St. Philip's CE Primary Academy

Working Together

bdat
Bradford Diocesan Academies Trust

Curriculum Learning Guide

Science

How is Science taught at St Philip's CE Primary Academy?

To be read alongside EYFS Programmes of Study for Curious Minds

Curriculum Intent:

What do we want to achieve with our Science curriculum?

Here at St Philip's C.E Primary Academy we want to encourage our children to be curious about the world around them through the teaching of scientific enquiry. The children are inspired to investigate how and why we are here and are encouraged to ask questions about the world around them. They will look at how science has changed our lives and is vital to the world's future prosperity; all pupils are taught essential aspects of the knowledge, methods, processes and uses of science.

We support the children in understanding how science can change people's perceptions and how it can be used to influence the world and future generations. We want the children to understand how the world can help us expand our horizons and how science can help us test our limits and the limits of the world. The children begin to develop a sense of excitement and curiosity about natural phenomena; to question the world around them and become independent learners in exploring possible answers for their scientific based questions.

Implementation:

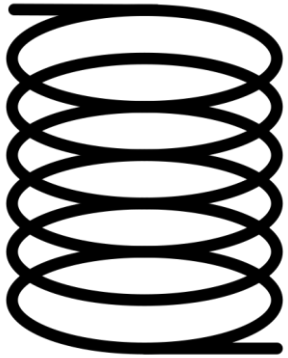
How will this be achieved?

Science will be taught every half term using the DfE Programmes of Study documents.
Every lesson will start with reflect and remember activities used to recap previous learning.
Children will be introduced to their new vocabulary for the day
Use of videos, pictures and practical resources will be used in lessons.
The children will complete at least 1 investigation every half term, using the investigation template for Y1-Y4.
Y5 and Y6 will begin to write out their investigation in preparation for Secondary School expectations.
Children will use yellow highlighters to highlight the key vocabulary they were focusing on in the lesson.

Impact:

By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study. At St.Philip's we use assessment to determine children's understanding and inform teachers planning. Science skill progression documents support this. Science is monitored throughout all year groups using a variety of strategies such as subject leader learning walks, book scrutinies and pupil interviews.

Spiral Curriculum



The Science curriculum design follows the Programmes of Study by the DfE in which key concepts are presented repeatedly throughout the curriculum but with deepening layers of complexity, or in different applications.

Throughout the teaching of science, pupils will;

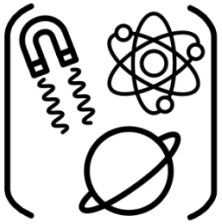
- Return to the key concepts again and again during their time in primary school.
- Deepen their understanding with each revisit as key concepts are covered withgreater complexity.
- Utalise prior knowledge so they can build upon previous foundations, rather than starting again.

Key Drivers at St Philip's

	Oracy Rich	Relevant Content	Experiential Learning	Future Proof	Inclusive & Supportive
Science	debate/discussion/negotiation explanations giving directions following directions listening walks dialogic talk challenging subjects where pupils reason & justify verbally	Delivery of the statutory requirements for KS 1 and 2 as outlined within the National Curriculum for Geography within units using key questions. Develop and enhance English and Maths' skills through scientific enquiry. Visits & studies of the local area	Plan a variety of visits and visitors. Enquiry, investigation, problem solving and decision making central to high quality learning in science. Real issues will be investigated not make believe scenarios. Use a variety of resources such as magnets, circuits, newton metres etc	Preparing pupils for an ever changing world. Scientific developments and advances are explored where appropriate. Use a wide range of ICT to support subject investigations and enquiries. Informing and empowering children and young people by introducing them to a	Creates a sense of place, belonging, identity, purpose Multi-sensory approaches SEND approaches used inc. use of resources and adults. Support and group work clearly identified. A variety of learning styles is used: visual, audio and kinetic

		Visitors from the local area Topical and emotive topics that deals with real issues. Open ended questions to inspire curiosity about familiar and new places	Complete a range of investigations exploring the world around them. Develop, enhance and apply fieldwork skills within context Pupils are taught through discussion, practical activity, games, investigations, problem solving, research, role-play and recording. Planning takes into account and plots the 100 things to do at St P's.	range of relevant scientists. Create Scientific problem solvers. Local visits to create an interest for the development of the future.	Whole-class teaching methods, enquiry based group work, individual, pair, class and group work Assessment of pupils inform the teacher of current achievements, and give guidance for future learning. Open ended investigations which can have a variety of responses Topical subjects in whole school assemblies. who call it home.

