Stamford Green Primary School and Nursery

Science Compendium

"The most important thing is to not stop questioning. It is enough if one tried to merely comprehend a little of the mystery of each day"

Albert Einstein

What is the vision for science at Stamford Green?

It is our vision that our children:

- See themselves as scientists and to know about the accomplishments of a range of diverse scientists from around the world.
- Have an open mind, are curious, observant and ask questions about the world we live in
- Develop a progressive knowledge and understanding of biology, chemistry and physics through our well-planned curriculum
- Use practical investigations to observe, record data and draw conclusions, developing scientific enquiry skills

Our Science curriculum is brought to life by our seven commitments:

HAPPINESS

We want the children to be happy in their science lessons and to develop a love of science. Through practical investigations, the curriculum is enhanced and bought to life, which allows the children to see themselves as scientists. Whilst ensuring that lessons are fun and engaging, practical activities are planned purposefully and in line with curricular goals.

INSPIRING

We aim to inspire the children to develop a love of learning science. We ensure that the children are inspired by a range of diverse scientists from across the globe. We want the children to know that scientists are not just people in white coats in a laboratory – we want to open the children's mind to a range of people who have made a difference to the field of science. We teach the children about a different scientist each term in order to inspire them to have a love of science. Each year the school celebrates British Science Week to spark enthusiasm and interest in science topics which may not be covered in the National Curriculum.

LEARNING

Our curriculum is carefully planned and organised, building on previous learning. Working scientifically is taught progressively and is threaded throughout the subjects of biology, chemistry and physics to enable the children to see, experience and learn science in real life. The curriculum will teach the substantive knowledge of science, whilst also teaching the children to make predictions, form hypotheses, analyse and recognise patterns and draw conclusions in an age appropriate way.

Science lessons are built around an 'enquiry question' where all of the learning builds and contributes to the children being able to answer the scientific question at the end of the term/half term. Science lessons are taught on a weekly basis and so as a result, there are opportunities to build on previous learning, make connections and apply scientific skills, allowing the children to demonstrate progress (so that they know more and remember more). At the beginning of each science lesson, teachers plan for a scientific discussion, using the website 'Explorify' to encourage children to think like a scientist and encourage awe and wonder about the world.

TOGETHERNESS

Togetherness is exemplified through our approach to scientific enquiry. Children will work together to carry out investigations and will see themselves as a 'laboratory partner' whether working in a pair or a larger group. Children will learn about the role they will need to play as a laboratory partner, including the important life skills of turn taking, listening to each other and contributing to discussions and when carrying out tasks in practical activities. Children will learn from each other as well as their teacher. We have formed strong links with Blenheim High School, one of our local

secondary schools, which has enabled us to share resources to enhance the lessons we teach in school.

VALUES

In every science lesson, the school's twenty two values will be evident and in action. When making predictions and forming hypotheses, children will be respectful of each other's opinions. At times children will demonstrate courage when presenting a new idea or prediction. Children will be resilient and show effort – they will be inquisitive learners who are curious to find out about the world they live in. When working with a partner or in a group, to carry out investigations, children will be independent, responsible and show co-operation, tolerance and empathy.

AMBITION

We are ambitious for our children that they see themselves as scientists and know that they all can be scientists. We will develop this further in KS2 by using the term physicist, chemist and biologist. We ensure that there is a planned approach to the use of vocabulary to enable the children to talk like a scientist, and fully understanding subject specific vocabulary. We will encourage the children to challenge misconceptions and ask questions to deepen their understanding.

We are also ambitious for our teacher's subject knowledge and ensure that there are regular planned activities to update knowledge and continually learn.

ACHIEVEMENT

It is our aim that through our carefully planned curriculum, the children achieve well and will leave our school with science outcomes that are above the national expectations. We want the children to feel a sense of achievement in their science lessons. Children will experience scientific enquiry and practical investigations in full, enabling them to see themselves as scientists and to understand the process of investigation, forming hypotheses and drawing conclusions.

