



## Science Programme of Study

### Purpose of Study:

#### **Our curriculum will ensure:**

Children understand the importance of science and how it will continue to change lives and the world, and how they too can become change makers through their exposure to science careers. Our purpose is to ensure children are spiritually and emotionally engaged with science through their experiences set out in our curriculum year on year. Children at Ivanhoe will experience the scientific processes first-hand in order to remedy misconceptions and generate excitement about the world around them. 'Working scientifically' is explored through inspirational and engaging activities linking to the scientific content set out in order to develop a love of science where questioning and an exploratory attitude is at the heart of learning. At Ivanhoe, speaking and listening is highly valued within science lessons to encourage children to share and develop their ideas and understanding with others. Through this, children's thinking will become clear and a secure foundation of knowledge will be built.

#### **The National Curriculum states that:**

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

### Aims:

#### **Our school curriculum will ensure:**

- ✓ All children will experience and learn about science through first-hand experiences where possible although, the importance of secondary sources will be taught
- ✓ All children will experience, use and learn to appreciate our ever-developing outdoor area
- ✓ Children will learn the correct vocabulary relating to different areas of science and for the scientific processes
- ✓ Children will carry out several investigations which involve different types of enquiry approaches: observation over time; identifying and classifying; pattern seeking; research; comparative and fair testing
- ✓ All children will delve into various science subjects by examining what different scientists do for their careers and how scientists impact and are necessary for the future
- ✓ Children will apply their mathematical knowledge when looking at and using data, and to their understanding of science
- ✓ Children will use technology where possible in science when investigating and presenting

#### **The National Curriculum for science aims to ensure that all pupils:**

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



<b>Spiritual</b>	<b>Moral</b>
Science supports spiritual development by providing many opportunities for children to think and spend time reflecting on the amazing wonders which occur in our natural world.	Science supports moral development by showing children that different opinions need to be respected and valued. There are many moral and ethical issues that we cover in science including discussions about environmental and human issues.
<b>SMSC in Science at Ivanhoe Academy</b>	
<b>Social</b>	<b>Cultural</b>
Science supports social development by exposing children to the power of collaborative working in the science community. This has led to some amazing and life-changing breakthroughs in medicine and technology. When undertaking experiments and research, children work collaboratively.	Science supports cultural development by looking at how scientists from a range of cultures have had a significant impact globally. It also helps children to understand how important science is to the economy and culture of the UK.

**Terminology**

Biology	Biology is the branch of science that studies life and living organisms. This includes such subjects as the cell, genes, inheritance, microorganisms, plants, animals, and the human body.
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. Sometimes chemistry is called the "central science" because it is an important part of other major sciences such as biology, Earth science, and 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.
Conceptual understanding	Conceptual science is the understanding of the basic ideas that underlie scientific thought.
classify	To group
variety	More than one
common	Found in large numbers, able to be found in our local area/country
mammals	Any of various warm-blooded vertebrate animals whose young feed on milk that is produced by the mother's mammary glands.
amphibians	Any of a group of cold-blooded vertebrate animals (as frogs and toads) that have gills and live in water as larvae but breathe air as adults.
explore	Search and discover; to think or talk about something in order to find out more about it
Micro-habitat	A small-scale, specific habitat which supports the survival of certain animals or plants. For instance, a rockpool or a rotting log.
investigate	to try to find out the facts in order to learn how it happened; scientific investigation is the way in which scientists and researchers use a systematic approach to answer questions about the world around us
experience	Experience is the first-person effects or influence of an event or subject gained through involvement in or exposure to it. Practical contact with and observation of facts or events.
relevant	Closely connected or appropriate to what is being done or considered.
systematic	Done or acting according to a fixed plan or system; methodical.
Data loggers	A data logger or data recorder is an electronic device that records data over time or in relation to location either with a built in instrument or sensor or via external instruments and sensors. From a variety of microscopes to sound and thermometer data loggers. Data logging integrates



	computing and technology into science. Using this equipment helps to bring science alive and develops children's confidence with using technology.
Comparative language	Words used to compare
Comparative and fair testing	Fair test investigation require children to observe and measure the effect changing one variable has on another whilst keeping all other variables the same. In a comparative test children will have less control over the variables.
Enquiries	Using evidence from observations and investigations to create logical explanations and answer questions.
Variables	Independent variable: what you change; dependent variable: what you observe/your effect; controlled variable: what you keep the same
hypotheses	In science, a hypothesis is part of the scientific method. It is a prediction or explanation that is tested by an experiment. Observations and experiments may disprove a scientific hypothesis, but can never entirely prove one.
Simple series circuit	A circuit with the components arranged in a straight line, so all of the current flows through each component in turn." If you made a basic loop circuit with a battery connected to two resistors, and then have a connection running back to the battery, the two resistors would be in series.
Magnetism	Magnetism is a force experienced by certain metals. There are two poles of magnetism - north and south.
Celestial	Positioned in or relating to the sky, or outer space as observed in astronomy.
Quantitative measures	Continuous and discrete
Geologist	A geologist is a scientist that studies the surface of the Earth and what it is made of. This branch of science is called geology, which means the study of rocks.
Secondary sources	Books, photographs and videos

Key:  = trips and/or experiences

**Bold** = terminology for teachers

WS = working scientifically

= science careers

**Bold** = internal year group or external year group link

### Science - EYFS

#### In EYFS pupils should:

**experience** and observe phenomena, looking at the natural and humanly-constructed world around them with adult guidance. They should be encouraged to be curious and ask questions. The majority of the learning about science in EYFS should be done through the use of first-hand practical experiences. It is important that children **experience** the world around them.

#### ♥ Spiritual and Emotional engagement in EYFS

All children in EYFS will experience chicks hatching from eggs, planting and nurturing a beanstalk and exploring day and night. These experiences will immerse children into the world of science and ignite their passion for the subject from a young age. They will start their science career learning journey through a visit to a farm and meeting a farmer. Day and night will be further explored through a planetarium visit.



## Science - KS1

### In KS1 pupils should:

**experience** and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things (more independently in Y2), carrying out simple comparative tests, and finding things out using secondary sources of information. They should be exposed to simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. The majority of the learning about science in KS1 should be done through the use of first-hand practical experiences. There should also be some use of appropriate secondary sources but it is important that children **experience** the world around them.