Science - Pedagogy
Education Endowment Fund (EEF) research indicates that the ability to reason scientifically –by testing hypotheses through well-controlled experiments –is a strong predictor of later success in the sciences and that this skill can be developed through experiences that allow pupils to design experiments that require them to control variables.

Science Components	
The Science curriculum can be ….	
	**Biology** Biology is **the study of living things**. It is broken down into many fields, reflecting the complexity of life from the atoms and molecules of biochemistry to the interactions of millions of organisms in ecology.
	**Chemistry** Chemistry is the **branch of science that studies the properties of matter and how matter interacts with energy**. Chemistry is considered a physical science and is closely related to physics.
	**Physics** Physics is a **branch of science that studies matter and its motion as well as how it interacts with energy and forces**. Physics is a huge subject. There are many branches of physics including electricity, astronomy, motion, waves, sound, and light.

Weaving knowledge, skills and understanding together in the Science Curriculum				
EYFS – The Natural World (Understanding the world)				
Nursery Semester 1	Nursery Semester 2	Reception Semester 1	Reception Semester 2	Year 1 National Curriculum
Learns about garden plants and pets and learns new vocabulary related to these.	Learns about plants, animals and found objects. Learns new vocabulary related to these.	Is able to talk about some of the things they have observed such as plants, animals, natural and found objects.	Learns how to make observations of animals and plants in our local environment. Learns how to explain why some things occur and how to talk about changes such as the life cycle of a butterfly.	**Sci.** – Working Scientifically – observing closely, using simple equipment. **Sci**. – Working Scientifically – using their observations and ideas to suggest answers to questions.
Learns some simple science experiments.	Learns about why things happen when materials are combined together.	Learns about why things happen and how things work in more detail.	Learns about why things happen and how things work and ways to talk about this.	**Sci.** – Working Scientifically – asking simple questions and recognising that they can be answered in different ways
	Learns how to tell the difference between something that has decayed and something that hasn't.	Learns about growth, decay and changes over time.	Learns about the changes that occur when something decomposing.	
Learns about how to look after a plant.	Learns about what a plant needs to grow.	Learns about how to care for plants and the environment. For example watering and weeding the garden	Learns how to grow a plant from a seed and how to talk about its needs.	
Learns vocabulary to talk about a pet.	Learns about what a pet needs.	Learns about how to look after a pet and goldfish	Learns how to explain what is needed to look after an animal.	

Learns about weather and some vocabulary to talk about weather.	Learns about the concept of seasons and the weather associated to them.	Learns about the process of freezing.	Learns the vocabulary to explain that when water is frozen it becomes solid and turns to ice.	
Learns about weather and some vocabulary to talk about weather.	Learns about the concept seasons and the weather associated to them.	Learns the vocabulary to name seasons Autumn & Winter	Learns the vocabulary to name seasons Spring & Summer	**Sci**. – Seasonal Change – observe changes across the four seasons.

Weaving knowledge, skills and understanding together in the Science Curriculum

KS1

During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking simple questions and recognising that they can be answered in different ways
- observing closely, using simple equipment
- performing simple tests
- identifying and classifying
- using their observations and ideas to suggest answers to questions
- gathering and recording data to help in answering

