

Our Curriculum for Science

Aims

At Totley All Saints, we aim to ensure that all pupils:

- understand and apply the fundamental principles and concepts of science, so that they can understand the world through the specific disciplines of biology, chemistry and physics. We will support and nurture all children with their understanding of how science has changed our lives and is vital to the world's future
- understand how science has changed our lives and is vital to the world's future prosperity, giving them the ability to recognise the power of rational explanation.
- are excited and curious about the world around them, so that they are inspired to think about science in a meaningful and responsible way throughout their lives.
- are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

Early Learning Goal: Understanding the world - the world

Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur, and talk about changes.

Year 1

Year 2

The working scientifically skills are taught during every Science unit of work. Some units lend themselves better to certain strands, but over the year, every year group will have taught even coverage of the skills outlined below.

Year 1		Year 2	
Working Scientifically	ask simple questions about the world around me	Working Scientifically	ask simple questions about the world around me
	observe carefully, using simple equipment		observe carefully, using simple equipment
	carry out simple tests		carry out simple fair tests
	identify and make groups		identify and classify into groups
	suggest answers to questions		answer questions in different ways
	collect data to answer questions		collect data to answer questions

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<p>Plants</p>	<ul style="list-style-type: none"> ➤ write instructions to describe how to plant a bean or similar ➤ identify some common garden plants from photographs ➤ name some garden plants from memory ➤ identify some common plants in the wild ➤ label the parts of a plant ➤ sort leaves into groups of deciduous or evergreen and describe the differences ➤ collect information from the school grounds/Woodland Workshop ➤ generate questions about plants ➤ measure the growth of a bean plant or similar with a ruler <p>use observations to give reasons for their answers to questions</p>	<p>Plants</p>	<ul style="list-style-type: none"> ➤ label the main parts of plants and trees ➤ describe and give examples of plants that grow from a seed and plants that grow from a bulb, suggesting why certain plants may need to grow from a bulb ➤ describe the stages in the life cycle of a plant ➤ explain that plants need water, light and a suitable temperature to grow well, and that different plants have different needs ➤ make observational drawings of plants ➤ measure the growth of plants with a ruler and compare with different plants ➤ record the growth of plants in a bar chart ➤ use observations to explain how we can tell that plants are living things, giving reasons ➤ set up a simple comparative test <p>make a simple prediction of the conditions that crops need to grow well</p>
<p>Seasonal changes</p>	<ul style="list-style-type: none"> ➤ name the four seasons and give an event or occasion that happens in each ➤ name and make observations about different types of weather ➤ describe the weather associated with each season ➤ describe how day length varies between seasons ➤ make comparisons across the four seasons 	<p>Living things & their habitats</p>	<ul style="list-style-type: none"> ➤ compare things that are living, dead or have never been alive, asking questions to help them decide ➤ explain some of the life processes ➤ identify a variety of plants and animals in a familiar habitat and record on a map ➤ begin to identify some plants and animals in global habitats ➤ sort objects into categories and give reasons for choices ➤ identify and name minibeasts in microhabitats ➤ suggest ways in which an animal can survive in its habitat ➤ explain why the animals in a habitat need the plants and begin to understand why the plants need the animals <p>draw and label a simple food chain</p>
<p>Animals including humans</p>	<ul style="list-style-type: none"> ➤ Draw and label parts of the human body ➤ Describe activities that use each of the 5 senses ➤ Sort animals into simple groups, including groups based on animal diets, for example using a Venn diagram ➤ Describe animal bodies using the appropriate scientific vocabulary ➤ Understand the difference between carnivore, herbivore and omnivore, be able to name these groups and give examples of each ➤ Identify and classify animals using the 5 main groups and give examples of each 	<p>Animals including humans</p>	<ul style="list-style-type: none"> ➤ say how an animal will change as it grows ➤ draw an animal as a baby and then as an adult ➤ name the different stages in a human's development and describe what they are like at the different stages ➤ say how an animal gets air, food and water ➤ say what is healthy about their own diet and how it can be improved, giving examples of a healthy balanced meal using the different food types where possible ➤ give a reason why humans need to exercise and name at least one of the effects it has on the body ➤ record information about exercise <p>give reasons why humans should keep themselves clean</p>
<p>Materials</p>	<ul style="list-style-type: none"> ➤ Distinguish between an object and the material it is made from ➤ Describe and compare the properties of different materials ➤ Make a prediction about the material an object is made from and suggest a reason ➤ Perform a simple test to investigate different materials, and explain how the test could be made fair ➤ Use observations to answer simple questions ➤ Sort objects 3 ways 	<p>Materials</p>	<ul style="list-style-type: none"> ➤ compare and classify the uses of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard ➤ compare and explain the suitability of the different everyday materials listed above in different circumstances ➤ investigate how the shapes of these solid materials can be changed by squashing, bending, twisting and stretching, by designing and carrying out fair tests, and recording and comparing results ➤ explain the basic process of recycling and explain its advantages, giving examples

