Tillington Manor PRIMARY SCHOOL
Working TOGETHER to achieve the best!

Science Progression map – Sequence of Learning

Intent

In science, our aim is to create passionate learners of science who are inquisitive, aspirational and resilient – we strive to achieve this through our ambitious curriculum.

Our science curriculum has been carefully designed to align to the national curriculum's aims, and it is sequenced progressively so that children develop their knowledge right the way from EYFS -Y6.

Our curriculum content is split into knowledge milestones, what they will learn, and working scientifically milestones, which are the skills they need to find their own answers. We recognise the value of teaching both knowledge and skills to support children to develop their understanding of abstract science concepts.

Learning is initiated through learning challenge questions, which require children to seek answers and thus, make the subject engaging and exciting to children. They are encouraged to answer these questions through the use of the different enquiry types. At Tillington, we are dedicated to ensuring that all 6 enquiry types are utilised within the classroom to encourage deep learning, and we recognise that in science, not all questions can be answered in the same way. These 6 enquiry types that we deliver our curriculum through are:

- Research
- Fair testing
- Observation over time/closely
- Pattern seeking
- Identifying, grouping and classifying
- Problem solving

The vocabulary the children learn is progressive, and is explicitly taught within every science lesson. Dual coding is used to support children in learning the vocabulary.

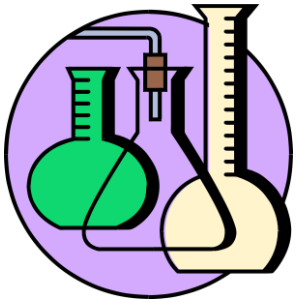
We recognise the importance of first-hand practical experience in developing children's scientific understanding and enthusiasm for science. As such, in our curriculum, investigations are carefully planned out for each unit. Working scientifically skills are matched to the investigations to ensure that these are explicitly taught.

Learning is adapted in science to support all children to access the curriculum.

Opportunities for reading, writing and mathematics are evident in science lessons – children read information, they write up their findings, they utilise measuring when conducting investigations and produce graphs to showcase their findings.

At Tillington, we are aware of the issues in uptake of STEM subjects in higher education facilities. As such, we plan lots of cultural capital opportunities into our school year, to continue to support children to develop a love of science and hopefully become the scientists of the future.

In summary, at Tillington all teaching and learning is built upon Rosenshine's Principles of Instruction. Prior learning is revisited frequently to ensure skills and knowledge are retained. Planning is well sequenced into small steps, to prevent overloading children's working memory. Learning reviews take place to allow the children to activate learning and questioning encourages children to think deeply. This also promotes children's metacognition and encourages them to be inquisitive. Scaffolds and models are provided to ensure all children can access the curriculum and solve problems.



The National Curriculum

The national curriculum for science aims to ensure that all pupils:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them
- are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future

EYFS – Areas of learning and development overview

Science		
Three and Four-Year-Olds	Communication and Language – Prime Area	• Understand 'why' questions, like: "Why do you think the caterpillar got so fat?"
	Physical Development – Prime Area	• Make healthy choices about food, drink, activity and toothbrushing.
	Understanding the World – Specific Area	• Use all their senses in hands-on exploration of natural materials. • Explore collections of materials with similar and/or different properties. • Talk about what they see, using a wide vocabulary. • Begin to make sense of their own life-story and family's history. • Explore how things work. • Plant seeds and care for growing plants. • Understand the key features of the life cycle of a plant and an animal. • Begin to understand the need to respect and care for the natural environment and all living things. • Explore and talk about different forces they can feel. • Talk about the differences between materials and changes they notice.
Reception	Communication and Language – Prime Area	• Learn new vocabulary. • Ask questions to find out more and to check what has been said to them. • Articulate their ideas and thoughts in well-formed sentences. • Describe events in some detail. • Use talk to work out problems and organise thinking and activities. Explain how things work and why they might happen. • Use new vocabulary in different contexts
	Physical Development – Prime Area	• Know and talk about the different factors that support their overall health and wellbeing: o regular physical activity o healthy eating o toothbrushing o sensible amounts of 'screen time' o having a good sleep routine

			○ - being a safe pedestrian
	Understanding the World – Specific Area		• Explore the natural world around them. • Describe what they see, hear and feel while they are outside. • Recognise some environments that are different to the one in which they live. • Understand the effect of changing seasons on the natural world around them.
ELG	Communication and Language – Prime	Listening, Attention and Understanding	• Make comments about what they have heard and ask questions to clarify their understanding.
	Physical Development – Prime	Managing Self	• Manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of healthy food choices.
	Understanding the World – Specific	The Natural World	• Explore the natural world around them, making observations and drawing pictures of animals and plants. • 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. • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

Science: Age related National Curriculum Coverage

Early Learning Goals	Reception	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2

Pupils will be taught about:
 	
Communication and Language
Listening, Attention and Understanding.
• Make comments about what they have heard and ask questions to clarify their understanding.
 	
Personal, Social and Emotional Development
Managing Self
• Manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of healthy food choices.
 	
Understanding the World
The Natural World
• Explore the natural world around them, making observations and drawing pictures of animals and plants.
• 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.
• Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.
	Pupils will be taught about:
	
	Communication and Language
	• Learn new vocabulary.
	• Ask questions to find out more and to check what has been said to them.
	• Articulate their ideas and thoughts in well-formed sentences.
	• Describe events in some detail.
	• Use talk to work out problems and organise thinking and activities.
	• Explain how things work and why they might happen.
	• Use new vocabulary in different contexts.
	
	Physical Development
	• Know and talk about the different factors that support their overall health and wellbeing:
	  ○ regular physical activity
	  ○ healthy eating
	  ○ toothbrushing
	  ○ sensible amounts of 'screen time'
	  ○ having a good sleep routine
	  ○ being a safe pedestrian
	
	Understanding the World
	• Explore the natural world around them.
	• Describe what they see, hear and feel while they are outside.
	• Recognise some environments that are different to the one in which they live.
		• The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information. They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos.
		• 'Working scientifically' is described separately in the programme of study, but must always be taught through and clearly related to the teaching of substantive
			• 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
				• 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

	• Understand the effect of changing seasons on the natural world around them.	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 at a level consistent with their increasing word reading and spelling knowledge at key stage 1 **Pupils will be taught about:** • Plants • Materials • Animals, including humans • Seasonal changes • Living things and their habitats	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. **Pupils will be taught about:** • Animals, including humans • Plants • Forces • Rocks • Light • Living things and their habitats • Electricity • Sound • States of Matter	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 **Pupils will be taught about:** • Changes in materials • Animals, including humans • Living things and their habitats • Earth and Space • Forces • Evolution and Inheritance • Light • Electricity

Year Group	Science Units				
Nursery	**All about me**	**People who help us**	**On the farm**	**Growing and changing**	
Reception	**All about me**	**People who help us**	**Plants and animals**	**My local area**	**Our world**
Year 1	**Plants**	**Materials**	**Animals, including humans**	***Seasonal changes***	
Big Question	What is growing all around me?	How are materials different?	How are humans similar and different to wild animals?	What changes happen throughout the seasons?	
Year 2	**Materials**	**Living things and their habitats**	**Animals, including humans**	**Plants**	
Big Question	Which material should Paddington's hat be made from? And why?	Why do animals and plants need to live in specific habitats?	What do animals need to stay alive and be healthy?	What do plants need to grow and stay alive?	
Year 3	**Animals, including humans**	**Rocks**	**Forces and magnets**	**Plants**	**Light**
Big Question	Why do animals need muscles and skeletons?	Are all rocks the same?	How are contact forces and non-contact forces different?	How are the parts of a plant important in keeping it alive?	What is the difference between light and shadows?
Year 4	**Animals, including humans**	**States of matter**	**Sound**	**Living things and their habitats**	**Electricity**
Big Question	What happens to the food that I have eaten?	What changes occur between the states of matter?	Why do instruments all sound so different?	How are living things classified?	How do the lights work in your home?
Year 5	**Properties and changes of materials**	**Earth and Space**	**Living things and their habitats**	**Animals, including humans**	**Forces**
Big Question	How can materials be grouped based on their basic properties?	How does Earth's movement in the solar system impact our lives?	How are the lifecycles of animals similar and different? (NC point)	How will I change as I get older?	How do forces affect an object's movement?

	(hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets) *Group materials based on this as it is a NC point. – possibly get each group to do a different property with the same materials as part of outcome? Or, do a Venn diagram with 3 groups and choose 3 properties. Sort materials into those categories – see moderated resources for example.*				
Year 6	**Evolution and Inheritance**	**Electricity**	**Living things and their habitats**	**Animals including humans**	**Light**
Big Question	Why have animals changed over time?	Can you design a circuit for a purpose and explain how its components will work?	How do we classify animals, microorganisms and plants?	Why do we need to keep our heart healthy?	How does light change as it shines on/in different mediums?

Science - Learning Challenges/ Prior learning /Vocabulary/Knowledge Milestones/ Working Scientifically Skills/ National Curriculum Statements/ Nursery Knowledge

	Autumn		Spring	Summer
EYFS Nursery	**All about me**	**People who help us**	**On the farm**	**Growing and changing**
Scientist/ Inventor	Focus is on different job roles throughout the year – dentist, farmer etc. Don't specifically teach science in EYFS, so don't need a scientist.			

Knowledge milestones	**By the end of the unit children should know:** • Children will be able to talk about themselves (hair colour, eye colour) • Children will use natural materials in Forest School sessions. • Developing sense of chronology - looking at when they were a baby and how they have changed	**By the end of the unit children should know:** • Different scientific jobs – doctor, dentist • How to clean their teeth and how often to clean their teeth. - *oral health document EYFS* - Government advises - - *Role play for dentists* - *Practise tooth brushing* - *Stories and discussion* - *Thinking about dentist visitor* - .	**By the end of the unit children should know:** • how to compare and contrast farm animals. • the names, and identify a range of farm and woodland animals with support. • identify farm animal features. • what jobs a farmer does. • the sounds a farm animal makes, and be able to imitate these. • the names of animal babies with support e.g. cow/calf.	**By the end of the unit children should know:** • that all animals have babies, and some look like their parents and some do not. • the simple life cycle of a butterfly – caterpillar →butterfly. • the names of a variety of minibeasts and their features. • know how to plant a seed, and how the plant changes as it grows. • that dinosaurs lived on our planet, but they are now extinct. • some dinosaurs lived for a long time, and some of them lived and died without ever meeting.
Prior learning	Knowledge will be dependent on prior experiences.	**Nursery:** - *They can talk about themselves and should know they have teeth.*	**Nursery:** - *They may have some knowledge of animals prior to this depending on experiences outside of school.*	**Nursery:** - *Children have learned about different animals and their habitats. They have learned about farm animals and can name babies. They may have explored plants in forest school.*
Vocabulary	hair eyes nose mouth ears body	dentist teeth clean brushing	cow calf sheep Lamb horse foul adult baby	caterpillar butterfly life cycle baby adult grow change

Working Scientifically Skill Milestones

Links to the National Curriculum	**Year 1:** • **Animals including humans** – *body parts and why they are used - senses* • **Materials** – *materials and their properties* **Year 2:** • **Animals including humans** – *offspring.* • **Materials** – *suitability and changing materials* **Year 3:** • **Animals including humans** – *musculoskeletal system* • **Rocks** – outdoor materials →rock **Year 4:** • **States of matter** – *solids, liquid, gases, melting and freezing and boiling → going outdoors may see these changes.* • **Animals inc humans** – digestive system **Year 5:** • **Animals including humans** – *changes as they grow – puberty/elderly.* • **Changes in materials**– dissolving, mixing,	**Year 1:** • **Animals including humans** – *body parts.* **Year 2:** • **Animals including humans** – *staying healthy and how to stay alive.* **Year 3:** • **Animals including humans** – *musculoskeletal system – teeth are bones to look after.* **Year 4:** • **Animals including humans** – *digestive system – teeth and how teeth can get decayed by sugar.* **Year 5:** • **Animals including humans** – *changes as we get older – our teeth fall out.* **Year 6:** • **Animals including humans** – *cardiovascular system – keeping heart healthy.*	**Year 1:** • **Animals including humans** – *naming a range of animals, wild pets and their body parts.* **Year 2:** • **Animals including humans** – *animal offspring, and do animals look like their adults? → going into more wider variety of animals.* • **Living things and their habitats** – *looking at what habitats are, and what different habitats exist.* **Year 3:** • **Plants** – *how pollination supports habitats.* **Year 4:** • **Living things and their habitats.** – *how humans can positively/negatively impact habitats and how to protect them.* **Year 5:** • **Living things and their habitats.** – *lifecycles of vertebrates.* **Year 6:** • **Evolution and inheritance** – *why offspring look like parents.*	**Year 1:** • **Animals including humans** – naming and comparing animals. • **Plants** – naming common garden plants and trees- looking at the parts and comparing the parts of plants. **Year 2:** • **Animals including humans** – *animal offspring? Do all animal offspring look like their adult?* • **Living things and their habitats** – *lifecycle of mammals.* • **Plants** – *What do plants need to stay alive? Comparing life cycles of plants – how do they grow from seeds?* **Year 3:** • **Plants** – *more requirements for plant growth, functions of parts, transpiration and pollination/cross pollination.* **Year 4:** • **Living things and their habitats** – *extinction – looking at protecting habitats. Also, sorting and classifying animals using classification keys.* **Year 5:** • **Living things and their habitats** – *lifecycles of a variety of animals – amphibians, insects – more detail on butterfly metamorphis.* **Year 6:** • **Living things and their habitats** – *classification in more detail – invertebrates, vertebrates, microorganisms and plants. Creating own classification keys.*

	separating, chemical reactions **Year 6:** • **Evolution and inheritance** – *looking at how they get their eye colour from parents, and how they change.*			

Science - Learning Challenges/ Prior learning /Vocabulary/Knowledge Milestones/ Working Scientifically Skills/ National Curriculum Statements/ Reception Knowledge

	Autumn		Spring	Summer	
EYFS Reception	**All about me**	**People who help us**	**Plants and animals**	**My local area**	**Our world**
Scientist/ Inventor	Scientists not specifically taught, but scientific job roles explored in role play area/through learning. Science isn't a specified area of the curriculum – understanding the world.				

