NC- Red

Year 1 Curriculum

These objectives can be completed with any unit across the year.

Working Scientifically					Term	Topic	Need to Know	Steps to Success	Vocabulary	Prior Learning	National curriculum	Significant Scientists
Asking questions and recognising that they can be answered in different ways: *Asking simple questions and recognising that they can be answered in different ways.*	• While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions.	• The children answer questions developed with the teacher often through a scenario.	• The children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered		**Autumn 1**	Everyday materials & WS	Children can distinguish between an object and the material from which it is made. Children can describe materials using their senses (touch, sight, smell, sound). Children can describe materials using their senses, using **specific scientific words: rough, shiny, smooth, light, heavy, soft, thick, thin, flexible, strong, waterproof, loud, quiet.** Children can explain what material objects are made from and compare similarities and differences. Children can explain why a material might be useful for a specific job. Children can name different everyday materials. e.g. **wood, plastic, metal, water and rock** Children can sort materials into groups with a given criteria- **size, shape, strength, flexibility**. Children can explain how solid shapes can be changed by **squashing, bending, twisting and stretching**.	Term 1- **What do we already know?** Flashback Friday. Prior knowledge , key questions, Key Scientific vocabulary. Assessment opportunity.	material touch taste smell sound squashing bending twisting stretching size shape strength flexibility wood plastic metal water rock smooth light heavy soft thick thin flexible strong waterproof loud quiet rough shiny		Pupils should be taught to: • 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.	Charles Mackintosh (1766-1843) Scottish chemist and Inventor of waterproof fabric. The mackintosh raincoat is named after him. Martin Brock – Nanotechnology engineer and XelfleX inventor
Engage in practical enquiry to answer questions: *Performing simple tests.*	•The children use practical resources provided to gather evidence to answer questions generated by themselves or the teacher.	• They carry out: tests to classify; comparative tests; pattern seeking enquiries; and make observations over time.	Identifying and classifying. • Children use their observations and testing to compare objects, materials and living things. They sort and group these things, identifying their own criteria for sorting.	• They use simple secondary sources (such as identification sheets) to name living things. They describe the characteristics they used to identify a living thing.	**Autumn 2**		If the children complete the previous statements try some of these: **Challenge**: Children can describe similarities and differences between materials. Children can explain what happens to materials when they are heated: bread, ice, chocolate, wax, egg. Children can explain what happens to materials when they are cooled: jelly, heated chocolate, water.	Term 2- **What do we already know?** Flashback Friday. Prior knowledge , key questions, Key Scientific vocabulary. Assessment opportunity. **Working Scientifically - Sorting & comparing.** Review different everyday materials. Describe them using physical properties. What is the same? What is different? Sort and compare using scientific vocabulary. **Senses** Explore materials using sight, smell, touch & sound. Make predictions. Use comparative language. **Significant Scientists** Charles Mackintosh & Martin Brock What did they invent? Why are their inventions important? How has it impacted our lives? Compare their impact on society. **Exploring/ Investigating** How do we know it is a solid material? Recap and name solid materials. Investigation- Explore how solid materials can be changed by stretching, twisting, bending and squashing. Predict and conclude. **Assessment Focus**- Can I describe materials using my senses, using scientific words? Can I describe materials using my senses (touch, sight, smell, sound)? Can I sort materials into groups? Can I explain how solid shapes can be changed? Can I explain why a material might be				
Making observations and taking measurements: *Observing closely, using simple equipment.*	• Children explore the world around them. They make careful observations to support identification, comparison and noticing change. They use appropriate senses, aided by equipment such as magnifying glasses or digital microscopes, to make their observations.	• They begin to take measurements, initially by comparisons, then using non-standard units.			**Spring 1**	Seasonal Changes & WS	Children can observe changes across the four seasons. Children can name the four seasons in order. Children can observe and describe weather associated with the seasons. Children can observe and describe how day length varies and why. Children can explain and understand sun safety. **Challenge** Children can observe features in the environment and explain that these are related to a specific season. Children can observe and talk about changes in the weather. Children can talk about weather variation in different parts of the world.		observe seasons winter spring summer autumn weather environment changes length rain sunshine snow sleet hail thunder lightening wind fog		Pupils should be taught to: • observe changes across the four seasons • observe and describe weather associated with the seasons and how day length varies.	John Dalton (1766- 1844) John Dalton was a British weather pioneer. In 1787, he used homemade instruments to start recording weather observations. His meteorological instruments helped to turn the forecasting of weather into actual science. Michael E Mann (Born 1965) Michael Evan Mann is an American climatologist and geophysicist. He is the director of the Earth System Science Center at Pennsylvania State University. Mann has contributed to the scientific understanding of historic climate change based on the temperature record of the past thousand years.
Recording and presenting evidence: *Gathering and recording data to help in answering questions.*	•The children record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing.	• They record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs.	• They classify using simple prepared tables and sorting rings.		**Spring 2**	Plants & WS	Children can name the petal, stem, leaf, bulb, flower, seed, stem and root of a plant. Children can identify and name common UK plants and trees. Children can recognise and compare deciduous and evergreen trees. Children can name the trunk, branches and root of a tree. Children can describe the parts of a plant (roots, stem, leaves, flowers).		plants flowers petals trunk branches roots stem leaves seeds bulbs deciduous evergreen light water warmth grow		Pupils should be taught to: • 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.	Wangari Maathai (1940-2011) Wangari Maathai was a Kenyan environmentalist who began a movement to plant trees and re-forest her country. She was the first African woman to win a Nobel Peace Prize.
Answering questions and concluding: *Using their observations and ideas to suggest answers to questions.*	• The children recognise 'biggest and smallest', 'best and worst' etc. from their data.				**Summer 1**							