Year 1

Materials	Seasonal Changes	Plants
		
• 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 • Talk about and notice objects throughout the year. • Talk about and describe different objects/materials. • Talk about and describe objects that we use every day. • Talk about how everyday objects are made (in a simple way).	• observe and describe weather associated with the seasons and how day length varies. • observe changes across the four seasons • observe and describe weather associated with the seasons and how day length varies. • Name the seasons and the time of year associated with them. • Talk about and notice the seasons throughout the year. • Talk about and describe the seasons. • Talk about what we do to adapt to different seasons e.g. clothes, activities, physical environment, food	• identify and describe the basic structure of a variety of common flowering plants, including trees. • identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. • Talk about and notice plants throughout the year. • Talk about and describe different plants. • Talk about what plants we eat. • Talk about how to grow plants. • Compare plants. • Talk about how they can look after plants

	• Talk about the plants and animals of different seasons and what they do. • Compare seasons.	
Working Scientifically		
	Identifying, Grouping and classifying -Can you name and sort the different seasons and the weather associated with them? Observation over time – Can you observe the weather over time and see the changes that occur?	Identifying, Grouping and classifying -What are the names of all parts of a plant? Observation over time – How does a bulb change over time? Research – What are the most common plants in Britain and where can we find them? Research – Are there any plants that flower in every season?
Vocabulary		
Object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see through, not see through	Weather (sunny, rainy, windy, snowy etc.), seasons (Winter, Summer, Spring, Autumn), sun, sunrise, sunset, day length, temperature	Leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud. Names of trees in the local area Names of garden and wild flowering plants in the local area
Everyday materials 	**Humans** 	**Animals inc. humans** 
• 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. • Compare objects. • Talk about how we look after our objects or belongings.	• identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. • Talk about and describe their body. • Talk about how they are the same as and different from others e.g. physical appearance, things you like, things you believe, how we do things etc. • Talk about their senses and how they use them in everyday life.	• identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals • describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) SEA CREATURES • identify and name a variety of common animals that are carnivores, herbivores and omnivores • Talk about animals that they are interested in.

	• Talk about how they've changed during year one • Measure themselves over the year and compare to others • Look after their own health e.g. handwashing, brushing teeth, choosing clothes	• Talk about and describe different animals. • Talk about what animals eat. • Talk about where animals live. • Talk about how to look after a pet. • Compare animals • Measure animals • Talk about how they can look after animals/pets
Working Scientifically		
Identifying, Grouping and classifying -Can you identify, group and classify different materials? Comparative/ Fair test – How can you test that the material is more absorbent than another?	Identifying, Grouping and classifying -What are the names of the body parts? Comparative/ Fair test – Is our sense of smell better if we cannot see?	
Vocabulary		
hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see through, not see through	Senses, touch, see, smell, taste, hear, fingers (skin), eyes, nose, ear and tongue	Head, body, eyes, ears, mouth, teeth, leg, tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves

Year 2		
Materials	**Plants**	**Animals inc. Humans**
Use of everyday materials • identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • find out how the shapes of solid objects made from some materials	• **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. • observe and describe how seeds and bulbs grow into mature plants	• 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) **Animals** • Talk about how to look after a pet. • Describe how animals help humans.

