

Science curriculum

'The most important thing in science is not so much to obtain new facts as to discover new ways of thinking about them.' (Sir William Brag)

Intent

At St John's we want every child to develop their scientific knowledge and conceptual understanding in the specific disciplines of biology, chemistry and physics. We equip children with an understanding of the nature, processes and methods of science through different types of science enquires that help them to answer specific questions about the world around them. Importantly, we give each child a 'toolkit' of the scientific knowledge required to understand the use and implications of science today and for the future.

Implementation

Through the Science curriculum, all children are provided with the opportunity to gain the scientific knowledge and skills they need to discover, understand and begin to explain the world and phenomena around them. Knowledge builds sequentially in biology, chemistry and physics, with opportunities to revisit ideas and concepts throughout and across units. Children are supported to gain knowledge of scientific concepts to enable them to work scientifically and engage in practical work purposefully. Scientific enquiry is incorporated across the units that children study in Science at St John's so that children constantly encounter enriching scientific opportunities that invites them to engage with: observing over time, pattern seeking, identifying, classifying and grouping, comparative and fair tests and research using secondary sources. We show children that science matters in the world and ensure every child rightly has the opportunity to be scientifically literate. Our science exercise books promote accountable reading in Science, where children engage with a source and then complete an activity to demonstrate their scientific knowledge and understanding.

Impact

Pupils record their knowledge and understanding in a science exercise book. The books capture children's existing knowledge and also enable each pupil to reflect on new learning required throughout each lesson. Each lesson begins with a low stakes quiz to check that children's understanding from previous learning. As appropriate, a double-page spread provides an opportunity for children to showcase their developed scientific knowledge and understanding at the end of a unit. Children are then invited to engage in learning dialogues to share what they have learnt with their peers, teachers and/or leaders.

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Breadth of study-Biology

Key Stage 1

Key Stage 2

Working scientifically- across all year groups scientific knowledge and skills should be learned by working scientifically.

Plants

- Identify, classify and describe their basic structure.
- Observe and describe growth and conditions for growth.

Habitats

- Look at the suitability of environments and at food chains.

Animals and humans

- Identify, classify and observe.
- Look at growth, basic needs, exercise, food and hygiene.

All living things

- Investigate differences.

Plants

- Look at the function of parts of flowering plants, requirements of growth, water transportation in plants, life cycles and seed dispersal.

Evolution and inheritance

- Look at resemblance in offspring.
- Look at changes in animals over time.
- Look at adaptation to environments.
- Look at differences in offspring.
- Look at adaptation and evolution.
- Look at changes to the human skeleton over time.

Animals and humans

- Look at nutrition, transportation of water and nutrients in the body, and the muscle and skeleton system of humans and animals.
- Look at the digestive system in humans.
- Look at teeth.
- Look at the human circulatory system.

All living things

- Identify and name plants and animals
- Look at classification keys.
- Look at the life cycle of animals and plants.
- Look at classification of plants, animals and micro-organisms.
- Look at reproduction in plants and animals, and human growth and changes.
- Look at the effect of diet, exercise and drugs.



Breadth of study-Chemistry

Key Stage 1

Key Stage 2

Working scientifically- across all year groups scientific knowledge and skills should be learned by working scientifically.

Materials

- Identify, name, describe, classify, compare properties and changes.
- Look at the practical uses of everyday materials.

Rocks and fossils

- Compare and group rocks and describe the formation of fossils.

States of matter

- Look at solids, liquids and gases, changes of state, evaporation, condensation and the water cycle.

Materials

- Examine the properties of materials using various tests.
- Look at solubility and recovering dissolved substances.
- Separate mixtures.
- Examine changes to materials that create new materials that are usually not reversible.



Breadth of study-Physics

Key Stage 1

Key Stage 2

Working scientifically- across all year groups scientific knowledge and skills should be learned by working scientifically.

Light

- Look at sources and reflections.

Sound

- Look at sources.

Electricity

- Look at appliances and circuits.

Forces

- Describe basic movements.

Earth and space

- Observe seasonal changes.

Light

- Look at sources, seeing, reflections and shadows.
- Explain how light appears to travel in straight lines and how this affects seeing and shadows.

Sound

- Look at sources, vibration, volume and pitch.

Electricity

- Look at appliances, circuits, lamps, switches, insulators and conductors.
- Look at circuits, the effect of the voltage in cells and the resistance and conductivity of materials.