	• Children use their experiences of the world around them to suggest appropriate answers to questions. They are supported to relate these to their evidence e.g. observations they have made, measurements they have taken or information they have gained from secondary sources.				**Summer 2**	Animals including humans	Children can point out some of the differences between different animals. Children can sort photographs of living things and non-living things. Children can identify and name a variety of common animals (birds, fish, amphibians, reptiles, mammals, invertebrates). Children can describe how an animal is suited to its environment. Children can identify and name a variety of common animals that are carnivores, herbivores and omnivores. Children can name the parts of the human body that they can see. Chilfren can draw & label basic parts of the human body. Children can identify the main parts of the human body and link them to their senses. Children can name the parts of an animal's body (ears, tail, paws, fins ect...) Children can name a range of domestic animals. Children can classify animals by what they eat (carnivore, herbivore, omnivore). Children can compare the bodies of different animals. **Challenge** Children can begin to classify animals according to a number of given simple criteria. Children can point out differences between living things and non- living things. Children can name some parts of the human body that cannot be seen. Children can say why certain animals have certain characteristics- what are they used for? Why do they need them? Children can name a range of wild animals.		same (similarity)different (difference)living	Pupils should be taught to: □ 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 Science – key stages 1 and 2 8 Statutory requirements □ 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.	Aristotle (384-322 BC) Is credited with first numbering the senses in his work De Anima. It's certain that the Big Five have been known for thousands of years. Touch, taste, smell, sight, hearing. Linda Buck Born 1947. Co-discovered how our sense of smell works: humans have about 350 different types of odor receptor cell which send signals directly into the brain's olfactory bulb.
Evaluating & raising further questions: *Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.*	Although there are no specific objectives for year 1 & 2, it will not hurt for the children to be exposed to this langauge and way of thinking. Evaluation, questioning and prediction skills are used across all areas of the curriculum.	*This could be done verbally, as a whloe class, in pairs or recorded as a class on flipchart paper or post its.*									
Communicating findings: *Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.*	Although there are no specific objectives for year 1 & 2, it will not hurt for the children to be exposed to this langauge and way of thinking. Evaluation, questioning and prediction skills are used across all areas of the curriculum.	*This could be done verbally, as a whloe class, in pairs or recorded as a class on flipchart paper or post its.*									

NC- Red

Year 2 Curriculum

These objectives can be completed with any unit across the year.

Working Scientifically					Term	Topic	Steps to success	Vocabulary	Prior Learning	National Curriculum	Significant scientists
Asking questions and recognising that they can be answered in different ways: *Asking simple questions and recognising that they can be answered in different ways.*	• While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions.	• The children answer questions developed with the teacher often through a scenario.	• The children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered		**Autumn 1**	Animals including humans	Children can describe what animals need to survive. Children can explain that animals grow and reproduce Children can explain why animals have offspring which grow into adults Children can describe the life cycle of some living things (bird:chicken, insect, mammal, amphibian, reptile) Children can explain the basic needs of animals, including humans for survival (water, food, air). Children can describe why exercise, balanced diet and hygiene are important for humans. **Challenge** Children can explain that animals reproduce in different ways- links to life cycles.	offspring reproduction growth exercise breathing hygiene germs disease needs- air shelter food water healthy- hygiene exercise right amount of food types	Children can point out some of the differences between different animals. Children can sort photographs of living things and non-living things. Children can identify and name a variety of common animals (birds, fish, amphibians, reptiles, mammals, invertebrates). Children can describe how an animal is suited to its environment. Children can identify and name a variety of common animals that are carnivores, herbivores and omnivores. Children can name the parts of the human body that they can see. Chilfren can draw & label basic parts of the human body. Children can identify the main parts of the human body and link them to their senses. Children can name the parts of an animal's body (ears, tail, paws, fins ect...) Children can name a range of domestic animals. Children can classify animals by what they eat (carnivore, herbivore, omnivore). Children can compare the bodies of different animals. **Challenge** Children can begin to classify animals according to a number of given simple criteria. Children can point out differences between living things and non-living things. Children can name some parts of the human body that cannot be seen. Children can say why certain animals have certain characteristics- what are they used for? Why do they need them?	Pupils should be taught to: □ 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.	Dr Ernest Madu (born 1960) Dr Ernest Madu is a cardiologist. His work focuses on providing affordable healthcare in low-resource nations.
Engage in practical enquiry to answer questions: *Performing simple tests.*	•The children use practical resources provided to gather evidence to answer questions generated by themselves or the teacher.	• They carry out: tests to classify; comparative tests; pattern seeking enquiries; and make observations over time.	Identifying and classifying. • Children use their observations and testing to compare objects, materials and living things. They sort and group these things, identifying their own criteria for sorting.	• They use simple secondary sources (such as identification sheets) to name living things. They describe the characteristics they used to identify a living thing.	**Autumn 2**	Uses of everyday materials & WS	Children can describe the simple physical properties of a variety of everyday materials (shape, size, material, weight, texture). Children can compare and group a variety of materials based on their simple physical properties (shape, size, material, weight, texture). Children can explore how the shapes of solid objects can be changed (squashing, bending, twisting, stretching). Children can say which materials are natural, which are man-made and make comparisons. Children can find out about people who developed useful new materials (Significant Scientists). Children can identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper, cardboard for particular uses. Children can explain how things move on different surfaces. **Challenge** Children can explain how materials are changed by heating and cooling. Children can tell which materials cannot be changed back after being heated, cooled, bent, stretched or twisted. Or **Challenge** Children can describe the properties of different materials using words like, transparent or opaque, flexible, rigid.	material texture group compare sort objects squash bend twist stretch natural man-made suitable wood metal plastic glass brick rock paper card surface friction John Dunlop John McAdam	Children can distinguish between an object and the material from which it is made. Children can describe materials using their senses (touch, sight, smell, sound). Children can describe materials using their senses, using **specific scientific words: rough, shiny, smooth, light, heavy, soft, thick, thin, flexible, strong, waterproof, loud, quiet.** Children can explain what material objects are made from and compare similarities and differences. Children can explain why a material might be useful for a specific job. Children can name different everyday materials. e.g. **wood, plastic, metal, water and rock** Children can sort materials into groups with a given criteria- **size, shape, strength, flexibility**. Children can explain how solid shapes can be changed by **squashing, bending, twisting and stretching**. If the children complete the previous statements try some of these: **Challenge**: Children can describe similarities and differences between materials. Children can explain what happens to materials when they are heated: bread, ice, chocolate, wax, egg. Children can explain what happens to materials when they are cooled: jelly, heated chocolate, water.		John Loudon McAdam (1756-1836) John Loudon McAdam was a Scottish engineer who modernised the way we build roads. He was the inventor of tarmacadam road surfacing – commonly called tarmac. John Dunlop (1840-1921) John Dunlop was a scottish inventor who made the first rubber tyres for bicycles. He was however not the first person that came up with the idea or pneumatic tyres. Julie Brusaw Julie is one of the inventors of Solar Roadways. Solar roadways use solar powered road panels to form a smart roadway.
Making observations and taking measurements: *Observing closely, using simple equipment.*	• Children explore the world around them. They make careful observations to support identification, comparison and noticing change. They use appropriate senses, aided by equipment such as magnifying glasses or digital microscopes, to make their observations.	• They begin to take measurements, initially by comparisons, then using non-standard units.			**Spring 1**					Pupils should be taught to: □ 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.	

