Tilston Parochial
CE Primary School

Tilston Parochial Primary School

Our School Curriculum

A creative and thematic approach to learning.

Curriculum Intent and Progression Map

Subject: Science

Tilston Parochial CE Primary School

Science Curriculum Statement

'Somewhere, something incredible is waiting to be known.' Carl Sagan

At Tilston Parochial CE Primary School we believe that exploring, investigating and understanding science helps us to live our lives to the fullest. We learn to encounter and appreciate the wonders of the natural world, and we learn about ourselves and the responsibility we have to care for the world around us. Caring for our environment through Outdoor Learning and Global studies are important for us to help tackle issues closest to home and look at how we can help make an impact around the world.

A strong understanding of Science will allow children to understand concepts, recognise the importance of explanations, develop their ability to explain the world around them, predict, analyse and broaden their vocabulary, all while developing a sense of curiosity and excitement about the natural world.

We believe that Science is vital to the world's future prosperity and that by developing key scientific skills and knowledge alongside a sense of joy, friendship, community, courage, respect and trust, we will be creating the scientists of the future by encouraging one another and building each other up.

Tilston Parochial CE Primary School

Science Curriculum **Intent**

At Tilston Parochial CE Primary School, we encourage children to be inquisitive throughout their time at the school and beyond. Science is the introduction to the world of life processes and living things, materials and their properties and physical processes. It involves distinct ways of seeing, exploring and understanding the world. It is a fundamental part of everyday life and is essential to our understanding of the world. Science encourages individuals to develop a sense of excitement and curiosity, to seek explanations and to respect the world. Through science, pupils understand how major scientific ideas contribute to technological change. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

As a result of our science teaching, we want to develop children who:

- are observant, curious and caring about our environment;
- see science as an enjoyable experience;
- can work individually and cooperatively, listening to, and valuing, the opinions of others;
- can observe, question, hypothesise, plan, measure, construct a fair test, communicate and draw conclusions;
- be able to relate science to everyday life and appreciate its contribution both in the present, and historically, to our society and other cultures;
- appreciate the nature of science and the importance of collecting evidence.
- focus on Scientific questions like *What is it like? How did it get like this? How and why did it change? What will happen if…?*
- develop their understanding of physical processes
- acquire practical scientific skills
- develop the skills of investigation, including – observing, measuring, predicting, experimenting, communication, interpreting, explaining and evaluating
- develop and use ICT skills

TRUST
'May the God of hope fill you with all joy and peace as we trust in him.' Romans 15:13

COURAGE
'Be strong and courageous, do not be frightened or dismayed, for the Lord your God is with you wherever you go.' Joshua 1:9

COMMUNITY
How good and pleasant it is when God's people live together in unity.' Psalm 133.1

RESPECT
'Do to others as you would have them do to you.' Matthew 7:12

JOY
'A happy heart makes the face cheerful.' Proverbs 15:13

FRIENDSHIP
'There is a friend who sticks closer than a brother.' Proverbs 18:24

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Implementation

Our children are encouraged to adopt a positive attitude towards science. We propose to present each child with the opportunity to develop their scientific knowledge through investigation and discovery. Additionally, the practical nature of science is recognised and opportunities for learning through play and first-hand experience is provided, especially in the early years. Science plays an important role in the development of investigative skills and draws upon strong mathematical links, for example measurement, pattern recognition, graphical skills and data handling. Curricula links to other areas, for example, language, are recognised and developed. Children are given opportunities, where appropriate, to develop their Information Technology capability in the study of science. Science is mainly taught through cross curricula topics.