Forces and magnets

- Look at contact and distant forces, attraction and repulsion, comparing and grouping materials.
- Look at poles, attraction and repulsion.
- Look at the effect of gravity and drag forces.
- Look at transference of forces in gears, pulleys, levers and springs.

Earth and space

- Look at the movement of the Earth and the Moon
Explain day and night



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		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
		How is it different, how is it the same?		How and why does that happen?		What did they leave behind?	What would happen if?
EYFS		Senses	Floating and sinking	Cooking and experimenting	Life cycles	Life cycle of a caterpillar Growing a plant	Observation of mould and decay over time (fruit)
Milestone 1	Cycle A	Seasonal changes (autumn, winter)	Protecting our Earth	Animals including humans- amazing animals		Everyday materials	Common plants
	Cycle B	Animal survival	Use of materials	Plants-bulbs and growth		Seasonal changes (spring, summer)	Habitats
Milestone 2	Cycle A	Teeth & digestion	Rocks & fossils	Classification & environments		Sound	Forces & magnets
	Cycle B	Skeletons & muscles	States of matter	Light & shadow		Plants need for survival	Electricity
Milestone 3	Cycle A	Circulation & lifestyles	Classification of species	Materials: properties of change		Electricity	Growing old
	Cycle B	Light & perception	Forces	Evolution & inheritance		Life cycles	Earth & space



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		How is it different, how is it the same?		How and why does that happen?		What did they leave behind?	What would happen if?
Milestone 1	Cycle A	Seasonal changes (autumn, winter)	Protecting our Earth 	Animals including humans-amazing animals		Everyday materials	Common plants
	Cycle B	Animal survival	Use of materials	Plants-bulbs and growth 		Seasonal changes (spring, summer)	Habitats 

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		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
		How is it different, how is it the same?		How and why does that happen?		What did they leave behind?	What would happen if?
Milestone 2	Cycle A	Teeth & digestion 	Rocks & fossils	Classification & environments		Sound 	Forces & magnets
	Cycle B	Skeletons & muscles	States of matter	Light & shadow 		Plants need for survival	Electricity 

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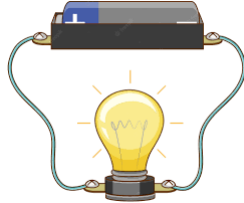
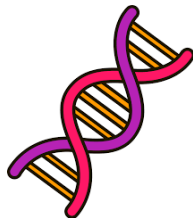
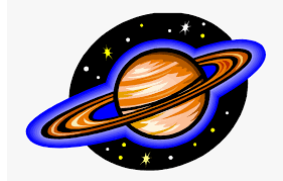
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		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
		How is it different, how is it the same?		How and why does that happen?		What did they leave behind?	What would happen if?
Milestone 3	Cycle A	Circulation & lifestyles	Classification of species 	Materials: properties of change		Electricity 	Growing old
	Cycle B	Light & perception	Forces	Evolution & inheritance 		Life cycles	Earth & space 

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Science skill progression

Science progression across all milestones

'The most important thing in science is not so much to obtain new facts as to discover new ways of thinking about them.' (Sir William Brag)

Concept	Milestone 1	Milestone 2	Milestone 3
<p>Work scientifically This concept involves learning the methodologies of the discipline of science.</p>	<ul style="list-style-type: none"> • Ask simple questions. • Observe closely, using simple equipment. • Perform simple tests. • Identify and classify. • Use observations and ideas to suggest answers to questions. • Gather and record data to help in answering questions. 	<ul style="list-style-type: none"> • Ask relevant questions. • Set up simple, practical enquiries and comparative and fair tests. • Make accurate measurements using standard units, using a range of equipment, e.g. thermometers and data loggers. • Gather, record, classify and present data in a variety of ways to help in answering questions. • Record findings using simple scientific language, drawings, labelled diagrams, bar charts and tables. • Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. • Use results to draw simple conclusions and suggest improvements, new questions and predictions for setting up further tests. • Identify differences, similarities or changes related to simple, scientific ideas and processes. • Use straightforward, scientific evidence to answer questions or to support their findings. 	<ul style="list-style-type: none"> • Plan enquiries, including recognising and controlling variables where necessary. • Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work. • Take measurements, using a range of scientific equipment, with increasing accuracy and precision. • Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs, and models. • Report findings from enquiries, including oral and written explanations of results, explanations involving causal relationships, and conclusions. • Present findings in written form, displays and other presentations. • Use test results to make predictions to set up further comparative and fair tests. • Use simple models to describe scientific ideas, identifying scientific evidence that has been used to support or refute ideas or arguments.