can be changed by squashing, bending, twisting and stretching. • Talk about and describe different objects/materials. • Talk about the properties of everyday objects that we use. • Talk about how they've made objects and things that went well or could be improved. • Which object is the most suitable for a task. E.g. Which one of these bags is best for carrying my marking home in? • Which material is the most suitable for an object.E.g. Which bag will protect my books from the rain?	**find out and describe how plants need water, light and a suitable temperature to grow and stay healthy**. • Talk about how to grow a variety of plants. • Grow a variety of plants from seeds and bulbs • Care for a variety of houseplants/plants over the whole of Y2 • Describe different seeds – what they look like, what they grow in to and how we use the plant. • Talk about how to grow a variety of bulbs. • Describe different bulbs – what they look like, what they grow in to and how we use the plant. • Talk about the parts of the plants we eat.	• Talk about baby animals and their parents. • Describe how baby animals change as they grow. • Compare baby animals with their parents and other baby animals. describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene **Humans** • Talk about and describe how to look after themselves – what foods are best to eat; why we need to exercise; why and how to rest. • Make comparisons between themselves and people that are older and younger than them • Look after their own health e.g. brushing their teeth (the singing dentist), washing hands, drinking water, choosing appropriate clothing, appropriate activities, bedtimes etc.
Working Scientifically		
Identifying, Grouping and classifying -Name, sort and classify materials and their properties. Problem Solving – compare the sustainability of different materials for the same purpose. Comparative/fair test – create and carry out a fair test when designing a rain hat.	Comparative/fair test – create a fair test where one variable demonstrates the best conditions for growing a plant. Identifying, grouping and classifying – identify the parts of a plant and how these look in plants that grow in our local environment. Observation over time - Carefully observe different seeds that grow. Research - Research what plants grown here in the UK and which plants grow abroad in different conditions. Observe over time - When growing seeds and bulbs observe the changes over time.	Identifying, grouping and classifying – Group and classify humans into different stages of life. Research – What is it that humans and animals need to stay healthy and alive? Problem solving – What is it that animals do for us?
Vocabulary		
Object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see through, not see through, opaque, transparent and translucent, reflective, non-reflective, flexible, rigid, Shape, push/pushing,	Leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud, light, shade, sun, warm, cool, water, grow, healthy. Names of trees in the local area. Names of garden and wild flowering plants in the local area.	Offspring, growth, young/old stages, breathing, survive, oxygen Comparative vocabulary – bigger, smaller taller, shorter, longer, narrower, wider, healthy, unhealthy. Names of adult animal and baby animal e.g. cow and calf, horse and foal, adult and child,

pull/puling, twist/twisting, squash/ squashing. Bend/bending,stretch/stretching		exercise, heartbeat, breathing, hygiene, germs, disease, food types - meat, fish, vegetables, bread, rice, pasta.

Living things & their habitats

- identify and name a variety of plants and animals in their habitats, including micro-habitats
- describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.
- 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

- Talk about and describe different habitats.
- Explain how an animal is designed for its habitat.
- Describe how animals and plants get what they need to survive from their habitat.
- Order a simple food chain.
- Say if something is living, dead or never been alive.

Working Scientifically

Comparative/fair test – What happens when a plant doesn't get any sunlight?
Identifying, grouping and classifying – Identify plants that grow around the school grounds.
Observation over time – Grow a sunflower and observe its growth.
Problem solving – Understand why weeds grow everywhere.
Identifying, grouping and classifying – Identify parts of the plant we eat.
Identifying, Grouping and classifying -group and classify items into dead, alive and never been alive and to observe to classify that habitats provide shelter, food and water.
Research – how we know something is alive, to name and describe habitats, to describe how animals are suited to their environment and to know which animals are endangered and why.

Vocabulary

Living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed, names of local habitats e.g. pond, woodland etc., names of micro-habitats e.g. under logs, in bushes

Weaving knowledge, skills and understanding together in the Science Curriculum
Lower KS2
During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content: • asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests • making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings.
Year 3

Light	Forces	Rocks
• 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. • Understand that darkness is the absence of light • Notice light reflects from different surfaces. Investigation: Which material is the most reflective? • Explain why light from the sun can be dangerous. • Investigate how light can be blocked by different objects. Investigation Statement – Paper blocks the sun more than any other material. • Find patterns in the way shadows can change.	• compare how things move on different surfaces • notice that some forces need contact between two objects, but magnetic forces can act at a distance • observe how magnets attract or repel each other and attract some materials and not others • compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials • describe magnets as having two poles • predict whether two magnets will attract or repel each other, depending on which poles are facing. • Explore forces in the environment E.g. playing with toys, kicking/throwing balls, opening doors, climbing. • Make observations on how we use forces in everyday life. • Describe forces and their effect on things • Spot and talk about simple patterns in our observations E.g. the harder the kick the further the ball went. • Measure forces using a force meter and record data in a table. • Investigate how things move on different surfaces	• compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • describe in simple terms how fossils are formed when things that have lived are trapped within rock • recognise that soils are made from rocks and organic matter. • Identify man made and natural rocks • Identifying, grouping and classifying – Group the rocks and soils into sedimentary, igneous and metamorphic? • Explain how sedimentary rocks are formed • Explain how igneous rocks are formed • Explain how metamorphic rocks are formed • Comparative/Fair Test: How does adding different amounts of soil affect how quickly water drains through it? • Explain how fossils are formed. • Research – Who was Mary Anning and what did she discover?