Aims for 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 worlds around them
- Are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future

By the end of Year 6 at Stamford Green, our children will…

Behaviours	The children will behave as scientists. They will have utilised the attitudes, skills and knowledge from the science curriculum to ask questions, investigate and form theories. The children will have respectful behaviours towards their peers during group activities and will demonstrate our school's twenty two values.
Attitudes	The children will have a positive attitude towards science and see themselves as scientists. They will be confident to ask questions about the world around them and have will have an enquiry-based attitude to learning. The children will be proactive in addressing misconceptions and exploring different ways to solve these.
Skills	The children will have developed their scientific enquiry skills in order to ask questions, make predictions and form hypotheses. The children will have used a variety of scientific equipment and will use these accurately to draw results. The children will be able to analyse their data and form conclusions. The children will have the skills to perform an investigation in a controlled and safe manner.

Knowledge	The children will begin to understand that science is the basis of everything around them. They will have a developing knowledge of biology, chemistry and physics and can use their substantive and disciplinary knowledge when carrying out different types of scientific enquiry. The children will have an expansive scientific vocabulary, which they will use correctly when discussing their learning. The children will demonstrate the knowledge of contributing factors to conduct experiments fairly and will understand the effect of variables.
Experiences	Children will be able to make links in their learning through real life experiences. They will be able to apply their knowledge in practical ways and will take part in experiments and investigations. The children will have a broad knowledge of different scientists and their influence in their field.
Technology	The children will begin to use equipment to gather data effectively and they will know how to use them accurately. The children will begin to understand the impact of how technology has enhanced modern day science and can discuss this confidently.
Sustained	The children will have a sustained and enthusiastic approach to their science learning and they will continue to show curiosity and ask questions. As the children leave our school, they will be well-prepared for the next stage of their education and will have a broad understanding of biology, chemistry and physics.

British Values and Spiritual, Moral, Social and Cultural Learning in Science

British Values: The Science curriculum promotes the values of democracy by encouraging the children to take the view and opinions if others into account. Mutual respect is also shown when the children are working as a team, discussing their findings and offering support and advice to others. Children will show tolerance when listening to the ideas of others, which may vary from their own. It is important for the children to understand the safety rules when working scientifically, which promotes rule of law. Children are often given the opportunity to make their own choices when planning an investigation.

Social: Children are provided with opportunities for group work and paired talk through planned investigations and scientific enquiry. This develops children's teamwork skills and well as allowing them to take responsibility. Each of these elements promotes children's social development.

Moral: Moral education in Science encourages children to become increasingly curious, to develop open mindness to the suggestions of others and to make judgements on scientific evidence. This allows the children to build the awareness of the ways that science can affect society and the world.

Spiritual: In science, we promote the spiritual development of our children by encouraging them to reflect on the wonder of our natural world. It helps us to understand our relationship with the world around us. It encourages children to reflect on what is special about life and the awe of the scale of living things.

Cultural: Cultural education involves learning about great scientific discoveries and the different work that scientists do. Scientific developments are made all over the world from people of all background and cultures. Our curriculum ensures that the children learn about the difference these people have made to the world.

Year 1 – 3 Science Curriculum Map

Year 3
Maggie Aderin Pocock

Year 3
What is light?

Year 3
Mary Somerville

Year 3
What is a magnet?

Year 3
Barbara McClintock

Year 3
How can you tell if something is a plant?

Year 3
Jane C Wright

Year 3
What is inside us?

Year 3
Mary Anning

Year 3
Why don't all rocks and soils look the same?

Year 2
Does a big plant need a big seed?

Year 2
Maria Sibylla Merian

Year 2
Why do we choose materials for different purposes?

Year 2
Charles Macintosh

Year 2
Agnes Arber

Year 2
What do living things need to survive?

Year 1
Mya Rose Craig

Year 1
What if there was only 1 season?

Year 1
Why don't all plants look the same?

Year 1
Are all materials the same?

Year 1
How are humans and animals different?

Year 4 – 6 Science Curriculum Map

Year 6
Alexander Fleming

Year 6
Can we stay fit and healthy as we get older?

Year 6
Gustav Kirchhoff

Year 6
How do we see things?

Year 6
Thomas Edison

Year 6
What does electricity need to work?

Year 6
Charles Darwin

Year 6
How much variation is there in how we look?

Year 6
Carl Linnaeus

Year 6
Why can't a fish live on land?

Year 5
John Dunlop

Year 5
How does a material change state?

Year 5
Jane Goodall

Year 5
What do plants and humans have in common?

Year 5
Sir David Attenborough

Year 5
How do humans change over time?

