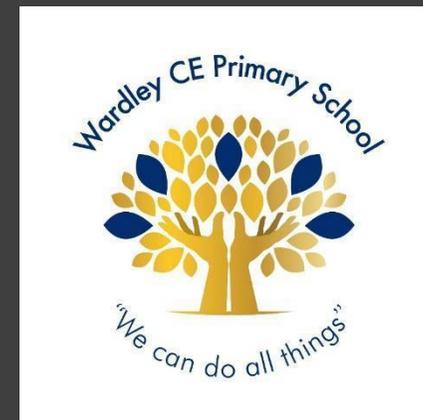
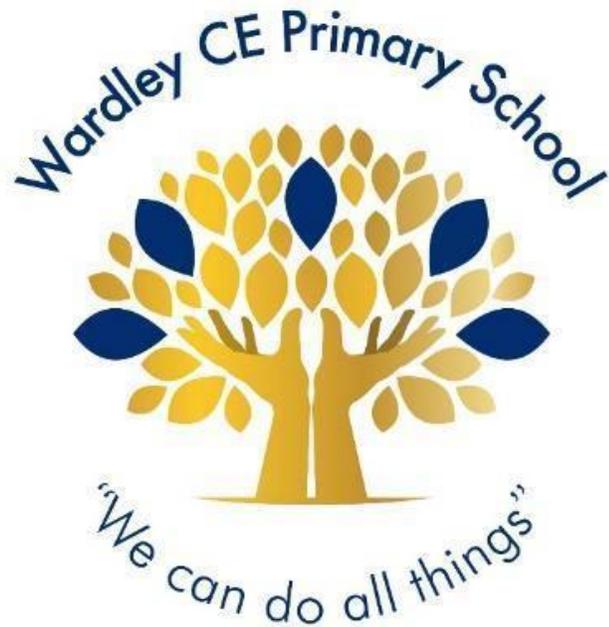


Science Curriculum



Curriculum Intent



The curriculum intent for Wardley CE Primary school aims to:

- **Be ever-evolving**, providing opportunities for children to develop as independent, confident, resilient, successful & motivated learners striving for the pursuit of excellence who know how to make a positive and transformational contribution to their community and wider global society.
- **Be rooted in the school's Christian ethos**, encouraging our pupils to grow in self-awareness and becoming advocates of social justice, adaptable to any social context.
- **Be ambitious** in our aim for pupils to develop the communication skills necessary for learning and life, promoting enjoyment, high expectations and standards across all subject areas.
- **Be memorable**: providing diverse, social, moral, spiritual and cultural (SMSC) rich opportunities from which children learn and develop a range of transferable skills.
- **Be aspirational**, cultivating a sense of personal pride in achievement, provide a purpose and relevance for learning and ultimately to help every student to find strengths and interests.
- **Be inspiring**, to empower pupils to respect each other and themselves, show respect and understanding for people of all faiths, race and gender, and for all living things, promoting stewardship and ensuring children are well prepared for life in a rapidly changing world.

Scientific Intent



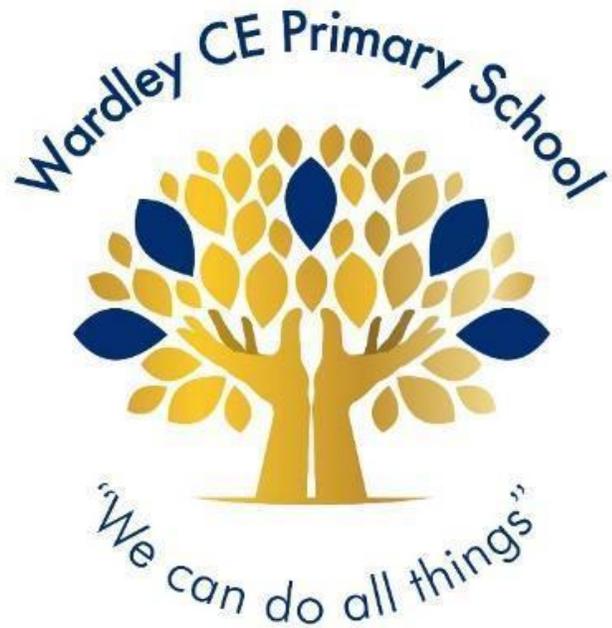
At Wardley, all children have the opportunity to develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics. We encourage children to be inquisitive throughout their time at the school and beyond.

Our ambitious Science curriculum fosters a healthy curiosity in children about our universe and promotes respect for the living and non-living. We believe science encompasses the acquisition of knowledge, concepts, skills and positive attitudes.