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Year 3		Year 4	
<p>The working scientifically skills are taught during every Science unit of work. Some units lend themselves better to certain strands, but over the year, every year group will have taught even coverage of the skills outlined below.</p>			
Working Scientifically	ask relevant questions	Working Scientifically	use, predict and answer relevant questions
	make observations and take accurate measurements		observe and measure, using a range of equipment
	set up fair tests		set up fair tests to compare ideas
	record and present data in different ways		record, classify and present data using keys
	use scientific language to explain my ideas		report on findings using displays and presentations
	draw simple conclusions and suggest improvements		use results to draw simple conclusions and raise further questions
Plants	<ul style="list-style-type: none"> ➤ identify the different parts and explain the different functions of a flowering plant; roots, stem/trunk, leaves and flowers ➤ identify different parts of a flower ➤ identify and describe the different stages of the life cycle of a flowering plant, including pollination, seed formation and seed dispersal ➤ understand that different seeds and bulbs grow into different plants and describe them, giving examples ➤ explain why and how seeds are dispersed ➤ 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 ➤ 	Living things and their habitats	<ul style="list-style-type: none"> ➤ generate own criteria to sort living things ➤ sort living things into a Venn and Carroll diagram ➤ use questions to sort animals using a key ➤ use a key to identify invertebrates by looking at their characteristics, and explain how it works ➤ use the characteristics of living things to sort them using a classification key ➤ show the characteristics of living things in a table ➤ create a classification key ➤ identify dangers to local wildlife in the local and wider environment; explaining how these have affected endangered species
Animals including humans	<ul style="list-style-type: none"> ➤ explain the different ways that plants and animals obtain food ➤ explain the difference between food groups and nutrient groups ➤ explain what the right type and amounts of nutrition for human beings, as well as some of the consequences related to eating the wrong type of diet ➤ identify the similarities and differences between animals based on their diets ➤ use the scientific names for the main bones in the human body and some other animals, and explain how the skeleton protects, supports and helps the body to move ➤ identify the pros and cons of different types of skeleton 	Animals including	<ul style="list-style-type: none"> ➤ identify and name parts of the digestive system, construct the digestive system independently ➤ match the parts of the digestive system to their functions and explain some of the functions ➤ match the types and functions of teeth, identify teeth from a diagram ➤ construct and interpret a variety of food chains
Light	<ul style="list-style-type: none"> ➤ understand that dark is the absence of light ➤ understand how surfaces reflect light and explain the properties of materials that reflect light well ➤ recognise that a mirror appears to reverse an image ➤ identify some parts of the eye ➤ understand how the Sun can damage some parts of the eye ➤ identify opaque, translucent and transparent objects ➤ know how shadows change size and understand why 	Rocks and Soils	<ul style="list-style-type: none"> ➤ give examples of natural and human made rocks ➤ group rocks by their properties and identify similarities and differences ➤ explain the difference between a bone and a fossil ➤ explain the main processes of fossilisation ➤ explain, using scientific language, how soil is formed ➤ identify the importance of Mary Anning's work in palaeontology