Year 5
Mae Jemison

Year 5
What does the earth look like from the solar system?

Year 5
Sir Isaac Newton

Year 5
How can we feel the force?

Year 4
George Washington -Carver

Year 4
How can we protect our wildlife?

Year 4
Wanda Diaz-Merced

Year 4
What is the difference between noise and sound?

Year 4
Alan Turing

Year 4
Where does water come from?

Year 4
Albert Einstein

Year 4
How long is our gut?

Year 4
Dr Mark Richards

Year 4
How much electricity do we use?

Long Term Plan: Early Years Foundation Stage

Milestones – By the end of the EYFS, children will demonstrate…

- I can ask questions and be curious
- I can say why it is important to take care of the environment
- I can investigate how plants grow
- I can use language to describe what is happening when I am exploring and investigating
- I can talk about the weather
- I am beginning to understand seasons

According to the Statutory Framework for the EYFS, children in Nursery and Reception should be taught:

- Understanding the world involves guiding children to make sense of their physical world and their community. The frequency and range of children's personal experiences increases their knowledge and sense of the world around them – from visiting parks, libraries and museums to meeting important members of society such as police officers, nurses and firefighters.
- In addition, listening to a broad selection of stories, non-fiction, rhymes and poems will foster their understanding of our culturally, socially, technologically and ecologically diverse world.
- As well as building important knowledge, this extends their familiarity with words that support understanding across domains. Enriching and widening children's vocabulary will support later reading comprehension

The new vocabulary the EYFS children will use will include:

	Tier 1	Tier 2	Tier 3
Working scientifically	look	explore, investigate, change, sink, float	Magnifying glass
The World of Stamford Green	water	plant, leaves, seed, animal, bug, grow, season, care, grow	environment, insect, seasonal, decay
How the world works	hot, cold	sound, light	magnet, temperature, shadow
The whole wide world	water	mix	substances

In Nursery, the children will be taught to:

Area of Science	Learning Focus	Progression of skills
Biology 	Personal Experiences	• Show interest in leaves/conkers, making collections and bringing them into the setting • Confidently exploring the forest areas at Forest School • Show respect for living creatures when finding bugs at Forest school and in the outdoor area
	Developing Understanding	• Understanding growth, change and decay • Know how to take care of plants • Planting seeds
Physics 	Personal Experiences	• Noticing changes in the weather in the different seasons
	Explore and Respond	• Observe changes from state to another e.g. water - ice
	Developing Understanding	• Use language related to exploration of forces e.g. stretch, pull, push, bend, magnet, attract

		• Investigating what happens when materials change from one state to another • Exploring and understanding sinking and floating • Exploring light and shadows
Working Scientifically 	Explore and respond	• Asking questions and showing curiosity
	Developing Understanding	• Investigate natural material using a magnifying glass
In Reception, the children will be taught to:		
Area of Science	**Learning Focus**	**Progression of skills**
Biology 	The World of Stamford Green	• Know that is it important to take care of the environment where we learn and ways to do this
	The Whole Wide World!	• Name and describe animals and the environment in which they live • Investigate plants and how they grow • Taking care of plants in the school environment
Physics 	World of Stamford Green	• Observe and talk about seasonal changes and record these ideas
Working Scientifically 	The World of Stamford Green	• Investigate and explore natural materials, substances and objects
	How the world works	• Explore and investigate natural processes relating to sounds and light • Explore and investigate natural processes relating to magnets and temperature •
	The Whole Wide World!	• Explore and investigate water in its different states • Explore and investigate what happens when different substances are mixed

Long Term Plan: Year 1

Milestones – By the end of Year 1, children will demonstrate…

- I can recognise the differences between common flowering plants and trees
- I can name some deciduous and evergreen trees
- I can describe the basic structure of plants and trees
- I can name a variety of common animals
- I know the difference between a carnivore, herbivore and omnivore
- I can identify and name different body parts
- I understand how body parts are associated to senses
- I can compare everyday objects and their materials
- I can name and group a variety of everyday objects
- I can name the four seasons and describe the weather associated with them

According to the National Curriculum, children in Year 1 should be taught:

- Working Scientifically
- Plants
- Animals, including humans
- Everyday materials
- Seasonal Changes

In Year 1, the children will be inspired by learning about the following scientists:	
How are animals and humans different?	Mya-Rose Craig