Science is a vibrant subject at Wardley about which we are incredibly passionate. Children ask lots of questions about the world around them, and we aim to provide them with the necessary core scientific knowledge and investigative skills to help them answer their specific questions.

Throughout the programmes of study, the children will acquire and develop the key knowledge that has been identified within each unit and across each year group, as well as the application of scientific skills. We ensure that the Working Scientifically skills are built-on and developed in each phase of school so that are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

Science Curriculum

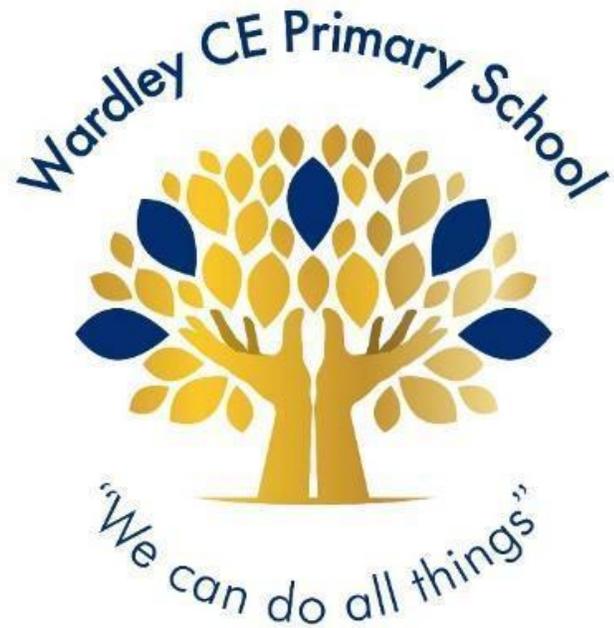


Science Overview

Science Overview

	Autumn		Spring		Summer	
EYFS						
YEAR 1	<p>BIOLOGY To understand animals & humans How do our senses help us to explore the world?</p> <p>PHYSICS Understand the Earth's movement in space What season is it and how do you know?</p>	<p>CHEMISTRY To investigate materials What are everyday objects made from?</p> <p>PHYSICS Understand the Earth's movement in space What season is it and how do you know?</p>	<p>BIOLOGY Understand animals and humans How are common animals different?</p>	<p>BIOLOGY To investigate living things How can we care for our planet?</p> <p>PHYSICS Understand the Earth's movement in space What season is it and how do you know?</p>	<p>BIOLOGY To understand plants How are common plants different?</p>	<p>BIOLOGY To understand plants What food can we grow in our garden?</p> <p>PHYSICS Understand the Earth's movement in space What season is it and how do you know?</p>
YEAR 2	<p>BIOLOGY To understand animals & humans What does it mean to be healthy?</p>	<p>CHEMISTRY To investigate materials Why do we use different materials to make different objects?</p>	<p>BIOLOGY Understand animals and humans How do living things survive?</p>	<p>BIOLOGY To investigate living things How do different habitats provide for different animals?</p>	<p>BIOLOGY To understand plants What do plants need to grow well?</p>	<p>PHYSICS Understand movement, forces and magnets How do I perform a simple test?</p>
YEAR 3	<p>CHEMISTRY To investigate materials How does one rock compare to another?</p>	<p>BIOLOGY To understand animals & humans Why do we need bones?</p>	<p>PHYSICS To understand light & seeing What can I see and how do I see it?</p>	<p>BIOLOGY To understand plants How do plants grow?</p>	<p>PHYSICS To understand movement, forces & magnets What is a magnet and what can it do?</p>	<p>PHYSICS To understand the Earth's movement in space Where is my planet and what does it do?</p>
YEAR 4	<p>PHYSICS To investigate sound & hearing How are sounds created and how do we hear them?</p>	<p>BIOLOGY To investigate living things What are living things and how do we classify them?</p>	<p>CHEMISTRY To investigate materials What is the key to changing states of matter?</p>	<p>BIOLOGY To understand animals & humans What role do teeth play in the digestive system?</p>	<p>PHYSICS To understand electrical circuits How do electrical components affect a circuit?</p>	<p>WORKING SCIENTIFICALLY What is the science behind bubbles?</p>
YEAR 5	<p>PHYSICS To understand the Earth's movement in space How does our solar system work?</p>	<p>CHEMISTRY To investigate materials Why are properties of materials important?</p>	<p>BIOLOGY To investigate living things What is the circle of life?</p>	<p>PHYSICS To understand movement, forces & magnets How do forces impact motion?</p>	<p>BIOLOGY Understand animals and humans What happens to our bodies as we get older?</p>	<p>WORKING SCIENTIFICALLY How do scientists work in the real world?</p>
YEAR 6	<p>BIOLOGY To investigate living things Why do we classify critters?</p>	<p>BIOLOGY To understand animals & humans Staying alive and staying healthy - how do we do it?</p>	<p>BIOLOGY To understand evolution & inheritance What is evolution and inheritance?</p>	<p>PHYSICS To understand light & seeing How can we prove that light travels in straight lines?</p>	<p>PHYSICS To understand electrical circuits Electricity - how does it work and how can we sustain it?</p>	<p>BIOLOGY Understand evolution and inheritance Are dinosaurs important?</p>