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<p style="text-align: center;">Sound</p>	<ul style="list-style-type: none"> ➤ explain how sound sources vibrate to make sounds ➤ explain how vibrations change when the loudness of a sound changes ➤ explain how sound travels to reach our ears and how we interpret sounds ➤ describe the pitch of a sound ➤ describe patterns between the pitch of a sound and the features of the object that made the sound ➤ explain how sound travels through a particular instrument e.g. a string telephone ➤ identify the best material for absorbing sound and how sound travels differently through different materials ➤ explain how sounds change over distance ➤ explain why sound travels better through solids than gases ➤ create a musical instrument that can play high, low, quiet and loud sounds and explain how it plays different sounds 	<p style="text-align: center;">Materials</p>	<ul style="list-style-type: none"> ➤ describe the properties of solids, liquids and gases and explain how their particles behave ➤ explain that melting and freezing are opposite processes that change the state of a material, and are caused by heating and cooling ➤ identify the melting and freezing point of several different materials and explain why it is the same temperature ➤ explain that heating causes evaporation and cooling causes condensation ➤ explain that evaporation and condensation are opposite processes that change the state of a material ➤ explain that the higher the temperature, the quicker water evaporates ➤ explain what happens to water at the different stages of the water cycle, and why the water that we use today is the same water that has been on Earth for millions of years
<p style="text-align: center;">Forces and magnets</p>	<ul style="list-style-type: none"> ➤ identify the type of force required to carry out an action ➤ investigate the force of friction produced by different surfaces ➤ make generalisations about the types of surfaces that produce the most or least friction ➤ explain that magnets produce an invisible pulling force and describe it as a magnetic field ➤ identify magnetic materials ➤ identify different types of magnet ➤ investigate the strength of different magnets ➤ identify when magnets will repel or attract based on their poles ➤ use a magnetic compass with 8 points 	<p style="text-align: center;">Electricity</p>	<ul style="list-style-type: none"> ➤ sort appliances based on whether they use battery or mains ➤ explain how a circuit works ➤ create a simple series circuit both with and without a switch and name the different components ➤ explain why a circuit is incomplete ➤ explain how a switch turns the electric current on and off ➤ name some electrical insulators and conductors ➤ generalise about types of materials that conduct electricity, eg. metals

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Year 5		Year 6	
<p>The working scientifically skills are taught during every Science unit of work. Some units lend themselves better to certain strands, but over the year, every year group will have taught even coverage of the skills outlined below.</p>			
Working Scientifically	plan enquiries to answer questions	Working Scientifically	plan enquiries to answer questions and identify variables
	observe and measure with increasing accuracy		measure accurately and take repeat readings.
	record results using diagrams, labels, tables, bar and line graphs		record results using classification keys and scatter graphs.
	make predictions from results and use in further fair tests		make predictions from results for comparative tests
	report and present findings, including conclusions, in different ways		report and present findings and explain how results might not be true.
	identify simple scientific evidence to support arguments		identify scientific evidence to back up arguments.
Living things and their habitats	<ul style="list-style-type: none"> ➤ identify parts of a flower and explain their function ➤ give 2 or more differences between asexual and sexual reproduction ➤ identify the features of plants pollinated by insects or the wind ➤ describe the stages of sexual reproduction ➤ describe the differences between the 3 types of mammals ➤ identify familiar animals that undergo metamorphosis ➤ order and describe the stages of the life cycles of mammals, birds, insects and amphibians ➤ identify similarities and differences between the life cycles of different plants and animals ➤ understand the important role of one or more naturalists, such as Jane Goodall and give 4 or more facts about their life and work 	Living things and their habitats	<ul style="list-style-type: none"> ➤ give reasons for the classification of animals, using examples as a guide ➤ classify living things using the Linnaean system and explain how they are classified at each level ➤ match groups of animals to their characteristics ➤ classify creatures based on their characteristics ➤ describe the useful and harmful effects of different microorganisms ➤ investigate how harmful microorganisms work ➤ describe the characteristics of different microorganisms including cell structure ➤ describe the characteristics of groups of organisms using visual prompts
Materials	<ul style="list-style-type: none"> ➤ identify different materials, describe and test their properties using own investigations ➤ identify thermal and electrical conductors and insulators and explain their uses ➤ explain the uses of a range of different materials according to a range of different properties ➤ order materials according to one of their properties ➤ identify materials that are soluble or insoluble in water ➤ explain and investigate dissolving, and recognise the conditions that will speed up its rate ➤ follow instructions to separate mixtures and explain the processes involved, choosing the most suitable ➤ identify and explain irreversible changes and identify the new materials made 	Electricity	<ul style="list-style-type: none"> ➤ explain how our understanding of electricity has changed over time ➤ explain how major discoveries led to the widespread use of electricity ➤ know the main circuit symbols and use these to draw circuit diagrams ➤ label the voltage correctly ➤ explain the effect of increasing or decreasing the voltage on different parts of a circuit ➤ identify variations in component function
Earth and Space	<ul style="list-style-type: none"> ➤ describe the Earth, Sun and Moon as approximately spherical ➤ explain some of the different ideas about the shape of the Earth that people used to have ➤ name some of the planets in the Solar System and describe some of their features ➤ explain how the planets orbit the Sun ➤ explain that day and night is due to rotation of the Earth 	Forces	<ul style="list-style-type: none"> ➤ identify and explain the different forces acting on objects, including balanced and unbalanced forces ➤ explain Isaac Newton's role in discovering gravity and other discoveries and explain gravity as a force that pulls objects down ➤ accurately measure an object's weight and mass ➤ explain the difference between weight and mass ➤ explain the link between the weight and mass of an object

