

## **Science**

### **Curriculum Intent**

We want our children to develop an understanding of the nature, processes and methods of science through different types of science investigations that help them to answer scientific questions about the world around them. We want to equip them with the scientific skills required to understand the uses and implications of science, today and for the future. We understand that it is important for lessons to have a skills-based focus and that the knowledge can be taught through this. We encourage children to be inquisitive throughout their time at school and beyond. The 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. 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 throughout children's time at the school so that they can apply their knowledge of science when using equipment, conducting experiments, building arguments and explaining concepts confidently and continue to ask questions and be curious about their surroundings.

### **Curriculum Implementation**

Science is taught using materials from Empiribox (<https://empiribox.com/>). There is a new theme each term and the emphasis is on practical science lessons that develop enquiring minds. In KS1, the topics taught follow a two year rolling program and in KS2 it is a four year rolling program. This means that the children are all given the opportunity to encounter the whole of the curriculum for their key stage.

Children are encouraged to ask their own questions and be given opportunities to use their scientific skills and research to discover the answers. This curiosity is celebrated within the classroom. Planning involves teachers creating well-resourced engaging lessons to aid understanding of conceptual knowledge. Teachers use precise questioning in class to test conceptual knowledge and skills, and assess children regularly to identify those children with gaps in learning, so that all children achieve and progress.

Subject-specific vocabulary is used to enrich pupils' language.

We build upon the learning and skill development of the previous years. As the children's knowledge and understanding progresses and deepens, they become more proficient in selecting, using scientific equipment, collating and interpreting results. They become increasingly confident in their growing ability to come to conclusions based on real evidence.

Teachers demonstrate how to use scientific equipment and the various 'working scientifically' skills in order to embed scientific understanding.

Teachers offer opportunities to develop children's understanding of their surroundings by accessing outdoor learning and the use of visits and visitors. Science is presented as a subject to enjoy and as one which is full of awe and wonder.

### **Curriculum Impact**

The successful approach in our school results in a fun, engaging and high-quality science education that provides children with the foundations and knowledge for understanding the world. Our engagement with the local environment ensures that children learn through varied and first hand experiences of the world around them. Frequent learning outside the classroom is embedded throughout the science curriculum. Through various workshops, trips and interactions with experts, children have the understanding that science has changed our lives and that it is vital to the world's future prosperity. Children learn the possibilities for careers in science ensuring that children have access to representative and positive role models within the field of science from the immediate and wider local community. From this exposure to a range of different scientists from various backgrounds, all children feel they are scientists and capable of achieving. Children enjoy science and this results in motivated learners with sound scientific understanding. Formative and summative assessments demonstrate the progress pupils make within Science.

PROGRESSION IN SCIENCE



		Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables Gather, record, classify and present data in a variety of ways to help in answering questions	Use straightforward scientific evidence to answer questions or to support their findings	
<b>Years 5/6</b>	Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary	Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs	Identify scientific evidence that has been used to support or refute ideas or arguments Report and present 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	Use test results to make predictions to set up further comparative and fair tests
<b>Working Scientifically at Greater Depth</b>				
Foundation	<p>Can find out by watching, listening, tasting, smelling and touching.</p> <p>Can give reasons for their answers.</p> <p>Can discuss similarities and differences.</p> <p>Can explain what they have found out using scientific vocabulary.</p> <p>Can compare measurements.</p>			
Year 1	<p>Can find out by watching, listening, tasting, smelling and touching.</p> <p>Can give reasons for their answers.</p> <p>Can discuss similarities and differences.</p> <p>Can they explain what they have found out using scientific vocabulary.</p> <p>Can make accurate measurements using nonstandard measurements.</p>			