### Year 1

### Year 2

#### Working scientifically

- to be taught through and clearly related to the science content set out

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| <ul style="list-style-type: none"> <li>• <i>Asking and answering questions:</i> Use everyday language/begin to use simple scientific words to ask or answer a scientific <b>question</b>.</li> <li>• <i>Investigating:</i> Follow instructions to complete a simple test in a group.</li> <li>• <i>Observing:</i> <b>Observe</b> objects, materials and living things and describe what they see.</li> <li>• <i>Equipment and measuring:</i> Use simple, non-standard measurements in a practical task with support</li> <li>• <i>Identifying and classifying:</i> <b>Sort</b> and <b>group</b> objects, materials and living things, with help, according to simple observational features.</li> <li>• <i>Recording and reporting findings:</i> Talk about their findings as a group and explain what they have found out.</li> <li>• <i>Analysing data:</i> Use every day language to ask and/or answer a <b>question</b> on given <b>data</b>.</li> <li>• <i>Drawing conclusions:</i> Explain, with help, what they think they have found out.</li> </ul> | <ul style="list-style-type: none"> <li>• <i>Asking and answering questions:</i> Suggest ideas, ask simple <b>questions</b> and know that they can be answered/investigated in different ways</li> <li>• <i>Investigating:</i> performing a simple test and begin to recognise when something is unfair.</li> <li>• <i>Observing:</i> <b>Observe</b> something closely and describe changes over time</li> <li>• <i>Equipment and measuring:</i> Use simple <b>equipment</b>, such as hand lenses or egg timers to take measurements, make observations and carry out simple <b>tests</b>.</li> <li>• <i>Identifying and classifying:</i> Decide, with help, how to group materials, living things and objects, noticing changes over time and beginning to see patterns.</li> <li>• <i>Recording and reporting findings:</i> Gather <b>data</b>, <b>record</b> (with support) and talk about their findings using simple scientific vocabulary.</li> <li>• <i>Analysing data:</i> <b>Identify</b> simple patterns and/or relationships using simple <b>comparative language</b>.</li> <li>• <i>Drawing conclusions:</i> Use simple scientific language to explain what they have found out.</li> </ul> |
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#### Vocabulary for Children in KS1

Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

question, answer, look at, sort, diagram, chart, map, data, same and different, describe, group

question, answer, observe, identify, classify, diagram, chart, map, data, compare and contrast, describe, equipment, tests



Living things, including plants	Living things and their habitats, including plants
<ul style="list-style-type: none"> <li>✓ identify and name: <b>common wild plants</b> <b>common garden plants</b> deciduous and evergreen trees</li> <li>✓ identify and name the basic structure of a flower and a tree</li> <li>✓ identify that most living things live in habitats</li> <li>✓ observe how seeds grow into mature plants and observe the conditions they are growing in (water and sunlight)</li> </ul> <p>WS:</p> <ul style="list-style-type: none"> <li>▪ observing closely using a magnifying glass</li> <li>▪ Comparing/contrasting familiar plants</li> <li>▪ Begin to draw diagrams of a plant</li> <li>▪ Changes over time - describing what they see when observing the growth of their sunflower</li> </ul> <p>Plant a sunflower seed - April time</p> <p>Science career - Natural scientist and conservationist Beatrix Potter</p>	<ul style="list-style-type: none"> <li>✓ identify and describe the basic structure of a <b>variety</b> of <b>common</b> flowering plants and trees</li> <li>✓ <b>explore</b> and compare the differences between things that are living, dead and things that have never been alive WS: sorting and classifying, recording using a chart</li> <li>✓ 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. How do conditions affect the number and types of plants?</li> <li>✓ identify and name a <b>variety</b> of plants and animals in their habitats, including <b>micro-habitats</b>, and the animals that live there (under a log, on a stony path, under bushes)</li> <li>✓ describe how animals obtain their food from plants and other animals, using the idea of a simple <b>food chain</b> (grass, cow, human), and identify and name different <b>sources of food</b></li> <li>✓ observe and describe how bulbs grow into mature plants and how they are different to seeds (introduce requirements for germination as well as processes of reproduction in plants)</li> <li>✓ <b>investigate</b> how plants need water, light and a suitable temperature to grow and stay healthy WS: setting up a comparative test for the conditions WS: observing closely, their bulb growing over time</li> </ul> <p>Plant a bulb - spring onion/onion - plant early spring and link to seasons</p>
Vocabulary	
habitats, wild plants, garden plants, deciduous, evergreen plant, grow, leaf, root, leaves, bud, flowers, blossom, petals, root, stem tree, deciduous, evergreen, trunk, branches, leaf, root fruit, vegetables, seed, water, sunlight	wild plants, garden plants, deciduous, evergreen plant, leaf, root, leaves, bud, flowers, blossom, petals, root, stem tree, deciduous, evergreen, trunk, branches, leaf, root, reproduction, germination, suitable, temperature, fruit, vegetables, bulb, seed, grow, healthy, living, alive, dead, habitats, food chain, sources of food
Animals, including humans	
<ul style="list-style-type: none"> <li>✓ identify and name a <b>variety</b> of <b>common</b> animals and think about animals we see in the day and at night - fish, amphibians, reptiles, birds and mammals (learn how to take care of them)</li> </ul>	<ul style="list-style-type: none"> <li>✓ notice that animals, including humans, have offspring which grow into adults e.g. egg/chick/chicken, egg/caterpillar/pupa/butterfly, lamb/sheep, baby/toddler/child/teenager/adult (introduction to the</li> </ul>