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	<ul style="list-style-type: none"> ➤ understand that different places on Earth experience night and day at different times and support with evidence, explaining why this is the case ➤ explain that the Moon orbits the Earth and how it moves relative to the Earth ➤ explain how the Earth and Moon move relative to the Sun ➤ recall and describe the phases of the Moon 		<ul style="list-style-type: none"> ➤ identify streamlines shapes ➤ make generalisations about how to increase the effects of air resistance ➤ explain how to minimise the effects of water resistance ➤ explain how friction is used in brake pads ➤ investigate the effects of friction ➤ make generalisations about the properties of materials that create the most friction ➤ explain how different mechanisms work ➤ design a mechanism to achieve a given purpose and explain how it can alter force and motion to achieve this purpose
Animals including humans	<ul style="list-style-type: none"> ➤ order the stages of human development; naming all 6 stages and being able to describe features of each stage ➤ demonstrate understanding of how babies grow in height and weight ➤ describe the main changes that occur during puberty, giving reasons ➤ analyse the similarities and differences between how girls and boys experience puberty ➤ explain the main changes that occur in old age 	Light	<ul style="list-style-type: none"> ➤ recognise that light travels in straight line ➤ explain how light travels to enable us to see ➤ understand that all objects reflect light ➤ identify the angles of incidence and refraction and understand that they are equal ➤ understand refraction as light bending or changing direction and explain how it happens through glass or water ➤ explain how a prism allows us to see the visible spectrum ➤ understand that colours are a result of light reflecting off an object ➤ have some knowledge of scientists experiments with light, e.g. Isaac Newton ➤ explain that objects block light to form shadows and how shadows change size ➤ understand that shadows are the same size as the objects that cast them
Animals including humans	<ul style="list-style-type: none"> ➤ identify the main parts of the circulatory system ➤ explain the main functions of the heart, lungs and blood vessels in the circulatory system ➤ name the main parts of the organs and give their specific functions within the circulatory system ➤ recap how the digestive system breaks down nutrients ➤ understand the processes of how water and nutrients are transported around the body and explain the processes which break down food into nutrients ➤ understand how the circulatory and digestive systems connect to transport water and nutrients throughout the body ➤ explain what constitutes a healthy lifestyle ➤ state the beneficial impact of a healthy diet and exercise on the human body ➤ describe how drugs and alcohol can impact negatively on the body ➤ describe how smoking cigarettes impacts negatively on the body and how scientific evidence has changed ideas about smoking ➤ take accurate measurements of the pulse rate 	Evolution and inheritance	<ul style="list-style-type: none"> ➤ identify inherited traits and adaptive traits ➤ understand that adaptations are random mutations ➤ develop an understanding of the development of evolutionary ideas and theories over time ➤ explain how human evolution has occurred and compare modern humans with those of the same genus and family ➤ understand that adaptation and evolution is not a uniform process for all living things ➤ explain the terms adaptation, evolution and natural selection, and use these in context ➤ examine fossil evidence supporting the idea of evolution ➤ identify the difference between selective and cross-breeding and give examples ➤ explain in simple terms what is meant by DNA and genes ➤ investigate the ethical issues of human intervention in the process of evolution by natural selection ➤ Understand the importance of scientists such as Charles Darwin in this field