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Science skill progression

Science progression across all milestones

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Concept	Milestone 1	Milestone 2	Milestone 3
<p>Biology Understand plants</p> <p>This concept involves becoming familiar with different types of plants, their structure and reproduction.</p>	<ul style="list-style-type: none"> Identify and name a variety of common plants, including garden plants, wild plants and trees and those classified as deciduous and evergreen. Identify and describe the basic structure of a variety of common flowering plants, including roots, stem/trunk, leaves and flowers. 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. 	<ul style="list-style-type: none"> Identify and describe the functions of different parts of flowering plants: roots, stem, 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 role of flowers in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. 	<ul style="list-style-type: none"> Relate knowledge of plants to studies of evolution and inheritance. Relate knowledge of plants to studies of all living things.
<p>Biology Understand animals and humans</p> <p>This concept involves becoming familiar with different types of animals, humans and the life processes they share.</p>	<ul style="list-style-type: none"> Identify and name a variety of common animals that are birds, fish, amphibians, reptiles, mammals and invertebrates. 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 (birds, fish, amphibians, reptiles, mammals and invertebrates, including pets). Identify name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. Notice that animals, including humans, have offspring which grow into adults. Investigate and describe the basic needs of animals, including humans, for survival (water, food and air). Describe the importance for humans of exercise, eating the right amounts of different types of food and hygiene. 	<ul style="list-style-type: none"> Identify that animals, including humans, need the right types and amounts of nutrition, that they cannot make their own food and they get nutrition from what they eat. Construct and interpret a variety of food chains, identifying producers, predators and prey. Identify that humans and some animals have skeletons and muscles for support, protection and movement. 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. 	<ul style="list-style-type: none"> Describe the changes as humans develop to old age. Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. Recognise the importance of diet, exercise, drugs and lifestyle on the way the human body functions. Describe the ways in which nutrients and water are transported within animals, including humans.

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Concept	Milestone 1	Milestone 2	Milestone 3
<p>Biology Investigate living things This concept involves becoming familiar with a wider range of living things, including insects and understanding life processes.</p>	<ul style="list-style-type: none"> • Explore and compare the differences between things that are living, that are dead and that have never been alive. • Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants and how they depend on each other. • Identify and name a variety of plants and animals in their habitats, including micro-habitats. • Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. 	<ul style="list-style-type: none"> • Recognise that living things can be grouped in a variety of ways. • Explore and use classification keys. • Recognise that environments can change and that this can sometimes pose dangers to specific habitats. 	<ul style="list-style-type: none"> • 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 how living things are classified into broad groups according to common observable characteristics. • Give reasons for classifying plants and animals based on specific characteristics.
<p>Biology Understand evolution and inheritance This concept involves understanding that organisms come into existence, adapt, change and evolve and become extinct.</p>	<ul style="list-style-type: none"> • <i>Identify how humans resemble their parents in many features.</i> 	<ul style="list-style-type: none"> • <i>Identify how plants and animals, including humans, resemble their parents in many features.</i> • <i>Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.</i> • <i>Identify how animals and plants are suited to and adapt to their environment in different ways.</i> 	<ul style="list-style-type: none"> • 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.

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Concept	Milestone 1	Milestone 2	Milestone 3
<p>Chemistry Investigate materials</p> <p>This concept involves becoming familiar with a range of materials, their properties, uses and how they may be altered or changed.</p>	<ul style="list-style-type: none"> • Distinguish between an object and the material from which it is made. • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock. • Describe the simple physical properties of a variety of everyday materials. • Compare and group together a variety of everyday materials on the basis of their simple physical properties. • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick/rock, and paper/cardboard for particular uses. 	<p>Rocks and Soils</p> <ul style="list-style-type: none"> • Compare and group together different kinds of rocks on the basis of their simple, physical properties. • Relate the simple physical properties of some rocks to their formation (igneous or sedimentary). • Describe in simple terms how fossils are formed when things that have lived are trapped within sedimentary rock. • Recognise that soils are made from rocks and organic matter. <p>States of Matter</p> <ul style="list-style-type: none"> • 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 the temperature at which this happens in degrees Celsius (°C), building on their teaching in mathematics. • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. 	<ul style="list-style-type: none"> • Compare and group together everyday materials based on evidence from comparative and fair tests, including their hardness, solubility, conductivity (electrical and thermal), and response to magnets. • Understand how 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, oxidation and the action of acid on bicarbonate of soda.