- Pupils experience Science every week.
- Teachers are clear about their learning intentions and track small steps of objectives through White Rose Science.
- Teachers are expected to set work that is in line with objectives and standards expected for the age and stage of the majority of pupils in the lesson. They set work for those pupils who are capable of going further and for those who make slower progress.
- Science is taught discretely in order to fully immerse themselves within the subject area, however teachers plan cross curricular links when suitable to optimise learning.
- Involvement of members of the community and parents in the children's scientific enquires and investigations is encouraged through annual science fairs.
- There are planned visits to sites of relevant scientific interest and appropriate fieldwork
- Use of a wide range of resources to support and enhance learning
- Liaison between the two key stages and through science partnership with Bishop Heber High School.
- Provision is available for professional development of staff

Tilston Parochial CE Primary School

Impact

'Nothing in life is to be feared; it is only to be understood.' Marie Curie

At Tilston Parochial CE Primary School our science curriculum ensures that there is a good balance of knowledge and skills with progression built in. Through practical 'hands on' work it means that science is enjoyed by all.

Observations of and discussions with pupils are carried out to listen for correct use of vocabulary and knowledge of learning. Differentiated activities allow teachers to ensure that all pupils are working at the relevant level and making progress. Teachers mark books regularly and use Insight to monitor and assess the children's progress in line with national expectations using exemplification materials to support these judgements. Ongoing reflections and evaluations of lessons take place to inform planning for teaching and learning and pupil progress.

Teachers also assess and monitor the pupil's knowledge through book scrutiny's and reflections on the KWL grids. Teachers will then analyse pupil's progress at the end of each academic year to enable them to complete each pupil's annual report to parents.

The successful approach at Tilston Parochial CE Primary School results in a fun, engaging, 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, giving science a rich context, relevant to their daily lives. Frequent, continuous and progressive learning outside the classroom is embedded throughout the science curriculum. Through various workshops, trips and interactions with experts and local charities, children have the understanding that science has changed our lives and that it is vital to the world's future prosperity.

SCIENCE- Progression in Skills

Plants							
	EYFS	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
National Curriculum Expectations	Explore the natural world around them. Describe what they see, hear and feel whilst outside Understand the effects of changing seasons on the natural world around them Use all their senses in hands-on exploration of natural materials Talk about what they see, using a wide vocabulary Plant seeds and care for growing plants Understand the key features of the life cycle of a plant and an animal Begin to understand the need to respect and care for the natural environment and all living things **ELG** **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**	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.	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	Identify and describe the functions of different parts of flowering plants: roots, stem, 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 role of flowers in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. Explore and use classification keys Recognise that living things can be grouped in a variety of ways.			
	Children plant seasonal vegetables and flowers around the school grounds						

Opportunities to work scientifically	Name and describe plants they find in the school grounds. Look for plants in different areas of the school ground.	**What order do the parts of a plant grow?** The children will grow two different plants and will observe over time at what point different parts of the plant grown and identify them.	**What does a plant need to grow?** Children investigate what a plant needs to grow through removing one of its key requirements and observing what happens to the plant over time.	**How is water transported in plants?** Children use celery and water with food dye to investigate how water is transported in plants, including what factors affect this transportation, such as heat and light.			
Vocabulary	Plants, bushes, flower, vegetables, name plants, contrasting habitats, weed, herb	Leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud Names of trees in the local area Names of garden and wild flowering plants in the local area	As for Year 1 plus light, shade, sun, warm, cool, water, grow, healthy	Photosynthesis, pollen, insect/wind pollination, seed formation, seed dispersal (wind dispersal, animal dispersal, water dispersal)			
Recommended texts and Scientists	Ben plants a Butterfly garden	Beatrix Potter (Author and Botanist)	Agnes Arber (Botanist) Alan Titchmarsh (Botanist and Gardener)	Jan Ingenhousz (Photosynthesis) Joseph Banks (Botanist)			

Living things and their habitats/ Seasonal Changes (Year 1)							
	EYFS	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
National Curriculum Expectations	Describe what they see, hear and feel whilst outside Understand the effects of changing seasons on the natural world around them **ELG** **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**	Observe changes across the four seasons Observe and describe weather associated with the seasons and how day length varies.	Explore and compare the differences between things that are living, dead, and things that have never been alive 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 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.		Recognise that living things can be grouped in a variety of ways Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment Recognise that environments can change and that this can sometimes pose dangers to living things.	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.	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.
Opportunities to work scientifically	How does a puddle change over time? Which clothes are suitable to wear in each season? Look for mini-beasts in different areas of the school ground	**Classification** The children will be given different pictures which have different features of the seasons and group and classify them into spring, summer, autumn, winter, spring	**Classification** The children will classify living, dead and never living into different groups. The children will predict what they may see in a microhabitat and then investigate to conclude if they are correct.		**How can we group animals and plants?** The children will group different animals into vertebrate and invertebrates. They will also group plants in different categories. **How can we identify different animals?** The children will be given owl pellets and they are to	**How can we group animals according to their life cycle?** The children will be given different animals and they have to find different ways of grouping them according to their life cycle.	**How can we identify and group the different living things in local area?** The children will have a variety of aspects of nature to group and classify according to their features.