	• Observe and describe magnetic forces Test objects to see if they are magnetic	
Working Scientifically		
Comparative/Fair testing – how does the distance between the shadow puppet and the screen affect the size of the shadow? **Identifying, grouping and classifying** – How would you organise these light sources onto natural and artificial?		Comparative/Fair Test: How does adding different amounts of soil affect how quickly water drains through it? **Identifying, grouping and classifying** – Group the rocks and soils into sedimentary, igneous and metamorphic? **Research** – Who was Mary Anning and what did she discover?
Vocabulary		
Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous	Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole	Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil
Animals inc. Humans		**Plants**
• 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. • Identify different food groups, • Identify foods from different food groups • Understand the appropriate amount of each food group to make a nutritious meal. • To understand we cannot make our own food.		• 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

• Big Question: **Why do different types of vitamins help keep us healthy and which foods can we find them in?**	• explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal • Talk about the things that plants give us • Observe, describe and compare plants • Measure plants • Describe the functions of parts of a plant • Describe how a variety of plants need different things to live • Describe the life cycle of plants and the role of the flower
Working Scientifically	
Identifying, grouping and classifying – How can we group the food that we eat? Research – Why do different types of vitamins help keep us healthy and which foods can we find them in? Research - Do all animals have a skeleton? How can you exercise to keep our muscles strong and healthy? Pattern Seeking – Are the children with the biggest feet the tallest?	
Vocabulary	
exercise, heartbeat, breathing, hygiene, germs, disease, quads, hamstrings, calves, glutes, triceps, biceps, skeleton, muscles, food types - meat, fish, vegetables, bread, rice, pasta, nutritious, Comparative vocabulary – bigger, smaller taller, shorter, longer, narrower, wider, healthy, unhealthy.	pollen, insect/wind pollination, seed formation, seed dispersal, animal dispersal, wind dispersal, water dispersal

Year 4		
Animals Incl Hum 	**States of Matter** 	**Electricity** 
• 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. • Talk about their teeth and how to care for them • Describe the functions of the different types of teeth • Explain how food/drinks can affect teeth • Compare human teeth with those of other animals • Identify and name the main parts of the digestive system • Order the main parts of the digestive system • Describe what happens in each part of the digestive system • Explain how to keep their digestive system healthy	• 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. • Talk about solids, liquids and gases • Describe the properties of solids, liquids and gases • Describe what happens when objects melt, freeze or solidify • Give everyday examples of melting and freezing • Describe what happens when liquids evaporate and condenses • Give everyday examples of evaporation and condensation • Describe the water cycle	• 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. • Talk about objects that use electricity • Talk about how electricity is used to produce • heat, warmth, movement and light and give • examples. • Make an electrical circuit and name the components

	• Talk about temperature being how hot or cold something is • Talk about how we measure temperature • Measure temperature using a variety of thermometers	• Control a circuit using a switch • Identify and classify conductors and insulators • Research how electricity is produced in a variety of ways • The risks when using electricity
Working Scientifically		
Which drinks make teeth decay quickly? (comparative and fair testing) Research-How can I keep my digestive system healthy?	Observe over time – How do different temperatures affect a solid over time? Patter seeking – Identify the relationship between the different stages in the water cycle and states of matter.	Problem solving – What materials conduct electricity? Research – How does electricity work and how is it formed?
Vocabulary		
Digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, nutrients, large intestine, rectum, anus, teeth, incisor, canine, molar, premolars, enzymes/acid.	Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle, particles,	Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol N.B. Children in year 4 do not need to use standard symbols as this is taught in year 6
Living things & their habitats 		**Sound** 
• recognise that living things can be grouped in a variety of ways. • recognise that environments can change and that this can sometimes pose dangers to living things. • 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. • Talk about and describe range of habitats and their plants & animals (building on from Y2 work) • Compare animals and plants		• 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