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Science skill progression

Science progression across all milestones

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Concept	Milestone 1	Milestone 2	Milestone 3
<p>Physics Understand movement, forces and magnets This concept involves understanding what causes motion.</p>	<ul style="list-style-type: none"> • Notice and describe how things move, using simple comparisons such as faster and slower. • Compare how different things move. 	<ul style="list-style-type: none"> • 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. 	<p>Magnets</p> <ul style="list-style-type: none"> • Describe magnets as having two poles. • Predict whether two magnets will attract or repel each other, depending on which poles are facing. <p>Forces</p> <ul style="list-style-type: none"> • Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. • Identify the effect of drag forces, such as air resistance, water resistance and friction that act between moving surfaces. • Describe, in terms of drag forces, why moving objects that are not driven tend to slow down. • Understand that force and motion can be transferred through mechanical devices such as gears, pulleys, levers and springs. • Understand that some mechanisms including levers, pulleys and gears, allow a smaller force to have a greater effect.
<p>Physics Understand light and seeing This concept involves understanding how light and reflection affect sight.</p>	<ul style="list-style-type: none"> • Observe and name a variety of sources of light, including electric lights, flames and the Sun, explaining that we see things because light travels from them to our eyes. 	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • Understand 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 eyes. • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them, and to predict the size of shadows when the position of the light source changes. • 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.

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Science skill progression

Science progression across all milestones

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Concept	Milestone 1	Milestone 2	Milestone 3
<p>Physics Investigate sound and hearing This concept involves understanding how sound is produced, how it travels and how it is heard.</p>	<ul style="list-style-type: none"> • <i>Observe and name a variety of sources of sound, noticing that we hear with our ears.</i> 	<ul style="list-style-type: none"> • Identify how sounds are made, associating some of them with something vibrating. • Recognise that vibrations from sounds travel through a medium to the ear. 	<ul style="list-style-type: none"> • 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.
<p>Physics Understand electrical circuits This concept involves understanding circuits and their role in electrical applications.</p>	<ul style="list-style-type: none"> • <i>Identify common appliances that run on electricity.</i> • <i>Construct a simple series electrical circuit.</i> 	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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.
<p>Physics Understand the Earth's movement in space This concept involves understanding what causes seasonal changes, day and night.</p>	<ul style="list-style-type: none"> • <i>Observe the apparent movement of the Sun during the day.</i> • Observe changes across the four seasons. • Observe and describe weather associated with the seasons and how day length varies. 	<ul style="list-style-type: none"> • <i>Describe the movement of the Earth relative to the Sun in the solar system.</i> • <i>Describe the movement of the Moon relative to the Earth.</i> 	<ul style="list-style-type: none"> • 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.

Science knowledge progression

Science knowledge progression across EYFS

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Understanding the World

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.

ELG: The Natural World

Children at the expected level of development will:

- Explore the natural world around them, making observations and drawing pictures of animals and plants;
- Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class;
- Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

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Science knowledge progression

Science knowledge progression across milestone 1

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		How is it different, how is it the same?		How and why does that happen?		What did they leave behind?	What would happen if?
Milestone 1	Cycle A	Seasonal changes (autumn, winter) <ul style="list-style-type: none"> Names of the four seasons Which months are in each of the four seasons What we mean by the word 'weather' Weather patterns, weather symbols and what the weather is like in both autumn and winter How we, as humans, might dress differently according to the weather outside How daylight hours change across autumn and winter The impact of changing weather and seasons on different plants and animals 	Protecting our Earth <ul style="list-style-type: none"> Why we need to protect our planet What we mean by the word 'environment' Why trees are so important for the environment How habitats can be negatively impacted How their local environment is being impacted The different ways in which we can save or conserve water and electricity How their actions at home could support the protection of the environment 	Animals including humans-amazing animals <ul style="list-style-type: none"> Recognise and name a variety of common animals including fish, amphibians, reptiles, birds, and mammals Recognise and name a variety of common animals that are carnivores, herbivores, and omnivores Know similarities and differences across a variety of common animals (fish, amphibians, reptiles, birds, and mammals, including pets) Recognise and name the basic parts of the human body and say which part of the body is associated with each sense 	Everyday materials <ul style="list-style-type: none"> What materials are and the names of different materials What different materials look like Which materials different objects are made from What some the properties of different materials are and if materials can have other properties Some properties are easy to see but others need to be investigated How the properties of materials mean they are used to make certain objects How to group, sort, and compare objects and materials 	Common plants <ul style="list-style-type: none"> What a plant is and the basic parts of a plant Recognise and name common garden plants Recognise and name common wild plants Recognise and name different types of trees Know why plants are important 	