Year 2	<p>Can suggest ways of finding out through listening, hearing, smelling, touching and tasting</p> <p>Can say whether things happened as they expected and if not why not.</p> <p>Can suggest more than one way of grouping animals and plants and explain their reasons</p> <p>Can use information from books and online information to find things out</p> <p>Can begin to independently consider controlling variables to create a fair test</p>
Year 3	<p>Can record and present what they have found using scientific language, drawings, labelled diagrams, bar charts and tables</p> <p>Can explain their findings in different ways.</p> <p>Can use their findings to draw a simple conclusion.</p> <p>Can suggest improvements and predictions for further tests</p> <p>Can suggest how to improve their work if they did it again</p>
Year 4	<p>Can plan and carry out an investigation by controlling variables fairly and accurately</p> <p>Can use test results to make further predictions and set up further comparative tests</p> <p>Can record more complex data and results using scientific diagrams, classification keys, tables, bar charts, line graphs and models</p> <p>Can report findings from investigations through written explanations and conclusions</p> <p>Can use a graph or diagram to answer scientific questions</p> <p>Can use a range of variables to investigate</p>
Year 5	<p>Can explore different ways to test an idea, choose the best way and give reasons</p> <p>Can vary one factor whilst keeping the others the same in an experiment</p> <p>Can use information to help make a prediction</p> <p>Can explain, in simple terms, a scientific idea and what evidence supports it</p> <p>Can decide which units of measurement they need to use</p> <p>Can explain why a measurement needs to be repeated</p> <p>Can find a pattern from their data and explain what it shows</p> <p>Can link what they have found out to other science</p> <p>Can they suggest how to improve their work and say why they think this</p>
Year 6	<p>Can choose the best way to answer a question and use information from different sources to plan an investigation</p> <p>Can make a prediction which links with other scientific knowledge</p> <p>Can plan which equipment they will need and use it effectively</p> <p>Can explain qualitative and quantitative data</p> <p>Can identify scientific evidence that has been used to support or to refute ideas or arguments and link their conclusions to it</p> <p>Can explain how they could improve their way of working</p>

	Can report and present 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
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## Foundation

Show curiosity about the world around them through exploration and play	Develop idea of grouping, sequences and cause and effect	Choose resources and handle equipment and tools effectively to carry out activities
Engage in open ended problem solving activities	Explore similarities and differences in natural and man made objects and materials	Make links and notice patterns
Take risks to engage in new learning activities	Use senses to explore and observe the world around them	Take on the role of scientists, doctors, engineers etc

## KS1

Plants	
<b>Year 1</b> <i>Deciduous, Evergreen trees, Leaves, Flowers (blossom), Petals, Fruit, Roots, Bulb, Seed, Trunk, Branches, Stem</i>	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
<b>Year 2</b> <i>Seeds, Bulbs, Water, Light, Temperature, Growth</i>	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

### Animals including humans

<b>Year 1</b> <i>Fish, Reptiles, Mammals, Birds, Amphibians (+ examples of each) Herbivore, Omnivore, Carnivore, Leg, Arm, Elbow, Head, Ear, Nose, Back, Wings, Beak</i>	Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. Identify and name a variety of common animals that are carnivores, herbivores and omnivores Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.
<b>Year 2</b> <i>Survival, Water, Air, Food, Adult, Baby, Offspring, Kitten, Calf, Puppy, Exercise, Hygiene</i>	Notice that animals, including humans, have offspring which grow into adults Find out about and describe the basic needs of animals, including humans, for survival (water, food and air) Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.

### Everyday materials

<b>Year 1</b> <i>Wood, Plastic, Glass, Paper, Water, Metal, Rock, Hard, Soft, Bendy, Rough, Smooth</i>	Distinguish between an object and the material from which it is made Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. Describe the simple physical properties of a variety of everyday materials. Compare and group together a variety of everyday materials on the basis of their simple physical properties
<b>Year 2</b> <i>Hard, Soft, Stretchy, Stiff, Shiny, Dull, Rough, Smooth, Bendy, Waterproof, Absorbent, Opaque, Transparent Brick, Paper, Fabrics, Squashing, Bending, Twisting, Stretching Elastic, Foil</i>	Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