Recording and presenting evidence: *Gathering and recording data to help in answering questions.*	•The children record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing.	• They record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs.	• They classify using simple prepared tables and sorting rings.		**Spring 2**	Plants & WS	Children can describe what plants need to survive. Children can observe and describe how seeds and bulbs grow into mature plants. Children can find out & describe how plants need water, light and a suitable temperature to grow and stay healthy. **Challenge:** Children can describe what plants need to survive and link it to where they are found (environments/ compare). Children can explain how plants grow and reproduce in different ways (compare).	plants petals roots stem leaves seeds seedling bulbs light Water Air Space Light nutrients warmth survive healthy germinate grow reproduce environment	Children can name the petal, stem, leaf, bulb, flower, seed, stem and root of a plant. Children can identify and name common UK plants and trees. Children can recognise and compare deciduous and evergreen trees. Children can name the trunk, branches and root of a tree. Children can describe the parts of a plant (roots, stem, leaves, flowers).	Pupils should be taught to: □ 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	David Douglas (1799-1834) David Douglas was a Scottish botanist, best known as the namesake of the Douglas-fir. He worked as a gardener, and explored the Scottish Highlands, North America, and Hawaii.
Answering questions and concluding: *Using their observations and ideas to suggest answers to questions.*	• The children recognise 'biggest and smallest', 'best and worst' etc. from their data.				**Summer 1**						
	• Children use their experiences of the world around them to suggest appropriate answers to questions. They are supported to relate these to their evidence e.g. observations they have made, measurements they have taken or information they have gained from secondary sources.				**Summer 2**	Living things and their habitats	Children can match certain living things to the habitats they are found in. Children can explain the differences between living and non-living things. Chlildren can decide whether something is living, dead or non-living. Children can describe some of the life processes common to plants and animals, including humans. Children can describe how a habitat provides for the basic needs of things living there. Children can describe a range of different habitats. Children can describe how plants and animals are suited to their habitat. **Challenge** Cahildren can name some characteristics of an animal that help it to live in a particular habitat. Children can describe what animals need to	living dead non-living habitat micro-habitat food chain woodland pond seashore polar ocean rainforest eaten by water nutirents warmth movement growth air		Pupils should be taught to: □ explore and compare the differences between things that are living, dead, and things that have never been alive □ identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other □ identify and name a variety of plants and animals in their habitats, including microhabitats □ describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.	Jeff Corwin Jeff Corwin is an American animal and nature conservationist. He is best known for hosting Animal Planet's 'The Jeff Corwin Experience' and 'Corwin's Quest'. He first experienced the tropical rainforests in 1984 in Belize. Is an active supporter of the tropical rainforest conservation in Central and South America. Dr. Archie Fairly Carr Dr. Archie Fairly Carr was a famous zoologist who was best known for his study of sea turtles. He was one of the co-founders of the Caribbean Conservation Corporation, which strives to save
Evaluating & raising further questions: *Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.*	Although there are no specific objectives for year 1 & 2, it will not hurt for the children to be exposed to this langauge and way of thinking. Evaluation, questioning and prediction skills are used across all areas of the curriculum.	*This could be done verbally, as a whloe class, in pairs or recorded as a class on flipchart paper or post its.*									
Communicating findings: *Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.*	Although there are no specific objectives for year 1 & 2, it will not hurt for the children to be exposed to this langauge and way of thinking. Evaluation, questioning and prediction skills are used across all areas of the curriculum.	*This could be done verbally, as a whloe class, in pairs or recorded as a class on flipchart paper or post its.*									

NC- Red

Year 3 Curriculum

These objectives can be completed with any unit across the year.

Working Scientifically				Term	Topic	Need to Know	Vocabulary	Prior Learning	National Curriculum	Significant Scientists
Asking questions and recognising that they can be answered in different ways: *Asking relevant questions and using different types of scientific enquiries to answer them.*	• The children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions.	• The children answer questions posed by the teacher.	• Given a range of resources, the children decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have chosen to answer their question.	**Autumn 1**	Light & WS	Children can recognise that they need light in order to see things. Children can recognise that dark is the absence of light. Children can notice that light is reflected from surfaces. Children can recognise that light from the sun can be dangerous and that there are ways to protect their eyes. Children can recognise that shadows are formed when the light from a light source is blocked by a solid object. Children can find patterns in the way that the size of shadows change. **Challenge** Children can explain why lights need to be bright or dimmer according to need. Children can explain the difference between transparent, translucent and opaque? Children can explain why their shadow changes when the light source is moved closer or further from the object?	light eyes dark reflect/ reflected surfaces shadows light source solid- opaque seethrough- transparent blocked dangerous protect closer/ further	NA	Pupils should be taught to: □ 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.	Justus von Liebig (1803-1873) Justus von Liebig was a German chemist. In 1835 he developed a process for applying a thin layer of metallic silver to one side of a pane of clear glass. This technique was soon adapted and improved, allowing for the mass production of mirrors.
Engage in practical enquiry to answer questions: *Setting up simple practical enquiries, comparative and fair tests.*	•The children select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher.	• They follow their plan to carry out: observations and tests to classify; comparative and simple fair tests; observations over time; and		**Autumn 2**						
Making observations and taking measurements: *Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including*	• The children make systematic and careful observations.	• They use a range of equipment for measuring length, time, temperature and capacity. They use standard units for their measurements.		**Spring 1**	Rocks & WS	Children can compare and group different rocks on the basis of their appearance and simple physical properties. Children can describe and explain how different rocks can be useful to us. Children can describe and explain the differences between sedimentary, igneous and metamorphic rocks and explain how they are formed. Children can describe in simple terms how fossils are formed- when things that have lived are trapped within rock. Children can recognise that soils are made from rocks and organic matter. **Challenge** Children can classify sedimentary, igneous and metamorphic rocks. Children can begin to relate the properties of rocks with their uses.	rocks soils properties sedimentary igneous metamorphic formation fossils fossilisation organic matter classify group uses	NA	Pupils should be taught to: □ 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.	Mary Anning (1799-1847) Mary Anning was an English palaeontologist and fossil collecter. She became known around the world for important finds she made in Jurassic fossil beds in Dorset. Holly Betts PhD student, University of Bristol Holly is a palaeobiologist. She is researching whether fossils are best for establishing a timescale for recent and ancient episodes in our evolutionary history.
Recording and presenting evidence: *Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions. Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.*	•The children sometimes decide how to record and present evidence. They record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. They record their measurements e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings). They record classifications e.g. using tables, Venn diagrams, Carroll diagrams.	• Children are supported to present the same data in different ways in order to help with answering the question.		**Spring 2**	Forces and Magnets & WS	Children can compare how things move on different surfaces. Children can observe that magnetic forces can be transmitted without direct contact. Children can observe how some magnets attract or repel each other. Children can classify which materials are attracted to magnets and which are not. Children can notice that some forces need contact between two objects, but magnetic forces can act at a distance. Children can compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet. Children can identify some magnetic materials. Children can describe magnets having two poles (N & S). Children can predict whether two magnets will attract or repel each other depending on which poles are facing. **Challenge** Children can investigate the strengths of different magnets and find fair ways to compare them.	forcesmagnetsmagnetic f	NA	Pupils should be taught to: □ 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	Michael Faraday (1791-1867) Michael Faraday was an English scientist. In 1831, he discovered electromagnetic induction. This was a very important discovery for the future of science and technology.