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Science knowledge progression

Science knowledge progression across milestone 1

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		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
		How is it different, how is it the same?		How and why does that happen?		What did they leave behind?	What would happen if?
Milestone 1	Cycle B	<p>Animal survival</p> <ul style="list-style-type: none"> The things that animals need to survive. Know how animals change as they grow Know why exercise is important to health What a balanced diet is and apply this knowledge to understanding their own diet Understand what hygiene is and why it is important 	<p>Use of materials</p> <ul style="list-style-type: none"> The materials different objects are made from How materials are used in their local area Gather and use data to compare the suitability of different materials Perform simple tests to explore how the shapes of objects made from some materials can be changed Suggest ways to stop plastic pollution Understand how new materials have been/are discovered 	<p>Plants-bulbs and growth</p> <ul style="list-style-type: none"> different types of seeds That plants can grow from seeds but can also grow from bulbs What is meant by 'seed dispersal' What is meant by 'germination' and that seeds need certain conditions to germinate The needs of a plant for survival after the initial germination stage 	<p>Seasonal changes (spring, summer)</p> <ul style="list-style-type: none"> How the weather changes from winter to spring What happens to plants and animals in spring and summer What changes can be seen in the weather from spring to summer Understand how the changing seasons can affect humans 	<p>Habitats</p> <ul style="list-style-type: none"> Recognise and classify objects and organisms as: alive, dead, or never alive Explore how we know if an object or organism is alive – using the life processes Know some of the different habitats plants are found in Investigate and name the minibeasts found in a range of different microhabitats Which animals are found in different world habitats with a focus on the Arctic and the Sahara Understand simple food chains using the vocabulary carnivore, herbivore, omnivore, predator and prey Understand that habitats can change over time 	



Science knowledge progression

Science progression across milestone 2

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		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
		How is it different, how is it the same?		How and why does that happen?		What did they leave behind?	What would happen if?
Milestone 2	Cycle A	Teeth & digestion <ul style="list-style-type: none"> The names of the different types of human teeth and the function of each type The importance of looking after teeth and what can happen if we do not look after our teeth How eating and drinking can damage teeth over time that not all animals have the same teeth The teeth that animals have greatly depend on whether that animal is a carnivore, an omnivore or an herbivore The different organs that make up the digestive system How the digestive system functions as a whole system 	Rocks & fossils <ul style="list-style-type: none"> What rocks are and how they can be classified as either sedimentary, igneous or metamorphic The properties of different types of rocks – in particular, durability and permeability How different rocks can be used and how those uses are based upon their properties What fossils are and what they can tell us about the past Who Mary Anning was The process of fossilisation and the different types of fossil What soil is, what soil is made from and whether all soils are the same 	Classification & environments <ul style="list-style-type: none"> A habitat is the natural home of an organism All living organisms display the seven characteristics of life Organisms within a habitat or ecosystem are interdependent The relationships between organisms can be represented by food chains and food webs The difference between a vertebrate and an invertebrate • vertebrates can be classified into five different groups Invertebrates can be classified into seven different groups Characteristics of animals supports us with classification • we can use a key to identify and classify animals Plants can be classified as flowering or non-flowering Non-flowering plants can be classified into three groups Who Libbie Hyman was and why she is considered significant That environments can change due to natural causes and through the actions of humans and that these changes can be both positive and negative The organisms and habitats found within their own local environment and how these are changing 		Sound <ul style="list-style-type: none"> Sound is a form of energy which is produced when something vibrates Different instruments make sound in different ways Sound travels in waves How sound travels through solids, liquids and gases What makes up the inside of our ears How we hear and how we can protect our hearing Volume is the intensity of sound and is determined by the strength of vibrations Pitch is how high or low a sound is and is controlled by the speed of vibrations The distance we are from a sound impacts the volume at which we hear the sound 	Forces & magnets <ul style="list-style-type: none"> What forces are in terms of pushes and pulls That gravity and friction are forces How objects move on different surfaces What a magnet is and what different magnets look like That a magnet has two poles How magnets react to each other Materials can be magnetic or non-magnetic How to investigate whether a material is magnetic How magnets are used in real-life scenarios to make some tasks much easier