Knowledge milestones	**By the end of the unit children should know:** • Identify seasonal changes that happen in autumn. • Harvest- why crops are harvested at this time of year. • Know how to talk about their immediate environment • Know about their families. • Family trees • Know the names of different parts of their bodies.	**By the end of the unit children should know:** • seasonal changes that occur in winter • that ice and frost appear when it is very cold. • what happens when ice gets warmer. • why we see our breath when it is cold.	**By the end of the unit children should know:** • how to observe and explore the natural world around them. • how to use a range of media drawing pictures of plants and animals • how animals need to be cared for and looked after. • how to plant seeds and care for growing plants • and understand how a bean seed needs water and sunlight to grow. • how different plants grow from different seeds by making observations – grass and flowering plant. • the simple lifecycle of a plant and an animal – caterpillars • seasonal changes that occur in spring. signs of spring – snowdrops, cherry blossom, buds and flowers, birds nesting, bees, lighter evenings.	**By the end of the unit children should know** • farming in the past – locally relevant info. Local areas that used to be farmland, what was grown, what those areas look like now. • Farming in our local area – what crops are grown where we live? Identify fruit and vegetables grown locally – walk around allotments	**By the end of the unit children should know:** • seasonal changes that occur in summer • flowers, warmer days, light evenings, butterflies, bees, birds how we stay safe in the sun – sunscreen, hats, sunglasses • why ice creams melt in the sun – changing state

Prior learning	**Nursery:** - Children will be able to talk about themselves (hair colour, eye colour) - Children will use natural materials in Forest School sessions. - Developing sense of chronology - looking at when they were a baby and how they have changed	**Nursery:** - *Children may have experience of ice/frost from Forest school and may have seen snow before.* **Reception:** - *experience of seasons in autumn.*	**Nursery:** *Children have learned about different animals and their habitats. They have learned about farm animals and can name babies. They may have explored plants in forest school. They have looked at life cycle of a butterfly very simple, and know that plants grow from seeds.* **Reception:** - *experience of seasons in autumn/winter.*	**Nursery:** *They may have explored plants in forest school. They know that plants grow from seeds.* **Reception:** - they know how a bean needs sunlight and water to grow, and have observed plants growing.	**Reception:** *experience of seasons in autumn/winter/spring.*
Vocabulary	arms legs knees elbows feet toes	winter frost ice freeze cold	plant grow flower seed soil petals	Vocabulary will be linked to farming in local community – geography/history topic	summer melt protection warmer days lighter evenings
Working Scientifically Skill Milestones					

Links to the National Curriculum	**Year 1:** • **Animals including humans** – *body parts and why they are used – senses.* • **Seasons -** *looking at changes in trees, temperature, weather etc – measuring.* **Year 2:** • **Animals including humans** – *offspring, and keeping themselves healthy* – reiterating importance of body parts. **Year 3:** • **Animals including humans** – *musculoskeletal system* **Year 4:** • **Animals inc humans** – digestive system **Year 5:** • **Animals including humans** – *changes as they grow – puberty/elderly.* **Year 6:** • **Evolution and inheritance** – *looking at how they get their eye colour from*	**Year 1:** • **Seasons -** *looking at changes in trees, temperature, weather etc – measuring* • **Materials** – water is a material **Year 2:** • **Materials** – how materials are used – suitability and depending on purpose (linking to insulation to protect melting Y5) **Year 4:** • **States of matter** – *solids, liquid, gases, melting and freezing and boiling → going outdoors may see these changes.* **Year 5:** • **Changes in materials:** *dissolving, evaporating – how water can change.*	**Year 1:** • **Animals including humans** – *body parts and why they are used – senses.* • **Plants -** *identifying and naming trees, the parts of different plants, how trees change, and comparisons between trees and flowers.* **Year 2:** • **Animals including humans** – *lifecycles of mammals, what animals need to stay alive.* • **Plants -** *lifecycles of plants, looking at the inside of seeds and bulbs, what do plants need to stay alive.* **Year 3:** • **Animals including humans** – *diet that helps human body develop, different skeletal systems of animals.* • **Plants -** *requirements of plant growth, functions of plants, transpiration and pollination* **Year 4:** • **Animals including humans** – food chains, teeth (inc are all animals teeth the same?) and *digestive system* • **Living things and their habitats-** sorting plants based on their observed features. **Year 5:** • **Living things and their habitats -** reproduction *of plants – sexual and asexual. Lifecycles of mammals, insects and amphibians.* **Year 6:** • **Living things and their habitats** – classifying animals, plants and microorganisms.	**Year 1:** • **Plants -** *identifying and naming trees, the parts of different plants, how trees change, and comparisons between trees and flowers.* **Year 2:** • **Plants -** *lifecycles of plants, looking at the inside of seeds and bulbs, what do plants need to stay alive.* **Year 3:** • **Plants -** *requirements of plant growth, functions of plants, transpiration and pollination* **Year 4:** • **Living things and their habitats-** sorting plants based on their observed features. **Year 5:** • **Living things and their habitats -** reproduction *of plants – sexual and asexual. Lifecycles of mammals, insects and amphibians.* **Year 6:** • **Living things and their habitats** – classifying animals, plants and microorganisms.	**Year 1:** • **Seasons -** *looking at changes in trees, temperature, weather etc – measuring* • **Materials** – water is a material **Year 2:** • **Materials** – how materials are used – suitability and depending on purpose (linking to insulation to protect melting Y5) **Year 4:** • **States of matter** – *solids, liquid, gases, melting and freezing and boiling → going outdoors may see these changes.* **Year 5:** • **Changes in materials:** *dissolving, evaporating – how water can change*

	parents, and how they change. • **Animals including humans** – *cardiovascular system* • **Light** – how our eyes work.				

Science - Learning Challenges/ Prior learning /Vocabulary/Knowledge Milestones/ Working Scientifically Skills/ National Curriculum Statements/ Y1

	Autumn	Spring	Summer	Throughout the year (evidence it at the back of science book)
KS1 Y1	Plants	Materials	Animals, including humans	Seasonal changes
Scientist/ Inventor	Dr. Marie Clark Taylor – first black female to get PHD in botany 	Charles McIntosh 	Steve Irwin 	John Dalton – recorded the weather 
Learning Sequence	• Which flowering plants are grown in gardens? *Research* • Which flowering plants are found in the wild? *Research Observing and recording* • Can you identify and name some common trees? *Research* • Can you name the parts of a flowering plant? *Research Observing and recording* • Can you name the parts of a tree? Research Observing and recording • How are flowering plants and trees similar and different? Identifying, grouping and classifying • Does the time of year affect how many leaves trees have? *Deciduous and evergreen* Pattern seeking/Observing over time Observing	• Can you identify and name everyday materials? Research *ensure rock is included as a material due to progression to Y3* • What material are these objects made from? *Research Recording* • What properties do materials have? Research Setting up tests (selecting their own materials to test), Recording (possibly pre-made table with ticks and crosses), interpreting and communicating results testing for, shiny/dull, rough/smooth/ float/sink/ waterproof/not waterproof → could be 2 lessons. Split so children only find 3 properties each lesson depending on cohort. Be careful as Y2 cover stretching, bending, squashing and twisting. Don't do those properties. • How are these materials similar and different? Identifying, grouping and classifying • Does layering a material affect how waterproof it is? Fair Testing*** Predicting, Observing and interpreting and communicating • What happens to shaving foam over time? *** Observing over time Predicting, Observing, interpreting and communicating results	• What body parts do you have? Research • Do taller children in our class have bigger hands?*** Pattern seeking *Predicting, Measuring, interpreting and communicating results and evaluating* • Can you identify these animals? (*wild animals + pets*) Research • What body parts do these animals have? Research • Do all animals eat the same things? Why? herbivores, carnivores and omnivores. Research *possibility for working scientific skills if you do the 'animal poo' activity – observing, recording, interpreting and communicating* • How would you sort these animals? Identifying, grouping and classifying • What are senses? Which body part do animals use for each sense? Research • Is our sense of smell better when we can't see? Comparative testing *Recording, interpreting and communicating results, evaluating*	• What is the weather like in autumn/winter/spring/summer? Observing over time *Observing, recording, interpreting and communicating results* • How long are the days in autumn/winter/spring/summer? Observing over time *Observing, recording* • How does the temperature change throughout the seasons? Is it always the same temperature in each season? Pattern seeking *Predicting, recording, interpreting and communicating results*

Prior learning	**EYFS:** • Plant seeds and care for growing plants. • Understand the key features of the life cycle of a plant and an animal. .	**EYFS:** • Explore collections of materials with similar and/or different properties. • Talk about the differences between materials and changes they notice.	**EYFS:** • Use all their senses in hands-on exploration of natural materials. • Understand the key features of the life cycle of a plant and an animal. • Explore the natural world around them, making observations and drawing pictures of animals and plants.	**EYFS:** • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter. **Y1:** • Evergreen and deciduous trees.
Vocabulary	Specific vocabulary: - stem - roots - petals - deciduous - evergreen	Specific vocabulary: • rough • smooth • shiny • dull • waterproof *Note: make sure to include rock as a material in lessons due to progression to Y3.*	Specific vocabulary: • omnivore • carnivore • herbivore • diet • sense	Specific vocabulary: • spring • summer • autumn • winter • season • temperature
Knowledge Milestones	**By the end of the unit children should know:** • the parts of a flowering plant and a tree • how evergreen and deciduous trees are different • the names of common garden and wild plants, as well as common trees.	**By the end of the unit children should know:** • the names of common materials – wood, plastic, metal, glass, water and rock. • basic properties of each material • what it means to be waterproof, and which materials are waterproof.	**By the end of the unit children should know:** • the names of a range of animals, including pets and wild animals. • the names of their body parts e.g. eyes, arm, leg, head, teeth etc. • the names of animal body parts that are similar and different to our own e.g. hands, feet, trunk, snout etc. • how animals can be herbivores, omnivores or carnivores. • what the 5 senses are, which body part we use for each sense and what each sense is used for.	**By the end of the unit children should know:** • how the weather changes across the 4 seasons • how day length varies across the seasons. • how the temperature changes across the seasons.