• Ask and answer yes/no questions • Identify plants and animals using a classification key • Group animals & plants in a variety of ways and give reasons e.g. flowering/ non flowering • Construct classification keys to help others to identify animals & plants • construct and interpret a variety of food chains, identifying producers, predators and prey • • Give examples of how an environment has changed due to human impact or natural phenomena • Talk about actions they could take to protect our planet	• recognise that sounds get fainter as the distance from the sound source increases. • Experience a variety of sounds around us, observe and describe them • Order sounds in a variety of ways e.g. loudest to quietest, highest to lowest • Compare sounds using words and decibels • Explain how we use sounds in everyday life • Consider how sounds help or hinder us • Be able to explain how sounds travels • Describe how volume and pitch are produced by a variety of simple instruments • Describe how sounds get fainter as the distance from the sound source increases • Explain how the ear works and how we can protect our hearing
Working Scientifically	
Working scientifically • Problem solving – Why are animals grouped into different classifications? Research – How do plants and animals evolve to their habitats?	• pattern seeking- Is there a link between the amount of noise in school and the time of the day? • Research-How do we use science in everyday life? • Research- What is it like to be hearing impaired?
Vocabulary	
Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate, herbivore, carnivore, omnivore, producer, predator, prey, food chain	Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation, vacuum

Weaving knowledge, skills and understanding together in the Science Curriculum

Upper KS2

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- identifying scientific evidence that has been used to support or refute ideas or arguments.

Year 5

Earth & Space	Forces	Properties & changes of materials
 **Error! Bookmark not defined.**		
• 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	• 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	• 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,

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. • Name and describe the sun and the planets • Say that the earth, sun and moon are spherical bodies • Use a model to explain day and night • Say that the sun does not move and it doesn't rise or set. It is the earth's rotation that gives us the impression of a sunrise and sunset. • Use a model to explain seasons • Use a model to explain how the earth and moon orbit the sun • Explain the phases of the moon • Talk about weightlessness in space and the pull of gravity on earth • Describe how scientist's thinking about space has changed over hundreds of years	• recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. • Say that a force is a push or a pull (recap Y3) • Say that forces come in different sizes (recap Y3) • Say how forces affect an object (recap Y3) • Say what gravity is and how it affects things on earth • Measure forces using a force meter (recap Y3) • Plan fair tests that investigate water • resistance, air resistance and friction • Use diagrams to explain water resistance • Use diagrams to explain air resistance • Use diagrams to explain friction • Give examples of when it is useful to when it is useful to have high water resistance, air resistance and friction • To explore how levers, pulleys and gears work • To say that levers, pulleys and gears are simple machines • To explain how each of these simple machines work by taking a force and making it bigger • Give examples of where these machines are used in everyday life	• 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. *Carousel of activities to recap previous learning as follows:* • *Describe the properties of objects* • *Compare and group everyday objects based on their properties* • *Group together materials that are magnetic & non-magnetic (recap Y3)* • *Group together materials that are electrical conductors/insulators* • *Order materials from transparent to opaque* • *Order materials from softest to hardest* • *Compare the same object made of different materials e.g. water bottle and say which one is best for a given user.* • *Explain which material is most suitable for a given purpose drawing on wider knowledge (every day and scientific).* • *Talk about the changes of state; solids, liquids, gases* • *Explain how materials can be recovered through evaporation* New learning • Explain what thermal conductivity is and which materials provide insulation • Describe what a solution is • Describe what a mixture is • Explain the difference between soluble and insoluble. • Explain what dissolving means and give examples of materials which dissolve • Explain what filtering and sieving are and give examples • Explain how materials can be recovered from solutions or mixtures through evaporation,