The new vocabulary the Year 1 children will use will include:

	Tier 1	**Tier 2**	**Tier 3**
Working scientifically	sort, changes, patterns, same, different	sorting, classifying, identify, explore	classification
Why don't all plants look the same?	plants, trees, flower, leaf	wild plants, garden plants, common flowering plants, blossom, petal, stem, trunk, branch	evergreen trees, deciduous trees
What if there was only one season?	change, sun, sunshine, rain, snow, cloud, hot, cold, sky, night, day	seasonal, spring, summer, autumn, winter, weather, sleet, ice, frost, fog, storm, earth,	seasonal change
Are all materials the same?	hard, soft, paper	wood, plastic, metal, glass, water, rock, brick, stone, fabric	everyday materials
How are animals and humans different?	fish, birds, see, hear, feel, smell, taste, head, body, neck, arms, legs, ears, eyes, mouth, nose, tongue, hand, feet, teeth	reptile, amphibians, mammals, human, body senses,	carnivores, herbivores, omnivores

In Year 1, the children will be taught to:		
Area of Science	**Enquiry Question**	**Progression of skills and knowledge**
Biology - 	Why don't all plants look the same?	• 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
Working Scientifically 		• **Identifying and classifying:** Identifying and classifying different trees and plants • **Asks simple questions:** Where do different plants grow?
Physics 	What if there was only one season?	• Observe changes across the four seasons • Observe and describe weather associated with the seasons and how day length varies
Working Scientifically 		• **Observe Closely:** Weather and daylight at points in the four seasons. • **Gather & Record Data:** Temperature/ feel, rainfall, wind, length of day (long/ short *Was it light when you woke up/ went to bed?*). Record in common data collection table (one for each season
Physics 	Are all materials the same?	• Distinguish between an object and a 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 properties of a variety of everyday materials • Compare and group together a variety of everyday materials on the basis of their simple physical properties
Working Scientifically 		• **Identifying and Classifying:** Venn diagram grouping materials according to their properties • **Use observations and ideas to suggest answers to questions:** Use observational skills to compare materials
Biology 	How are humans and animals different?	• 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 (including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth) and which part of the body is associated with each sense
Working Scientifically 		• **Identify & Classify:** Sort animals into 5 key type: fish, reptile, amphibians, mammals & birds. Group by what they eat: herbivore, omnivore, carnivore

Long Term Plan: Year 2

Milestones – By the end of Year 2, children will demonstrate…
• I can understand the differences between living, dead and things that have never been alive • I can understand the basic needs of different animals and plants • I can understand a simple food chain • I can understand how seeds and bulbs grow into plants • I can describe the basic needs of animals, including humans • I can describe the importance of exercise, hygiene and eating a balanced diet • I can compare and classify a variety of everyday materials • I can say how the shapes of some sold objects can be changed

According to the National Curriculum, children in Year 2 should be taught:
• Working Scientifically • Plants • Animals, including humans • Uses of everyday materials • Living things and their habitats

In Year 2, the children will be inspired by learning about the following scientists:	
Why do choose different materials for different purposes?	Charles Macintosh
What do living things need to survive?	Maria Sibylla Merian
Does a big plant need a big seed?	Agnes Arber

The new vocabulary the Year 2 children will use will include:			
	Tier 1	**Tier 2**	**Tier 3**
Working scientifically	look, identify, explore	experience, observe, measure, record, equipment, test, investigate,	data
Why do choose different materials for different purposes?	shiny, dull, stretchy, stiff, rough, smooth, squash, twist, bend, stretch	plastic, dough, rubber, card, cardboards, clay, object, make/made, bendy, rigid, waterproof, not waterproof, absorbent	transparent, opaque
What do living things need to survive?	pond, garden, field, park, grow, food, young, egg,	woodland, sea shore, river, ocean, rainforest, stones, habitat, living, dead, not living, alive, healthy, food chain, source of food, shelter, growth, air, survive, exercise, chick, chicken, caterpillar, moth, butterfly, tadpole, frog, frogspawn, lamb, sheep, calf, cow, foal, horse	micro-habitat, hygiene, pupa,
Does a big plant need a big seed?	seed, grow, growth	stem, branch, root, bulb, bud, habitat, leaf fall, temperature, healthy growth, survive, soil	local environment, germinate, stages of growth