Science Curriculum



Early Years

Science Features in EYFS

In nursery and reception children will, within their Understanding the World work towards the following outcomes:

- Children will be able to make sense of their physical world
- Build important knowledge and sense of the world around them from stories, investigations and visits
- Begin to talk about why things happen and make simple predictions

By the end of Reception children should:

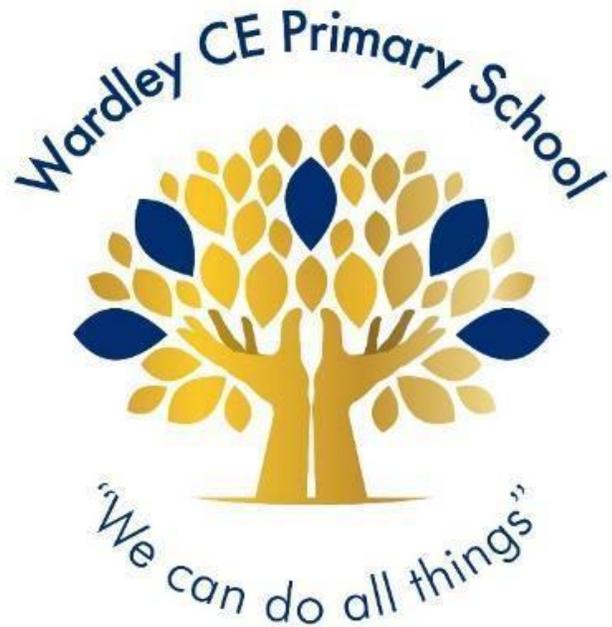
The Natural World

- 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 the effect of the changing seasons on the natural world around them

Science Overview EYFS

	Autumn term		Spring term		Summer term	
Nursery	<ul style="list-style-type: none"> To learn how to take care of themselves 	<ul style="list-style-type: none"> To explore natural objects from their surrounding environment To learn about their senses To explore light sources To shine light on or through different materials 	<ul style="list-style-type: none"> To identify electrical devices To use battery powered devices (bee – bots) To explore how things work To feel forces 	<ul style="list-style-type: none"> To explore their natural surroundings To explore a range of materials To shape and join materials To combine and mix ingredients 	<ul style="list-style-type: none"> To learn about the life cycles of animals To plant seeds 	<ul style="list-style-type: none"> To compare adult animals to their babies To observe how baby animals change over time To explore animals in their natural environment
Reception	<ul style="list-style-type: none"> To name body parts To describe people who are familiar to them To learn how to take care of themselves To develop a deeper understanding of their senses 	<ul style="list-style-type: none"> To listen to sounds outside and identify the sounds To make sounds Explore how to change how things work 	<ul style="list-style-type: none"> To explore a range of materials including natural materials To observe, measure and record how materials changed when heated and cooled To compare how materials change over time and in different conditions To explore shadows and rainbows 	<ul style="list-style-type: none"> To name and describe animals that live in different habitats To explore plants and animals in contrasting environments 	<ul style="list-style-type: none"> Life cycles To compare and describe adult animals to their babies To observe how baby animals change over time 	<ul style="list-style-type: none"> Similarities and differences between plants Growing plants Observing the changes as plants grow To explore plants in their natural environment Make objects from different materials including natural materials

Science Curriculum



Threshold Concepts:
Disciplinary Knowledge
Biology, Chemistry & Physics

Science: Threshold Concepts - Biology

Biology: Understand animals and humans

By the end of KS1		By the end of LKS2		By the end of UKS2	
<ul style="list-style-type: none"> identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals identify and name a variety of common animals that are carnivores, herbivores and omnivores 	<ul style="list-style-type: none"> notice that animals, including humans, have offspring which grow into adults 	<ul style="list-style-type: none"> identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat 	<ul style="list-style-type: none"> describe the simple functions of the basic parts of the digestive system in humans 	<ul style="list-style-type: none"> describe the changes as humans develop to old age. 	<ul style="list-style-type: none"> identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood
<ul style="list-style-type: none"> describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) 	<ul style="list-style-type: none"> describe the basic needs of animals, including humans, for survival (water, food and air) 	<ul style="list-style-type: none"> identify that humans and some other animals have skeletons and muscles for support, protection and movement. 	<ul style="list-style-type: none"> identify the different types of teeth in humans and their simple functions 	<ul style="list-style-type: none"> describe the ways in which nutrients and water are transported within animals, including humans. 	<ul style="list-style-type: none"> recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function
<ul style="list-style-type: none"> identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. 	<ul style="list-style-type: none"> describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. 		<ul style="list-style-type: none"> construct and interpret a variety of food chains, identifying producers, predators and prey. 		