Answering questions and concluding: *Using straightforward scientific evidence to answer questions or to support their findings.*	• Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. The answers are consistent with the evidence.			**Summer 1**	Plants & WS	Children can identify and describe the functions of different parts of flowering plants. (roots, stem/trunk, leaves and flowers). Children can explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow). Children can explain how the requirements vary from plant to plant. Children can investigate and explain the way in which water is transported within plants. Children can explore and explain the part that flowers play in the life cycle of flowering plants: pollination, seed formation and seed dispersal. **Challenge** Children can classify a range of common plants according to many criteria (environment found, size, climate required, etc.)	petalsrootsstemtrunkleav	Children can describe what plants need to survive. Children can observe and describe how seeds and bulbs grow into mature plants. Children can find out & describe how plants need water, light and a suitable temperature to grow and stay healthy. **Challenge**: Children can describe what plants need to survive and link it to where they are found (environments/ compare). Children can explain how plants grow and reproduce in different ways (compare).	Pupils should be taught to: 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.	Joseph Dalton Hooker (1817-1911) Joseph Hooker was a doctor and travelled to many places. He was a plant collecter and botanist and brought many plants back to the UK. Joseph was interested in finding out why plants grow in the locations they do. Ron Finley 'The Gangsta Gardener' Ron Finley Project. Concerned with the lack of available fresh produce in Los Angeles USA, Ron Finley decided in 2010 to start growing vegetables in the pavement grass outside his front door. The police said it was illegal so he started a petition demanding the right to grow food in your own neighbourhood. He now has a thriving community garden of beautiful fruits and vegetables, is a community leader and teacher and has helped to set up many other community gardens in Los Angeles.
Identifying differences, similarities or changes related to simple scientific ideas and processes.	• Children interpret their data to generate simple comparative statements based on their evidence. They begin to identify naturally occurring patterns and causal			**Summer 2**	Animals including humans & WS	Children can explain the importance of a nutritionally balanced diet. Why do we need it? What might happen if we don't? Children can describe how nutrients, water and oxygen are transported within animals and humans. Children can identify that animals, including humans, cannot make their own food: they get nutrition from what they eat. Children can describe and explain the skeletal system of a human. Children can describe and explain the muscular system of a human. **Challenge** Children can explain how the muscular and skeletal systems work together to create movement. Children can classify living things and non-living things by a number of characteristics that they have thought of. Children can explain how people, weather and the environment can affect living things. Children can explain how certain living things depend on one another to survive.	nutrition nutrients carbiohydrates vitamins minerals fibre skeleton bones muscles joints healthy skull spine ribcage pelvis colar bone	Children can describe what animals need to survive. Children can explain that animals grow and reproduce Children can explain why animals have offspring which grow into adults Children can describe the life cycle of some living things (bird:chicken, insect, mammal, amphibian, reptile) Children can explain the basic needs of animals, including humans for survival (water, food, air). Children can describe why exercise, balanced diet and hygiene are important for humans.	Pupils should be taught to: 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.	Wilhelm Conrad Rontgen (1845-1923) Wilhelm Rontgen was a German physicist who discovered X-rays in 1895. He was awarded many honours and won the Nobel Prize for physics in 1901.
Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.	• They draw conclusions based on their evidence and current subject knowledge.									
Evaluating & raising further questions: *Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.*	•They identify ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry.	• Children use their evidence to suggest values for different items tested using the same method e.g. the distance travelled by a car on an additional surface.	• Following a scientific experience, the children ask further questions which can be answered by extending the same enquiry.							
Communicating findings: *Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.*	• They communicate their findings to an audience both orally and in writing, using appropriate scientific vocabulary.									

NC- Red

Year 4 Curriculum

These objectives can be completed with any unit across the year.