Working Scientifically Skill Milestones	By the end of the unit, children will develop the following working scientifically skills:	By the end of the unit, children will develop the following working scientifically skills:	By the end of the unit, children will develop the following working scientifically skills:	By the end of the unit, children will develop the following working scientifically skills:
	• **Observing and measuring** Observe and describe what they see. Use non standard equipment and measurements in a practical task. E.g. measuring with cubes. • **Recording Data** – Begin to record simple data. This can be done by using tens frames or using diagrams. It can also be done through Venn diagrams with 2 circles. It can also be done verbally through discussion, and recorded whole class. **Through the following enquiry types:** • **Research** – Ask people questions and, with help, use simple secondary sources to find answers. • **Pattern seeking** – With guidance, they should begin to notice simple patterns and relationships. • **Identifying, grouping and classifying** – With help, use simple features to compare objects, materials and living things and, with help, decide how to sort and group them.	• **Making predictions** – Say what they think may happen in an investigation. • **Setting up tests** – Follow adult instructions to complete a simple test. • **Observing and measuring** Observe and describe what they see. Use non standard equipment and measurements in a practical task. E.g. measuring with cubes. • **Recording Data** – Begin to record simple data. This can be done by using tens frames or using diagrams. It can also be done through Venn diagrams with 2 circles. It can also be done verbally through discussion, and recorded whole class. • **Interpreting and communicating results** – Explain verbally, and with help, what they think they have found out. **Through the following enquiry types:** • **Fair testing**– With help, carry out simple comparative tests. • **Research** – Ask people questions and, with help, use simple secondary sources to find answers.	• **Making predictions** – Say what they think may happen in an investigation. • **Observing and measuring** Observe and describe what they see. Use non standard equipment and measurements in a practical task. E.g. measuring with cubes. • **Recording Data** – Begin to record simple data. This can be done by using tens frames or using diagrams. It can also be done through Venn diagrams with 2 circles. It can also be done verbally through discussion, and recorded whole class. • **Interpreting and communicating results** – Explain verbally, and with help, what they think they have found out. • **Evaluating** – Use everyday language to answer a question verbally. **Through the following enquiry types:** • **Research** – Ask people questions and, with help, use simple secondary sources to find answers. • **Pattern seeking** – With guidance, they should begin to notice simple patterns and relationships.	• **Making predictions** – Say what they think may happen in an investigation. • **Observing and measuring** Observe and describe what they see. Use non standard equipment and measurements in a practical task. E.g. measuring with cubes. • **Recording Data** – Begin to record simple data. This can be done by using tens frames or using diagrams. It can also be done through Venn diagrams with 2 circles. It can also be done verbally through discussion, and recorded whole class. • **Interpreting and communicating results** – Explain verbally, and with help, what they think they have found out. **Through the following enquiry types:** • **Observation**– With help, observe closely using simple equipment. With help, observe simple changes over time • **Pattern seeking** – With guidance, they should begin to notice simple patterns and relationships.

		• **Identifying, grouping and classifying** – With help, use simple features to compare objects, materials and living things and, with help, decide how to sort and group them. • **Observation over time**– With help, observe closely using simple equipment. With help, observe simple changes over time	• **Identifying, grouping and classifying** – With help, use simple features to compare objects, materials and living things and, with help, decide how to sort and group them. • Comparative testing – With help, conduct comparative tests. •	
National Curriculum	• 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.	• 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 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, 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.	• observe changes across the four seasons • observe and describe weather associated with the seasons and how day length varies.

Science - Learning Challenges/ Prior learning /Vocabulary/Knowledge Milestones/ Working Scientifically Skills/ National Curriculum Statements/ Y2

	Autumn		Spring	Summer
KS1 Y2	Materials	Living things and their habitats	Animals, including humans	Plants
Scientist/ inventor	Lars Berglund (manufacturing translucent wood) 	Dr Helen Scales (marine habitat protection and interest in rock pools) 	Maria Merian  Sibylla	Wangari Maathai 

Learning Sequence	• What can these materials be used for? Research • How are some materials more suitable for a purpose than others? E.g. paper straws compared to plastic straws. Research • How long will a paper boat float for? Observation over time*** *Predicting, Observing, Interpreting and communicating results* • How can we change materials? - *bending, squashing, twisting and stretching – link to Y3 forces* Research *** *Setting up tests* (choosing own materials to test) *Observing, Recording, Interpreting and communicating results* • Which shapes would make the strongest paper bridge? Comparative testing *** *Predicting, Recording (possibly with tally chart -see guidance), interpreting and communicating results. Evaluating (see guidance)* • What's the difference between an opaque/transparent/translucent material? Research *don't do shadow puppets – Y3 objective.* *Note: make sure to include rock as a material in lessons due to progression to Y3.*	• What does it mean to be alive, never alive or dead?← Identifying, grouping and classifying sorting objects, animals, plants etc into living, dead, never been alive and talking about why they have placed them there. • What is a habitat? Why are habitats so important to animals and plants? Research • Can you name some habitats and identify the animals and plants that live there? Research • What is a microhabitat? Can you name some minibeasts that live there? Research/Observation *opportunity to visit wildlife garden outside using magnifying glasses so would be Observing and recording* • Which habitat would a woodlouse prefer? Pattern seeking*** *Asking questions, predicting, observing and interpreting and communicating results* see guidance • Can you design and make a microhabitat for insects in our wildlife garden? Problem solving • What do animals eat in a habitat? ← *simple food chains (don't label predator, prey etc. – y4 objective – just show how energy is transferred by drawing arrows).* Research	• What do animals need to stay alive? Research • Why is eating healthily and exercising important? Research • Why is washing my hands important? Observation over time *Mouldy bread investigation*** *Observing, recording, interpreting and communicating results and evaluating* • What are offspring? Research • Do all animal offspring look like their adult? Research/Identifying, grouping and classifying (dependent on activity – see guidance) • How do humans change as they grow? Basic lifecycle of human - foetus, child, adult, elder Observation over time/Research • How do mammals change over time? Observation over time/Research Look at another mammal's lifecycle (y5 objective to look at insects, amphibians etc)	• What's inside a seed that makes it important for growing a plant? Research Observing inside seeds with magnifying glasses. Drawing them *Observing and recording* • How does a seed grow into a mature plant? Observation over time life cycle of a plant • What are bulbs? Research *Recording* Observing inside bulbs with magnifying glasses. Drawing them • How are bulbs different to seeds? - Research *what's similar/different?* • What do plants need to grow and stay alive? Fair testing*** *predicting, setting up tests, record interpreting and communicating results* Water, light and suitable temp investigation? Don't do room to grow or. nutrients as y3 objectives. • Do the biggest seeds grow into the biggest plants? Pattern seeking *** *Predicting, Setting up tests Observing and measuring, Recording, Interpreting and Communicating using block diagrams with pre drawn axis for scaffold* **As plant investigations are happening that require plants grow, think about planning ahead with them. They may need to be set up at the start of the term.**

Prior learning	**EYFS:** • Explore collections of materials with similar and/or different properties. • Talk about the differences between materials and changes they notice. **Y1:** • Name common materials – wood, plastic, metal, glass, water and rock. • Identify basic properties of each material • Understand what it means to be waterproof, and which materials are waterproof.	**EYFS:** • Explore the natural world around them, making observations and drawing pictures of animals and plants. **Y1:** • Recognise that animals can be herbivores, omnivores or carnivores. • The names of a range of animals, including wild animals and pets (used to discuss habitats they live in) • Children studied hot and cold climates in geography, so will be able to link this learning to habitats.	**EYFS:** • Understand the key features of the life cycle of a plant and an animal. • Explore the natural world around them, making observations and drawing pictures of animals and plants. • Know and talk about the different factors that support their overall health and wellbeing: regular physical activity and healthy eating **Y1:** • Names a range of animals, including pets and wild animals. • Names animal body parts that are similar and different to our own. • Recognise that animals can be herbivores, omnivores or carnivores. **Y2:** • The importance of habitats for survival.	**EYFS:** • Plant seeds and care for growing plants. • Understand the key features of the life cycle of a plant and an animal. **Y1:** • Name parts of a flowering plant and a tree • State how evergreen and deciduous trees are different • Know the names of common garden and wild plants, as well as common trees. **Y2:** • Life cycle of animals could be used to introduce life cycle of plants
Vocabulary	Specific vocabulary: - suitable - twisting (link to y3 forces) - opaque - translucent - transparent	Specific vocabulary: - habitat - microhabitat - minibeast - dead - alive	Specific vocabulary: - offspring - life cycle - foetus - elder - survive - hygiene	Specific vocabulary: • life cycle • seed • bulb • seedling • mature plant

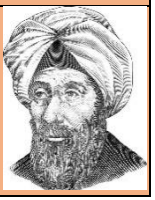
Knowledge Milestones	**By the end of the unit children should know:** - how materials are used - that materials suitability depends on its purpose. - how materials can be changed by bending, stretching, twisting and squashing. - what opaque, translucent and transparent mean.	**By the end of the unit children should know:** - the difference between being alive, dead or never alive. - what habitats are and why they are so important to animals. - what habitats animals live in. - what microhabitats are and the names of minibeasts who live there. - how to construct a basic food chain.	**By the end of the unit children should know** - what offspring are. - how humans change as they grow. - the differences between human life cycles and mammal life cycles. - what animals need to stay alive. - why healthy eating and exercising are important. - why hygiene is important.	**By the end of the unit children should know** - the structure of a seed that makes it important for growing a plant. - the life cycle of a plant. - what bulbs are and how they are different to seeds - what plants need to stay alive.

Working Scientifically Milestones	**By the end of the unit, children will develop the following working scientifically skills:** • **Asking questions** – Suggest ideas, ask simple questions and answer questions using simple secondary sources. • **Making predictions** – Begin to make predictions (may be scaffolded – possibly with three choices to choose from) • **Setting up tests** – Do things in the correct order when completing an adult led test. • **Observing and measuring** – Observe something closely and describe how something changes over time. Use simple equipment, such as egg times to take measurements. Begin to introduce measuring in cm, g or ml (only up to 100cm, 100g or 100ml) • **Recording Data** – Gather data and record it in simple ways. Ways to record could be: tally charts tables with numbers, block diagrams, or pictograms with 1-1 ratio. • **Interpreting and communicating results**– With support, using simple scientific language to explain what they have found out.	**By the end of the unit, children will develop the following working scientifically skills:** • **Asking questions** – Suggest ideas, ask simple questions and answer questions using simple secondary sources. • **Making predictions** – Begin to make predictions (may be scaffolded – possibly with three choices to choose from) • **Observing and measuring** – Observe something closely and describe how something changes over time. Use simple equipment, such as egg times to take measurements. Begin to introduce measuring in cm, g or ml (only up to 100cm, 100g or 100ml) • **Recording Data** – Gather data and record it in simple ways. Ways to record could be: tally charts tables with numbers, block diagrams, or pictograms with 1-1 ratio. • **Interpreting and communicating results**– With support, using simple scientific language to explain what they have found out. **Through the following enquiry types:** • **Research** – Ask people questions and use simple secondary sources to find answers. • **Identifying, grouping and classifying** –Use simple features to compare objects, materials and living things and, with help, decide how to sort and group them. • **Problem solving** – Use their observations and ideas to suggest	**By the end of the unit, children will develop the following working scientifically skills:** • **Asking questions** – Suggest ideas, ask simple questions and answer questions using simple secondary sources. • **Observing and measuring** – Observe something closely and describe how something changes over time. Use simple equipment, such as egg times to take measurements. Begin to introduce measuring in cm, g or ml (only up to 100cm, 100g or 100ml) • **Recording Data** – Gather data and record it in simple ways. Ways to record could be: tally charts tables with numbers, block diagrams, or pictograms with 1-1 ratio. • **Interpreting and communicating results**– With support, using simple scientific language to explain what they have found out. • **Evaluating**– Answer questions with support from adults. Identify	**By the end of the unit, children will develop the following working scientifically skills:** • **Asking questions** – Suggest ideas, ask simple questions and answer questions using simple secondary sources. • **Making predictions** – Begin to make predictions (may be scaffolded – possibly with three choices to choose from) • **Setting up tests** – Do things in the correct order when completing an adult led test. • **Observing and measuring** – Observe something closely and describe how something changes over time. Use simple equipment, such as egg times to take measurements. Begin to introduce measuring in cm, g or ml (only up to 100cm, 100g or 100ml) • **Recording Data** – Gather data and record it in simple ways. Ways to record could be: tally charts tables with numbers, block diagrams, or pictograms with 1-1 ratio.