Science: Threshold Concepts - Biology

Biology: Investigate living things

By the end of KS1	By the end of LKS2	By the end of UKS2	
<ul style="list-style-type: none"> • explore and compare the differences between things that are living, dead, and things that have never been alive 	<ul style="list-style-type: none"> • recognise that living things can be grouped in a variety of ways 	<ul style="list-style-type: none"> • describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird 	<ul style="list-style-type: none"> • describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals
<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment 	<ul style="list-style-type: none"> • describe the life process of reproduction in some plants and animals 	<ul style="list-style-type: none"> • give reasons for classifying plants and animals based on specific characteristics
<ul style="list-style-type: none"> • identify and name a variety of plants and animals in their habitats, including Microhabitats • describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. 	<ul style="list-style-type: none"> • recognise that environments can change and that this can sometimes pose dangers to living things. 		

Science: Threshold Concepts - Biology

Biology: Understand evolution and inheritance

By the end of KS1	By the end of LKS2	By the end of UKS2
<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>	<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.
<ul style="list-style-type: none">•	<ul style="list-style-type: none">• <i>identify how animals and plants are suited to and adapt to their environment in different ways.</i>	<ul style="list-style-type: none">• identify how animals and plants are suited to and adapt to their environment in different ways.

Science: Threshold Concepts - Biology

Biology: Understand plants

By the end of Key Stage 1		By the end of Lower Key Stage 2		By the end of Upper Key Stage 2	
Common plants	Plants seed and growth	Basic structure and functions of a plant		Reproductive processes linked to Investigating living things	
<ul style="list-style-type: none"> • identify and name a variety of common wild and garden plants, including deciduous and evergreen trees • identify and describe the basic structure of a variety of common flowering plants, including trees. 	<ul style="list-style-type: none"> • 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/trunk, leaves and flowers • explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. • investigate the way in which water is transported within plants. • explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal 	<ul style="list-style-type: none"> • to know the parts of flowering plants. • to know how flowering plants reproduce. • to describe the process of asexual reproduction in plants. • give reasons for classifying plants based on specific characteristics. 		

Science: Threshold Concepts - Chemistry

Chemistry: Investigate materials

By the end of KS1 Everyday Materials	By the end of KS1 Uses of Everyday Materials	By the end of Lower Key Stage 2		By the end of UKS2
		Rocks	States of Matter	Properties and changes of Materials
<ul style="list-style-type: none"> distinguish between an object and the material from which it is made. describe the simple physical properties of a variety of everyday materials. 	<ul style="list-style-type: none"> identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. compare and group together a variety of everyday materials on the basis of their simple physical properties. 	<ul style="list-style-type: none"> Compare and group together different kinds of rocks on the basis of their simple, physical properties. Describe, in simple terms, how fossils are formed when things that have lived are trapped within sedimentary rock. 	<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 or research the temperature at which this happens in degrees Celsius (°C). 	<ul style="list-style-type: none"> compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. understand how some materials will dissolve in liquid form a solution and describe how to recovery substance from a solution. explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes in oxidisation and the action of acid on bicarbonate of soda.
<ul style="list-style-type: none"> identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. 	<ul style="list-style-type: none"> find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching 	<ul style="list-style-type: none"> recognise that soils are made of rocks and organic matter. relate the simple physical properties of some rocks to their formation (igneous or sedimentary). 	<ul style="list-style-type: none"> 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"> know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.
<ul style="list-style-type: none"> 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 				<ul style="list-style-type: none"> give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday forces of motions. demonstrate that dissolving, mixing and changes of state are reversible changes.

Science: Threshold Concepts - Physics

Physics: Understand light and seeing

By the end of LKS2

- 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 objects.

- Find patterns in the way that the size of shadows change.

By the end of UKS2

- 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.

- Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.
- Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

Science: Threshold Concepts - Physics

Physics: Investigate sound and hearing

By the end of LKS2

- identify how sounds are made, associating some of them with something vibrating.
- recognise that vibrations from sounds travel through a medium to the ear.

By the end of UKS2

- 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.

Science: Threshold Concepts - Physics

Physics: Understand electrical circuits

By the end of LKS2

- 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.