Working Scientifically				Term	Topic	Need to Know	Vocabulary	Prior Learning	National Curriculum	Significant Scientists
Asking questions and recognising that they can be answered in different ways: *Asking relevant questions and using different types of scientific enquiries to answer them.*	• The children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions.	• The children answer questions posed by the teacher.	• Given a range of resources, the children decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have	**Autumn 1**	Sound & WS	Children can describe a range of sounds and explain how they are made. Children can associate some sounds with something vibrating. Children can compare sources of sound and explain how the sounds differ. Children can explain how to change a sound- louder/softer. Children can recognise how vibrations from sound travel through a medium to an ear. Children can find patterns between the volume of the sound and the strength of the vibrations that produced it. Children can recognise that sounds get fainter as the distance from the sound source increases. Children can explain how you could change the pitch of a sound. Children can investigate how different materials can affect the pitch and volume of sounds. **Challenge** Children can explain why sound gets fainter or louder according to the distance.	sound volume louder softer vibrating/ vibrations ear compare travel patterns fainter sources pitch insulation	N/A	Pupils should be taught to: □ 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.	Christian Doppler (1803-1853) Christian Doppler was an Austrian mathematician and physicist. He is celebrated for his principle known as the Doppler effect. This describes how noises sound different as you move toward or away from a noisy object.
Engage in practical enquiry to answer questions: *Setting up simple practical enquiries, comparative and fair tests*	•The children select from a range of practical resources to gather evidence to answer questions generated by	• They follow their plan to carry out: observations and tests to classify; comparative and simple fair tests;		**Autumn 2**	States of matter & WS	Children can compare and group materials together, according to whether they are solids, liquids or gases. Children can explain what happens to materials when they are heated or cooled. Children can measure or research the temperature at which different materials change state in degrees Celsius. Children can use measurements to explain changes to the state of water. Children can identify the role that evaporation and condensation plays in the water cycle. Children can associate and explain the rate of evaporation with temperature. **Challenge** Children can group and classify a variety of materials according to the impact of temperature on them. Children can explain what happens over time to materials- puddles on the playground or washing hanging on a line. Children can relate temperature to change of state of materials.	change of state melting freezing melting point boiling point evaporation condensation water cycle temperature compare group solids,liquids, gases heated cooled degrees celsius materials changes classify	These may not have been covered as they are challenges Year 2: **Challenge** Children can explain how materials are changed by heating and cooling. Children can tell which materials cannot be changed back after being heated, cooled, bent, stretched or twisted. Or **Challenge** Children can describe the properties of different materials using words like, transparent or opaque, flexible, rigid. Year 1: **Challenge**: Children can describe similarities and differences between materials. Children can explain what happens to materials when they are heated: bread, ice, chocolate, wax, egg. Children can explain what happens to materials when they are cooled: jelly, heated chocolate, water.	Pupils should be taught to: □ 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.	Bernard Palissy (1510-1590) Bernard Palissy was a French potter and scientist. He is often credited as the man who 'discovered' the modern theory of the water cycle. He asserted that rainfall alone was sufficient for the maintenance of rivers
Making observations and taking measurements: *Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment*	• The children make systematic and careful observations.	• They use a range of equipment for measuring length, time, temperature and capacity. They use standard units for their measurements.		**Spring 1**						
Recording and presenting evidence: *Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions. Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.*	•The children sometimes decide how to record and present evidence. They record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. They record their measurements e.g. using tables, tally charts and bar charts (given templates, if	• Children are supported to present the same data in different ways in order to help with answering the question.		**Spring 2**	Animals including humans & WS	Children can identify and name the basic parts of the digestive system in humans. Children can describe the simple functions of the basic parts of the digestive system in humans. Children can identify the simple function and hygiene of different types of teeth in humans. Children can compare the teeth of herbivores and carnivores. Children can explain what a simple food chain shows. Children can construct and interpret a variety of food chains, identifying producers, predators and prey. **Challenge** Children can classify living things and non-living things by a number of characteristics that they have thought of. Children can explain how people, weather and the environment can affect living things. Children can explain how certain living things depend on one another to survive- plants and animals, plants and insects.	digestive system digestion herbivore carnivore omnivore producer consumer predator prey food chain teeth incisors canines molars and premolars intestine stomach oesophagus	Children can explain the importance of a nutritionally balanced diet. Why do we need it? What might happen if we don't? Children can describe how nutrients, water and oxygen are transported within animals and humans. Children can identify that animals, including humans, cannot make their own food: they get nutrition from what they eat. Children can describe and explain the skeletal system of a human. Children can describe and explain the muscular system of a human. **Challenge** Children can explain how the muscular and skeletal systems work together to create movement. Children can classify living things and non-living things by a number of characteristics that they have thought of. Children can explain how people, weather and the environment can affect living things.	Pupils should be taught to: □ 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.	William Beaumont (1785-1853) William Beaumont was a surgeon in the U.S. Army. He carried out lots of experiments and research on human digestion. As a result, he provided the world with new information about the digestive process in living human beings.

Answering questions and concluding: *Using straightforward scientific evidence to answer questions or to support their findings.*	• Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. The answers are consistent with the evidence.			**Summer 1**	Electricity & WS	Children can identify common appliances that run on electricity. Children can construct a simple series electric circuit. Children can identify and name the basic part in a series circuit, including cells, wires, bulbs, switches and buzzers. Children can 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. Children can recognise that a switch opens and closes a circuit. Children can associate a switch opening with whether or not a lamp lights in a simple series circuit. Children can recognise some common conductors and insulators. Children can associate metals with being good conductors. **Challenge** Children can explain how a bulb might get brighter. Children can recognise if all metals are conductors of electricity and make comparisons. Children can work out which metals can be used to connect across a gap in a circuit. Children can explain why cautions are necessary for working safely with electricity.	electricityelectriacal appliancemainselectrical circuitcell and batteryelectr		Pupils should be taught to: □ 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	Thomas Edison (1847-1931) Thomas Edison was an American inventor. He is sometimes described as America's greatest inventor. He invented the first practical incandescent light bulb.
Identifying differences, similarities or changes related to simple scientific ideas and processes.	• Children interpret their data to generate simple comparative statements based on their evidence. They begin to identify naturally occurring patterns and causal relationships.			**Summer 2**	Living things and their habitats & WS	Children can recognise that living things can be grouped in a variety of ways. Children can explore and use a classification key to group, identify and name a variety of living things (plants, vertebrates, invertebrates). Children can compare the classification of common plants and animals to living things found in other places (under the sea, prehistoric). Children can recognise that environments can change and this can sometimes pose a danger to living things. **Challenge** Children can give reasons for how they have classified animals and plants, using their characteristics and how they are suited to their environment. Children can explore the work of pioneers in classification (e.g. Carl Linnaeus). Children can name and group a variety of living things based on	classification classification key environment habitat migrate hibernate vertebrates invertebrates plants living things global warming deforestation air pollution littering	Children can match certain living things to the habitats they are found in. Children can explain the differences between living and non-living things. Chlildren can decide whether something is living, dead or non-living. Children can describe some of the life processes common to plants and animals, including humans. Children can describe how a habitat provides for the basic needs of things living there. Children can describe a range of different habitats. Children can describe how plants and animals are suited to their habitat. **Challenge** Children can name some characteristics of an animal that help it to live in a particular habitat. Children can describe what animals need to survive	Pupils should be taught to: □ 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.	Seirian Sumner Dr Seirian Sumner is an evolutionary biologist and behavioural ecologist. She specialises in social evolution and behaviour in insects (bees, wasps and ants). Lucy Evelyn Cheesman (1881-1969) Lucy Cheesman was a British entomologist (someone who studies insects) and traveller.
Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.	• They draw conclusions based on their evidence and current subject knowledge.									
Evaluating & raising further questions: *Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.*	•They identify ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry.	• Children use their evidence to suggest values for different items tested using the same method e.g. the distance travelled by a car on an additional surface.	• Following a scientific experience, the children ask further questions which can be answered by extending the same enquiry.							
Communicating findings: *Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.*	• They communicate their findings to an audience both orally and in writing, using appropriate scientific vocabulary.									

NC- Red

Year 5 Curriculum

These objectives can be completed with any unit across the year.