	Through the following enquiry types: • **Research** – Ask people questions and use simple secondary sources to find answers. • **Observation over time**– Observe closely using simple equipment, and or observe changes over time with help. • **Comparative testing** - With help, carry out simple comparative tests. •	answers to questions. Talk about what they have found out and how they found it out.	simple patterns/make comparisons with support. Begin to record these using scaffolds. **Through the following enquiry types:** • **Research** – Ask people questions and use simple secondary sources to find answers. • **Observation over time** – Observe using simple equipment, and or observe changes over time with help. • **Identifying, grouping and classifying** –Use simple features to compare objects, materials and living things and, with help, decide how to sort and group them.	• **Interpreting and communicating results**- With support, using simple scientific language to explain what they have found out. **Through the following enquiry types:** • **Research** – Ask people questions and use simple secondary sources to find answers. • **Observation over time** – Observe closely using simple equipment, and or observe changes over time with help. • **Pattern seeking** – With guidance, they should begin to notice patterns and relationships. • **Fair testing** – Carry out simple, comparative tests.

National Curriculum	• 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 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	• 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

Science - Learning Challenges/ Prior learning /Vocabulary/Knowledge Milestones/ Working Scientifically Skills/ National Curriculum Statements/ Y3

	Autumn	Spring		Summer	
KS2 Y3	Animals, including humans	Rocks	Force and magnets	Plants	Light
Scientist/inventor	Nina Tandon – grows bones for people who needs them. 	Mary Anning 	William Gilbert 	Janaki Ammal 	Ibn al-Haytham 

Learning Sequence	• What types of food do humans need to eat and why? *Research* • What does a human skeleton look like? *Research –* • Do male skeletons have larger/longer_____ than female skeletons? **2 lessons** Children choose which bone they investigate Pattern Seeking *** *Asking questions, predicting, measuring, recording using bar chart, evaluating* • Are all animal skeletons the same? *Identifying, grouping and classifying* – branching diagram for this. • Why do we need a skeleton? *Research -* • Why are muscles important? *Research -* • How do muscles work? *Research -* • Does the size of quadricep • muscle affect how far a person can jump? *** *Fair test Predicting, setting up tests, measuring, recording and evaluating.*	• What are rocks? *Research*, • How are they formed? *Research* • Can you classify rocks based on their appearance and properties? *Identifying, grouping and classifying* • What are fossils? How do they form? *Research* • What is soil? Are all soils the same? *Research* • How does adding different amounts of sand to soil affect how quickly water drains through it? *Fair testing*** *Predicting, setting up tests, observing and measuring, recording, interpreting and communicating results and evaluating* *stopwatches, weighing scales, funnels, filter paper*	• What are forces? *Research/Identifying, grouping and classifying* contact forces (pushes and pulls) or non-contact (act at a distance e.g. magnets) – sort pictures of each force • Which surface is best for making a toy car travel the furthest? And why? *** *Fair Testing – Predicting, setting up tests, observing and measuring, recording, interpreting and communicating results and evaluating* • How do magnets work? Will these magnets attract or repel? *Research* • Are all materials magnetic? *** *Research Predicting, Observing, recording and evaluating.* • Can you design the fastest magnetic race car for a brand-new board game? *Problem solving see WS guidance for how to guide.*	• What are the functions of each part of a plant? *Research* • What do plants need to grow? - don't' do investigation on this as y2 already have. – they looked at how it needed water, light and suitable temp – reteach this and add air, space to grow and nutrients from soil too. Building knowledge. *Research* • Can you water plants with other liquids? Fair testing/ Observation over time*** *Predicting, setting up tests, observing and measuring, recording, interpreting and communicating results and evaluating* • How is water transported around a plant? *Research* • What happens to celery when it is left in coloured water? *Observation over time? (carnation/celery activity?) Prediction, observing, recording, evaluating.* • Why is pollination so important for plants?– *pollen from male part of flower is transferred to female part of another plant by insect. Pollinated and seeds made. Don't go into parts of flower (Y6 objective)* *Research* • How are seeds dispersed? *Research*	• What is the difference between light and dark? *Research/Identifying, grouping and classifying look at light and dark, then sort light sources into artificial and natural.* • How does light help us to see? *Research* • Why can light from the Sun be dangerous? How can we protect ourselves? *Research* • What are shadows? *Research* • Which material is best for making shadow puppets? *Comparative testing observing, recording, interpreting and communicating, evaluating* • How does moving the light source change the shadow?*** *Pattern seeking Predicting, setting up tests, observing and measuring, recording, interpreting and communicating results and evaluating*

Prior learning	**EYFS:** • Understand the key features of the life cycle of a plant and an animal. • Know and talk about the different factors that support their overall health and wellbeing: healthy eating **Y1:** • Names animal body parts that are similar and different to our own. • Recognise that animals can be herbivores, omnivores or carnivores **Y2:** • What animals need to stay alive. • Why healthy eating and exercising are important.	**EYFS:** • Describe what they see, hear and feel while they are outside. **Y1:** • Everyday materials (including rock). **Y2:** • Uses of everyday materials (rock).	**EYFS:** • Explore and talk about the different forces they feel. **Y2:** • how materials can be changed by bending, pushing (squashing), and pulling (stretching) – *links because forces are pushes and pulls so when changing materials, we apply force.*	**EYFS:** • Plant seeds and care for growing plants. • Understand the key features of the life cycle of a plant and an animal. **Y1:** • Name parts of a flowering plant and a tree • Know the names of common garden and wild plants, as well as common trees. **Y2:** • Life cycle of plants. • The structure of a seed. • What bulbs are. • What plants need to stay alive (water, light and suitable temp).	**EYFS:** • Talk about what they see, • Describe what they see, hear and feel while they are outside. **Y1:** • Senses – using their eyes to see around them. **Y2:** • Materials – opaque, translucent and transparent.
Vocabulary	Specific vocabulary: - endoskeleton - exoskeleton - muscles - contract - relax	Specific vocabulary: • rock • sedimentary • metamorphic • igneous • fossil	Specific vocabulary: - contact force - non-contact force - attract - repel - magnetic -	Specific vocabulary: - seed dispersal - pollinated - pollinator - absorption - xylem	Specific vocabulary: - light - dark - reflect - light source - shadow

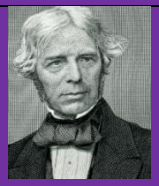
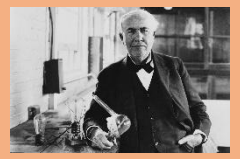
Knowledge Milestones	**By the end of the unit children should know:** • Humans have to eat protein, carbohydrates, protein, vitamins and minerals and fats to stay alive and healthy. • The common bones in the human body (femur, ribs, skull (cranium), spine etc). • That some animals have endoskeletons (skeletons inside their body) and some have exoskeletons (outside of their body). • The functions of a skeleton – support, movement, protection and making blood cells. • The function of muscles- moving our bones. • Muscles work by contracting and relaxing. This pulls tendons, which pull on the bones.	**By the end of the unit children should know:** • The three types of rocks (sedimentary, metamorphic and igneous). • How each rock is formed – *sedimentary is formed when layers of rock are put under pressure, igneous is formed when lava cools and metamorphic is when sedimentary and igneous and heated and put under pressure.* • How to classify rocks based on their appearance and properties. • Which type of rocks absorb water and which don't. • What fossils are and how they are formed. • What soil is made up of – weathered rocks and organic material.	**By the end of the unit children should know:** • Forces are contact (pushes and pulls) or non- contact (act at a distance – magnets.) • What the best surface for making a toy car travel the furthest is. • How magnets have two poles which make it attract or repel objects. • The names of some magnetic materials.	**By the end of the unit children should know:** • The functions of each part of a plant. • Further conditions for successful growth of plants (air, space, nutrients to grow). • How plants do not all need the same conditions to grow. • How water is transported via through the roots, up the xylem and around the plant. • How seeds are formed because pollen is transferred from the male part of a plant to a female part of a plant. • Different ways that seeds are dispersed.	**By the end of the unit children should know:** • How dark is the absence of light. • How light helps us to see by reflecting off objects and into our eyes • Why light from the Sun is dangerous for our eyes and skin. • How we can protect ourselves from the Sun. • That shadows are formed when an opaque object blocks the light. • How shadows change depending on where the light source is.

Working scientifically	By the end of the unit, children will develop the following working scientifically skills: • **Asking questions** - Use ideas to pose questions about the world around them. • **Making predictions** - Make a prediction and begin to give reasons with support. • **Setting up tests** - Discuss enquiry methods and describe how to conduct a fair test. With support, be able to conduct an investigation. • **Observing and measuring** - Decide what to observe during an investigation. Take accurate measurements using standard units – cm, kg, ml and l (all up to 1000) • **Recording** - Record their findings using scientific language. It can be recorded in note form using scaffolds, writing tables, diagrams, tables or charts. This will be scaffolded but scaffolding can be removed as children become more confident.	By the end of the unit, children will develop the following working scientifically skills: • **Asking questions** - Use ideas to pose questions about the world around them. • **Making predictions** - Make a prediction and begin to give reasons with support. • **Setting up tests** - Discuss enquiry methods and describe how to conduct a fair test. With support, be able to conduct an investigation. • **Observing and measuring** - Decide what to observe during an investigation. Take accurate measurements using standard units – cm, kg, ml and l (all up to 1000) • **Recording** - Record their findings using scientific language. It can be recorded in note form using scaffolds, writing tables, diagrams, tables or charts. This will be scaffolded but scaffolding can be removed as children become more confident.	By the end of the unit, children will develop the following working scientifically skills: • **Asking questions** - Use ideas to pose questions about the world around them. • **Making predictions** - Make a prediction and begin to give reasons with support. • **Setting up tests** - Discuss enquiry methods and describe how to conduct a fair test. With support, be able to conduct an investigation. • **Observing and measuring** - Decide what to observe during an investigation. Take accurate measurements using standard units – cm, g, ml and l (all up to 1000) as well as using stop watches. • **Recording** - Record their findings using scientific language. It can be recorded in note form using scaffolds, writing tables, diagrams, tables or charts. This will be scaffolded but scaffolding can be removed as children become more confident.	By the end of the unit, children will develop the following working scientifically skills: • **Asking questions** - Use ideas to pose questions about the world around them. • **Making predictions** - Make a prediction and begin to give reasons with support. • **Setting up tests** - Discuss enquiry methods and describe how to conduct a fair test. With support, be able to conduct an investigation. • **Observing and measuring** - Decide what to observe during an investigation. Take accurate measurements using standard units – cm, g, ml and l (all up to 1000) as well as using stop watches. • **Recording** - Record their findings using scientific language. It can be recorded in note form using scaffolds, writing tables, diagrams, tables or charts. This will be scaffolded but scaffolding can be removed as children become more confident.	By the end of the unit, children will develop the following working scientifically skills: • **Asking questions** - Use ideas to pose questions about the world around them. • **Making predictions** - Make a prediction and begin to give reasons with support. • **Setting up tests** - Discuss enquiry methods and describe how to conduct a fair test. With support, be able to conduct an investigation. • **Observing and measuring** - Decide what to observe during an investigation. Take accurate measurements using standard units – cm, g, ml and l (all up to 1000) as well as using stop watches. • **Recording** - Record their findings using scientific language. It can be recorded in note form using scaffolds, writing tables, diagrams, tables or charts. This will be scaffolded but scaffolding can be removed as children become more confident.