By the end of UKS2

- 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

Science: Threshold Concepts - Physics

Physics: Understand movement, forces and magnets

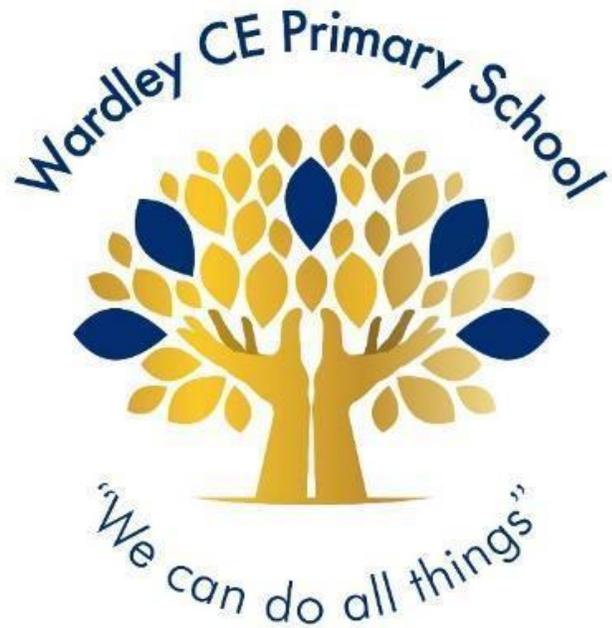
By the end of LKS2	By the end of UKS2 Forces	By the end of UKS2 Magnets
<ul style="list-style-type: none"> • Compare how things move on different surfaces. • Notice that some forces need contact between 2 objects, but magnetic forces can act at a distance. • Observe how magnets attract or repel each other and attract some materials and not others. 	<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 	<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
<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • Identify the effects of air resistance, water resistance and friction, that act between moving surfaces 	<ul style="list-style-type: none"> • Identify the effects of air resistance, water resistance and friction, that act between moving surfaces
<ul style="list-style-type: none"> • Describe magnets as having 2 poles. • Predict whether 2 magnets will attract or repel each other, depending on which poles are facing. 	<ul style="list-style-type: none"> • Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect 	<ul style="list-style-type: none"> • Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect

Science: Threshold Concepts - Physics

Physics: Understand the Earth's movement in space

By the end of LKS2	By the end of UKS2 Forces	By the end of UKS2 Magnets
<ul style="list-style-type: none">• 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.
<ul style="list-style-type: none">• 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.		<ul style="list-style-type: none">• describe the Sun, Earth and Moon as approximately spherical bodies.• use the idea that the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.

Science Curriculum



Threshold Concepts:
Disciplinary Knowledge
Working Scientifically

Science Threshold Concepts: KS1 Working scientifically

	Asking simple questions and recognising that they can be answered in different ways	Observing closely, using simple equipment	Performing simple tests	Identifying and classifying	Gathering and recording data to help in answering questions	Using their observations and ideas to suggest answers to questions
By the end of Key Stage 1	<p>While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions.</p> <ul style="list-style-type: none"> • The children answer questions developed with the teacher often through a scenario. • The children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered 	<p>Children explore the world around them. They make careful observations to support identification, comparison and noticing change. They use appropriate senses, aided by equipment such as magnifying glasses or digital microscopes, to make their observations.</p> <ul style="list-style-type: none"> • They begin to take measurements, initially by comparisons, then using non-standard units. 	<p>The children use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. They carry out: tests to classify; comparative tests; pattern seeking enquiries; and make observations over time.</p>	<p>Children use their observations and testing to compare objects, materials and living things. They sort and group these things, identifying their own criteria for sorting.</p> <ul style="list-style-type: none"> • They use simple secondary sources (such as identification sheets) to name living things. They describe the characteristics they used to identify a living thing. 	<p>The children record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing.</p> <ul style="list-style-type: none"> • They record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs. • They classify using simple prepared tables and sorting rings. 	<p>Children use their experiences of the world around them to suggest appropriate answers to questions. They are supported to relate these to their evidence e.g. observations they have made, measurements they have taken or information they have gained from secondary sources.</p> <ul style="list-style-type: none"> • The children recognise 'biggest and smallest', 'best and worst' etc. from their data.