Working Scientifically				Term	Topic	Need to Know	Vocabulary	Prior Learning	National Curriculum	Significant Scientists
Asking questions and recognising that they can be answered in different ways: *Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. .*	• Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry.	• Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work.		**Autumn 1**	Forces & WS	Children can explain that unsupported objects fall towards the earth because of the force of gravity acting between the earth and the falling object. Children can identify the effects of air resistance, water resistance and friction that act between moving surfaces. Children can recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. **Challenge** Children can describe and explain how motion is affected by forces- gravitational attractions, magnetic attraction and friction. Children can design effective parachutes. Children can work out how water can cause resistance to floating objects. Children can explore how scientists such as Galileo, Galilei and Issac Newton helped to develop the theory of gravitation.	force gravity force meter Newton (N) earth air resistance water resistance friction surfaces mechanisms levers pulleys gears	Children can compare how things move on different surfaces. Children can observe that magnetic forces can be transmitted without direct contact. Children can observe how some magnets attract or repel each other. Children can classify which materials are attracted to magnets and which are not. Children can notice that some forces need contact between two objects, but magnetic forces can act at a distance. Children can compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet. Children can identify some magnetic materials. Children can describe magnets having two poles (N & S). Children can predict whether two magnets will attract or repel each other depending on which poles are facing. **Challenge**	Pupils should be taught to: □ **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.	Galileo Galilei (1564-1642) He was an Italian scientist. He discovered that if two objects of similar shape and size are dropped, they will fall at the same rate. Sir Isaac Newton (1642-1726) He was an English scientist and mathematician. He 'discovered' the concept of gravity when sitting under a tree and an apple fell to the ground near him. Contemporary Emma England
Engage in practical enquiry to answer questions: *Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.*	• The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample.			**Autumn 2**	Earth and space & WS	Children can identify and explain the movement of the Earth and other planets relative to the sun in the solar system. Children can explain how seasons and the associated weather is created. Children can describe and explain the movement of the Moon relative to the Earth. Children can describe the sun, earth and moon as approximately spherical bodies. Children can use the idea of the earth's rotation to explain day and night and the apparent movement of the sun across the sky. Children can explain the size, shape and position of the Earth,sun and moon. **Challenge** Children can compare the time of day at different places on the earth. Create shadow clocks. Children can begin to understand how older civilisations used the sun to create astronomical clocks- Stonehenge, Children can explore the work of some scientists? (Ptolemy,	solar system earth moon Luna phases: Waning Gibbous. Waxing Crescent. Waning Half Moon. Waning Crescent sun planets stars seasons weather movement rotate orbit spherical bodies day/ night	'Year 1: Children can observe changes across the four seasons. Children can name the four seasons in order. Children can observe and describe weather associated with the seasons. Children can observe and describe how day length varies and why. Children can explain and understand sun safety. **Challenge** Children can observe features in the environment and explain that these are related to a specific season. Children can observe and talk about changes in the weather. Children can talk about weather variation in different parts of the world."	Pupils should be taught to: □ **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.	Nicolaus Copernicus (1473-1543) Nicolaus was a Polish astronomer and mathematician who formulated the heliocentric model of the solar system that placed the Sun rather than the Earth at the centre of the universe. Maggie Aderin-Pocock (born 1968) Maggie is a British space scientist and science educator. She is working on the observation instruments for the Aeolus satellite, which will measure wind speeds to help the investigation of climate change.
Making observations and taking measurements: *Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.*	• The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale.	• During an enquiry, they make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in		**Spring 1**	Properties and changes of materials & WS	Children can compare and group together everyday materials on the basis of their properties including hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. Children can explain how some materials dissolve in a liquid to form a solution. Children can describe how to recover a substance from a solution. Children can use their knowledge of solids, liquids and gases to decide how mixtures might be separated through filtering, sieving, and evaporating. Children can give reasons, based on evidence for comparative and fair tests for the uses of everyday materials, including metals, wood and plastic. Children can describe changes using scientific words (melting, evaporation, condensation, cooling, freezing) Children can demonstrate that dissolving, mixing and changes of state are reversible changes. Children can explain that some changes result in the formation of new materials and that this kind of change us not usually reversible-changes associated with burning and the action of acid bicarbonate of soda. Children can use the terms 'reversible' and 'irreversible' **Challenges** Children can describe methods for separating mixtures (filtration, distillation). Children can work out which materials are most effective for keeping us warm or for keeping something cold. Children can use their knowledge of materials to suggest ways to classify (solids, liquids, gases). Children can explore changes that are difficult to reverse, e.g. burning, rusting and reactions such as vinegar with bicarbonate of soda. Children can explore the work of chemists who created new	hardness transparency conductivity- electrical and thermal magnetic substance solids,liquids,gas es thermal insulator thermal conductor electrical insulator electrical conductor dissolve solution soluble insoluble sieve filter evaporation reversible change E.g. dissolving, melting, freezing Non Reversible Change	Year 2: Children can describe the simple physical properties of a variety of everyday materials (shape, size, material, weight, texture). Children can compare and group a variety of materials based on their simple physical properties (shape, size, material, weight, texture). Children can explore how the shapes of solid objects can be changed (squashing, bending, twisting, stretching). Children can say which materials are natural, which are man-made and make comparisons. Children can find out about people who developed useful new materials? (John Dunlop- rubber, Charles Macintosh-waterproof, John McAdam- roads). Children can identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper, cardboard for particular uses. Children can explain how things move on different surfaces. **Challenge** Children can explain how materials are changed by heating and cooling. Children can tell which materials cannot be changed back after being heated, cooled, bent, stretched or twisted. Or **Challenge** Children can describe the properties of different materials using words like, transparent or opaque, flexible, rigid.	Pupils should be taught to: □ **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.	Spencer Silver (born 1941) Spencer Silver is an American scientist who together with Arthur Fry was the inventor of Post-it notes in 1974. At the time, he was working to develop new classes of adhesives. Joe Keddie Joe Keddie is a professor of Soft Matter Physics at the University of Surrey. He is interested in the fundamental processes of soft matter especially polymer thin films and nanoparticles.
Recording and presenting evidence: *Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.*	• The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and	• The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g. using tables,		**Spring 2**						
Answering questions and concluding: Identifying scientific evidence that has been used to support or refute ideas or arguments.	• Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. When doing this, they discuss whether other evidence e.g. from other groups, secondary sources and their scientific understanding, supports or refutes their answer.	• They talk about how their scientific ideas change due to new evidence that they have gathered.	• They talk about how new discoveries change scientific understanding.	**Summer 1**	Living things and their habitats & WS	Children can describe the differences in the life cycles of a mammal, amphibians, insects and a bird. Children can describe the life cycles of common plants. Children can explore the work of well-known naturalists and animal behaviourists. (David Attenborough and Jane Goodall) **Challenge** Children can observe their local environment and draw conclusions about life-cycles, e.g. plants in the vegetable garden or flower border. Children can compare the life cycles of plants and animals in their local environment with the life cycles of those around the world, e.g. rainforests.	life cycle reproduction sexual reproduction asexual reproduction fertilise metamorphis runner bulb naturalist behaviourist environment	Children can recognise that living things can be grouped in a variety of ways. Children can explore and use a classification key to group, identify and name a variety of living things (plants, vertebrates, invertebrates). Children can compare the classification of common plants and animals to living things found in other places (under the sea, prehistoric). Children can recognise that environments can change and this can sometimes pose a danger to living things. **Challenge** Children can give reasons for how they have classified animals and plants, using their characteristics and how they are suited to their environment. Children can explore the work of pioneers in classification (e.g. Carl Linnaeus). Children can name and group a variety of living things based on feeding patterns (producer, consumer, predator, prey, herbivore, carnivore, omnivore).	Pupils should be taught to: □ **describe the differences in the life** cycles of a mammal, an amphibian, an insect and a bird □ **describe the life process of** reproduction in some plants and animals.	
Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.	• In their conclusions, children: identify causal relationships and patterns in the natural world from their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge.			**Summer 2**	Animals including humans & WS	Children can describe the changes as humans develop to old age. Children can understand that all living things have lifecycles. Children can identify and compare the gestation periods between animals and humans. Children can explain the importance of gestation periods and the affects on growth and development. Children can identify and compare the life span of humans and other animals. **Challenge** Children can create a timeline to indicate stages of growth in certain animals- frogs and butterflies. Children can draw a timeline to indicate stages in the growth and development of humans. Children can describe the changes experienced in puberty.	life expectancy genstation sexual reproduction puberty life cycle menstration sperm egg foetus changes growth development	Children can identify and name the basic parts of the digestive system in humans. Children can describe the simple functions of the basic parts of the digestive system in humans. Children can identify the simple function of different types of teeth in humans. Children can compare the teeth of herbivores and carnivores. Children can explain what a simple food chain shows. Children can construct and interpret a variety of food chains, identifying producers, predators and prey. **Challenge** Children can classify living things and non-living things by a number of characteristics that they have thought of. Children can explain how people, weather and the environment can affect living things. Children can explain how certain living things depend on one another to survive- plants and animals, plants and insects.	Pupils should be taught to: □ **describe the changes as humans** develop to old age.	Sarah Fowler Sarah Fowler (OBE) is a marine biologist. She is the principal scientist of the Save Our Seas Foundation. Her research has identified the global threat to sharks and she shares strategies of how we can protect them.
Evaluating & raising further questions: *Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations*	•They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used.	• They identify any limitations that reduce the trust they have in their data.								
Using test results to make predictions to set up further comparative and fair tests.	• Children use the scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests.									
Communicating findings: *Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations*	•They communicate their findings to an audience using relevant scientific language and illustrations.									