In Year 2, the children will be taught to:		
Area of Science	**Enquiry Question**	**Progression of skills and knowledge**
Physics 	Why do we choose materials for different purposes?	• Identify and compare the uses 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
Working Scientifically 		• **Identifying and classifying:** Identifying and classifying different materials • **Asks simple questions:** What material would be good for a particular use • Perform simple tests • **Gathering and recording data to help in answering questions:** Testing different materials for their suitability for a purpose e.g. waterproof
Biology 	Does a big plant need a big seed?	• 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 • Find out about the requirements for plant germination, growth and survival
Working Scientifically 		• **Perform simple tests**: Grow seeds in different locations – which seed grows best? • **Observe Closely using a variety of equipment:** the growth of a variety of seeds and plants and how they change • **Gather & Record Data:** Comparative tests to show that plants need light and water to stay healthy
Biology 	What do living things need to survive??	• 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 their 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 ideas of a simple food chain and identify and name different sources of food • Notice that humans, including animals have offspring which grow into adults • Find out about and describe the basic needs of animals including humans for survival (food water air) • Describe the importance for humans of exercise, eating the right amounts of different types of food and hygiene
Working Scientifically 		• **Asking and answering simple questions:** what do animals need to survive?

Long Term Plan: Year 3

Milestones – By the end of Year 3 children will demonstrate…
• I can describe the function of different parts of a plant • I can explain the requirements that a plant needs to live and grow • I understand the life cycle of a plant • I can name parts of the a skeleton • I can name different types of rock • I can describe how fossils are formed • I can describe how shadows are formed • I know how to protect my eyes from sunlight • I can name a magnetic material • I can understand that forces need contact between two objects • I know that magnetic forces can act at a distance • I can describe magnets and now how they attract or repel each other

According to the National Curriculum, children in Year 3 should be taught:
• Working scientifically • Plants • Animals, including humans • Rocks • Light • Forces and Magnets

In Year 3, the children will be inspired by learning about the following scientists:	
Why don't all rocks and soils look the same?	Mary Anning
What is inside us?	Jane C Wright
How can you tell if something is a plant?	Barbara McClintock
What is a magnet?	Mary Somerville
What is light?	Maggie Aderin-Pocock

The new vocabulary the Year 3 children will use will include:			
	Tier 1	**Tier 2**	**Tier 3**
Working scientifically	Identify, classify, observe, compare, record	fair test, variable dependent, independent, predict, conclude	systematically
Why don't all rocks and soils look the same?	rock, soil,	fossil, organic matter, grains, crystals	sedimentary, igneous, metamorphic
What is inside us?	body, bones, protect, move, shell	nutrition, diet, skeleton, muscles, contract, relax protection, support, movement, bones, skull	tendons, vertebrae, vertebrate, invertebrate
How can you tell if something is a plant?	root, stem, leaf, flower, grow, growth, germination, soil, water, air, healthy growth	functions, nutrients, nutrition, transport (water), life cycle, pollination, seed formation, seed dispersal, reproduce, fertiliser	reproduction, xylem, photosynthesis
What is a magnet?	move, movement, surfaces,	forces, push, pull, contact, distance, magnet, bar magnet, ring magnet, horseshoe magnet, attract, repel, poles (of magnets), magnetic materials	magnetic North, magnetism

What is light?	light, dark, mirror,	absence of light, reflect, shadow, transparent, opaque, reflect	reflective surface, translucent

In Year 3, the children will be taught to:		
Area of Science	**Enquiry Question**	**Progression of skills and knowledge**
Physics 	Why don't all rocks and soils look the same?	• Compare and group together different kinds of rocks on the basis of the 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
Working Scientifically 		• **Identify & classify:** Using classification keys • **Observe & compare using magnifying glasses:** different rock types using simple scientific language (see vocab) drawings, labelled diagrams.
Biology 	What is inside us?	• 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 animals have skeletons and muscles for support, protection and movement
Working Scientifically 		• **Identify & classify:** Grouping animals with and without internal skeletons: slug, snail, worm, snake, human. • **Observe & compare:** Movement of above.
Biology 	How can you tell if something is a plant?	• 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
Working Scientifically 		• **Provide fair test question '*Does [what I change] affect [what I measure]*:** *Does the amount of water/ light/ heat/ soil affect the height of the plant?* • **Observe systematically and carefully using simple equipment:** Measure height using ruler, observe leaf & appearance. • **Record data using provided table.** • **Use observations to draw conclusions:** Did the variable affect the measurement?
Physics		• Compare how things move on different surfaces