		filtering and sieving. • Give examples of reversible and non-reversible changes
Working Scientifically		
Pattern seeking- How long does it take different planets to orbit the Sun? Pattern seeking -Does the size of the planet effect the time it takes to orbit the Sun? Observation -What are the different phases of the moon?	Comparative/fair test – Plan an investigation into the effectiveness of various parachutes. Research – Know what gravity and resistance are and identify balanced and unbalanced forces. Investigate how levers work.	Comparative/fair test – Changing the state of a substance. Identifying, grouping and classifying – How to identify materials. Research – Reversible or irreversible?
Vocabulary		
Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune) spherical, solar system, rotates, star, orbit, planets	Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears	Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve reversible/non-reversible change, burning, rusting, new material
Living things and their habitats 	**Animals inc Humans** 	
• 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. • Describe the life cycles of a mammal • Describe the life cycles of an amphibian	• Describe the changes as humans develop to old age • Name and order the different stages of human life e.g. foetus, new born, child, adolescent, adult, old age • Work as part of a group to describe in detail one stage of the five listed above. • Compare two or more stages (E.g. new born and adolescent) • Describe the changes of humans	

• Describe the life cycles of an insect • Describe the life cycles of a bird • Compare the life cycles of the above • Review from year 3 parts of a plant, parts of a flower and the life cycle of a plant including pollination and seed dispersal • Say that plants reproduce in 2 ways – asexual and sexual • Give a simple explanation of sexual reproduction in plants and give examples of plants that reproduce this way. • Talk about the two main groups of plants (flowering and non-flowering) and give examples of each • Give a simple explanation of asexual reproduction in plants and give examples of plants that reproduce this way.	from birth to old age • Explain strategies that people could use to support their mental wellbeing • The following may be covered during RSE or PSHE • Explain the changes during puberty for boys • Explain the changes during puberty for girls	
Working Scientifically		
Comparative & fair test/ observation over time – Will a seed germinate in salty water? Research – research similarities and differences between the lifecycles of different animals	Pattern seeking – look for patterns in animal gestation periods and draw logical conclusions. Research – Learn about foetal development in humans. Research – Changes in adolescents over time. Observation over time – Recognise and explore key milestones in a baby and child development.	
Vocabulary		

Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings	Puberty: the vocabulary to describe sexual characteristics	

Year 6

Animals inc. Humans	Electricity	Living Things and Their Habitats
• 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. • Describe the digestive system and how diet and lifestyle impact our body (Recap Year 4) • Identify and name the main parts of the circulatory system • Describe the functions of the blood • Describe the functions of the blood vessels • Describe the functions of the heart • Explain how diet, exercise, drugs and lifestyle • affect the way our bodies function • Describe how nutrients and water are moved in humans • Explain how they can keep their heart healthy and why it is important to do so	• 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 • Make an electric circuit, including a switch (recap Y4) • Change the components in a circuit and explain what effect it has • Explain which materials are conductors and insulators (recap Y5) • Draw circuit diagrams using the correct symbols • Explain how to keep safe around electricity • Explore the use of electricity to power cars	• 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. • Describe the characteristics of amphibians, reptiles, birds, fish and mammals (recap Y4) • Compare the characteristics of animals in different groups • Say that plants are classified into two main groups and give examples of each • Create classification keys for plants and animals and micro-organisms (partial recap Y4) • Explain what micro-organisms are and how they help or hinder us • Say what the 5 kingdoms of living things are • Talk about the work of Carl Linnaeus and why his work was influential • Use classification materials to

• (Cardiovascular disease is the world's number one killer) • Explain why blood donation is important		• identify unknown plants, animals and microbes • Classify living things according to Linnaean principles (Kingdom, Phylum, Class, Order, Family, Genus, Species)
Working Scientifically		
• Pattern seeking-The further I run, the higher my heart rate? True or false? • Research-How can I keep my heart healthy?	Comparative and fair testing- What effects the brightness of a bulb?	Observing over time-Microbes are responsible for breaking down our food. Does the type of packaging effect how long food lasts? Research -Are all microbes harmful? Research – Carl Linnaeus was a scientific pioneer. Why? identifying and classifying -Can you create a key to classify plants, animals and micro-organisms?
Vocabulary		
Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs and lifestyle	Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage NB Children do not need to understand what voltage is but will use volts and voltage to describe different batteries. The words cells and batteries are now used interchangeably	Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering and non-flowering
Light 	**Evolution & Inheritance** 	
• recognise that light appears to travel in straight lines • use the idea that light travels in straight lines to explain that	• 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	