Jane Goodall (Born 1934)Jane Goodall is an expert onwild chimpanzees. She isknown for her groundbreaking discoveries abouttheir behaviour. She hasshown us the urgent need toprotect chimpanzees fromextiction.David Attenborough (born 1926)Sir David is an Englishbroadcaster andnaturalist.He has made manyfamous wildlifeprogrammes. He waasknighted in 1985.

NC- Red

Year 6 Curriculum

These objectives can be completed with any unit across the year.

Working Scientifically				Term	Topic	Need to Know	Vocabulary	Prior Learning	National Curriculum	Significant Scientists
Asking questions and recognising that they can be answered in different ways: *Planning different types of scientific enquiries to answer questions, including recognising and*	• Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry.	• Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to		**Autumn 1**	Light & WS	Children can recognise that light appears to travel in straight lines. Children can 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. Children can 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. Children can use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. Children can explain the difference between transparent, translucent and opaque? Children can explain why their shadow changes when the light source is moved closer or further from the object? **Challenge** Children can explain how different colours of light can be created. Children can use and explain how simple optical instruments work-periscope, telescope, binoculars, mirror, magnifying glass, Newton's first reflecting telescope. Children can explore a range of phenomena, including rainbows, colours on soap bubbles, objects looking bent in water (refraction) and coloured filters.	light straight lines objects sight reflect/ reflection light sources shadows cast transparent translucent opaque refraction	Year 3: Children can recognise that they need light in order to see things. Children can recognise that dark is the absence of light. Children can notice that light is reflected from surfaces. Children can recognise that light from the sun can be dangerous and that there are ways to protect their eyes. Children can recognise that shadows are formed when the light from a light source is blocked by a solid object. Children can find patterns in the way that the size of shadows change. **Challenge** Children can explain why lights need to be bright or dimmer according to need. Children can explain the difference between transparent, translucent and opaque? Children can explain why their shadow changes when the light source is moved closer or further from the object?	Pupils should be taught to: □ 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.	Abu Ali al-Hasan Alhazen) (965-1040) Alhazan was an Iranian mathematician, astronomer and physicist. He was the pioneer of modern optics. He carried out experiments with pinhole cameras and candles and explained how the image is formed by rays of light travelling in straight lines. Ben Jensen Ben Jensen is an inventor at Surrey NanoSystems Ltd and developed Vantablack, a super-black coating that holds the world record as the darkest human-made substance.
Engage in practical enquiry to answer questions: *Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.*	• The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample.			**Autumn 2**						
Making observations and taking measurements: *Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.*	• The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale.	• During an enquiry, they make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value).		**Spring 1**	Electricity & WS	Children can identify and name the basic parts of a simple electric circuit- cells, wires, bulbs, switches, buzzers. Children can compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers, the on/off position of switches. Children can use recognised symbols when representing a simple circuit in a diagram. **Challenge** Children can explain the danger of short circuits? Children can explain what a fuse is? Children can explain how to make changes in a circuit? Children can explain the impact of changes in a circuit? Children can explain the effect of changing the voltage of a battery?	circuit circuit symbol circuit diagram cell battery switch voltage wire buzzer bulb motor components electrical circuit fuse	Year 4: Children can identify common appliances that run on electricity. Children can construct a simple series electric circuit. Children can identify and name the basic part in a series circuit, including cells, wires, bulbs, switches and buzzers. Children can 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. Children can recognise that a switch opens and closes a circuit. Children can associate a switch opening with whether or not a lamp lights in a simple series circuit. Children can recognise some common conductors and insulators. Children can associate metals with being good conductors. **Challenge** Children can explain how a bulb might get brighter. Children can recognise if all metals are conductors of electricity and make comparisons. Children can work out which metals can be used to connect across a gap in a circuit.	Pupils should be taught to: □ 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.	Nicholas Tesla (1856-1943) Nicholas Tesla was a SerbianAmerican engineer and physicist. He invented the first alternating current (AC) motor and developed AC generation and transmission technology. He worked for Thomas Edison when he first moved to New York. Peter Rawlinson Peter Rawlinson is a British engineer based in California. He is working on the development of electric vehicles, providing clear vision for a nextgeneration product.
Recording and presenting evidence: *Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.*	• The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g. using tables, Venn diagrams, Carroll diagrams and classification keys.	• The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g. using tables, Venn diagrams, Carroll diagrams and classification keys.		**Spring 2**	Animals including humans & WS	Children can identify and name the main parts of the human circulatory system and describe the functions of the heart, blood vessels and blood. Children can recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. Children can describe the ways in which nutrients and water are transported within animals, including humans. **Challenge** Children can explore the work of medical pioneers, for example, William Harvey and Galen and recognise how much we have learnt about our bodies. Children can compare the organ systems of humans to other animals. Children can explain how parts of the human body work and depend on one another. Children can name the major organs in the human body. Children can locate the major human organs.	heart pulse blood blood vessels lungs circulatory system diet exercise drugs lifestyle healthy oxygen carbon dioxide nutrients water	Year 5: Children can describe the changes as humans develop to old age. Children can understand that all living things have lifecycles. Children can identify and compare the gestation periods between animals and humans. Children can explain the importance of gestation periods and the affects on growth and development. Children can identify and compare the life span of humans and other animals. **Challenge** Children can create a timeline to indicate stages of growth in certain animals- frogs and butterflies. Children can describe the changes experienced in puberty. Children can draw a timeline to indicate stages in the growth and development of humans.	Pupils should be taught to: □ 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.	William Harvey (1578-1657) William Harvey was an English physician and the first person to correctly describe blood's circulation in the body. He showed that arteries and veins form a complete circuit.