### Seasonal Changes

<b>Year 1</b> <i>Summer, Spring, Autumn, Winter, Sun, Day, Moon, Night, Light, Dark</i>	Observe changes across the four seasons. Observe and describe weather associated with the seasons and how day length varies
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### Living things and their habitats

<b>Year 2</b>	Explore and compare the differences between things that are living, dead, and things that have never been alive.
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<p><i>Living, Dead, Habitat, Energy, Food chain, Predator, Prey, Woodland, Pond, Desert</i></p>	<p>Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other  Identify and name a variety of plants and animals in their habitats, including micro-habitats.  Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.</p>
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<b>Working at Greater Depth</b>	
<p>Year 1</p>	<p>Can begin to describe what each part of a plant does.  Can begin to classify animals according to a number of given criteria.  Can point out differences between living and non-living things.  Can name some parts of the human body that cannot be seen.  Can say why certain animals have certain characteristics.  Can name a range of wild animals?  Can describe things that are similar and different between materials.  Can explain what happens to certain materials when they are heated.  Can explain what happens to certain materials when they are cooled.</p>
<p>Year 2</p>	<p>Can name some characteristics of an animal that help it to live in a particular habitat  Can describe what animals need to survive and link this to their habitats.  Can explain that animals reproduce in different ways.  Can describe what plants need to survive and link it to where they are found Can they explain that plants grow and reproduce in different ways  Can describe the properties of different materials using words like, transparent or opaque, flexible, etc.  Can sort materials into groups and say why they have sorted them in that way  Can say which materials are natural and which are manmade  Can explain how materials are changed by heating and cooling  Can explain how materials are changed by bending, twisting and stretching  Can tell which materials cannot be changed back after being heated, cooled, bent, stretched or twisted</p>

**Lower KS2**



Animals including humans	
<b>Year 3</b> <i>Movement, Muscles, Bones, Skull, Nutrition, Skeletons,</i>	Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat Identify that humans and some other animals have skeletons and muscles for support, protection and movement
<b>Year 4</b> <i>Mouth, Tongue, Teeth, Oesophagus, Stomach, Small Intestine, Large Intestine, Herbivore, Carnivore, Canine, Incisor, Molar</i>	Describe the simple functions of the basic parts of the digestive system in humans Identify the different types of teeth in humans and their simple functions Construct and interpret a variety of food chains, identifying producers, predators and prey
Forces and magnets	
<b>Year 3</b> <i>Magnetic, Force, Contact, Attract, Repel, Friction, Poles, Push, Pull</i>	Compare how things move on different surfaces Notice that some forces need contact between two objects, but magnetic forces can act at a distance Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials Describe magnets as having two poles Predict whether two magnets will attract or repel each other, depending on which poles are facing
Light	
<b>Year 3</b> <i>Light, Shadows, Mirror, Reflective, Dark, Reflection</i>	Recognise that he/she needs 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 eyes Recognise that light from the sun can be dangerous and that there are ways to protect eyes Find patterns in the way that the size of shadows change
Plants	
<b>Year 3</b> <i>Air, Light, Water, Nutrients, Soil, Reproduction, Transportation, Dispersal, Pollination, Flower</i>	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
Rocks	
<b>Year 3</b> <i>Fossils, Soils, Sandstone, Granite, Marble, Pumice, Crystals, Absorbent</i>	Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties Describe in simple terms how fossils are formed when things that have lived are trapped within rock Recognise that soils are made from rocks and organic matter