					identify the bones in the owl pellet.		
Vocabulary	Autumn, Spring, Summer, Winter, various weather types. Plant, tree, bush, flower, vegetable, herb, weed, animals, names of plants and animals they see, name contrasting environments e.g beach, forest	Weather (sunny, rainy, windy, snowy etc.) Seasons (winter, summer, spring, autumn) Sun, sunrise, sunset, day length	Living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed Names of local habitats e.g. pond, woodland etc. Names of micro-habitats e.g. under logs, in bushes etc		Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate	Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings	Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering, non-flowering
Recommended texts and Scientists	Bad tempered Ladybird – eric Carle Aargh the spider Insects: A close up look	Dr Steve Lyons (Extreme Weather) Holly Green (meteorologist)	Terry Nutkins (TV Presenter) Liz Bonnin (Conservationist)		Cindy Looy (Environmental change and Extinction) Jaques Cousteau (Marine Biologist)	David Attenborough (Naturalist and Nature Documentary broadcaster) James Brodie (Reproduction of Plants by spores)	Carl Linnaeus (identifying, naming and classifying organisms)

Materials/ States of Matter							
EYFS	**EYFS**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
National Curriculum Expectations	Recognise some environments that are different to the one in which I live. Use all their senses in hands-on exploration of materials Explore a collection of materials with similar and/ or different properties Talk about the differences between materials and changes they notice	**Everyday Materials** Distinguish between an object 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.	**Uses of Everyday Materials** 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.		**States of Matter** 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 building on the teaching in mathematics. Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	**Properties and changes of materials** 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 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 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.	
		Design and Technology **Design and make a textile explorers bag (Textiles)** **Fairground Wheel (Mechanical)** **Baby Bear's Chair (Structure)**			**Design and Technology** **Fastenings and materials for sandals (Textiles)** **Pavilions (Structures)**	**Design and Technology** **Bridges (Structures)** **Stuffed Toy (Textiles)**	

Opportunities to work scientifically	**How quickly do ice cubes melt in different parts of the playground?** **How does cake mixture change as it is cooked?**	**How can we group materials in our classroom?** The children look at the different materials in their classroom and group them explaining why. **Is there a pattern in the types of materials that are used to make objects in school?**	**How have the materials that humans used for tools changed through the years?** **Test materials for different uses e.g. which material can be used for a bucket?** The children will pose a question, test and conclude. ***Which material would be best for the roof of a house?***		**Do all solids have the same melting point?** The children will be find out the melting points of chocolate, butter and ice. **What keeps water the hottest for the longest?** The children will have different materials wrapped around a flask of water and measure the temperature over time. **Does water evaporate at the same rate?** The children will have the same amount of water in a container and place the water in different places with different temperatures.	**What materials will dissolve in water?** The children will have sand, sugar, salt, flour and iron fillings and they will have to predict which will dissolve and then find out which do and why.	
Vocabulary	Ice, water, frozen, icicle, snow, melt, plastic, smaller, paper, card, metal, waterproof, not waterproof.	Object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see-through, not see-through	Names of materials – wood, metal, plastic, glass, brick, rock, paper, cardboard Properties of materials – as for Year 1 plus opaque, transparent and translucent, reflective, nonreflective, flexible, rigid Shape, push/pushing, pull/puling, twist/twisting, squash/squashing, bend/bending, stretch/stretching		Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle	Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material	
Recommended texts and Scientists		William Addis (Toothbrush inventor) Charles Mackintosh (waterproof coat) John MacAdam (Roads)	William Addis (Toothbrush inventor) Charles Mackintosh (waterproof coat) John MacAdam (Roads)		Anders Celcuis (Celcuis Temperature scale) Daniel Fahrenheit (Temperature Scale/ invention of the thermometer)	Spencer Silver, Arthur Fry and Alan Amron (Post-it notes) Ruth Benerito (wrinkle-free cotton)	