Answering questions and concluding: *Identifying scientific evidence that has been used to support or refute ideas or arguments.*	• Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. When doing this, they discuss whether other evidence e.g. from other groups, secondary sources and their scientific understanding, supports or refutes their answer.	• They talk about how their scientific ideas change due to new evidence that they have gathered.	• They talk about how new discoveries change scientific understanding.	**Summer 1**	Evolution and inheritance & WS	Children can recognise that living things have changed over time and that fossils provide information about living things that inhabited the earth millions of years ago. Children can recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. Children can give reasons why offspring are not identical to each other or to their parents. Children can explain the process of evolution and describe the evidence for this. Children can identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. **Challenge** Children can explain how some living things adapt to survive in extreme conditions. Children can analyse the advantages and disadvantages of specific adaptations, such as being on two rather than four feet. Children can begin to understand what is meant by DNA.	evolution offspring inherited characteristics variation adapted environment species fossil	Year 3: Children can compare and group different rocks on the basis of their appearance and simple physical properties. Children can describe and explain how different rocks can be useful to us. Children can describe and explain the differences between sedimentary, igneous and metamorphic rocks and explain how they are formed. Children can describe in simple terms how fossils are formed- when things that have lived are trapped within rock. Children can recognise that soils are made from rocks and organic matter. Challenge Children can classify sedimentary, igneous and metamorphic rocks. Children can begin to relate the properties of rocks with their uses.	Pupils should be taught to: □ 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.	Charles Darwin (1809-1882) Charles Robert Darwin was born in Shrewsbury and was an English naturalist and biologist. His scientific theory of evolution by natural selection became the foundation of modern evolutionary studies. Alfred Wallace (1823-1913) Alfred Russel Wallace was an explorer, naturalist and anthropologist. He independently proposed the theory of evolution by natural selection. He worked around the world gathering evidence to support his theory. Oswald Avery 1877 – 1955. Discovered that DNA passes heredity instructions through successive generations of organisms – it carries the chemical code of life, as revealed
Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.	• In their conclusions, children: identify causal relationships and patterns in the natural world from their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge.				Living things and their habitats & WS	Children can 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 based on specific characteristics. **Challenge** Children can explain why classification is important. Children can readily group animals into reptiles, fish, amphibians, birds and mammals. Children can sub divide their original groupings and explain their divisions. Children can group animals into vertebrates and invertebrates. Children can find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification.	vertebrate fish amphibian reptile bird mammal invertebrate plants micro-organisms classification flowering non-flowering	Year 5: Children can describe the differences in the life cycles of a mammal, amphibians, insects and a bird. Children can describe the life cycles of common plants. Children can explore the work of well-known naturalists and animal behaviourists. (David Attenborough and Jane Goodall) **Challenge** Children can observe their local environment and draw conclusions about life-cycles, e.g. plants in the vegetable garden or flower border. Children can compare the life cycles of plants and animals in their local environment with the life cycles of those around the world, e.g. rainforests.	Pupils should be taught to: □ 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.	Carl Linnaeus (1707-1778) Carl Linnaeus was a Swedish scientist who developed the modern system of classifying and naming organisms. Before this the names of living things were often very long. He gave them a two-part name. Chris Nelson Chris Nelson is a horticulturist and a director of Growing Underground which uses hydroponic techniques to grow pesticide-free crops in a former London underground
Evaluating & raising further questions: *Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations*	•They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used.	• They identify any limitations that reduce the trust they have in their data.		**Summer 2**		**Part of PSHE-SRE** Children can describe the changes as humans develop to old age. Children can understand that all living things have lifecycles. Children can identify and compare the gestation periods between animals and humans. Children can explain the importance of gestation periods and the affects on growth and development. Children can identify and compare the life span of humans and other animals. Children can describe the changes experienced in puberty. Children can create a timeline to indicate stages of growth in certain animals- frogs and butterflies.	life expectancy genstation sexual reproduction puberty life cycle mentstration sperm egg foetus changes growth development	Year 5: Children can describe the changes as humans develop to old age. Children can understand that all living things have lifecycles. Children can identify and compare the gestation periods between animals and humans. Children can explain the importance of gestation periods and the affects on growth and development. Children can identify and compare the life span of humans and other animals.		
Using test results to make predictions to set up further comparative and fair tests.	• Children use the scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests.									

Communicating findings: *Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written*	•They communicate their findings to an audience using relevant scientific language and illustrations.		