	• Children can record their results using: pictograms (key of 1, 2, 5, 10), tally charts, and bar charts (pre-draw axis). • **Interpreting and communicating results -** Draw, with help, a simple conclusion based on evidence from their investigation. • **Evaluating-** Use recorded results with support to answer a question **Through the following enquiry types:** • Research - Use secondary sources to help them answer questions that cannot be answered through practical investigations. • Pattern seeking - Begin to look for naturally occurring patterns and relationships. • Identifying, grouping and classifying Talk about criteria for grouping, sorting and classifying, and with help, use simple keys (if appropriate). • Fair testing With help, set up simple practical enquiries, comparative and	• Children can record their results using: pictograms (key of 1, 2, 5, 10), tally charts, and bar charts (pre-draw axis). • **Interpreting and communicating results -** Draw, with help, a simple conclusion based on evidence from their investigation. • **Evaluating-** Use recorded results with support to answer a question **Through the following enquiry types:** • Research - Use secondary sources to help them answer questions that cannot be answered through practical investigations. • Fair testing With help, set up simple practical enquiries, comparative and fair tests. Recognise when simple fair tests are necessary. • Identifying, grouping and classifying Talk about criteria for grouping, sorting and classifying, and with help, use simple keys (if appropriate).	• Children can record their results using: pictograms (key of 1, 2, 5, 10), tally charts, and bar charts (pre-draw axis). • **Interpreting and communicating results -** Draw, with help, a simple conclusion based on evidence from their investigation. • **Evaluating-** Use recorded results with support to answer a question **Through the following enquiry types:** • Research - Use secondary sources to help them answer questions that cannot be answered through practical investigations. . • Fair testing With help, set up simple practical enquiries, comparative and fair tests. Recognise when simple fair tests are necessary. • Problem Solving – Scaffolding should be provided so that children	• Children can record their results using: pictograms (key of 1, 2, 5, 10), tally charts, and bar charts (pre-draw axis). • **Interpreting and communicating results -** Draw, with help, a simple conclusion based on evidence from their investigation. • **Evaluating-** Use recorded results with support to answer a question **Through the following enquiry types:** • Research - Use secondary sources to help them answer questions that cannot be answered through practical investigations. • Observation over time Make careful observations. Help to make decisions about what observations to make • Fair testing With help, set up simple practical enquiries, comparative and fair tests. Recognise when simple fair tests are necessary.	• Children can record their results using: pictograms (key of 1, 2, 5, 10), tally charts, and bar charts (pre-draw axis). • **Interpreting and communicating results -** Draw, with help, a simple conclusion based on evidence from their investigation. • **Evaluating-** Use recorded results with support to answer a question **Through the following enquiry types:** • Research - Use secondary sources to help them answer questions that cannot be answered through practical investigations. • Pattern seeking - Begin to look for naturally occurring patterns and relationships. • Comparative testing - With help, set up simple practical enquiries, comparative and fair tests. Recognise when simple fair tests are necessary. • Identifying, grouping and classifying Talk about criteria for grouping, sorting and classifying, and with help,

	fair tests. Recognise when simple fair tests are necessary.		can begin to answer questions by applying their own, learned scientific knowledge.		use simple keys (if appropriate).
National Curriculum	• 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.	• 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 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.	• 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	• 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.

Science - Learning Challenges/ Prior learning /Vocabulary/Knowledge Milestones/ Working Scientifically Skills/ National Curriculum Statements/ Y4

	Autumn		Spring	Summer	
KS2 Y4	Animals, including humans	States of matter	Sound	Living things and their habitats	Electricity
Scientist/ inventor	Dr Ranj Singh 	Michael Faraday (ice discovery) 	Lucy Richardson Dyson acoustic engineer – making Dyson products quieter. 	Jane Goodall 	Thomas Edison 

Learning Sequence	• What are food chains? Research *make more complex than y2 by adding predator, producer, prey vocab* • Can you make a food web? Research • Why are our teeth different shapes? Research *Functions of different types of teeth.* • Are all animals' teeth the same? Research *Compare carnivores/herbivores/omnivores teeth.* • Why do I need to look after my teeth? Research • Which drink causes the most tooth decay? *** Observation over time Predicting, setting up tests, observing and measuring, recording, interpreting and communicating and evaluating. *egg shell experiment – support to identify patterns that high sugar=decays fastest.* • How does my body digest food? Research –*body parts and functions. See guidance.*	• What's the difference between a solid, liquid and a gas? Research particle theory and properties - • Can you sort materials according to their state of matter? To challenge, put materials like foam/jelly/mayonnaise/aerosols → only do if children are ready for it. They are colloids Identifying, grouping and classifying • How does heating and cooling change materials? *Particle theory* Research • Which material has the greatest melting point? Comparative testing *** Predicting, Setting up tests, observing and measuring, recording, interpreting and communicating results and evaluating. *Use Celsius to measure* - • How can water change state? Research look at evaporation and condensation as well as melting and freezing. Could show as cycle. • What is the water cycle? Research • How does temperature affect water's evaporation rate? Research • What is the best dish for a bird water bowl? Fair testing/Problem solving *** Predicting, observing and measuring, recording, interpreting and communicating results and evaluating. Looking at rate of evaporation compared to surface area of dish. See guidance.	• How are sounds made? Why can I hear sound? Research • What is volume? Why are some sounds louder than others? Research • How does the volume of a drum change as you move further away from it? ***Fair testing Predicting, Setting up tests, Observing and measuring, recording, interpreting and communicating and evaluating. • What is pitch? Which objects make high/low pitched sounds? Research • Does the amount of water in a bottle affect the pitch of the sound? *** Pattern seeking Predicting, Setting up tests, Observing and measuring, recording, interpreting and communicating and evaluating. • Which material is best for soundproofing a room? Problem solving/Comparative testing Setting up tests, Observing and measuring, recording, interpreting and communicating and evaluating	• How can we sort plants into groups? Identifying, grouping and classifying *Based on what they look like e.g. these have yellow petals, these have spikey leaves so need to go together etc. – possibly plants from our local area – go on a hunt? - don't go into flowering/non-flowering as covering in year 6* • How can we sort animals into groups? Identifying, grouping and classifying *Based on what they look like e.g. these have feathers, these have scales so need to go together etc.* • What are vertebrates? How are they sorted by scientists? Research *into 5 groups – mammals, fish, reptiles etc – and their features. don't talk about invertebrates again Y6 objective.* • How can a classification key sort and identify living things? Research/Identifying and classifying *using an already made classification key to sort animals and plants. Try to use some animals that children don't recognise.* • How do humans negatively affect the habitats of living things? Research global warming and deforestation. Discuss why deforestation happens. Discuss impact on habitats – endangered animals and plants. • What can humans do to protect the habitats of living things? Research conservation, recycling, reduce fast fashion etc.	• How has electricity changed the way that we live? Research – *identify common electrical appliances.* • Can you name the parts needed to form a circuit? Research only using 1 bulb, battery, wire. Then teach what switches do. • Can you design and make a simple electrical circuit? Research *Not actual symbols yet (Y6 objective)- just drawing the parts.* • Why are these circuits not working? Problem Solving • How long does a battery light a torch for? Observation over time Predicting, recording data, interpreting results and evaluating – asking questions they want to explore next. • How are conductors and insulators different? Research • Which material is the best conductor of electricity? *** Fair testing Predicting, Setting up tests, Observing, recording, interpreting and communicating and evaluating.

Prior learning	**EYFS:** • Know and talk about the different factors that support their overall health and wellbeing – healthy eating and toothbrushing. **Y1:** • the names of human body parts - teeth • how animals can be herbivores, omnivores or carnivores – link to types of teeth each animal needs. **Y2:** • what animals need to stay alive. • why healthy eating and exercising are important • how to construct a basic food chain. **Y3:** • Humans have to eat protein, carbohydrates, protein, vitamins and minerals and fats to stay alive and healthy. • The common bones in the human body (femur, ribs, skull (cranium), spine etc).	**EYFS:** • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter e.g. ice, snow etc. **Y1:** • the names of common materials – wood, plastic, metal, glass, water and rock. • basic properties of each material **Y2:** • How are some materials more suitable for a purpose than others? E.g. paper straws compared to plastic straws. • How can we change materials **Y3:** • The three types of rocks - solids • How to classify rocks based on their appearance and properties – solids but with different properties.	**EYFS:** • Describe what they see, hear and feel while they are outside. **Y1:** • Senses – hearing using our ears.	**EYFS:** • Explore the natural world around them, making observations and drawing pictures of animals and plants. **Y1:** • the names of a range of animals, including pets and wild animals. • Comparing and sorting animal body parts to human body parts. **Y2:** - what habitats are and why they are so important to animals. - what habitats animals live in. - what microhabitats are and the names of minibeasts who live there.	*New topic, although children will have prior knowledge of the use of electricity from home. However, children's understanding of materials will be important when looking at conductors/insulators.* **Y1:** • the names of common materials – wood, plastic, metal, glass, water and rock. • basic properties of each material **Y2:** • How are some materials more suitable for a purpose than others? E.g. paper straws compared to plastic straws. • How can we change materials

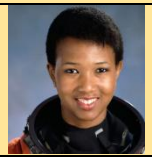
Vocabulary	Specific vocabulary: - digestion - decay - predator - prey - producer	Specific vocabulary: - particles - solid - liquid - gas - evaporation	Specific vocabulary: - pitch - volume - vibration - sound wave - soundproof	Specific vocabulary: - classification - vertebrates - endangered - extinct - deforestation	Specific vocabulary: - electricity - complete circuit - cell - conductor - insulator
Knowledge Milestones	**By the end of the unit children should know:** • How to make food chains, identifying the producer, the prey and the predator. • The different types of teeth humans have and their functions. • How animal teeth may be different/similar to ours. • The importance of looking after teeth, and the damage that sugars can do in terms of decay. • How the digestive system works – parts of the body (mouth, tongue, teeth, oesophagus, stomach and small and large intestine) and their role in digestion.	**By the end of the unit children should know:** • The simple differences between a solid, a liquid and a gas e.g. a solid holds its shape, a liquid pools and gas can escape from unsealed containers). • How to sort materials into each state of matter. • How heating materials melts them and how cooling materials can freeze them. • How materials have different melting points. • How water can change state by freezing, melting. evaporating and condensing, • How higher temperatures increase evaporation rate. • What the water cycle is, and the role of evaporation and condensation in this.	**By the end of the unit children should know:** • That sound is made by an object vibrating. • That they can hear sound because sound waves travel through a medium, enter their ears and make their ear drum vibrate. • What volume and pitch are. • Volume is how loud/quiet a sound is – louder sounds have strong vibrations; quieter sounds have weaker vibrations. • Pitch is how high or low a sound is. • Smaller, shorter, thinner, tighter or denser objects have high pitched sounds and larger, longer, thicker, looser and less-dense objects make low pitched sounds. • That sound is harder to hear further away because objects are absorbing the sound waves. • Which materials are most effective at insulating sound.	**By the end of the unit children should know:** • How to sort animals into groups based on their appearance. • That vertebrates are animals with back bones and that there are 5 categories of vertebrates (mammals, fish, birds, amphibians and reptiles) that scientists use to sort animals. • What a classification key is and how to use it. • How to create a classification system to sort animals. • The positive and negative affects that humans have on animal habitats, and why this can be detrimental to animals.	**By the end of the unit children should know:** • Why electricity is so important to us. • The names of the parts of a circuit • What a switch does. • How to make a simple circuit. • How to problem solve when a circuit fails. • What electrical conductors and insulators are, and which materials are the best conductors of electricity.

Working Scientifically Milestones	**By the end of the unit, children will develop the following working scientifically skills:** • **Asking questions -** Begin to ask relevant questions that can be investigated using a range of sources. Answer questions using scientific evidence. • **Making predictions -** Make predictions and give reasons. Begin to use scientific vocabulary in these predictions. • **Setting up tests -** Make decisions about different enquiries, including recognising when a fair test needs to be conducted. • **Observing and measuring -** Make systematic and careful observations. Take accurate measurements using standard units, and using a range of equipment including thermometers and data loggers. • **Recording data -** Children can begin to discuss and select the most appropriate ways to record their results using scientific vocabulary. Y4 children could record using diagrams, writing, tables or charts. They should now be confident in bar charts and drawing tables, and be able to produce these using their own results. Strive to draw own axis.	**By the end of the unit, children will develop the following working scientifically skills:** • **Asking questions -** Begin to ask relevant questions that can be investigated using a range of sources. Answer questions using scientific evidence. • **Making predictions -** Make predictions and give reasons. Begin to use scientific vocabulary in these predictions. • **Setting up tests -** Make decisions about different enquiries, including recognising when a fair test needs to be conducted. • **Observing and measuring -** Make systematic and careful observations. Take accurate measurements using standard units, and using a range of equipment including thermometers and data loggers. • **Recording data -** Children can begin to discuss and select the most appropriate ways to record their results using scientific vocabulary. Y4 children could record using diagrams, writing, tables or charts. They should now be confident in bar charts and drawing tables, and be able to produce these using their own results. Strive to draw own axis.	**By the end of the unit, children will develop the following working scientifically skills:** • **Asking questions -** Begin to ask relevant questions that can be investigated using a range of sources. Answer questions using scientific evidence. • **Making predictions -** Make predictions and give reasons. Begin to use scientific vocabulary in these predictions. • **Setting up tests -** Make decisions about different enquiries, including recognising when a fair test needs to be conducted. • **Observing and measuring -** Make systematic and careful observations. Take accurate measurements using standard units, and using a range of equipment including thermometers and data loggers. • **Recording data -** Children can begin to discuss and select the most appropriate ways to record their results using scientific vocabulary. Y4 children could record using diagrams, writing, tables or charts. They should now be confident in bar charts and drawing tables, and be able to produce these using their own results. Strive to draw own axis.	**Through the following enquiry types:** • Research – Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. • Identifying, grouping and classifying – Talk about criteria for grouping, sorting and classifying, and use simple keys.	**By the end of the unit, children will develop the following working scientifically skills:** • **Asking questions -** Begin to ask relevant questions that can be investigated using a range of sources. Answer questions using scientific evidence. • **Making predictions -** Make predictions and give reasons. Begin to use scientific vocabulary in these predictions. • **Setting up tests -** Make decisions about different enquiries, including recognising when a fair test needs to be conducted. • **Observing and measuring -** Make systematic and careful observations. Take accurate measurements using standard units, and using a range of equipment including thermometers and data loggers. • **Recording data -** Children can begin to discuss and select the most appropriate ways to record their results using scientific vocabulary. Y4 children could record using diagrams, writing, tables or charts. They should now be confident in bar charts and drawing tables, and be able to produce these using their own results. Strive to draw own axis.