Science Threshold Concepts: LKS2 Working scientifically

Asking relevant questions and using different types of scientific enquiries to answer them	Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers	Setting up simple practical enquiries, comparative and fair tests	Gathering, recording classifying and presenting data in a variety of ways to help in answering questions. Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables	Using straightforward scientific evidence to answer questions or to support their findings	Identifying differences, similarities or changes to related to simple scientific ideas and processes
<p>By the end of Lower Key Stage 2</p> <p>The children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions.</p> <ul style="list-style-type: none"> • The children answer questions posed by the teacher. • Given a range of resources, the children decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have chosen to answer their question. 	<p>The children make systematic and careful observations.</p> <ul style="list-style-type: none"> • They use a range of equipment for measuring length, time, temperature and capacity. They use standard units for their measurements 	<p>The children select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher.</p> <ul style="list-style-type: none"> • They follow their plan to carry out: observations and tests to classify; comparative and simple fair tests; observations over time; and pattern seeking. <p>Explanatory note A comparative test is performed by changing a variable that is qualitative e.g. the type of material, shape of the parachute. This leads to a ranked outcome. A fair test is performed by changing a variable that is quantitative e.g. the thickness of the material or the area of the canopy. This leads to establishing a causative relationship.</p>	<p>The children sometimes decide how to record and present evidence. They record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. They record their measurements e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings). They record classifications e.g. using tables, Venn diagrams, Carroll diagrams.</p> <ul style="list-style-type: none"> • Children are supported to present the same data in different ways in order to help with answering the question. 	<ul style="list-style-type: none"> • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. The answers are consistent with the evidence. 	<ul style="list-style-type: none"> • Children interpret their data to generate simple comparative statements based on their evidence. They begin to identify naturally occurring patterns and causal relationships

Science Threshold Concepts: LKS2 Working scientifically

Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions

Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions

By the
end of
Lower
Key
Stage 2

They draw conclusions based on their evidence and current subject knowledge.

- They identify ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry.
- Children use their evidence to suggest values for different items tested using the same method e.g. the distance travelled by a car on an additional surface.
- Following a scientific experience, the children ask further questions which can be answered by extending the same enquiry.

- They communicate their findings to an audience both orally and in writing, using appropriate scientific vocabulary.

Science Threshold Concepts: UKS2 Working scientifically

Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary

Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate

Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs

Identifying scientific evidence that has been used to support or refute ideas or arguments

By the end of Upper Key Stage 2

Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry.

- Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work.
- The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample.

The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale.

- During an enquiry, they make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value).

The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g. using tables, Venn diagrams, Carroll diagrams and classification keys.

- Children present the same data in different ways in order to help with answering the question.

Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. When doing this, they discuss whether other evidence e.g. from other groups, secondary sources and their scientific understanding, supports or refutes their answer.

- They talk about how their scientific ideas change due to new evidence that they have gathered.
- They talk about how new discoveries change scientific understanding.

Science Threshold Concepts: UKS2 Working scientifically

Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations

Using test results to make predictions to set up further comparative and fair tests

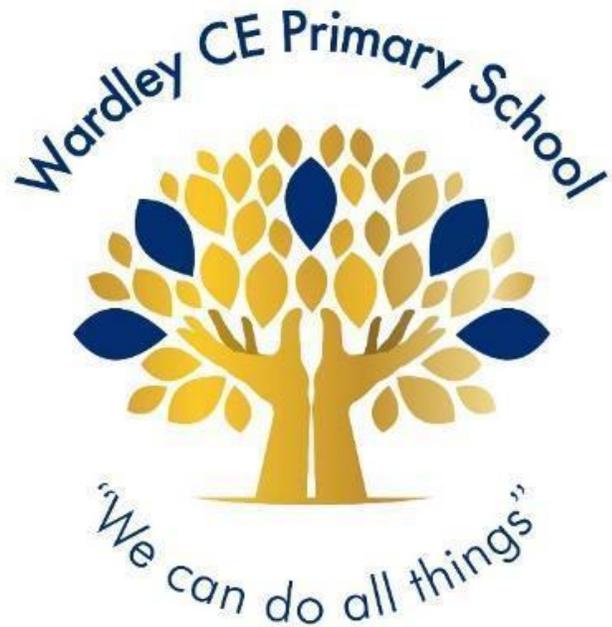
By the
end of
Upper
Key
Stage
2

In their conclusions, children: identify causal relationships and patterns in the natural world from their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge.

- They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used.
- They identify any limitations that reduce the trust they have in their data.
- They communicate their findings to an audience using relevant scientific language and illustrations.

- Children use the scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests.

