



## Science - Goals and Waypoints

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<p>Aspirational outcomes by the end of...</p>	<p><b>Disciplinary knowledge</b> Scientific attitudes Experimental skills &amp; investigations Analysis &amp; Evaluation</p>	<p><b>Biology:</b> Structure &amp; Function of Living Organisms Material cycles and energy Interactions &amp; interdependence Genetics &amp; evolution</p>	<p><b>Chemistry:</b> The particulate nature of matter Atoms, elements and compounds Pure and impure substances Chemical reactions Energetics The Periodic table Materials Earth &amp; atmosphere</p>	<p><b>Physics:</b> Energy Motion &amp; Forces Waves Electricity &amp; Electromagnetism Matter Space physics</p>
<p><b>EYFS</b></p>	<p>Observing, comparing, identifying similarities and differences, exploring using senses. Communicating thoughts and ideas using newly introduced language and vocabulary</p>	<p><b>PSED:</b> Manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of healthy food choices.</p> <p><b>CL:</b> Listen attentively and respond to what they hear with relevant questions, comments and actions when being read to and during whole class discussions and small group interactions Make comments about what they have heard and ask questions to clarify their understanding. Hold conversation when engaged in back-and-forth exchanges with their teacher and peers. Participate in small group, class and one-to-one discussions, offering their own ideas, using recently introduced vocabulary. Offer explanations for why things might happen, making use of recently introduced vocabulary from stories, non-fiction, rhymes and poems when appropriate. Express their ideas and feelings about their experiences</p>		

		<p>using full sentences, including use of past, present and future tenses and making use of conjunctions, with modelling and support from their teacher.</p> <p><b>UW:</b> Explore the natural world around them, making observations and drawing pictures of animals and plants. Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.</p>		
<p><b>Key Stage 1</b></p>	<p>Asking simple questions and recognising that they can be answered in different ways.</p> <p>Observing closely, using simple equipment.</p> <p>Performing simple tests.</p> <p>Identifying and classifying.</p> <p>Using their Observations and ideas to suggest answers to questions.</p> <p>Gathering and recording data to help in answering questions.</p>	<p><b>Living things and their habitats:</b> Knowing and explaining the common characteristics of living things (those that are living, dead and have never been alive). Knowing and explaining what a habitat and microhabitat is and why animals are best suited to it. Explain what an animal is, how they get their food and what a simple food chain is.</p> <p><b>Animals including humans:</b> Knowing and explaining what an animal is, their offspring, lifecycle, how seasons affect</p>	<p><b>Everyday materials:</b> Knowing the properties of everyday materials and explaining differences between them. Identifying and explaining the suitability of materials for different purposes.</p>	<p><b>Seasonal changes and daily weather:</b> Knowing and explaining the order of seasons, the changes within each season including months of the year and the different patterns of weather and explaining, for example, how rain can occur in all seasons. Knowing that the earth rotates and explaining how day and night occurs.</p>

them, their common features,  
food they eat and their  
habitats.

Knowing and locating the  
main body parts of a human  
and explaining the five senses.  
Explaining the elements  
needed to keep humans  
healthy.

**Plants:**

Identifying the basic structure  
of plants and trees and  
explaining similarities and  
differences between them.

## Lower KS2

Ask relevant questions, set up simple, practical enquiries and comparative and fair tests.

Make accurate measurements using standard units, using a range of equipment.

Gather, record, classify and present data in a variety of ways to help in answering questions.

Record and report findings in a variety of different ways.

### **Animals including humans:**

Explaining nutrition needs for humans and animals, the purpose and function of the human skeleton and muscles, and the difference between vertebrates and invertebrates. Identifying and explaining the parts and functions of teeth and the digestive system. Knowing, constructing and explaining food chains.

### **Plants:**

Knowing and identifying the structure, function and needs of flowering plants. Explaining the process of transpiration, pollination, seed formation and dispersal.

### **Living things and their habitats:**

Grouping living things in a variety of ways, knowing using and explaining the classification of vertebrates and invertebrates. Using classification keys to group, identify and name living things and explaining the impact of habitat changes.

### **Rocks:**

Knowing and explaining what a rock is/is not, how rocks are formed, the different types and how they can be grouped according to their properties. Explaining how fossils are formed, and the different types. Explaining what soil is made from.

### **States of Matter:**

Knowing and explaining what matter and state means, introducing simple models of what particles are. Explaining the difference between solids, liquids and gases and how some materials change state. Knowing and explaining evaporation and condensation.

### **Forces and Magnets:**

Explaining friction and resistance, the difference between contact and non-contact forces, how magnets attract and repel and knowing and identifying a magnet's two poles and what materials are magnetic and why.

### **Light:**

Knowing and explaining what light is, how it is reflected, how shadows are formed and change size and how to protect our eyes.

### **Electricity:**

What runs on electricity?, Identifying and explaining a single loop circuit and its components. Identifying and using components such as a lamp and switch and identifying conductors and insulators.

### **Sound:**

Knowing and explaining what sound is, how sounds are made, how they travel, what pitch and loudness means and the patterns between pitch and an object, and volume of sound and the vibrations it produces and sound and distance.