<ul style="list-style-type: none"> <li>✓ describe and compare the structure of a <b>variety</b> of <b>common</b> animals (fish, <b>amphibians</b>, reptiles, birds and <b>mammals</b>, including <b>pets</b>)</li> <li>✓ identify and name a <b>variety</b> of <b>common</b> animals that are <b>carnivores</b>, <b>herbivores</b> and <b>omnivores</b></li> <li>✓ identify, name, draw and label basic parts of the <b>human body</b> and say which part of the body is associated with each <b>sense</b> (head, neck, legs, knees, face, ears, eyes, hair, mouth, teeth)</li> <li>✓ understand the importance of <b>exercise</b></li> </ul> <p>WS:</p> <ul style="list-style-type: none"> <li>▪ <i>compare and contrast animals</i></li> <li>▪ <i>sort and group animals e.g. according to what they eat</i></li> <li>▪ <i>use senses to compare textures, sounds and smells</i></li> </ul> <p><b>Class pet - fish</b> <b>Science career - veterinary scientist</b></p>	<p>processes of reproduction but focus on growth not understanding how reproduction occurs)</p> <ul style="list-style-type: none"> <li>✓ find out about and describe the basic needs of animals, including humans, for <b>survival</b> (water, food and air)</li> <li>✓ describe and understand the importance for humans of <b>exercise</b>, eating the right amounts of different types of food and <b>hygiene</b></li> </ul> <p>WS:</p> <ul style="list-style-type: none"> <li>▪ <i>observing and measuring how animals grow</i></li> <li>▪ <i>ask questions about the things animals need for survival and humans need to stay healthy</i></li> <li>▪ <i>suggest ways to find answers</i></li> </ul> <p><b>Visit from a baby/toddler if possible as well as a lamb - link to seasons</b></p>
Vocabulary	
<p>human, body, head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth, exercise</p> <p>animals, fish, amphibians, reptiles, birds, mammals, pets, exercise</p> <p>senses, tongue - taste, nose - smell, eyes - vision, skin - touch, ears - hearing</p>	<p>offspring, grow, adults, survival, exercise, hygiene, nutrition, reproduce, baby, toddler, child, teenager, adult, herbivores, omnivores, carnivores</p>
Everyday materials	Uses of everyday materials
<ul style="list-style-type: none"> <li>✓ distinguish between an <b>object</b> and the <b>material</b> from which it is made</li> <li>✓ identify and name a <b>variety</b> of everyday materials, including <b>wood</b>, <b>plastic</b>, <b>glass</b>, <b>metal</b>, <b>water</b> and <b>rock</b></li> <li>✓ describe the simple <b>physical properties</b> of a variety of everyday materials (e.g. <b>rough</b>, <b>smooth</b>, <b>bendy</b>)</li> <li>✓ compare a <b>variety</b> of everyday materials on the basis of their simple physical properties and group together collaboratively</li> </ul> <p>WS:</p> <ul style="list-style-type: none"> <li>▪ <i>performing simple tests to explore questions e.g. the best material for an umbrella, dog basket, curtains - using simple non-standard measurements with support</i></li> </ul>	<ul style="list-style-type: none"> <li>✓ identify, compare and <b>investigate</b> the <b>suitability</b> of a <b>variety</b> of everyday materials, including <b>wood</b>, <b>metal</b>, <b>plastic</b>, <b>glass</b>, <b>brick</b>, <b>rock</b>, <b>paper</b> and <b>cardboard</b> for different <b>uses</b> (different materials can be used for the same thing e.g. spoons and materials can be used for different things e.g. metal used for coins, cans, table legs)</li> <li>✓ <b>investigate</b> how the shapes of solid objects made from some <b>materials</b> can be change by squashing, bending, twisting and stretching</li> </ul> <p>WS:</p> <ul style="list-style-type: none"> <li>▪ <i>identifying and classifying the uses of materials and recording</i></li> </ul> <p><b>Look at the works of famous scientists: John Dunlop (Rubber), Charles Macintosh (waterproof fabric) and John McAdam (Macadamisation - roads)</b></p>
Vocabulary	
<p>object, materials, wood, plastic, glass, metal, water, rock, brick, paper, fabrics, elastic, foil</p> <p>properties, hard/soft, stretchy/stiff, shiny/dull, rough/smooth, bendy/not bendy, waterproof/not waterproof, absorbent/not absorbent</p>	<p>suitability, uses, wood, metal, plastic, glass, brick, rock, paper, cardboard</p> <p>squashing, bending, twisting, stretching</p> <p>wood: matches, floors, telegraph poles</p> <p>metal: alloy, coins, cans, cars, table legs</p>



spoons: plastic, metal and wooden	
<b>Seasonal changes</b>	
<p><b>Weather:</b></p> <ul style="list-style-type: none"> <li>✓ Name a range of different types of <b>weather</b> from pictures or sounds</li> <li>✓ observe and describe the weather as a class</li> <li>✓ Explain how and why the weather influences our choice of clothing and affects what we can do.</li> </ul> <p><b>Seasons:</b></p> <ul style="list-style-type: none"> <li>✓ observe changes across the <b>seasons</b> as a class and broadly assign different weather types to seasons WS: observing leaves falling off the trees etc.</li> <li>✓ Discuss how <b>day length</b> changes over a year through experience</li> </ul> <p><b>WS:</b></p> <ul style="list-style-type: none"> <li>▪ <i>creating table and charts as a class showing the weather and the changing seasons</i></li> </ul>	<p><b>Weather:</b></p> <ul style="list-style-type: none"> <li>✓ Identify less familiar <b>weather conditions</b> that are more common in other parts of the world.</li> <li>✓ Describe some positive and negative effects of the weather for ourselves and our <b>environment</b>.</li> <li>✓ Observe and record the daily weather on a chart or in a table and identify patterns and similarities and differences over a period of time.</li> </ul> <p><b>Seasons:</b></p> <ul style="list-style-type: none"> <li>✓ Explain how animals or plants are affected by the <b>seasons</b>, using a specific animal (lambs/fawns/hedgehogs/chicks) or plant (deciduous tree/daffodils) as an example. WS: <i>observing over time</i></li> </ul> <p><b>Day length:</b></p> <ul style="list-style-type: none"> <li>✓ Describe how day length changes over a year, from experience and know how it affects their lives.</li> </ul>
<b>Vocabulary</b>	
seasons, spring, summer, autumn, winter, day, daytime, length weather, wind, rain, snow, hail, sleet, fog, sun, hot, warm, cold	seasons, spring, summer, autumn, winter, day, daytime weather, conditions, wind, rain, snow, hail, sleet, fog, sun, hot, warm, cold, environment
<b>Space</b>	
<ul style="list-style-type: none"> <li>✓ To explore <b>day</b> and <b>night</b> in simple terms (the sun is our light which helps us to see) and building upon EYFS learning thinking about animals we see in the daytime and at night - linking to 'animals, including humans'</li> <li>✓ To name the 8 planets</li> </ul>	<ul style="list-style-type: none"> <li>✓ To identify and name the 8 <b>planets</b> and explore some of their differing features (Venus being the hottest, Jupiter, Saturn, Uranus and Neptune being the gas planets etc.)</li> <li>✓ To know that the sun is not a planet and recognise that light from the sun can be dangerous and there are ways to protect their eyes - not to look directly at even with sunglasses</li> </ul> <p><b>Planetarium - astronomers</b> Learn about the famous <b>astronaut Yuri Gagarin</b> and how he was the first astronaut to visit space- link to <b>Animals including humans e.g. how we have a lack of certain things in space in which we need to survive</b></p>
<b>Vocabulary</b>	
day, night, dark, light, nocturnal animals	planets, moons, astronomers, astronauts, space, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune
♥ <u>Spiritual and Emotional engagement in KS1</u>	



All children in Y1 will explore our local area with visits to places such as the Mill Piece to appreciate the natural beauty in our area but to also explore the nature in and around this area to build on that growing and surrounding our school grounds. Y1 children will plant a garden flower from a seed in order to gain first-hand experience - they will then nurture and care for the plant to understand what our environment needs to thrive. Y1 children will visit the zoo which will support their learning about different animals and how to care for them. They will also visit a city which will support moral thinking but will also open discussions about animals and different materials. Y1 children will nurture and care for their first class pet which will be a fish. Through this, they will learn to care for animals as well as experiencing the structure of a fish first-hand. Physical education happens daily at Ivanhoe and is engaging to support children in building a healthy lifestyle for life from a young age!