Science knowledge progression

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		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
		How is it different, how is it the same?		How and why does that happen?		What did they leave behind?	What would happen if?
Milestone 2	Cycle B	Skeletons and Muscles <ul style="list-style-type: none"> What a human skeleton looks like What the function of the human skeleton is in terms of movement, support and protection How bones and muscles work together The different types of muscle found within our bodies How skeletons vary between different animals – endoskeletons, exoskeletons and hydrostatic skeletons What nutrition is and how it is obtained through eating different food groups How different animals get the nutrition they need 	States of Matter <ul style="list-style-type: none"> What the three states of matter are and the properties of each one The processes of melting and freezing and how these processes affect the properties and state of a substance Some of the conditions that can affect melting and freezing for example temperature What the processes of evaporation and condensation are What the water cycle is Where the processes of evaporation and condensation fit into the water cycle The importance of the water cycle for plants and animals 	Light & Shadow <ul style="list-style-type: none"> There are different sources of light and those sources can be natural or man-made Who Thomas Edison was and why he is considered significant Darkness is the absence of light and light allows us to see things Light is reflected from surfaces Some objects are opaque, some are transparent, and some are translucent Shadows are formed when light is blocked by an opaque object Position, shape and size of a shadow can be varied Light is dangerous and we can take steps to protecting our ourselves from the Sun The different uses of mirrors 		Plants need for survival <ul style="list-style-type: none"> What a plant needs to grow • the impact of fertilizer on a growing plant Plants have roots to absorb water and nutrients but also to anchor the plant in the ground Plants have a stem as it is needed to support the plant and transport water from the roots Plants have leaves because they play an important part in how a plant produces its own food That flowering plants produce flowers as an important part of their lifecycle The stages in the lifecycle of a flowering plant 	Electricity <ul style="list-style-type: none"> Electricity is a form of energy which powers many things we use everyday An electric current is a flowing charge of electricity There are renewable and non-renewable methods of producing electricity Some appliances use electricity and others do not It is important to be safe and sensible around electricity What a circuit is and which components are needed to construct a circuit The difference between a complete and incomplete circuit How the brightness of a bulb can change within a circuit The function of a simple switch within a circuit Which materials are conductors and insulators of electricity and how to investigate this property



Science knowledge progression

Science progression across milestone 3

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		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
		How is it different, how is it the same?		How and why does that happen?		What did they leave behind?	What would happen if?
Milestone 3	Cycle A	<p>Circulation & lifestyles</p> <ul style="list-style-type: none"> The circulatory system consists of the heart, the lungs and the systemic system The role the heart play in the circulatory system The names of the different parts of the human heart Human blood consists of plasma, white blood cells and platelets and red blood cells The role the lungs play in the circulatory system How heart rate differs before and after exercise How nutrients are moved around the body by the circulatory system after they are broken down by the digestive system How diet, exercise and lifestyle impact the heart and the body What drugs are (legal and illegal) and the impact of different drugs on the human body 	<p>Classification of species</p> <ul style="list-style-type: none"> Who Carl Linnaeus was and how his work influenced the classification of living things How to use the Linnaean System of classification The six kingdoms used in classification are: kingdom archaea, Kingdom Bacteria, Kingdom Protista, Kingdom Fungi, Kingdom Plantae and Kingdom Animalia How to classify vertebrates and invertebrates How to classify plants – beginning with vascular and non-vascular What microorganisms are and how they can be classified The positive and negative impacts of microorganisms How habitats are important for the conservation of species 	<p>Materials: properties of change</p> <p>Materials: Properties and Changes (Chemistry)</p> <ul style="list-style-type: none"> Materials can be grouped based on their properties including hardness, solubility, transparency and conductivity What we mean by 'dissolving' and whether certain substances dissolve in water to form a solution Whether the rate at which a substance dissolves can be altered by heat or stirring Mixtures can be sometimes be separated by sieving, filtering and/or evaporation The difference between a reversible and an irreversible change Examples of reversible and irreversible changes the impact of heating and cooling on a range of different materials What happens when something burns How new materials are usually formed after an irreversible change The chemists and scientists who have created new materials that we use in our everyday lives 	<p>Electricity</p> <ul style="list-style-type: none"> Electricity is a type of energy produced when electrons move around very quickly and create a current Electricity can be produced by generators which can be powered by renewable and non-renewable sources Electrical components in a circuit can be represented by symbols • the symbols for a bulb, cell, battery, buzzer, motor and switch (on and off) What happens to the components in a circuit if a component is added to the circuit or a component is changed The difference between a parallel and a series circuit We measure electricity in volts (V) 	<p>Growing old</p> <ul style="list-style-type: none"> Humans grow and change throughout the human lifecycle How to place the stages of the human lifecycle on a timeline The stages of development in babies and children An introduction to what puberty is How humans change from adulthood to old age The changes experienced in old age 	
		<p>Excite-Embrace-Encourage-Excel-Let Your Light Shine</p>					