## Upper KS2

Plan enquiries, including recognising and controlling variables where necessary.

Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work.

Take measurements, using a range of scientific equipment, with increasing accuracy and precision.

Record, report and present data in a variety of ways. Use test results to make predictions to set up further comparative and fair tests.

Use simple models to describe scientific ideas, identifying scientific evidence that has been used to support or refute ideas or arguments.

- **Animals including humans:**
- Knowing, describing and explaining the process of aging, including puberty and the difference in gestation periods between humans and other animals.
- Identifying and explaining the parts and functions of the human circulatory system, and what effects it, and the ways in which water and nutrients are transported within animals including humans.
- **Living things and their habitats:**
- Knowing, identifying and explaining the differences in lifecycles, and the life process of reproduction. Classifying living

### **Properties and changes of materials:**

Grouping properties of everyday materials, Separate mixtures, explain dissolution, recovering a substance, reversing changes and the formation of new materials from changes.

### **Forces:**

Explaining gravity, effects of air resistance, water resistance and friction. Explore and explain mechanisms such as levers, pulleys and gears. Identify significant scientists and how they helped gravitational theory.

### **Earth in Space**

Identify the planets in our solar system, explain the movement of Earth and other planets in relation to the sun, the movement of the Moon relative to the Earth and the Earth's rotation to explain day and night.

### **Electricity**

Know and explain how a series circuit works, how components function and are affected by the number and voltage of cells. Knowing and using recognised symbols and explaining how to be safe when working with electricity.

### **Light**

Explain how light travels in straight lines, how objects are seen and how shadows have the same shape as the objects that cast them.

		<p>things into groups according to characteristics. Explaining about a significant scientist. Knowing, using and explaining taxonomy.</p> <ul style="list-style-type: none"> <li>- <b>Evolution and Inheritance:</b></li> <li>- Knowing and explaining that fossils provide information, offspring varies, animals and plants adapt to suit their environment and may lead to evolution.</li> </ul>		
<p><b>Key Stage 3</b></p>	<p>Analyse patterns, draw conclusions, collect &amp; present data, plan variables, test hypotheses, construct explanations, justify opinions, discuss limitations, evaluate data, critique claims and justify opinions</p> <p>Analyse patterns, draw conclusions, collect &amp; present data, plan variables, test</p>	<p>Describe organisational hierarchy in organisms</p> <p>Explain the biological processes of digestion, immunity, reproduction, respiration and photosynthesis.</p> <p>Explain inheritance, adaptation and factors that</p>	<p>Describe Particle Model in solids, liquids and gases</p> <p>Describe different types of chemicals; elements, compounds &amp; mixtures</p> <p>Draw electrons and describe atomic structure</p> <p>Describe the properties of metals and non-metals</p>	<p>Describe energy stores and transfers</p> <p>Use physics equations to calculate different types of energy</p> <p>Describe a range of contact &amp; non-contacts</p> <p>Explain the link between forces and motion</p> <p>Build circuits and calculate charge,</p>

	<p>hypotheses, construct explanations, justify opinions, discuss limitations, evaluate data, critique claims and justify opinions</p>	<p>lead to evolution</p> <p>Describe the role of plants, animals and decomposers in ecological food webs</p>	<p>Describe properties of groups in the Periodic Table</p> <p>Learn about a range of chemical reactions including neutralisation</p>	<p>describe static electricity</p> <p>Describe sound waves in terms of amplitude &amp; frequency and reflection of sound</p>
<p><b>Key Stage 4</b></p>	<p>Development of investigation &amp; maths skills in relation to all the required practicals in the curriculum: Key terms: accuracy, precision, reliability, reproducibility, repeatability, resolution, intervals Skills: describing variables, evaluating materials</p>	<p>Describe the structure and function of a range of specialised cells, tissues, organs and organ systems</p> <p>Describe how organisms deal with infection, the prevention and treatment</p> <p>Describe cell transport, cell division, differentiation and energy transfer in cells</p> <p>Explain which factors affect the rate of photosynthesis</p> <p>Explain the structure and function of a range of body</p>	<p>Describe atomic theory</p> <p>Explain how the Periodic Table is organised and describe properties of major Groups</p> <p>Compare 3 types of bonding and 2 types of chemical forces</p> <p>Chemistry calculations</p> <p>Describe 5 different types of chemical reactions and energy changes that can take place</p> <p>Explain factors that affect rates of reaction and equilibrium position</p>	<p>Compare energy stores &amp; transfers in terms of latent heat, specific heat capacity and internal energy</p> <p>Describe electricity in circuits and in the home using a range of physics equations</p> <p>Compare the properties &amp; dangers of nuclear radiation</p> <p>Explain the importance of the electromagnetic spectrum in everyday applications</p> <p>Explain the interactions between electric and magnetic fields and applications of electromagnetism</p>

		<p>systems: respiratory, digestive &amp; circulatory Measure distribution of organisms in a habitat (sampling technique)</p>		<p>Understanding concepts that explain expansion of the universe, formation of stars, organisation of bodies within our universe</p>
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