants:**		Drama.	

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	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. **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 other animals have skeletons and muscles for support, protection and movement.	1 or 2 lessons. This could be extended to a few lessons if placing it into a wider context / moving on from the basics.	Written records. Role-play bees etc. Discussions on effect of eating just one food type. Describe the effects of conditions which affect muscles and bone strength.	Different types of plant, competitions to see who can grow the most etc. Relationship with the wider world – why is investigating this so important? Look at quickly growing plants e.g. bamboo, cactus and compare. Fair testing. Carnation in coloured water. Cooking – for yourself or preparing food for other animals. Caring for animals. Could be linked to the wider world and how to ensure every person get access to the right nutrition. Animals preferences for food e.g. locusts, snails and reasons why. Looking at conditions which affect muscles and bone strength.
4	**Living things and their habitats:** 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 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.	Less time on this. Something to focus on. 4-6 lessons	Generating debate. Why is there an increase in veganism? Why is the Polar Bear endangered etc. Why are there more floods etc? Role play as parts of the body.	Gathering and classifying data. Empowerment to give them the confidence to argue for change. Global warming. Make your own digestive system. Eat sweetcorn and time its journey! Look at human relationship and interaction with food webs.

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			Key questions e.g. How would changing this one part of a food web affect the rest of it?	
5	**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:** Describe the changes as humans develop to old age.	5-6 lessons	Environmental campaign with strong scientific element. Designing products to help people.	Secondary research. Individual research on specific animals chosen by them. Focus on endangered animals. Relationships – looking at disabilities / age-related conditions.
6	**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 microorganisms, plants and animals Give reasons for classifying plants and animals based on specific characteristics **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:** 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	Quick. Important. This could be done in more depth.	Create your own creature and classify it according to the criteria. Art – clay modelling with explanation. Personal reflections on their exercise, lifestyle etc. Drama Evolution tree.	Sorting and classifying. Use models and simulations. Visiting speaker – blood donations? First aid training. Fitness tracking. Setting personal targets. Make fossils. Secondary research. Go into more depth on inheritance (chromosomes etc). Investigate nature v nuture – link to mental health.

	Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.			Difference within humans – what can we change or not change.

	Materials/states of matter Rocks Space	Suggested time allocation	Potential subject assessment opportunities	Working scientifically connections to our DNA
R	Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another.	Ongoing through play.	Observations. Photos.	Case studies of two different places which Winston visits. Being independent in their own enquiry. Finding what works and doesn't.
1	**Everyday materials:** 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. **Seasonal changes:** Observe changes across the four seasons Observe and describe weather associated with the seasons and how day length varies	Not too long needed on this – could easily move onto the year 2 similar content. Ongoing	Suggesting and justifying materials for different purposes.	Comparing to other locations in the world e.g. Wehoya.
2	**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.	This could be covered in year 1.	Suggesting and justifying materials for different purposes.	Teaching through DT and Art – what can you make?
3	**Rocks** Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties	3-4 lessons	Verbal and written comparisons.	

	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.		Drama.	Getting a sense of our place in the history of the earth. Link to the impact of pollution on soils.
4	**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.	2-3 lessons 2-3 lessons	Classifying activities. Predictions about different materials before cooling or heating them with reasons why.	Find out about the uses of the change of states of matter in real life examples. Secondary research looking at what happens to gases such as oxygen and nitrogen when made very cold. Investigating how to slow down evaporation to help drought prone areas of the world.
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 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.	Important – several weeks' work, including lots of opportunities to start to design their own experiments.	Children's solutions to engineering problems, justifying the use of materials. Written / verbal evaluation of experiments to remove salt water. Looking at meals and explaining which changes could/couldn't be reversed.	Lots of scope for independent questions about different materials and setting up own experiments to answer them. Challenge to find a way to make salt water drinkable – how could the salt be removed? Link to providing fresh drinking water. Cooking – looking at changes in materials.

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	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.	2-3 lessons	Models and diagrams. Explanations of why previous models of space were incorrect (e.g. earth centred universe).	Look at the history of the study of space and the many misconceptions on the way. Link to resilience in that science is our current best explanation but scientists need to be ready to accept when they have got something wrong. Find out your age on different planets.
6				

	Light and sound	Suggested time allocation	Potential subject assessment opportunities	Working scientifically connections to our DNA
R				
1				
2				
3	**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.	5-6 lessons	Diagrams Safety posters Written and verbal explanations for how shadows are formed.	Resilience and understanding that experiment that 'doesn't work' can still help us learn something. Making links with road safety and looking after ourselves and each other. Looking at myths and legends from other cultures about the sun and reasons why most cultures have celebrations linked to light.
4	**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	5-6 lessons	Diagrams. Written and verbal explanations of observations	Opportunities for them to begin to set up their own experiments to answer their own or given questions.

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	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.		made in experiments.	
5				
6	**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.	5-6 lessons	Diagrams. Written / verbal explanations to explain what they observe in practical experiments. Explain how a solar eclipse works.	Children should be setting up their own experiments to answer questions they have about light. Resilience when designing experiments within the confines of what is practically possible in school. E.g. finding ways to stop other light sources from interfering. Starting to think about how they could explain their learning to others.

	Forces including Electricity	Suggested time allocation	Potential subject assessment opportunities	Working scientifically connections to our DNA
R				
1				
2				
3	**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	5-6 lessons	Written and verbal explanations of what they observe. Diagrams. Predictions.	Looking at uses of magnets in the real world. Starting to see how they can change the variables in an experiment and take a more formal investigation in their own direction. Friction and its use in real life for safety. E.g. tyres / grip.

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	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.			
4	**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.	5-6 lessons	Can they get some circuits working? Can they suggest why it did/didn't work referring to the science learnt so far? Labelled circuit diagrams completed independently. Chose a suitable material to complete a gap in a circuit.	Resilience – lots of opportunities for trial and improvement, solving problems and learning from mistakes to get electrical circuits working. Time to try things out and set up their own more formal investigations. Look at how electricity is generated. Why do we try to reduce the amount of electricity we use?
5	**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 some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.	4-6 lessons	Why do astronauts on the moon fall to the ground more slowly than on Earth? Written and verbal explanations of what they observe in their experiments.	Opportunities for children to complete more parts of their experiments independently (e.g. they may plan, carry out and record independently, with help to make conclusions). Resilience when given engineering and design tasks (e.g. designing a parachute to deliver an emergency package safely).
6	**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	3-4 lessons	Written recording of their experiments.	Children should be designing, completing and evaluating their own experiment for a given question. Link the need for electricity with finding renewable sources.

	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.		Correct use of symbols.	