Living things and their habitats	
Year 4	<p>Recognise that living things can be grouped in a variety of ways</p> <p>Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment</p> <p>Recognise that environments can change and that this can sometimes pose dangers and have an impact on living things</p>
Electricity	
Year 4 <i>Cells, Wires, Bulbs, Switches, Buzzers, Battery, Circuit, Series, Conductors, Insulators</i>	<p>Identify common appliances that run on electricity</p> <p>Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers</p> <p>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</p> <p>Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit</p> <p>Recognise some common conductors and insulators, and associate metals with being good conductors</p>
Sound	
Year 4 <i>Volume, Vibration, Wave, Pitch, Tone, Speaker</i>	<p>Identify how sounds are made, associating some of them with something vibrating</p> <p>Recognise that vibrations from sounds travel through a medium to the ear</p> <p>Find patterns between the pitch of a sound and features of the object that produced it</p> <p>Find patterns between the volume of a sound and the strength of the vibrations that produced it</p> <p>Recognise that sounds get fainter as the distance from the sound source increases</p>
States of matter	
Year 4 <i>Solid, Liquid, Gas, Evaporation, Condensation, Particles, Temperature, Freezing, Heating</i>	<p>Compare and group materials together, according to whether they are solids, liquids or gases</p> <p>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)</p> <p>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature</p>
Working at Greater Depth	
Year 3	<p>Can classify igneous and sedimentary rocks</p> <p>Can begin to relate the properties of rocks with their uses</p> <p>Can investigate the strengths of different magnets and find fair ways to compare them</p>

	<p>Can explain why lights need to be bright or dimmer according to need</p> <p>Can say what happens to the electricity when more batteries are added</p> <p>Can explain why their shadow changes when the light source is moved closer or further from the object</p> <p>Can explain how the muscular and skeletal systems work together to create movement</p> <p>Can classify living things and non-living things by a number of characteristics that they have thought of</p> <p>Can explain how people, weather and the environment can affect living things</p> <p>Can explain how certain living things depend on one another to survive</p> <p>Can classify a range of common plants according to many criteria (environment found, size, climate required, etc.)</p>
Year 4	<p>Can classify living things and non-living things by a number of characteristics that they have thought of</p> <p>Can explain how people, weather and the environment can affect living things</p> <p>Can explain how certain living things depend on one another to survive</p> <p>Can give reasons for how they have classified animals and plants, using their characteristics and how they are suited to their environment</p> <p>Can explore the work of pioneers in classification</p> <p>Can name and group a variety of living things based on feeding patterns (producer, consumer, predator, prey, herbivore, carnivore, omnivore).</p> <p>Can group and classify a variety of materials according to the impact of temperature on them</p> <p>Can explain what happens over time to materials such as puddles on the playground or washing hanging on a line</p> <p>Can explain why sound gets fainter or louder according to the distance</p> <p>Can explain how pitch and volume can be changed in a variety of ways</p> <p>Can work out which materials give the best insulation for sound</p> <p>Can explain how a bulb might get lighter</p> <p>Can recognise if all metals are conductors of electricity</p> <p>Can work out which metals can be used to connect across a gap in a circuit</p> <p>Can explain why cautions are necessary for working safely with electricity</p>

## Upper Key Stage 2

Animals including humans

<b>Year 5</b> <i>Foetus, Embryo, Womb, Gestation, Baby, Toddler, Teenager, Elderly, Growth, Development, Puberty</i>	Describe the changes as humans develop to old age
<b>Year 6</b> <i>Circulatory, Heart, Blood Vessels, Veins, Arteries, Oxygenated, Deoxygenated, Valve, Exercise, Respiration</i>	Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function Describe the ways in which nutrients and water are transported within animals, including humans

Living things and habitats	
<b>Year 5</b> <i>Mammal, Reproduction, Insect, Amphibian, Bird, Offspring</i>	Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird Describe the life process of reproduction in some plants and animals
<b>Year 6</b> <i>Classification, Vertebrates, Invertebrates, Micro-organisms, Amphibians, Reptiles, Mammals, Insects</i>	Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals Give reasons for classifying plants and animals based on specific characteristics

Earth and Space	
<b>Year 5</b> <i>Earth, Sun, Moon, Axis, Rotation, Day, Night, Phases of the Moon, star, constellation</i>	Describe the movement of the Earth, and other planets, relative to the Sun in the solar system Describe the movement of the Moon relative to the Earth Describe the Sun, Earth and Moon as approximately spherical bodies Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky

Forces and magnets	
<b>Year 5</b> <i>Air resistance, Water resistance, Friction, Gravity, Newton, Gears, Pulleys</i>	Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object Identify the effects of air resistance, water resistance and friction, that act between moving surfaces Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird Describe the life process of reproduction in some plants and animals

Materials	
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<p><b>Year 5</b>  <i>Hardness, Solubility, Transparency, Conductivity, Magnetic, Filter, Evaporation, Dissolving, Mixing</i></p>	<p>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 • Recognise that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution • Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • Demonstrate that dissolving, mixing and changes of state are reversible changes • Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda</p>
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<b>Electricity</b>	
<p><b>Year 6</b>  <i>Cells, Wires, Bulbs, Switches, Buzzers, Battery, Circuit, Series, Conductors, Insulators, Amps, Volts, Cell</i></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          Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches          Use recognised symbols when representing a simple circuit in a diagram</p>
<b>Evolution and Inheritance</b>	
<p><b>Year 6</b>  <i>Fossils, Adaptation, Evolution, Characteristics, Reproduction, Genetics</i></p>	<p>Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago          Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents          Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution</p>
<b>Light</b>	

<p>Year 6</p> <p><i>Refraction, Reflection, Light, Spectrum, Rainbow, Colour,</i></p>	<p>Recognise that light appears to travel in straight lines</p> <p>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</p> <p>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</p> <p>Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them</p>
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Working at Greater Depth	
<p>Year 5</p>	<p>Can create a timeline to indicate stages of growth in certain animals, such as frogs and butterflies</p> <p>Can describe the changes experienced in puberty</p> <p>Can draw a timeline to indicate stages in the growth and development of humans</p> <p>Can observe their local environment and draw conclusions about life-cycles</p> <p>Can compare the life cycles of plants and animals in their local environment with the life cycles of those around the world</p> <p>Can describe methods for separating mixtures</p> <p>Can work out which materials are most effective for keeping us warm or for keeping something cold</p> <p>Can use their knowledge of materials to suggest ways to classify (solids, liquids, gases)</p> <p>Can explore changes that are difficult to reverse, e.g. burning, rusting and reactions such as vinegar with bicarbonate of soda</p> <p>Can explore the work of chemists who created new material</p> <p>Can compare the time of day at different places on the earth</p> <p>Can create shadow clocks</p> <p>Can begin to understand how older civilizations used the sun to create astronomical clocks, e.g. Stonehenge</p> <p>Can explore the work of some scientists</p> <p>Can describe and explain how motion is affected by forces? (including gravitational attractions, magnetic attraction and friction)</p> <p>Can design very effective parachutes</p> <p>Can work out how water can cause resistance to floating objects</p> <p>Can explore how scientists, such as Galileo Galilei and Isaac Newton helped to develop the theory of gravitation</p>
<p>Year 6</p>	<p>Can explain the advantages of a parallel circuit</p> <p>Can explain how to make changes in a circuit</p> <p>Can explain the impact of changes in a circuit</p> <p>Can explain how different colours of light can be created</p>

	<p>Can they use and explain how simple optical instruments work? (periscope, telescope, binoculars, mirror, magnifying glass, Newton's first reflecting telescope)</p> <p>Can explore a range of phenomena, including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters</p> <p>Can research and discuss the work of famous scientists, such as Charles Darwin, Mary Anning or Alfred Wallace</p> <p>Can explain how some living things adapt to survive in extreme conditions</p> <p>Can explain why classification is important</p> <p>Can readily group animals into reptiles, fish, amphibians, birds and mammals</p> <p>Can sub divide their original groupings and explain their divisions, such as vertebrates and invertebrates</p> <p>Can find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification</p> <p>Can compare the organ systems of humans to other animals</p> <p>Can make a diagram of the human body and explain how different parts work and depend on one another</p> <p>Can name and locate the major organs in the human body</p>
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<https://www.gov.uk/government/publications/national-curriculum-in-england-science-programmes-of-study/national-curriculum-in-england-science-programmes-of-study#upper-key-stage-2-programme-of-study>