	• **Interpreting and communicating results -** Identify, with help, changes, patterns, similarities and differences in data to help form conclusions.. • **Evaluating -** With increasing independence, answer the research question using results. Reflect on earlier predictions. **Through the following enquiry types:** • Research – Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. • Observation over time – Make systematic and careful observations. Help to make decisions about what observations to make, how long to make them for and the type of equipment they may need.	• **Interpreting and communicating results -** Identify, with help, changes, patterns, similarities and differences in data to help form conclusions.. • **Evaluating -** With increasing independence, answer the research question using results. Reflect on earlier predictions. **Through the following enquiry types:** • Research – Recognise when and how secondary sources might help them to answer questions that cannot be • Identifying, grouping and classifying - Talk about criteria for grouping, sorting and classifying, and use simple keys. • Fair/Comparative testing – Set up simple practical enquiries and comparative fair tests. Recognise when a simple fair test is necessary and help to decide how to set it up. • Problem Solving – Scaffolding should be provided so that children can begin to answer questions by applying their own, learned scientific knowledge.	• **Interpreting and communicating results -** Identify, with help, changes, patterns, similarities and differences in data to help form conclusions.. • **Evaluating -** With increasing independence, answer the research question using results. Reflect on earlier predictions. **Through the following enquiry types:** • Research – Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. • Problem Solving – Scaffolding should be provided so that children can begin to answer questions by applying their own, learned scientific knowledge. • Pattern seeking – begin to look for naturally occurring patterns and relationships and decide what data to collect to identify them. • Comparative testing/ Fair testing – Set up simple practical enquiries and comparative fair tests. Recognise when a simple fair test is necessary and help to decide how to set it up.		• **Interpreting and communicating results -** Identify, with help, changes, patterns, similarities and differences in data to help form conclusions.. • **Evaluating -** With increasing independence, answer the research question using results. Reflect on earlier predictions. **Through the following enquiry types:** • Research – Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. • Problem Solving – Scaffolding should be provided so that children can begin to answer questions by applying their own, learned scientific knowledge. • Fair testing – Set up simple practical enquiries and comparative fair tests. Recognise when a simple fair test is necessary and help to decide how to set it up. • Observation over time – Make systematic and careful observations. Help to make decisions about what observations to make, how long to make them for and the type of equipment they may need.

National Curriculum	• 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	• 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.	• 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.	• 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.	• 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

Science - Learning Challenges/ Prior learning /Vocabulary/Knowledge Milestones/ Working Scientifically Skills/ National Curriculum Statements/ Y5

	Autumn		Spring		Summer
KS2 Y5	Changes in materials	Earth and space	Living things and their habitats	Animals, including humans	Forces
Scientist/inventors	Nitin Swarnakar – pioneered how to make insoluble ingredients soluble so they can be used in medicine 	Mae Jemison – 	David Attenborough 	Sir Robert Edwards 	Isaac Newton 

Learning Sequence	• What is a thermal conductor/insulator? Research/ Comparative testing Look at different materials that are conductors/insulators • Does the thickness of a material affect how effective it is as a thermal insulator? Fair testing asking questions, predicting, setting up tests, observing and measuring (Celsius), recording with line graph interpreting results and evaluating. children identify variables with support.. • What does it mean to dissolve? Which materials are soluble, and which are not? Comparative testing Setting up tests, recording and interpreting results and evaluating. • Does the temperature of a solvent affect how fast solutes dissolve? *** →Pattern seeking/fair testing Predicting, setting up tests, observing and measuring (Celsius), recording, interpreting results and evaluating. children identify variables with support.. • What's the difference between reversible and irreversible changes? Research • How can a solute be recovered from a solution? Research • How can mixtures be separated? Research	• What planets are in our solar system? What shape are they? Research • How do planets move in relation to the Sun? Research • Why do we have day and night? Research • How do time zones differ because of the Earth's rotation? Research • How and why does the sun appear to move across the sky? ***Observation over time/Pattern seeking Observing, recording, interpreting and evaluating (don't do shadow investigation to observe shadows as this is Y6 objective – could observe the position of the sun in the sky instead and link this to the Earth's rotation - rising in E and set in the W) • Why does the moon appear to change shape? Observation over time/Research – moon diaries – if so, give moon diary activity at start of topic so they have a month to observe. Observe every 3 nights. Observing, recording, interpreting and evaluating	• How do plants reproduce sexually? Research *(build on Y3)* • How do plants reproduce asexually? Research bulbs, tubers and runners, as well as humans artificially propagating using cuttings and grafting. • Which parts of a plant can be cut to make a new plant? ***Comparative testing Predicting, setting up tests, observing, recording, interpreting results and evaluating. Group with previous lesson. • How do mammals reproduce? Research • What does the life cycle of a bird look like? Observation over time Observing, recording, • What does the lifecycle of an insect look like? Observation over time Observing, recording, • What does the lifecycle of an amphibian look like? Observation over time Observing, recording,	Revisit prior learning of human life cycle studied in year 2 before teaching – order stages of life. • How do we grow and develop in the womb? Research • Is there a relationship between a mammal's size and its gestation period? Pattern seeking ,predicting, recording, interpreting results and evaluating– make bar charts to show relationship • What changes occur during puberty? Research • What changes take place during old age? Research • How and why has life expectancy in the UK changed since the Middle Ages? Researching recording, interpreting results and evaluating make line graphs ,	• What is gravity and why is it important? Research • What is friction and why is it important? Research • Which material is best for the sole of a shoe when walking on ice? *** Problem solving/Fair testing Predicting, setting up tests, observing, recording, interpreting results and evaluating.measuring in N • What is air resistance and why is it important? • How does the _____ (size, material, shape etc) of a parachute affect the rate an object falls? *** Fair testing Asking questions, predicting, setting up tests, observing, recording, interpreting results and evaluating *chn choose variable and ask their own question. Can be very scaffolded for this one – judge as class teacher.* line/bar chart. • What is water resistance? Why is it important? Research • How does the _____ (shape, surface area, material, weight) of an object affect how fast an object moves through water? *** Fair testing Asking questions, predicting, setting up tests, observing, recording, interpreting results and evaluating *chn choose variable and ask their own question.* • What are levers? How does moving the pivot position affect a lever? Research why are they important too. Moderated resources have ideas. • What are pulleys? why are they important too. Different types of pulleys

					• Can you build a pulley system to get tomatoes up and down a mountain without squashing them? , Problem solving recording, evaluating Tomato challenge on Google. • What are gears? Research why are they important too. .

Prior learning	**EYFS:** • Explore collections of materials with similar and/or different properties. • Talk about the differences between materials and changes they notice. **Y1:** • Name common materials – wood, plastic, metal, glass, water and rock. • Identify basic properties of each material • Understand what it means to be waterproof, and which materials are waterproof. **Y2:** • how materials are usedthat materials suitability depends on its purpose. **Y3:** ←*for outcome so recap as part of prior learning*. • How magnets have two poles which make it attract or repel objects. • The names of some magnetic materials. **Y4:** ←*for outcome so recap as part of prior learning*. • What electrical conductors and insulators are, and which materials are the best conductors of electricity • The water cycle and changes of state- evaporation → way of separating	**EYFS:** • Explore the natural world around them. • Describe what they see, hear and feel while they are outside – children should recognise the Sun, moon and stars in the sky. **Y3:** • How dark is the absence of light. • How light helps us to see by reflecting off objects and into our eyes • Why light from the Sun is dangerous for our eyes and skin. • How we can protect ourselves from the Sun. • That shadows are formed when an opaque object blocks the light. • How shadows change depending on where the light source is.	**EYFS:** • Understand the key features of the life cycle of a plant and an animal. **Y1:** • the parts of a flowering plant and a tree • the names of animals, including pets and wild animals. **Y2:** • the difference between being alive, dead or never alive • the differences between human life cycles and animal life cycles. • the life cycle of a plant. **Y3:** • How seeds are formed because pollen is transferred from the male part of a plant to a female part of a plant. • Different ways that seeds are dispersed. • Functions of each part of the plant – flower produces seeds. **Y4:** • explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment - knowing insects, birds, reptiles, mammals and amphibians are all vertebrates.	**EYFS:** • Know and talk about the different factors that support their overall health and wellbeing: **Y1:** • the names of their body parts e.g. eyes, arm, leg, head, teeth etc. **Y2:** • notice that animals, including humans, have offspring which grow into adults • describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. **Y3:** • Humans have to eat protein, carbohydrates, protein, vitamins and minerals and fats to stay alive and healthy. • The common bones in the human body (femur, ribs, skull (cranium), spine etc). • The functions of a skeleton – support, movement, protection and making blood cells. • The function of muscles- moving our bones. **Y4:** • The different types of teeth humans have and their functions • How the digestive system works – parts of the body (mouth, tongue, teeth, oesophagus, stomach and small and large intestine) and their role in digestion.	**EYFS:** • Explore and talk about the different forces they feel. **Y1:** • Name common materials – wood, plastic, metal, glass, water and rock. • Identify basic properties of each material **Y2:** • how materials can be changed by bending, pushing (squashing), and pulling (stretching) – *links because forces are pushes and pulls so when changing materials, we apply force.* **Y3:** • Forces are contact (pushes and pulls) or non- contact (act at a distance – magnets.) • What the best surface for making a toy car travel the furthest is. • How magnets have two poles which make it attract or repel objects. • The names of some magnetic materials. **Y5:** • Gravity holds the planets in orbit around the Sun.

	• Particle theory – particles are the reason we can change materials.				
Vocabulary	Specific vocabulary: - dissolve - soluble - solution - reversible change - irreversible change	Specific vocabulary: • planet • Solar System • orbit • rotate • axis	Specific vocabulary: • reproduction • sexual reproduction • asexual reproduction • fertilise • metamorphosis	Specific vocabulary: • gestation • puberty • adolescence • hormones • life expectancy	Specific vocabulary: • gravity • resistance • streamlined • friction • mechanism

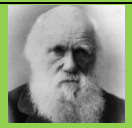
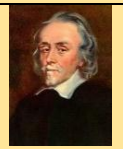
Knowledge Milestones	**By the end of the unit children should know:** - That thermal conductors let heat pass through them and thermal insulators prevent heat from passing through them. - That the type of material/thickness of a material affects how good of a thermal insulator it is. - Dissolving is the process that occurs when a solute is added to a solvent and the solute disappears. - How changing variables such as the temperature of a solvent, the type of liquid and how many types of solvent is stirred, affect how fast solutes dissolve. How solutes can - be recovered from a solution by evaporation. - How mixtures can be separated by sieving, filtering or evaporation. - How a reversible change can be undone because materials can go back to how they were before the reactions took place. - That burning and acid reactions are irreversible because the materials are changed forever. -	**By the end of the unit children should know:** • The names of the planets, and the order of planets, in our Solar System. • Planets in our solar system, the Sun and the moon are spherical. • That planets orbit the Sun. • That day and night is caused by the rotation of the Earth on its axis. • How time zones are caused by the rotation of the Earth on its axis. • The rotation of the Earth on its axis makes the Sun appear to move across the sky. The sun rises in the east and sets in the west because the Earth rotates towards the east. • We can see the moon because of the Sun's reflection upon it. • The moon appears to change shape because of the amount of sunlight reflecting upon it. -	**By the end of the unit children should know:** • Sexual reproduction in plants is where the pollen from one plant's stamen is transferred to the stigma of another plant to make new seeds. • In sexual reproduction, the new seeds are not identical to the parent plants. • Asexual reproduction can happen via tubers, bulbs or runners. Artificial asexual reproduction is when humans cut or graft plants to make new plants. • Asexual reproduction produces identical offspring. • How mammals reproduce through mating, and how offspring is not • What the life cycle of a mammal looks like. • What insect lifecycles look like, including how some insects metamorphosize. • What amphibian lifecycles are like. • The similarities and differences between mammal, insects and amphibian life cycles.	**By the end of the unit children should know:** • How humans grow and change from a foetus – old age. • How foetus' grow and change inside the womb. • How babies grow in size during their first year. • What changes occur during puberty. • What changes occur during old age.	**By the end of the unit children should know:** • The names of forces that exist around them (gravity, friction, air resistance and water resistance). • That gravity pulls object towards the centre of the Earth. • Gravity keeps objects on Earth, and it keeps planets in orbit around the Sun. • That friction is the force that acts when two objects are sliding across each other, and that friction always works in the opposite direction that the object is trying to move in. • Friction slows things down and stops them moving. • The types of materials that create the most friction e.g. rubber, sandpaper etc. • Air resistance is the friction that acts between an object and the air, and that it acts to slow moving objects. • How the different variables of a parachute can affect its rate of descent. • That water resistance is the friction between an object and water, and it slows objects moving in water. • How the different variables affect how fast an object moves through water. • What pulleys, levers and gears are, and how they are used.