All children will have the opportunity in Y2 to explore the local area which will include visits to areas such as Ravenfield Ponds to learn about the nature in our area but also to appreciate and enjoy the beauty on our doorstep. Similarly, outdoor spaces will be used to grow plants from a bulb. This hands on approach will engage and excite the children when learning within the school grounds but it will also create links to sustainable living and healthy eating when planting onions. All children in Y2 will visit the seaside and explore the end of the river through geography, whilst exploring and enjoying the natural beauty of the seaside, children will be able to explore the plants and animals in those areas and how they are the same or different to those found in Conisbrough. In Y2, children will visit a forest through their geography learning which will enable children to explore wild plants and trees and appreciate their beauty. To create excitement around science wonders, ongoing investigations will be set up such as a weather investigation using pine cones. During springtime, a visit from a lamb will support and engage children in their learning about offspring and seasons. Physical exercise is at the heart of a healthy lifestyle and children participate and enjoy physical activities every day at Ivanhoe and through science, will learn the importance of this for them. Although the main body of learning about space will come for children in Y5, it is important that children at Ivanhoe start to explore space in KS1 to ignite the excitement around this phenomena through a planetarium visit to enable them to experience what lies beyond!



### Science - Lower KS2

#### In lower KS2 pupils should:

The principal focus of science teaching in lower key stage 2 is to enable pupils to broaden their scientific view of the world around them. They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions. They should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out.

#### Year 3

#### Year 4

#### Working scientifically

- to be taught through and clearly related to the science content set out

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| <ul style="list-style-type: none"> <li>• <i>Questions:</i> Use ideas to pose questions independently, about the world around them</li> <li>• <i>Investigating:</i> Setting up simple practical <b>enquiries</b> and describe a fair test</li> <li>• <i>Observing:</i> Make decisions about what to observe during an investigation</li> <li>• <i>Equipment and measuring:</i> Take accurate measurements with support using standard units</li> <li>• <i>Identifying and classifying:</i> Talk about criteria for grouping, sorting and categorising, beginning to see patterns and relationships.</li> <li>• <i>Recording and reporting findings:</i> Record their findings using scientific language and present in note form, diagrams, tables and pictograms.</li> <li>• <i>Analysing data:</i> Gather, record and use data in a variety of ways to answer a simple question.</li> <li>• <i>Drawing conclusions:</i> Draw, with help, a simple conclusion based on evidence from an enquiry or observation.</li> </ul> | <ul style="list-style-type: none"> <li>• <i>Questions:</i> Asking <b>relevant</b> questions and know that they could be answered in a variety of ways and answer questions using straight forward scientific evidence</li> <li>• <i>Investigating:</i> Make decisions about different <b>enquiries</b>, including recognising when a fair test is necessary and begin to identify <b>variables</b></li> <li>• <i>Observing:</i> Make <b>systematic</b> and careful observations</li> <li>• <i>Equipment and measuring:</i> Take accurate measurements using standard units and a range of equipment including thermometers and <b>data loggers</b></li> <li>• <i>Identifying and classifying:</i> Identify similarities/differences/changes when talking about scientific processes. Use and begin to create simple keys.</li> <li>• <i>Recording and reporting findings:</i> Use scientific language and present using diagrams, tables and bar charts. Choose appropriate ways to record and present information, findings and conclusions for different audiences (e.g. displays, oral or written explanations).</li> <li>• <i>Analysing data:</i> Identify, with help, changes, patterns, similarities and differences in data to help form conclusions. Use scientific evidence to support their findings.</li> <li>• <i>Drawing conclusions:</i> Use recorded data to make predictions, pose new questions and suggest improvements for further enquiries</li> </ul> |
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#### Vocabulary for children in lower KS2

Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.



**research**, questions, scientific enquiry, comparative and fair test, observation, accurate measurements  
**equipment**, thermometer  
**data**, gather, record, present  
**record**, drawings, labelled diagrams, keys, bar charts, tables, conclusion, predictions, evidence, secondary sources

**research**, relevant questions, scientific enquiry, comparative and fair test, systematic, careful observation, accurate measurements  
**equipment**, thermometer, data logger  
**data**, gather, record, classify, present  
**record**, drawings, labelled diagrams, keys, bar charts, tables, oral and written explanations, conclusion, predictions, differences, similarities, changes, evidence, improve, secondary sources, guides, keys, construct, interpret.

### Living things and their habitats, including plants

- ✓ Identify and describe the functions of different parts of flowering plants; roots, stem/trunks (nutrition and support), leaves (nutrition) and flowers (reproduction) - every part has a job to do (introduce the idea that plants can make their own food but not how it happens)
- ✓ Investigate the way in which water is transported within plants  
*WS: observe and investigate e.g. cut, white carnations*
- ✓ 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
- ✓ Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal - **link back to Y1 when planting seeds.**

WS:

- *comparing the effect of different factors on growth e.g. the amount of light, amount of fertiliser,*
- *how seeds are formed by observing different stages of plant life cycles*
- *looking for patterns in the structure of fruits that relate to how seeds are dispersed*
- *grouping plants into flowering and non-flowering*

Grow a fruit plant using the seeds from a fruit to start e.g. strawberries

Botanist (impacts of human activity): Albert Howard (organic agriculture)

- ✓ Understand that plants are producers at the bottom of the food chain (teach through 'Animals, including humans')
- ✓ Living things are grouped in a variety of ways
- ✓ Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment  
**\*More detail in Y6**
- ✓ Recognise that environments can change and this can sometimes pose dangers to living things  
Explore the human impacts on the environment (positive = nature reserves/ garden ponds negative = population, development and litter)

WS:

- *group vertebrate animals such as fish, amphibians, reptiles, birds and mammals and invertebrates into snails and slugs, worms, spiders and insects*
- *using and making simple guides or keys to explore and identify local plants and animals (make a guide to local living things)*
- *raise and answer questions based on observations of animals and what they have found out about other animals they have researched*

### Vocabulary

**common** wild plants, garden plants, deciduous, evergreen  
**tree** deciduous, evergreen, trunk, branches, leaf, root  
**plant** leaf, root, leaves, bud, flowers, blossom, petals, root, stem, fruit, vegetables, bulb, seed

producers, classification, population, impact, environment, nature reserve, development, litter, vertebrates, invertebrates



Environment, flowering (including grasses), non-flowering (including mosses and ferns) human impact <i>positive</i> - nature reserves, ecologically planned parks, garden ponds <i>negative</i> - population, development, litter, deforestation	
<b>Animals, including humans</b>	
<ul style="list-style-type: none"> <li>✓ Identify that animals, including humans, need the right types and amount of nutrition and that they cannot make their own food like plants; they get nutrition from what they eat (link and compare with plants) - children to design healthy meals thinking about the food groups</li> <li>✓ Explore some simple food chains</li> <li>✓ Identify that humans and some other animals have skeletons and muscles for support, protection and movement (the main body parts associated with the skeleton and muscles, and how different parts of the body have special functions)</li> </ul> <p>WS:</p> <ul style="list-style-type: none"> <li>▪ identify and group animals with/without skeletons and observing and comparing their movement - what would happen if we didn't have skeletons?</li> <li>▪ compare/contrast diets of different animals, including their pets, and ways of grouping them based on this</li> </ul>	<ul style="list-style-type: none"> <li>✓ Describe the simple functions of the basic parts of the digestive system in humans and the main body parts associated with it (mouth, tongue, teeth, oesophagus, stomach, small and large intestine) <ul style="list-style-type: none"> <li>- Draw and discuss the digestive system</li> </ul> </li> <li>▪ Identify the different types of teeth in humans and their simple functions (find out what damages teeth and how to look after them)</li> <li>✓ Construct and interpret a variety of food chains (land and aquatic), identifying producers, predators and prey <b>**see plant link</b></li> </ul> <p>WS:</p> <ul style="list-style-type: none"> <li>▪ Generate and ask questions to help with their understanding of the digestive system</li> <li>▪ Compare teeth of carnivores and herbivores</li> </ul> <p><b>Frogspawn - watch the lifecycle and understand they can be predators as well as prey <b>**Lifecycles Y5</b></b></p>
<b>Vocabulary</b>	
<p><b>nutrition</b> nutrients, carbohydrates, protein, fats, fibre, water, vitamins, minerals, diet</p> <p><b>skeleton</b> bones, joints, endoskeleton, exoskeleton, vertebrate, invertebrate, contract, relax, muscles, joints</p>	<p>Digestive system, mouth, oesophagus, pancreas, liver, large intestine, small intestine, stomach, anus,</p> <p>incisor, canine, premolar, molar</p> <p>producers, prey, predators</p>
<b>Rocks</b>	<b>States of matter</b>
<ul style="list-style-type: none"> <li>✓ Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. Discuss how rocks are solids (<b>more detail in Y5</b>).</li> <li>✓ Learn that there are three types of rocks; igneous, metamorphic and sedimentary and discuss as a group how they are formed</li> <li>✓ Describe in simple terms how fossils are formed when things that have lived are trapped in a rock (<b>important basis for evolution in Y6</b>)</li> <li>✓ Recognise that soils are made from rocks and organic matter (explore erosion)</li> </ul> <p>WS:</p> <ul style="list-style-type: none"> <li>▪ explore different soils looking at the differences and similarities</li> </ul>	<ul style="list-style-type: none"> <li>✓ Compare and group materials together, according to whether they are solids, liquids or gases (solids hold shape, liquids form pools and gas escapes a container)</li> <li>✓ 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)</li> <li>✓ Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</li> </ul> <p>WS:</p> <ul style="list-style-type: none"> <li>▪ observe and record evaporation over time (a puddle or washing on a line)</li> <li>▪ investigate the effect of temperature on snow melting etc.</li> </ul>



- investigate what happens when rocks are rubbed together
- raise and answer questions about the way rocks are formed
- observing rocks, including those used in buildings and gravestones, and why they have changed over time
- use hand lenses and microscopes to identify and classify rocks (grains or crystals, fossils)

**Science careers - geologist visit (TRC)**

- observe water as a solid, liquid and gas
  - grouping and classifying different materials - explore temperature on substances such as chocolate, butter and cream
  - research the temperature at which materials change state, including when iron melts or oxygen to liquid
- (avoid materials where change is associated with chemical change e.g. burning or baking)

## Vocabulary

Appearance, physical, properties, hard/soft, shiny/dull, rough/smooth  
absorbent/not absorbent, fossils, sedimentary, rock, soils, organic matter, buildings,  
gravestones, grains, crystals, erosion, melting

Solids, liquids, gases, states, temperature, evaporation, condensation

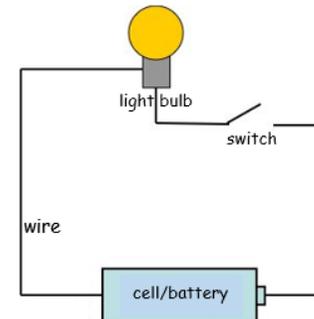
## Light, space and electricity

- ✓ Recognise that they need light in order to see things and that dark is the absence of light
- ✓ Identify light sources including the sun and the stars (natural light sources). Build a simple circuit (with instructions in groups) to explore how some light sources are man-made.
- ✓ Recognise that light from the sun can be dangerous and that there are ways to protect their eyes - not to look directly at even with sunglasses
- ✓ Notice that light is reflected from surfaces and know that the moon is a reflector and not a light source
- ✓ 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

**\*\*See continuation in Y6**

**Science career - astronaut** Learn about Neil Armstrong, the first man on the moon, and discuss the light and shadows on the moon

- ✓ Working safely with electricity
- ✓ Identify common appliances that run on electricity
- ✓ Construct and draw (not using symbols at this point) 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 know that metals tend to be good conductors - explore how some materials cannot be used to connect across a gap in a circuit

(use terms such as current and voltage but these shouldn't be introduced or defined formally)

WS:



	<ul style="list-style-type: none"> <li>Observe patterns e.g. bulbs get brighter if more cells are added, metals tend to be conductors of electricity and some materials can/can't be used to connect across a gap in a circuit</li> </ul> <p><b>**See continuation in Y6 Science career - electrician visit</b></p>
Vocabulary	
<p>Light, see, dark, reflect, surface, natural, artificial star, Sun, Moon, shadow, blocked, solid, torch, candle, lamp, sunlight, dangerous, protect eyes</p>	<p>danger, electrical safety appliances, electricity, electrical circuit, cell, wire, bulb, buzzer, sign, switch open, closed insulators wood, rubber plastic, glass conductors metal, water</p>
Sound	Forces and magnets
<ul style="list-style-type: none"> <li>Identify how sounds are made, associating some of them with something vibrating (use different musical instruments from around the world)</li> <li>Recognise that vibrations from sounds travel through a medium to the ear</li> <li>Find patterns between the pitch of a sound and features of the object that produced it</li> <li>Find patterns between volume of sound and the strength of the vibrations that produced it <i>(pitch and volume taught and explored in KS1 through Music)</i></li> <li>Recognise that sound gets fainter as the distance from the sound source increases</li> </ul> <p>WS:</p> <ul style="list-style-type: none"> <li>find patterns in sounds made by different objects such as saucepan lids of different sizes or elastic bands with different thicknesses</li> <li>make and play their own instruments through investigations into how sounds are made</li> </ul>	<ul style="list-style-type: none"> <li>Compare how things move on different surfaces - rough/smooth surfaces affect speed for example</li> <li>Notice that some forces need contact between two objects (explore push and pull forces), but magnetic forces can act at a distance including gravity on Earth (no in-depth detail to be taught about gravity)</li> <li>Observe how magnets attract and repel each other and attract some materials not others - link to push and pull forces</li> <li>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. <b>Magnetism</b> is a force that can be felt by metals such as iron, steel, nickel and cobalt (ferrous metals).             <ul style="list-style-type: none"> <li>look at everyday uses for magnets including bar, ring, button and horseshoe</li> </ul> </li> <li>Describe magnets as having two poles - link to Earth's North and South pole and how compasses find the North (explored further in geography)</li> <li>Predict whether two magnets will attract or repel each other, depending on which poles are facing. Like poles push each other away but opposite poles pull each other together.</li> </ul> <p>WS:</p> <ul style="list-style-type: none"> <li>Compare how different things move - group them, raise questions and carry out tests to find how far things move on different surfaces</li> <li>Explore the strengths of magnets and find a fair way to compare</li> </ul>
Vocabulary	
<p>Sound, vibrate, vibration, vibrating, air, medium, ear, hear, sound, volume, pitch faint, fainter, loud, louder, string, percussion, woodwind, brass, insulate</p>	<p>force, push, pull, open, surface, magnet, magnetic, attract, repel, magnetic poles, North, South</p>



### ♥ Spiritual and Emotional engagement in Lower KS2

All children in Y3 will continue to appreciate the natural world around them by visit Castleton and its glorious landscape and caves. They will build upon sustainable and healthy living through planting and growing a fruit plant as well as building upon their knowledge of plants and the environment. They will continue to learn about healthy living but delving more deeply into nutrition through hands-on tasting activities.

In KS1 pitch and volume is explored through music and the science behind this will be built upon through engaging activities such as building instruments out of everyday materials.

A geologist visit will continue to support children's understanding and excitement around the differing science careers and how this links to their studies and the world around them.

All children in Y4 will start their understanding of life cycles through nurturing and caring for tadpoles, through this they will learn about the food chain and how to care for animals and our environment correctly.

Moral thinking will be support through the discussions humans have on living things and their habitats.

Children in Y4 will learn the importance of science for jobs such as electricians whom they may come across more often in their daily lives.



## Science - Upper KS2

### In Upper KS2 pupils should:

The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.

### Year 5

### Year 6

#### Working scientifically

*-to be taught through and clearly related to the science content set out*

- *Asking and answering questions:* Raise different types of scientific questions, and hypotheses
- *Investigating:* Plan a range of science enquiries, including comparative and fair tests
- *Observing:* Plan and carry out comparative and fair tests, making systematic and careful observations.
- *Equipment and measuring:* Take measurements using a range of scientific equipment with increasing accuracy and precision.
- *Identifying and classifying:* Use and develop keys to identify, classify and describe living things and materials.
- *Recording and reporting findings:* Record data and results of increasing complexity using scientific diagrams, labels, classification keys, tables, bar and line graphs and models.
- *Analysing data:* Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas.
- *Drawing conclusions:* Use a simple mode of communication to justify their conclusions on a hypothesis.

- *Asking and answering questions:* Pose/select the most appropriate line of enquiry to investigate scientific questions.
- *Investigating:* Select and plan the most suitable line of enquiry, explaining which variables need to be controlled and why, in a variety of comparative and fair tests.
- *Observing:* Make their own decisions about which observations to make, using test results and observations to make predictions or set up further comparative or fair tests.
- *Equipment and measuring:* Choose the most appropriate equipment in order to take measurements, explaining how to use it accurately.
- Decide how long to take measurements for, checking results with additional readings.
- *Identifying and classifying:* Identify and explain patterns seen in the natural environment.
- *Recording and reporting findings:* Choose the most effective approach to record and report results, linking to mathematical knowledge.
- *Analysing data:* Identify and explain causal relationships in data and identify evidence that supports or refutes their findings, selecting fact from opinion.
- *Drawing conclusions:* Identify validity of conclusion and how to improve methodology.



## Pupils should read, spell and pronounce scientific vocabulary correctly.

variables, measurements, accuracy, precision  
 record data, scientific diagrams, labels, classification keys, tables, bar graph and line graphs, predictions, conclusions, explanations, degree of trust  
 evidence, support, identify, classify and describe, patterns, systematic

variables, measurements, accuracy, precision, repeat readings  
 record data, scientific diagrams, labels, classification keys, tables, scatter graphs, bar graph and line graphs, predictions, further comparative and fair test, conclusions, causal relationships, explanations, degree of trust, evidence, support, refute, identify, classify and describe, patterns, systematic, **quantitative measurements**

## Living things and their habitats

- ✓ Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird - look at the negative effects to habitats through PSHE and geography such as deforestation
- ✓ Describe the life processes of reproduction in some plants and animals (sexual/asexual in plants and sexual reproduction in animals) - grow plants from different parts of the parent plant

WS:

- *Observe life cycle changes in living things*
- *Observe and compare life cycles of plants and animals in local environments and around the world*
- *Ask questions and suggest reasons for similarities and differences*