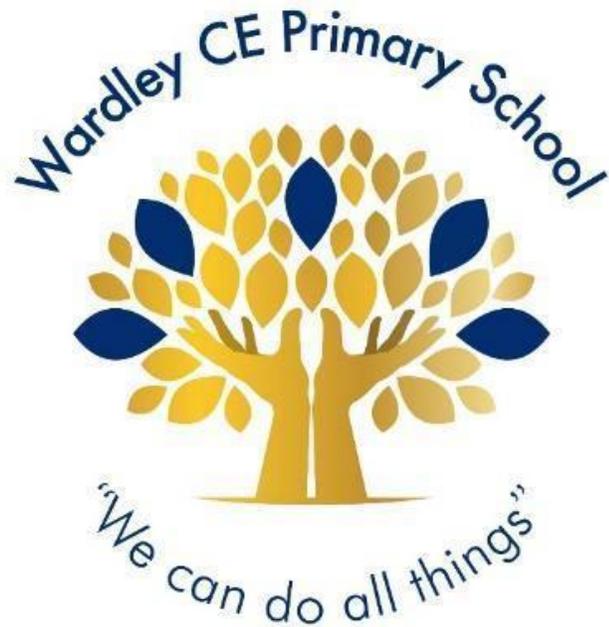
Science Curriculum



Substantive Knowledge

The substantive knowledge is the scientific knowledge and vocabulary that is developed within our science curriculum. This knowledge is covered through the curriculum strands of physics, biology and chemistry. As such, this substantive knowledge has been embedded within the threshold concepts for physics, biology and chemistry. We believe that it is through the use of these disciplinary skills that the pupils become more expert in their substantive knowledge. This substantive knowledge is further detailed in our science knowledge organisers.

Science Curriculum



Science: Progression of Vocabulary

The national curriculum for science reflects the importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically. The quality and variety of language that pupils hear and speak are key factors in developing their scientific vocabulary and articulating scientific concepts clearly and precisely. At Wardley, they are assisted in making their thinking clear, both to themselves and others, and teachers ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.

Language is vital for communication and children enjoy learning and understanding new words.

Children will be able to use the vocabulary of preceding topics as well as those listed for their current science topic. All the vocabulary listed here is taken from the science curriculum or related subjects, such as mathematics.

Science progression of vocabulary

	By the end of Key Stage 1		By the end of Lower Key Stage 2		By the end of Upper Key Stage 2	
Working scientifically	above	amount	acute	3D shape terminology	abundant	appropriate accuracy
	answer	appearance	approximate	accurate	cancel out	arc
	area (non-maths meaning)	beyond	approximately	base	capacity	authentic
	below	contains	area (maths meaning)	comparative	causal	bias
	centre	difference	case study	concave	complex	circumference
	clockwise	distance	corresponding	convention	control	concentric
	close to	document	data	convex	correlate	controversy
	different	exact	data logger	cylindrical	crucial	cross-section
	direction	exactly	degrees	decrease	dependent	degree of trust
	distant	fair test	down	exception	diagonal	diameter
	down	fractions	equivalent	factor	distribution	intersecting
	equal to	left	evidence	increase	exceptional	plane
	event	nearest	fact	intricate	imperial units	plausible
	far	property	group	negative numbers	maximum	proportion
	further	represents	hypothesis	origin	million	radius
	group	right	impact	precise	minimum	ratio
	half	scale	necessary	reliability	percentage	recurring
	high(er)	similarity	negative	rotation	perspective	robust
	larger	stands for	obstacle	spherical	phenomenon	stance
	least	strategy	obtuse	statistics	reflex angle	tertiary source
	less than	symmetrical	opinion	systematic	rigorous	
	low(er)		outcome	translation	rotation	
	more than		parallel	trend	sparse	
	most		positive	typical	sustain	
	near		primary source	unique	variable	
	nearly		quantity			
	new(er)		relationship			
	non-fiction		remainder			
	old(er)		round			
	pattern		secondary source			
point		theory				
position		up				

Science progression of vocabulary

	By the end of key Stage 1			By the end of Lower Key Stage 2			By the end of Upper Key Stage 2		
Habitats	adapted	predator	Antarctic Circle	producer	anemometer	variation	asexual reproduction	microbes	
	conditions	prey	Arctic Circle	soil	barometer	Vertebrates	erosion	microorganism	
	damp	produce	carnivore	survive	biome	deciduous	interdependence	Organism	
	dark	reproduce	characteristics	temperate	classification	evergreen	sexual reproduction	Invertebrates	
	dinosaur	suited	climate	tropical	deforestation	flowering plants	Topography	Vertebrates	
	environment	surroundings	climate zones	tundra	dominant	garden plants	clone	Species	
	food chain	variety	consumer	vegetation	environmental	grasses	plantlets	Linnaeus system	
	food source	woodland	desert		fungus/fungi	non-flowering	runners	Fungi	
	habitat		food web		invertebrates	plants	seed formation	Mollusc	
	indigenous		forest		key	plant groups	transpiration	Domains	
	life cycle		grassland		mould	pores		Kingdoms	
	log		herbivore		organism	trees		Species	
	microhabitat		life process		pollution	wild		Classification	
	microscopic		omnivore		population			Branch database	
	pond		population		region				