Working Scientifically Milestones	By the end of the unit, children will develop the following working scientifically skills:	By the end of the unit, children will develop the following working scientifically skills:	By the end of the unit, children will develop the following working scientifically skills:	By the end of the unit, children will develop the following working scientifically skills:	By the end of the unit, children will develop the following working scientifically skills:
	• **Asking questions -** Ask scientific questions and begin to form hypotheses • **Making predictions -** Make a prediction and use scientific vocabulary to explain • **Setting up tests -** Plan a range of science enquiries, including fair tests. Begin to identify variables. • **Observing and measuring -** Plan and carry out fair tests with support, ensuring careful and systematic observations are taken. Take measurements using a range of scientific equipment with increasing accuracy and precision. • **Recording data -** Children can record data and results with increasing complexity using scientific diagrams, labels, classification keys, tables, bar and line graphs. • In Y5, children need to draw line graphs from data collected. • **Interpreting and communicating results -** With increasing independence, draw conclusions based on evidence, identifying patterns. Use relevant scientific language to discuss, communicate and justify their findings...	• **Observing and measuring -** Plan and carry out fair tests with support, ensuring careful and systematic observations are taken. Take measurements using a range of scientific equipment with increasing accuracy and precision. • **Recording data -** Children can record data and results with increasing complexity using scientific diagrams, labels, classification keys, tables, bar and line graphs. • **Interpreting and communicating results -** With increasing independence, draw conclusions based on evidence, identifying patterns. Use relevant scientific language to discuss, communicate and justify their findings... • **Evaluating -** Answer the research question, using their own scientific knowledge and results. Reflect on their prediction and whether it was accurate or not. With support, pose new questions for further investigations, making predictions for these investigations based on their new found knowledge.	• **Making predictions -** Make a prediction and use scientific vocabulary to explain • **Setting up tests -** Plan a range of science enquiries, including fair tests. Begin to identify variables. • **Observing and measuring -** Plan and carry out fair tests with support, ensuring careful and systematic observations are taken. Take measurements using a range of scientific equipment with increasing accuracy and precision. • **Recording data -** Children can record data and results with increasing complexity using scientific diagrams, labels, classification keys, tables, bar and line graphs. • **Interpreting and communicating results -** With increasing independence, draw conclusions based on evidence, identifying patterns. Use relevant scientific language to discuss, communicate and justify their findings... • **Evaluating -** Answer the research question, using their own scientific knowledge and results. Reflect on their	• **Making predictions -** Make a prediction and use scientific vocabulary to explain • **Recording data -** Children can record data and results with increasing complexity using scientific diagrams, labels, classification keys, tables, bar and line graphs. • **Interpreting and communicating results -** With increasing independence, draw conclusions based on evidence, identifying patterns. Use relevant scientific language to discuss, communicate and justify their findings... • **Evaluating -** Answer the research question, using their own scientific knowledge and results. Reflect on their prediction and whether it was accurate or not. With support, pose new questions for further investigations, making predictions for these investigations based on their new found knowledge. **Through the following enquiry types:** • Research recognise which secondary sources	• **Asking questions -** Ask scientific questions and begin to form hypotheses • **Making predictions -** Make a prediction and use scientific vocabulary to explain • **Setting up tests -** Plan a range of science enquiries, including fair tests. Begin to identify variables. • **Observing and measuring -** Plan and carry out fair tests with support, ensuring careful and systematic observations are taken. Take measurements using a range of scientific equipment with increasing accuracy and precision. • **Recording data -** Children can record data and results with increasing complexity using scientific diagrams, labels, classification keys, tables, bar and line graphs. • **Interpreting and communicating results -** With increasing independence, draw conclusions based on evidence, identifying patterns. Use relevant scientific language to discuss, communicate and justify their findings...

	• **Evaluating -** Answer the research question, using their own scientific knowledge and results. Reflect on their prediction and whether it was accurate or not. With support, pose new questions for further investigations, making predictions for these investigations based on their new found knowledge. **Through the following enquiry types:** • Research recognise which secondary sources will be most useful to research their ideas. • Pattern seeking look for different causal relationships in their data • Fair testing with help, recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why. • Identifying, grouping and classifying use and develop keys and other information records to describe, classify, sort and identify living things and materials. (OUTCOME)	**Through the following enquiry types:** • Research recognise which secondary sources will be most useful to research their ideas. • Observation over time with help, make their own decisions about what observations to make, what measurements to make and how long to make them for. • Pattern seeking look for different causal relationships in their data	prediction and whether it was accurate or not. With support, pose new questions for further investigations, making predictions for these investigations based on their new found knowledge. **Through the following enquiry types:** • Research recognise which secondary sources will be most useful to research their ideas. • Observation over time with help, make their own decisions about what observations to make, what measurements to make and how long to make them for. • Identifying, grouping and classifying use and develop keys and other information records to describe, classify, sort and identify living things and materials. (OUTCOME) • Comparative testing with help, recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why.	will be most useful to research their ideas. • Pattern seeking look for different causal relationships in their data •	• **Evaluating -** Answer the research question, using their own scientific knowledge and results. Reflect on their prediction and whether it was accurate or not. With support, pose new questions for further investigations, making predictions for these investigations based on their new found knowledge. **Through the following enquiry types:** • Research recognise which secondary sources will be most useful to research their ideas. • Fair testing with help, recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why. • Problem solving with support, conduct tests to find answers to problems. Use scientific knowledge to support their answers.

National Curriculum	• 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.	• 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.	• describe the differences in the life cycles of a mammal, an amphibian, an insect and bird • describe the life process of reproduction in some plants and animals	• describe the changes as humans develop to old age.	• 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.

Science - Learning Challenges/ Prior learning /Vocabulary/Knowledge Milestones/ Working Scientifically Skills/ National Curriculum Statements/ Y6

	Autumn	Spring		Summer	
KS2 Y6	Evolution and inheritance	Electricity	Living things and their habitats	Animals including humans	Light
Scientist/Inventor	Charles Darwin 	Edith Clarke 	Carl Linnaeus  Alexander Fleming	William Harvey 	Patricia Bath 

Learning Sequence	• What is inheritance? How does this lead to variation? Research • How are plants adapted to their environment? Research • How are animals adapted to their environment? Research • What is natural selection? How does this lead to evolution? Moth investigation - Wendy training! Research *(could add which moths would survive on our school playground?)* • Which beak shape is most effective for helping a bird to survive in the wild?*** Comparative testing, predicting, setting up tests, observing, recording, dual bar chart interpreting results and evaluating. Let children explore and then discuss what Charles Darwin found on Galapagos islands and what this taught him – see moderated resources.	• Can you draw a scientific diagram of a circuit? Research identifying electrical symbols, including buzzer and motor, bulb, switch, cell and wire. → give year 4 circuit pictures and get them to draw the electrical circuit. • Can interpret a scientific diagram to make a circuit? Research opportunity to discover what motors and buzzers do. • What happens inside a circuit? Research • How does changing the number of volts affect a circuit? (the brightness of a bulb, the loudness of a buzzer, the speed of a motor)? *** Pattern seeking/Fair testing Asking questions, predicting, setting up tests, observing, recording, interpreting results and evaluating. • How does increasing the number of electrical components affect a circuit? Pattern seeking/Fair testing Asking questions, predicting, setting up tests, observing, recording, interpreting results and evaluating. *children work in groups.*	• How are animals classified? *Vertebrates and invertebrates – break each group down into their sections* Research • How are plants classified? Research • What are microorganisms? Research • What are the best conditions to activate yeast? Fair testing Asking questions, predicting, setting up tests, observing, recording, interpreting results and evaluating. Children choose their own variables • How far can a sneeze travel? Fair testing Asking questions, predicting, setting up tests, observing, recording, interpreting results and evaluating • Can you create your own classification key to sort organisms and give reasons for your choices? – give children some unfamiliar animals and let them research to help classify it. Recording and interpreting and communicating results Identifying, grouping and classifying • How did Carl Linnaeus help us to classify organisms? Research	• What is the circulatory system made of? Research • How does our heart work? Research • What is blood made of? Research • Why do we need a circulatory system? – *functions of heart (pump blood around body), blood vessels (transport blood to every part of body) and blood (transport nutrients and water around the body after it is absorbed in the intestines)* Research • How can I keep my heart healthy? Research • Does the _____ (*the age of a person, the height of a person, the weight of a person, the amount of exercise a person does)* affect their heart rate?*** Pattern seeking Chn to choose own variable . *(scaffolded through each step)* Asking questions, predicting, setting up tests, observing, recording, interpreting results and evaluating. • What can damage our heart? Research/Observation *of damaged hearts, and could possibly make predictions of what they thing caused it.*	• How does light travel? Research • How do our eyes help us to see light? Research make sure children talk about light travelling in straight lines. • Which materials are best for reflecting light in a periscope? *** Comparative testing/Problem solving predicting, setting up tests, observing, recording, interpreting results and evaluating. • Why are shadows the same shape as objects? Research • How does a shadow change throughout the day? *** Observation over time /Pattern seeking predicting, setting up tests, observing, recording, interpreting results and evaluating. • Why do objects look different in water? Research • How are rainbows formed? Research • Can you conduct your own scientific enquiry about light? Children decide on enquiry *** WS skills decided by children. Could be research – how do glasses change how we see?

Prior learning	**EYFS:** • Begin to make sense of their own life-story and family's history. • Notice differences between people **Y1:** • Name parts of a flowering plant and a tree • State how evergreen and deciduous trees are different • Know the names of common garden and wild plants, as well as common trees. **Y2:** • What plants need to stay alive (water, light and suitable temp. • What are offspring? • Do all animal offspring look like their adult? - sorting – these do, these don't • **Y3:** • The functions of each part of a plant. • Further conditions for successful growth of plants (air, space, nutrients to grow). • How plants do not all need the same conditions to grow. • What fossils are and how they are formed.	**Y1:** • the names of common materials – wood, plastic, metal, glass, water and rock. • basic properties of each material **Y2:** • How are some materials more suitable for a purpose than others? E.g. paper straws compared to plastic straws. • How can we change materials **Y4:** • Why electricity is so important to us. • The names of the parts of a circuit • How to make a simple circuit. • How to problem solve when a circuit fails. • What a switch does. • What electrical conductors and insulators are, and which materials are the best conductors of electricity. **Y5:** How materials can be grouped based on their properties, including electrical conductivity	**EYFS:** • Explore the natural world around them, making observations and drawing pictures of animals and plants. **Y1:** • the names of a range of animals, including pets and wild animals. • Comparing and sorting animal body parts to human body parts. **Y2:** - what habitats are and why they are so important to animals. - what habitats animals live in. - what microhabitats are and the names of minibeasts who live there. **Y3** - functions of parts of a plant – link to flowering and non-flowering. **Y4:** • How to sort animals into groups based on their appearance. • That vertebrates are animals with back bones and that there are 5 categories of vertebrates (mammals, fish, birds, amphibians and reptiles) that scientists use to sort animals.	**EYFS:** • Use all their senses in hands-on exploration of natural materials. • Understand the key features of the life cycle of a plant and an animal. • Explore the natural world around them, making observations and drawing pictures of animals and plants. **Y1:** • the names of their body parts e.g. eyes, arm, leg, head, teeth etc. • how animals can be herbivores, omnivores or carnivores. • what the 5 senses are, which body part we use for each sense and what each sense is used for. **Y2:** • What do animals need to stay alive? • Why is eating healthily and exercising important? Y3: • Humans have to eat protein, carbohydrates, protein, vitamins and minerals and fats to stay alive and healthy. • The common bones in the human body (femur, ribs, skull (cranium), spine etc). • The functions of a skeleton – support, movement, protection and making blood cells.	**EYFS:** • Talk about what they see, • Describe what they see, hear and feel while they are outside. **Y1:** • Senses – using their eyes to see around them. **Y2:** • Materials – opaque, translucent and transparent. **Y3** • How dark is the absence of light. • How light helps us to see by reflecting off objects and into our eyes • Why light from the Sun is dangerous for our eyes and skin. • How we can protect ourselves from the Sun. • That shadows are formed when an opaque object blocks the light. • How shadows change depending on where the light source is. **Y5:** - Solar system – could mention light comes from light sources like the Sun. Life wouldn't be sustained on Earth without the Sun. -