St. John Baptist School



Pehmarshi

Science knowledge progression

Science progression across milestone 3

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		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
		How is it different, how is it the same?		How and why does that happen?		What did they leave behind?	What would happen if?
Milestone 3	Cycle B	<p>Light & perception</p> <ul style="list-style-type: none"> • That we see when light is reflected from an object into our eyes • Light travels (or appears to travel) in straight lines • The parts of the human eye and how the eye works • Reflection is when light bounces off a surface and changes the direction of the ray of light • The angle of incidence is always equal to the angle of reflection • How light behaves in water (refraction) • Clear white light is made of 7 colours • The colours we see are known as the visible spectrum • Light waves can be absorbed, transmitted or reflected to create colour, white or black • How shadows are formed and that they are the same shape as the object that cast them • What light pollution is and its impact on both humans and animals 	<p>Forces</p> <ul style="list-style-type: none"> • The names of a range of different forces – gravity, friction, water resistance, air resistance, upthrust and magnetism • Which forces are pushes and which are pulls • The difference between contact and non-contact forces • The difference between balanced and unbalanced forces who Isaac Newton was and the role he played in helping us to understand forces • What 'matter' is, the difference between mass and weight and how we measure both • How friction works in the world around us • How air resistance works in the world around us • Who Galileo Galilei was and the role he played in helping us to understand air resistance • How upthrust (or buoyancy) and water resistance act in water • What 'density' is and the relationship between density and whether an object is able to float • What levers, pulleys and gears are and what they can do to the strength and size of a force 	<p>Evolution & inheritance</p> <ul style="list-style-type: none"> • Why the information fossils give us is so important • who Mary Anning was and why her findings are significant living things have adapted or changed over time to be able to survive in their environments • Why animals need to adapt to their environments • Natural selection is when living things are better adapted to their environments and have a greater chance of survival • Evolution takes a very long time and animals do not simply chose to evolve • Who Charles Darwin and Alfred Wallace were and why they are considered significant • Why living things produce offspring of the same kind • Why offspring vary and are not identical to their parents 	<p>Life cycles</p> <ul style="list-style-type: none"> • The difference between sexual and asexual reproduction • The process of pollination and the role it plays in the lifecycle of a flowering plant • How plants reproduce both sexually and asexually • How different animals produce offspring • How lifecycles differ between animals • How and why gestation periods differ between animals • What a naturalist is and why both Jane Goodall and David Attenborough are considered significant 	<p>Earth & space</p> <ul style="list-style-type: none"> • What a sun is, what a solar system is, what a galaxy is and how our own solar system fits in to the wider universe • Which planets make up our own solar system knowledge of the inner and outer planets of the solar system including order, size, what the planet consists of, atmosphere, temperature, rotation and orbit • What the relationship is between the Earth and the sun in relation to night and day • What a time zone is and how the different time zones are arranged across the world • What the relationship is between the Earth and the sun in relation to seasons • How daylight hours change across the year in different places across the world • What a moon is and what the phases of our own moon are • The heliocentric and geocentric theories of the solar system • The flat and spherical Earth theories • The views of various astronomers over time: Aristotle, Ptolemy, Alhazen, Tusi, Copernicus and Galileo 	
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