Butterflies - observe life cycle and compare with frogs in Y4  
 animal naturalist- David Attenborough  
 animal behaviourist- Jane Goodall

- ✓ 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  
**\*build on Y4**
- ✓ Give reasons for classifying plants and animals based on specific characteristics - subdivide broad groupings

WS:

- *Use classification systems and keys to identify some animals and plants within the immediate environment*
- *Research unfamiliar animals and plants and decide where they belong on the classification system*

Botanist, zoologist and physician: Carl Linnaean (pioneer for classification)

## Vocabulary

life cycles mammal, amphibian, insect, bird  
 life process of reproduction plants, animals, vegetable garden, flower border  
 Reproduction plants: sexual, asexual, animals: sexual  
 lifecycles around the world rainforest, oceans, desert, prehistoric, similarities, differences

classify, compare, Linnaean, domain, Kingdom, phylum class, order family genus, species characteristics, vertebrates, invertebrates, microorganisms, organism, flowering, non-flowering

## Animals, including humans

- ✓ Describe the changes as humans develop to an old age

PSHE link - external providers and teaching around puberty and body changes

- ✓ Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood  
**\*build on Y3/4 learning about main body parts and skeletal/muscular/digestive system**
- ✓ 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



	<p>WS:</p> <ul style="list-style-type: none"> <li>Look at the relationship between diet, exercise, drugs, lifestyle and health</li> </ul> <p>PSHE link - external providers and LA visits such as local police and nurses Crucial Crew visit (link to science careers - chemist/chemistry - importance of drugs in having a positive affect)</p>
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**Vocabulary**

puberty, life cycle, gestation, growth, reproduce, foetus, baby fertilisation, toddler, child, teenager, adolescence, adult, old age, life expectancy, childhood, early adulthood, adulthood, middle adulthood, late adulthood	internal organs, heart, lungs, liver, kidney, brain, skeletal, skeleton, muscle, muscular, digest, digestion, digestive, circulatory system, heart, blood vessels, blood, impact, diet, exercise, drugs, lifestyle, nutrients, water, damage, drugs, alcohol, substances
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<b>Properties and changes of materials/matter</b>	<b>Evolution and inheritance</b>
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<ul style="list-style-type: none"> <li>✓ Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical Y3 and thermal), and response to magnets (magnetism Y4)</li> <li>✓ Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</li> <li>✓ Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating</li> <li>✓ Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic</li> <li>✓ Demonstrate that dissolving, mixing, evaporating, filtering, sieving, melting and changes of state are reversible changes</li> <li>✓ Explain that some changes result in the formation of new materials, and that this is kind of change is not usually reversible (burning, rusting etc.), including changes associated with burning and the action of acid on bicarbonate of soda, Refer back to Y3 rocks and show the changes within the 'rock cycle'</li> </ul> <p>WS:</p> <ul style="list-style-type: none"> <li>Carry out tests such as the most effective for a warm jacket, wrapping for ice-cream and blackout curtains</li> <li>Compare materials to make a switch in a circuit</li> <li>Observe and compare changes when baking</li> </ul>	<ul style="list-style-type: none"> <li>✓ Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago - also look at cross-breeds etc. <b>*build on Y3</b></li> <li>✓ Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents</li> <li>✓ Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution</li> </ul> <p>WS:</p> <ul style="list-style-type: none"> <li>Observe and raise questions about local animals and how they are adapted to their environment, comparing how some living things are adapted to survive in extreme conditions e.g. cactus, penguins</li> <li>Analyse advantages and disadvantages of specific adaptations such as being on two feet rather than 4, long necks or short beaks (not expected to understand how genes and chromosomes work)</li> </ul> <p>Naturalist, geologist and biologist: Charles Darwin Naturalist and biologist: Alfred Wallace</p>
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<ul style="list-style-type: none"> <li>Research how chemical changes impact our lives e.g. cooking, sticky materials, thin materials</li> </ul> <p>Chemists: Spencer Silver, Ruth Benerito</p> <p>LUSH Cosmetics trip links to PSHE and Fair Trade</p>	<p>Palaeontologist: Mary Anning</p>
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Vocabulary

<p>properties, hardness, solubility, transparency, electrical conductor, thermal conductor, response to magnets, dissolve, solution, separate, solids, liquids, gases, reversible changes, irreversible, dissolving, mixing, evaporating, evaporation, filtering, sieving, melting, new material, burning, rusting, magnetism, electricity, chemists, quantitative, measurements, conductivity, insulation, chemical</p>	<p>evolution, adaption, inherited traits, adaptive traits, natural selection, inheritance, DNA genes, variation, parent, offspring, fossil, environment, habitat, fossilisation, plants, animals, living things</p>
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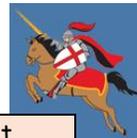
Light, Earth and space

<ul style="list-style-type: none"> <li>Describe the movement of the Earth, and other planets, relative to the Sun in the solar system. Learn that the sun is a star at the centre of our solar system and recap the 8 planets within. Learn that Pluto was reclassified as a 'dwarf planet' in 2006. <i>Create simple models of the solar system</i></li> <li>Describe the movement of the Moon relative to the Earth and understand that a moon is a <b>celestial</b> body that orbits a planet</li> <li>Understand that Earth has one moon and other planets have more</li> <li>Describe the Sun, Earth and Moon as approximately spherical bodies</li> <li>Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. Revisit sun safety and not looking directly at the sun even when wearing dark glasses.</li> </ul> <p>WS:</p> <ul style="list-style-type: none"> <li>Research the way ideas about the solar system have developed understanding about how the geocentric model of solar system gave way to the heliocentric model (works of Ptolemy, Alhazen and Copernicus)</li> <li>Compare the time of day at different places on Earth through internet links and communication</li> <li>Construct simple shadow clocks and sundials to show midday</li> <li>Research and find out why Stonehenge might have been used as astronomical clocks (as some believe)</li> </ul> <p>The National Space Centre visit</p> <p>VR Space Workshop - virtually explore planets and moons</p> <p>Astronomers and astronauts - Science careers</p>	<ul style="list-style-type: none"> <li>Recognise that light appears to travel in straight lines <b>*build on Y3</b></li> <li>Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye</li> <li>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</li> <li>Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them</li> </ul> <p>WS:</p> <ul style="list-style-type: none"> <li>Investigate and research where to place rear-view mirrors on cars or design and make a periscope</li> <li>Make predictions</li> <li>Extend knowledge though research by looking at rainbows, colours on soap bubbles, objects in bent water and coloured filters (don't need to explain why these occur)</li> </ul> <p>Physicist: Albert Einstein</p>
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Vocabulary