	What is a magnet?	• 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 • Describe magnets as having two poles • Predict whether two magnets will attract or repel each other, depending on which poles are facing
Working Scientifically 		• **Predict:** whether magnets will attract or repel • **Identify & Classify:** Magnetic objects • **Asking simple questions:** Do magnets have different strengths? Do magnets need to touch to attract/ repel? • **Provide fair test question 'Does [what I change] affect [what I measure]:** Does the type of surface affect the speed a toy car moves down it? • **Record data using provided table.** • **Use observations to draw conclusions:** Did the variable affect the measurement?
Physics 	What is light?	• Recognise that they need light in order to see things and that dark is the absence of light • Notice that light is reflected from surfaces • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes • Recognise that shadows are formed when the light from a light source is blocked by a solid object • Find patterns in the way that the size of shadows change
Working Scientifically 		• **Predict:** Where and how shadows will form • **Identify** which materials are reflective. • **Provide fair test question 'Does [what I change] affect [what I measure]:** Does the distance of a puppet from the touch affect the size of the shadow? • **Observe systematically and carefully using simple equipment:** Height/ Width of shadow. • **Record data using provided table.** • **Use observations to draw conclusions:** The closer the puppet is to the torch, bigger the shadow.

Long Term Plan: Year 4

Milestones – By the end of Year 4 children will demonstrate…
• I know that living things can be grouped in different ways • I can use classification keys to group a variety of living things • I can describe the functions of the digestive system • I can name and explain the functions of the different types of teeth • I can construct and interpret a variety of food chains • I can distinguish between a solid, liquid and a gas • I can talk about the water cycle and explain the part played by evaporation and condensation • I know how sounds are made • I recognise that sounds get fainter as the distance from the sound source increases • I can recognise that vibrations from sounds travel through a medium to the ear • I can construct simple series electrical circuits • I can recognise some common conductors and insulators

According to the National Curriculum, children in Year 4 should be taught:
• Working scientifically • Living things and their habitats • Animals, including humans • States of matter • Sound • Electricity

In Year 4, the children will be inspired by learning about the following scientists:	
Where does water come from?	Albert Einstein
How long is our gut?	Dr Mark Richard
How much electricity do we use?	Alan Turing
What is the difference between light and sound?	Wanda Diaz-Merced
How can we protect our wildlife?	George Washington Carver

The new vocabulary the Year 4 children will use will include:

	Tier 1	Tier 2	Tier 3
Working scientifically	Identify, classify, observe, predict, equipment, fair test, record, data, conclude	research, construct, systematic	classification
Where does water come from?	heat, cool, water, temperature,	solid, liquid, gas, heating, cooling, water cycle, evaporation, condensation, melting, freezing	freezing point, boiling point,
How long is our gut?	food, eat	stomach, small intestine, large intestine, oesophagus, teeth, saliva, digest, digestion, digestive,	types of teeth: molar, pre-molar, incisor, canine,
How much electricity do we use?	light	electricity, simple circuit, loop, light bulb, cell, battery, wire, buzzer, switch, motor, conduct	series circuit, conductor, insulator

What is the difference between noise and sound?	sound, volume,	vibration, vibrate, pitch, insulation	
How can we protect our wildlife?	animal, skeleton	vertebrate animals: fish, birds, mammals, amphibians, reptiles, invertebrate animals: snails, worms, slugs, spiders, insects	human impact – litter, deforestation, population increase, nature reserves

In Year 4, the children will be taught to:		
Area of Science	**Enquiry Question**	**Progression of skills and knowledge**
Chemistry 	Where does water come from?	• 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 • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature
Working Scientifically 		• **Research:** What conditions cause water to evaporate: surface area, wind, temperature. • **Observe:** Freezing/ Boiling point of water.
Biology 	How long is our gut?	• Describe the simple functions of the basic parts of the digestive systems 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
Working Scientifically 		• **Classify** animals and plants using food chains.
Physics 	How much electricity do we use?	• 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