Science progression of vocabulary x

	By the end of Key Stage 1			By the end of Lower Key Stage 2			By the end of Upper Key Stage 2		
Healthy living	emotions exercise fish meat salt(y) sugar sweet taste water	activity balanced diet beans dairy fat fruit germ grains heart rate lifestyle medicine nuts pulse seafood starch	sugar vegetable		bacteria carbohydrate dietary fibre food groups hydrated hygiene infection minerals nutrition protection protein starches virus x-ray		canines cavities decay dentin enamel fluoride gums incisors molars nerves plaque pre-molars pulp-cavity tooth decay	menstrual cycle penis puberty testes vagina	carbon monoxide drugs
Evolution and inheritance								adaptation chromosomes competition DNA dominant genes evolution evolutionary change fossil records	genes inherit inheritance natural selection recessive genes species survival of the fittest
Rocks				chalk clay cobble crystals fossil grains granite granule igneous impermeable lava layers limestone magma	marble metamorphic mineral organic particles pebble permeable porous quartz sand sandstone sedimentary silt slate surface	absorb absorbent artificial characteristic chemical dissolve opaque powder reflective resources texture translucent			

Science progression of vocabulary

	By the end of Key Stage 1				By the end of Lower Key Stage 2		By the end of Upper Key Stage 2			
Everyday materials	bendy boil bright burn cloudy dim dull freeze glass hard material melt metal object plastic	rock rough see-through shiny smooth soft stiff strong water waterproof weak Wood <u>Transparent</u> <u>Opaque</u>	boiling point elastic flexible function gas heat liquid man-made molten natural pressure property purpose reflection rigid	rust solid suitable transparent transparent Useful float pull push sink squash(ing) stretch(ing) twist(ing) electricity mains		absorb absorbent artificial characteristic chemical dissolve opaque powder reflective resources texture translucent				
Properties and changes of materials						insulation insulator irreversible change mixture reaction residue	bicarbonate buoyancy change combustion conductor conductivity filter filtrate	reversible separation soluble solute solution solvent	suspension thermal helium hydrogen oxidisation solubility sublimation	
States of matter				freezing point gas gaseous liquid melting point molecules	boiling point Celsius change of state condensation degree evaporation oxygen precipitation					

Science progression of vocabulary

	By the end of Key Stage 1		By the end of Lower Key Stage 2			By the end of Upper Key Stage 2	
Light			absorb block crescent moon emit gibbous moon kaleidoscope lens light beam light source	quarter moon reflect solar system spectrum speed of light sundial wane wax	light wave mirror new moon phases of moon prism	concave convex cornea iris lens optics pupil refraction retina	
Sound			amplitude auditory decibel dynamic echo frequency instruments insulation muffle	mute noise pitch pollution sound source sound wave	soundproof tone tuning fork vibrate vibration Volume transmission		
Forces and magnets			air resistance aluminium attract bar magnet brass button magnet compress copper force force-meter friction gravity horse-shoe magnet iron	magnet magnetic Newton meter nickel non-magnetic North pole repel ring magnet South pole spring steel streamlined		air resistance cams drag forces gears levers mechanisms parachute pulleys surface resistance transference water resistance	

Science progression of vocabulary

	By the end of key Stage 1				By the end of Lower Key Stage 2			By the end of Upper Key Stage 2			
Seasonal changes	autumn	rain gauge	April	monthly							
	bright	rainbow	August	November							
	cold	seasons	daily	October							
	dark	shadow	December	poles							
	darkness	snow	equator	seasonal							
	day	spring	February	September							
	dim	summer	fortnight	weekly							
	hot	sun	January	wind							
	ice	sunlight	July	windsock							
	length	weather	June	wind vane							
light	moon	March	winter								
month	movement	May	Year								
	Rain										
Earth and Space								asteroid	meteorite	astronomical	sphere
								axis/axes	Neptune	geocentric model of	spherical
								celestial body	orbit	the universe	spin
								comet	Pluto	heliocentric model of	time zone
								elliptical orbit	prime Meridian	the universe	Uranus
								equator	revolve	spherical	Venus
								galaxy	rotation	spin	
								hemisphere	Saturn	time zone	
								Jupiter		Uranus	
								latitude		Venus	
							light year				
							lsphere				
Electricity					appliances	components	positive	conductivity	socket		
					battery	conductor	resister	copper wire	terminal		
					bulb	connection	switch	current	volts		
					buzzer	electrical	symbol	dimmer switch	voltage		
					cell	insulator	wire	fuse	Wire		
					circuit	motor	crocodile	generator	series circuits		
					close circuit	negative	clip	parallel circuits	simple circuits		
					complete circuit	open circuit	device	power			
								resistance			