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. • Identify light sources (recap Y3) • Use a diagram/model to explain how we see things which are a light source • Use a diagram/model to explain how we see things that reflect light • Explain how to make a variety of shadows (recap Y3) • Use a diagram/model to explain how shadows are formed • Describe how light (natural & man-made) can affect our mood/health	• identify how animals and plants are adapted to suit their environment in different ways **and** that adaptation may lead to evolution. SATs • 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. • Explain how fossils are formed and how they provide scientists with a snapshot of the past • Give examples of living things that lived millions of years ago and the fossil evidence we have to support this • Give examples of fossil evidence that can be used to support the theory of evolution • Give examples of how plants and animals have adapted suit an environment E.g. Darwin's finches • Explain how an animal or plant has evolved over time E.g. penguin or peppered moth • Explain the process of evolution • Talk about the influence of Charles Darwin, Alfred Wallace and Mary Anning • Say that all living things have offspring of the same kind but the offspring are not identical to their parents and vary from each other • Talk about inherited and non-inherited characteristics of a family E.g. Beckhams, The Royal family
Working Scientifically	
• Pattern seeking -Light travels in straight lines. True or false? Prove it • Research- How many different colours can white light be split in to?	Research – learn what fossils are and how they are formed. Research – learn about Charles Darwin Observe over time – Understand how fossils change over time. Identifying, grouping and classifying – Having knowledge of how adaptation to certain climates work. Pattern seeking – Understanding inheritance.
Vocabulary	
As for year 3 plus straight lines, light rays.	Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils

Monitoring and Evaluation

In all subjects at St Philip's CE Primary Academy, the teaching and learning will be monitored and evaluated by both individual Subject Leaders and members of the Senior Leadership Team.

As a Subject Leader, the following activities will be undertaken and used to inform understanding of the subject. Evidence and information from these activities will then be used to inform each subject Plan of Action and the CPD needs of all staff and individuals.

AUTUMN 1 **Audit Subject** **Create Action Plan** **Pupil Surveys**	**SPRING 1** **Lesson Observations** **Website Update and Review** **Assessment Analysis** **Review Action Plans**	**SUMMER 1** **Planning Scrutiny** **Book/Work Scrutiny** **Website Update and Review**
AUTUMN 2 **Planning Scrutiny** **Book/Work Scrutiny** **Triangulation of M&E** **Identify CPD Requirements**	**SPRING 2** **Target CPD Requirements** **Review Action Plan**	**SUMMER 2** **Pupil Surveys** **Triangulation of M&E** **Review Action Plan**

In supporting individuals, it is expected that Subject Leaders will follow the programme of support below to give all staff the opportunity to gain the knowledge and understanding to deliver the curriculum to the best of their ability:

- Ensure the member of staff has a good understanding of the subject and units to be delivered, using the subject documentation, Medium Term Plans, individual lesson plans and Knowledge Organisers.
- CPD given to individuals through video tutorials, one-to-one support in planning and preparing etc.
- Modelling expectations through demonstration lessons in own or colleague's class.
- Further coaching and discussion of how to implement strategies or modify lessons for the needs of pupils etc.

Science: Long Term Plan Overview	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
EYFS	Enhanced Provision and Focus Tasks					
Year 1	Seasonal Changes throughout the year					
	Humans	Materials	Animals	Animals	Plants	Plants
Year 2	Materials	Living things and their habitats	Plants	Animals Inc Humans	Plants	Living things and their habitats
Year 3	Light	Forces and magnets	Rocks	Animals Inc Humans	Animals Inc Humans	Plants
Year 4	Animals Inc Humans	States of Matter	Electricity	Living things and their habitats	Living things and their habitats	Sounds
Year 5	Earth and Space	Forces	Properties and changes of materials	Animals Inc Humans	Living things and their habitats	Properties and changes of materials
Year 6	Animals Inc Humans	Electricity	Habitats	Light	Evolution and Inheritance	Evolution and Inheritance