	Y4: • The positive and negative effects that humans have on animal habitats, and why this can be detrimental to animals. **Y5:** • Sexual reproduction in plants is where the pollen from one plant's stamen is transferred to the stigma of another plant to make new seeds. • In sexual reproduction, the new seeds are not identical to the parent plants. • How mammals reproduce through mating.		• What a classification key is and how to use it. • How to create a classification system to sort animals. • The positive and negative affects that humans have on animal habitats, and why this can be detrimental to animals. **Y5:** • How plants reproduce sexually and asexually • How animals reproduce by mating Life cycles of different vertebrates..	• Muscles work by contracting and relaxing. This pulls tendons, which pull on the bones. – link to heart as a muscle. Y4: • How the digestive system works – parts of the body (mouth, tongue, teeth, oesophagus, stomach and small and large intestine) and their role in digestion. Y5: • How humans grow and change from a foetus – old age. •	
Vocabulary	Specific vocabulary: - characteristics - inheritance - adaptation - evolution - natural selection	Specific vocabulary: • electrical current • electrons • voltage • resistance • series circuit	Specific vocabulary: - invertebrate - microorganism - taxonomy - bacteria - fungi •	Specific vocabulary: • heart • blood vessels • pulse • transported • oxygen carbon dioxide	Specific vocabulary: • retina • iris • refract • spectrum • dispersion

Knowledge Milestones	**By the end of the unit children should know:** – that adaptations are features that allow a plant/animal to live successfully in their habitat. – Ways that plants have adapted depending on their habitat e.g. in a rainforest, plants would need big leaves to capture light, and in a mountainous environment, plants would need strong roots to break through rocks. - Ways that animals have adapted depending on their habitat e.g. desert animals have long eyelashes to block out sand, and Antarctic animals have lots of blubber to keep them warm. - that natural selection is the survival of the fittest – those best adapted, survive in their habitats and they pass those adaptations onto their offspring, leading to evolution. - fossil records provide evidence of evolution. - that inheritance is when w a living thing reproduces and passes on its genetic information to its offspring. - How reproduction causes variation amongst offspring (some genetic information passed from mother and some from father).	**By the end of the unit children should know:** • That inside a circuit, there is an electrical current. Electrons are very small particles that carry electrical current. The voltage of a cell/battery pushes electrons through a conducting loop. This increases the current • What motors and buzzers are, and why they are used. • How to draw and interpret a scientific diagram of a circuit, using circuit symbols. • That volts are a measure of the size of the push provided by a cell or other source of electricity. • How changing the voltage affects the different components of a circuit. As voltage increases, the current also increases. Increasing the voltage means that the electrons moving around the circuit are given a bigger 'push'. They will move faster and a higher number of them then passes the same point every second • How changing number of components affects the way a circuit functions. E.g. If you add more bulbs, the bulbs get	**By the end of the unit children should know:** • Animals can be more specifically classified into vertebrates (mammals, reptiles, fish, birds and amphibians) and invertebrates (insects, arachnids and crustaceans) • Plants can be classified as having seeds and not having seeds. These can be further split into flowering and non-flowering, and ferns and mosses. • Microorganisms are tiny, living things, too small to see with the naked-eye. • Microorganisms can be classified into bacteria, fungi, and viruses. • How to sort animals, plants and microorganisms by creating their own classification keys, and how to give reasons for their choices.	**By the end of the unit children should know:** • The circulatory system is made up of the heart, blood vessels (aorta and vena cava) and blood. • The heart works by pumping blood to the lungs to collect oxygen. The blood then returns to the heart to be pumped around the body. • Blood is made from plasma, white blood cells, red blood cells and platelets. • A circulatory system is important as it supplies our body with water, oxygen and nutrients to keep it alive. • Eating the right nutrition and exercising keep the heart healthy. • How different variables can influence heart rate. • How alcohol and drugs can damage our heart.	**By the end of the unit children should know:** • Light travels in straight lines from a light source. • Light is reflected into our eyes. It is detected by the retina, and the information is sent to the brain. • Which materials are best for reflecting light. • That shadows are the same shape as objects because shadows block light. • How shadow length and direction change throughout the day, and how this is related to the Sun's apparent movement across the sky. • Why objects look different in water due to water absorbing light.

		dimmer. This is because there is more resistance • How landing light circuits have two switches and two separate circuits.			

Working Scientifically Milestones	By the end of the unit, children will develop the following working scientifically **skills**:	By the end of the unit, children will develop the following working scientifically **skills**:	By the end of the unit, children will develop the following working scientifically **skills**:	By the end of the unit, children will develop the following working scientifically **skills**:	By the end of the unit, children will develop the following working scientifically **skills**:
	• **Asking questions -** Suggest scientific questions that can be investigated and choose the most appropriate enquiry type to investigate these. • **Making predictions** Make a hypothesis to investigate and use scientific vocabulary to explain. Begin to utilise prior knowledge as a basis for predictions. • **Setting up tests -** Select and plan the most suitable line of enquiry and be able to identify variables confidently. • **Observing and measuring -** Decide what they need to observe, and how they are going to do this. Independently make systematic observations. Choose their own equipment in order to take measurements and be able to explain how to use it. Decide how long to take measurements for, and check results with additional readings – possibly finding the mean. • **Recording data -** Children choose the most effective approach to record their results and link it constantly to their mathematical knowledge.	• **Asking questions -** Suggest scientific questions that can be investigated and choose the most appropriate enquiry type to investigate these. • **Making predictions** Make a hypothesis to investigate and use scientific vocabulary to explain. Begin to utilise prior knowledge as a basis for predictions. • **Setting up tests -** Select and plan the most suitable line of enquiry and be able to identify variables confidently. • **Observing and measuring -** Decide what they need to observe, and how they are going to do this. Independently make systematic observations. Choose their own equipment in order to take measurements and be able to explain how to use it. Decide how long to take measurements for, and check results with additional readings – possibly finding the mean. • **Recording data -** Children choose the most effective approach to record their results and link it constantly to their mathematical knowledge.	• **Recording data -** Children choose the most effective approach to record their results and link it constantly to their mathematical knowledge. They have the option to draw scientific diagrams, bar charts, tables and line graphs. • Children should be challenged to draw line graphs with two lines, dual bar charts, and pie charts where appropriate. • They should also be repeating tests to increase accuracy of experiments, finding the mean. • **Interpreting and communicating results -** Identify and explain relationships in data using scientific language. Identify where their evidence supports or refutes their findings, selecting fact from opinion. **Through the following enquiry types:** • **Research-** Recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact.	• **Asking questions -** Suggest scientific questions that can be investigated and choose the most appropriate enquiry type to investigate these. • **Making predictions** Make a hypothesis to investigate and use scientific vocabulary to explain. Begin to utilise prior knowledge as a basis for predictions. • **Setting up tests -** Select and plan the most suitable line of enquiry and be able to identify variables confidently. • **Observing and measuring -** Decide what they need to observe, and how they are going to do this. Independently make systematic observations. Choose their own equipment in order to take measurements and be able to explain how to use it. Decide how long to take measurements for, and check results with additional readings – possibly finding the mean. • **Recording data -** Children choose the most effective approach to record their results and link it constantly to their mathematical knowledge.	• **Asking questions -** Suggest scientific questions that can be investigated and choose the most appropriate enquiry type to investigate these. • **Making predictions** Make a hypothesis to investigate and use scientific vocabulary to explain. Begin to utilise prior knowledge as a basis for predictions. • **Setting up tests -** Select and plan the most suitable line of enquiry and be able to identify variables confidently. • **Observing and measuring -** Decide what they need to observe, and how they are going to do this. Independently make systematic observations. Choose their own equipment in order to take measurements and be able to explain how to use it. Decide how long to take measurements for, and check results with additional readings – possibly finding the mean. • **Recording data -** Children choose the most effective approach to record their results and link it constantly to their mathematical knowledge.

	They have the option to draw scientific diagrams, bar charts, tables and line graphs. • Children should be challenged to draw line graphs with two lines, dual bar charts, and pie charts where appropriate. • They should also be repeating tests to increase accuracy of experiments, finding the mean. • **Interpreting and communicating results -** Identify and explain relationships in data using scientific language. Identify where their evidence supports or refutes their findings, selecting fact from opinion. • **Evaluating -** Draw conclusions about the investigation conducted. Identify the validity of conclusions drawn with further secondary research. Suggest required improvements to methodology. Suggest further investigations and make predictions about what they believe to happen. Discuss how scientific ideas develop over time. **Through the following enquiry types:** • **Research**- Recognise which secondary sources will be most useful to research their ideas and	They have the option to draw scientific diagrams, bar charts, tables and line graphs. • Children should be challenged to draw line graphs with two lines, dual bar charts, and pie charts where appropriate. • They should also be repeating tests to increase accuracy of experiments, finding the mean. • **Interpreting and communicating results -** Identify and explain relationships in data using scientific language. Identify where their evidence supports or refutes their findings, selecting fact from opinion. • **Evaluating -** Draw conclusions about the investigation conducted. Identify the validity of conclusions drawn with further secondary research. Suggest required improvements to methodology. Suggest further investigations and make predictions about what they believe to happen. Discuss how scientific ideas develop over time. **Through the following enquiry types:** • Fair testing **-** - Recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why.	• **Identifying, grouping and classifying -** 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 • Fair testing **-** - Recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why.	They have the option to draw scientific diagrams, bar charts, tables and line graphs. • Children should be challenged to draw line graphs with two lines, dual bar charts, and pie charts where appropriate. • They should also be repeating tests to increase accuracy of experiments, finding the mean. • **Interpreting and communicating results -** Identify and explain relationships in data using scientific language. Identify where their evidence supports or refutes their findings, selecting fact from opinion. • **Evaluating -** Draw conclusions about the investigation conducted. Identify the validity of conclusions drawn with further secondary research. Suggest required improvements to methodology. Suggest further investigations and make predictions about what they believe to happen. Discuss how scientific ideas develop over time. **Through the following enquiry types:** • **Research**- Recognise which secondary sources will be most useful to research their ideas and	They have the option to draw scientific diagrams, bar charts, tables and line graphs. • Children should be challenged to draw line graphs with two lines, dual bar charts, and pie charts where appropriate. • They should also be repeating tests to increase accuracy of experiments, finding the mean. • **Interpreting and communicating results -** Identify and explain relationships in data using scientific language. Identify where their evidence supports or refutes their findings, selecting fact from opinion. • **Evaluating -** Draw conclusions about the investigation conducted. Identify the validity of conclusions drawn with further secondary research. Suggest required improvements to methodology. Suggest further investigations and make predictions about what they believe to happen. Discuss how scientific ideas develop over time. **Through the following enquiry types:** • **Comparative testing**- Recognise when and how to set up comparative and fair

	begin to separate opinion from fact. • **Comparative testing-** Recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why. • **Problem solving –** Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas.	• Research Recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact. • Problem solving Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas. • Pattern seeking Look for different causal relationships in their data and identify evidence that refutes or supports their ideas. •		begin to separate opinion from fact. • **Pattern seeking** Look for different causal relationships in their data and identify evidence that refutes or supports their ideas. • **Observation closely/over time** - Make their own decisions about what observations to make, what measurements to use and how long to make them for	tests and explain which variables need to be controlled and why. • **Research-** Recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact. • **Observation over time** - Make their own decisions about what observations to make, what measurements to use and how long to make them for • **Pattern seeking** Look for different causal relationships in their data and identify evidence that refutes or supports their ideas. • **Problem solving –** Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas.

National Curriculum	• 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	• 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	• 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	• 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.