<p>Earth, Sun, Moon, moons, planets, stars, solar system, Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto, rotate, day, night, orbit, axis, spherical, heliocentric, geocentric, hemisphere, season, tilt</p>	<p>light, light sources, travel, straight, reflect, reflection, light source, object, shadows, mirrors, periscope, rainbow, filters</p>
<p style="text-align: center;"><b>Forces</b></p>	<p style="text-align: center;"><b>Electricity</b></p>
<p>✓ Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</p> <p>✓ Identify the effects of air resistance and friction, that act between moving surfaces</p> <p>✓ Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect</p> <p>WS:</p> <ul style="list-style-type: none"> <li>▪ Exploring falling paper cones or cupcakes, and design and make a variety of parachutes</li> <li>▪ Carry out fair tests to determine which design is most effective</li> <li>▪ Investigate the resistance in water - making and testing boats of different shapes</li> <li>▪ Investigate the effects of air resistance and friction - parachutes, sycamore seeds falling, brakes on a bike</li> <li>▪</li> </ul> <p style="background-color: #00FF00; padding: 2px;">Physicists and astronomers: Galileo Galilei, Sir Isaac Newton</p>	<p><b>**Building on Y4 work</b></p> <p>✓ Working safely</p> <p>✓ Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit by constructing simple series circuits (not parallel circuits) - they should learn how to represent a simple circuit in a diagram using recognised symbols</p> <div style="text-align: center;"> </div> <p>✓ 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</p> <p>WS:</p> <ul style="list-style-type: none"> <li>▪ Systematically identify the effect of changing one component at a time</li> </ul> <p style="text-align: center;"><i>Design and make traffic lights, burglar alarms or something useful in our lives</i></p>
<b>Vocabulary</b>	
<p>gravity, air resistance, water resistance, friction, surface, force, effect, move, accelerate, decelerate, stop, change direction, brake, mechanism, pulley, gear, spring</p>	<p>electrical safety, danger, voltage, brightness, volume, switches, series, circuit, circuit diagram, symbols, switch, bulb, buzzer, motor</p>
<p>♥ <b><u>Spiritual and Emotional engagement in Upper KS2</u></b></p>	
<p>All children in Y5 will continue their work on understanding how to nurture and care for our environment through use of the outdoors and studying naturalist - Sir David Attenborough and animal behaviourist - Jane Goodall. Through these significant public figures, children in Y5 will learn to appreciate our wonderful world and learn how we can positively impact upon it.</p> <p>They will explore the life cycle of butterflies building upon their knowledge of the frog lifecycle in Y4.</p> <p>Children in Y5 will start to deepen their understanding of changes to themselves as humans and will build upon an important PSHE topic relating to changes. External visits will support their learning on the human life cycle including areas such as puberty. Not</p>	<p>Y6 children will visit a beloved zoo local to our area to delve into the world of evolution and inheritance. They will learn the works of naturalist, geologist and biologist - Charles Darwin and palaeontologist Mary Anning. Further exploring the differing science careers and learning how science has a phenomenal impact on the future world.</p> <p>Many people have heard of the famous physicist, Albert Einstein and our Y6 children will learn why through their studies on light.</p> <p>When learning scientific knowledge, Y6 children will understand the scientists behind what we know about our world today and how it is ever changing. Ensuring that they understand that, they too can have an impact and be a part of this changing world - as a scientist or not!</p>



only will this enable children to feel comfortable with change but they will also gain an important understanding of their next steps in life.

Children will experience Fair Trade and reversible/irreversible changes through a visit to LUSH cosmetics where they will also learn the importance of chemists. They will also delve into the world of famous chemists whom have impacted the future - Spencer Silver and Ruth Benerito.

The National Space Centre is a key Ivanhoe trip - Y5 children will delve straight into life in space and will explore the exciting science phenomena that is space through interactive workshops and informative talks. They will gain a deeper understanding into the career of an astronaut and astronomers. Children will also experience a virtual tour of the planets in school led by an informed facilitator creating science and technology links.

Children in Y6 will further experience chemistry through a secondary school lab visit where they will not only experience the excitement of a science laboratory but will also delve into the world of a chemistry teacher.

Y6 children will be responsible for planning a science and technology fair in the summer months showcasing new or old learning and putting scientific enquiry on show. This will create a sense of achievement and an end goal for the Y6 children before taking their science skills and knowledge onto KS3.



Trips and experiences						
EYFS	Y1	Y2	Y3	Y4	Y5	Y6
Grow a beanstalk from a bean  Planetarium  Strawberry picking  Chicks	Grow a sunflower from a seed - Living things, including plants  Class pet -fish - Animals, including humans  Zoo - animals, including humans	Grow an onion from a bulb - Living things and their habitats, including plants  Planetarium - Space  Austerfield - Living things and their habitats, including plants	Grow a fruit plant - strawberries  Castleton - Rocks	Tadpoles - Animals, including humans  Predatory experience - Animals, including humans	Butterflies - life cycle  LUSH - reversible and irreversible changes  National Space Centre and VR Space workshop - Light, Earth and Space	Wildlife Park - evolution and inheritance  Secondary school lab visit
Science careers						
EYFS	Y1	Y2	Y3	Y4	Y5	Y6
Visits						
Farmer	Vet	Astronomer	Geologist	Electrician	Chemist Astronauts	Chemistry Teacher
Learning						
	<ul style="list-style-type: none"> <li>Natural scientist and conservationist - Beatrix Potter</li> </ul>	<ul style="list-style-type: none"> <li>Inventor - Dunlop</li> <li>Chemist - Macintosh</li> <li>Engineer - McAdam</li> <li>Astronaut Yuri Gagarin</li> </ul>	<ul style="list-style-type: none"> <li>Astronaut - Neil Armstrong</li> <li>Botanist - Albert Howard</li> </ul>	<ul style="list-style-type: none"> <li>Physicists</li> </ul>	<ul style="list-style-type: none"> <li>Animal naturalist - Sir David Attenborough</li> <li>Animal behaviourist - Jane Goodall</li> <li>Chemists - Spencer Silver and Ruth Benerito</li> <li>Physicists/ astronomers - Sir Isaac Newton and Galileo</li> </ul>	<ul style="list-style-type: none"> <li>Naturalist, geologist and biologist - Charles Darwin</li> <li>Palaeontologist Mary Anning</li> <li>Physicist: Albert Einstein</li> </ul>