Working Scientifically 		• **Predict:** Which bulbs will light using a circuit diagram • **Use simple equipment:** to test predictions of which circuit will light • **Provide fair test question** 'Does the type of material effect whether a bulb will light?' • **Observe systematically and carefully using simple equipment:** Whether bulb lights when different materials are used to complete the circuit. • **Record data using provided table** • **Use observations to draw conclusions:** Metals make good conductors
Physics 	What is the difference between noise and sound?	• Identify how sounds are made, associating some of them with something vibrating • Recognise that vibrations from sounds travel through a medium to the ear • Find patterns between the pitch of a sound and features of the object that produced it • Find patterns between the volume of a sound and the strength of the vibrations that produced it • Recognise that sounds get fainter as the distance from the sound source increases
Working Scientifically 		• **Predict:** How does the amount of water in a bottle alter the pitch when blown across? • **Complete a fair test: Provide fair test question 'Does [what I change] affect [what I measure]:** Does the amount of water in a bottle affect the pitch? • **Record data using provided table. Use observations to draw conclusions:** The greater the amount of water the higher the pitch. • **Explain effect scientifically:** Speed of vibrating air raises pitch.
Biology 	How can we protect our wildlife?	• 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
Working Scientifically 		• **Classify** animals and plants using food chains.

Long Term Plan: Year 5

Milestones – By the end of Year 5 children will demonstrate…
• I can explain the life cycles of animals, including humans • I can describe the process of reproduction in plants and animals • I know how humans change as they develop to old age • I can compare and group materials based on their properties • I know how solids, liquids and gases can be separated • I can name some of the planets in the solar system • I can describe the movement of the earth and the other planets relative to the sun • I can explain day and night and the apparent movement of the sun across the sky using the idea of the Earth's rotation • I can explain the effect that gravity has on objects • I can explain the effect air resistance, water resistance or friction can have on a moving object

According to the National Curriculum, children in Year 5 should be taught:
• Working scientifically • All living things and their habitats • Animals, including humans • Properties and changes of materials • Earth and space • Forces

In Year 5, the children will be inspired by learning about the following scientists:	
How can we feel the force?	Isaac Newton
What does the earth look like from the solar system?	Mae Carol Jemison, Katherine Johnson
How do humans change over time?	Jane Goodall
What do plants and humans have in common?	David Attenborough
How does a material change state?	John Dunlop

The new vocabulary the Year 5 children will use will include:			
	Tier 1	**Tier 2**	**Tier 3**
Working scientifically	Identify, describe, investigate, plan, test, fair test, observe, compare, measure, report, findings	Taking measurements, reporting and presenting findings from enquiries	
How can we feel the force?	air, water, force, pull, lift	gravity, air resistance, water resistance, friction, levers, pulleys, gears, springs	
What does the earth look like from the solar system?	sun, planet, moon, stars, sphere, rotate, day, night	solar system, spherical bodies, rotation, orbit, satellite	Mercury, Venus, Earth, Mars, Jupiter, Saturn, Neptune, Uranus,
How do humans change over time?	body, young, old, adult, changes	puberty, gestation period	menstruation
What do plants and humans have in common?	life cycles, reproduce, mammal, amphibian, insect, bird	reproduction, life processes, sexual and asexual reproduction (plants), root cuttings	
How does a material change state?	hard, soft, transparent, opaque, conduct, separate,	properties, hardness, solubility, transparency, electrical conductivity,	bicarbonate of soda, acid

	mixing, magnet, magnetic, burn, solid, liquid, gas	thermal conductivity, magnetism, dissolve, solution, substance, separating, filtering, sieving, reversible change, burning, rusting, reactions, irreversible change	

In Year 5, the children will be taught to:		
Area of Science	**Enquiry Question**	**Progression of skills and knowledge**
Physics 	How can we feel the force?	• 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
Working Scientifically 		• **Learn to measure gravity using a Newton meter. Investigate friction using a Newton meter:** Pulling shoes on different surfaces. • **Plan own fair test to investigate Air resistance:** Predict > Question (Does changing X affect Y) > record results in table > draw conclusions 'The _____er the _____, the _____er the _____'. • **Make Observations** about effect of pulleys and levers. • **Taking measurements, reporting and presenting findings from enquiries –** designing parachutes to test air resistance
Physics 	What does the earth look like from the solar system?	• 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
Working Scientifically 		• **Investigate & Observe:** The length and movement of shadows over the course of a day (rounder's post with shadow drawn in chalk with time of day labelled).
Biology 	How do humans change over time?	• Describe the changes as humans develop to old age

Working Scientifically 		• **Planning scientific enquiry:** Gestation period of other animals and compare with humans (e.g. length and mass of baby as it grows)
Biology 	What do plants and humans have in common?	• Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • Describe the life processes of reproduction in some plants and animals
Working Scientifically 		• **Comparing:** Life cycle of plants and animals in local environment compared to those around the world, comparing how different animals grow and reproduce • **Observing:** Grow new plants from different parts of plant (seed/stem/root cuttings)
Chemistry 	How does a material change state?	• 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
Working Scientifically 		• **Perform simple tests:** Answer questions e.g. 'What material would be most effective for a warm jacket?' • **Observe closely:** Using equipment to separate mixtures, filter, sieve, using magnets, heating to evaporate. Observing reversible and irreversible changes, dissolving materials (e.g. salt, sand, sugar, soil, cocoa powder)

Long Term Plan: Year 6

Milestones – By the end of Year 6 children will demonstrate…
• I can name the different groups into which animals can be grouped • I can describe how an animal could be grouped based on specific characteristics • I can name the key parts of the circulatory system and their function • I understand some of the impacts that drugs and lifestyle can have on the body • I can describe how nutrients are transported within animals • I can explain the living things have changed over times and that fossils provide information about animals that lived before • I can explain the meaning of evolution • I can explain how some animals and plants are adapted to suit their environment • I can recognise the light appears to travel in straight lines • I can explain how we see things • I can explain how a shadow is made • I can recognise symbols when drawing a circuit diagram

According to the National Curriculum, children in Year 6 should be taught:
• Working scientifically • Living things and their habitats • Animals including humans • Evolution and inheritance • Light • Electricity

In Year 6, the children will be inspired by learning about the following scientists:	
What does electricity need to work?	Thomas Edison
Why can't a fish live on land?	Carl Linnaeus
How much variation is there in how we look?	Charles Darwin
How can we stay fit and healthy as we get older?	Alexander Fleming
How do we see things?	Gustav Kirchhoff

The new vocabulary the Year 6 children will use will include:

	Tier 1	Tier 2	Tier 3
Working scientifically	Identify, describe, investigate, plan, test, fair test, observe, compare, measure, report, findings, measure, report, present	interpret	
What does electricity need to work?	circuit	voltage, components, symbols, circuit diagram	
Why can't a fish live on land?	classify	classification, microorganisms, organisms	
How much variation is there in how we look?	adapt, vary	evolution, evolve, adaptation, variation, inherit, inheritance	
How can we stay fit and healthy as we get older?	heart, lungs, blood, water, nutrient, transport, oxygen,	circulatory system, blood vessels, pulse, lifestyle disease, water	Oxygenised, deoxygenised

	air, breathing, exercise, diet, drugs	transportation, nutrient transportation	
How do we see things?	light, eye, straight, shadow	light sources, periscope	phenomena

In Year 6, the children will be taught to:		
Area of Science	**Enquiry Question**	**Progression of skills and knowledge**
Physics 	What does electricity need to work?	• 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
Working Scientifically 		• **Perform simple tests:** How does changing components affect the circuit (control and variable – only changing one component)
Biology 	Why can't a fish live on land?	• Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals • Give reasons for classifying plants and animals based on specific characteristics
Working Scientifically 		• **Classify plants:** Using Classification key • **Research:** Adaptation of plants and animals
Biology 	How much variation is there in how we look?	• 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

Working Scientifically 		• **Observation**: How local animals have adapted to their environment compared to those in extreme conditions e.g. camel, penguin
Biology 	How can we stay fit and healthy as we get older?	• 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
Working Scientifically 		• **Observe:** Effect of exercise on heart rate. **Measure:** Pulse/ minute • **Record:** Results on a table • **Interpret results:** Reason why pulse increases in response to exercise.
Physics 	How do we see things?	• 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
Working Scientifically 		• **Investigate** how light is bounced off reflective surfaces and enters our eyes. • **Range of phenomena:** Rainbows, colours of soap objects looking bent in water • **Perform simple tests:** light travelling in straight lines and explain how it works