<table>
<tr><th colspan="8">Electricity</th></tr>
<tr><th></th><th>EYFS</th><th>Year 1</th><th>Year 2</th><th>Year 3</th><th>Year 4</th><th>Year 5</th><th>Year 6</th></tr>
<tr><td rowspan="2">National Curriculum Expectations</td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2"></td><td>Identify common appliances that run on electricity

Construct a simple series 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</td><td></td><td>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</td></tr>
<tr><td></td><td colspan="2">Design and Technology
Make torches</td><td colspan="2">Design and Technology
Electrical systems- Steady Hand Game</td></tr>
<tr><td>Opportunities to work scientifically</td><td></td><td></td><td></td><td></td><td>How can we make the bulb brighter? The children will be given different parts of a circuit and they will have to make the bulb brighter.
What conducts electricity? The children will be given different objects to see if they conduct electricity.</td><td></td><td>How can you increase the volume of the buzzer? The children will make circuits using a buzzer to make Morse code to show signals to their partner.</td></tr>
</table>

Vocabulary					Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol		As of year 4. Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage
Recommended texts and Scientists					Thomas Edison (First working lightbulb) Joseph Swan (Incandescent light bulb)		Alessandro Volta (Electrical Battery) Nicola Tesla (Alternating Currents)

Animals including Humans							
	EYFS	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
National Curriculum Expectations	**Animals Excluding Humans** Describe what they see, hear and feel whilst outside Recognise some environments that are different to the one in which they live. **Humans** Talk about members of immediate family and community Name and describe people who are familiar to them Know and talk about the different factors that effect their overall health and wellbeing Recognise some environment that are different to the one in which they live Make healthy choices about food, drink, activity and toothbrushing Use all their senses in hands-on exploration of natural materials **ELG** **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**	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.	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	Identify that animals, including humans, need the right types and amounts of nutrition, that they cannot make their own food and they get nutrition from what they eat. Identify that humans and some animals have skeletons and muscles to support, protection and movement.	Describe the simple functions of the basic parts of digestive system in humans. Construct and interpret a variety of food chains, identifying producers, predators and prey. Identify the different types of teeth in humans and their simple functions.	Describe the changes as humans develop to old age	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.
		Design and Technology - Food technology **Healthy Wrap** **Smoothie – Fruit and Veg**		**Design and Technology – Food Technology** **Adapting Recipes** **Eating Seasonally**		**Design and Technology – Food Technology** **What could be Healthier?**	

	world around them, including the seasons and changing states of matter **Manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of food choices**						
Opportunities to work scientifically	Sort animals according to where they live Learn about how different animals from different habitats are cared for Sort images according to their characteristics Find out information from visitors **Are taller children faster?**	**Which bird visits our school grounds the most?** Children will collect and collate data gathered through the day. Ext…Does weather change our results?	**How does my body change during exercise?** The children will predict how the body may change after exercise and they show their results. ***Do bananas make you run faster?***	**Classifying food into food groups** The children will classify the different types of food for example dairy, protein.	**How do different liquids effect the shell of an egg?** The children will observe over time the effects of different liquids on the shell of an egg (similar material to teeth) **What are the different parts of the digestive system?** The children will create the different parts of the digestive system and then watch how the food changes going through each part of it.	**Can we group the different gestation periods of animals?** The children look for patterns when researching the different gestation periods of animals.	**Who has the largest lung capacity in the class?** The children will blow into a tube which is linked to a bottle with measurements. The children will look at patterns between boys and girls **What effects our pulse rate?** Take a baseline pulse rate and then exercise and measure the pulse rate. The children will then exercise further and measure their pulse rate.
Vocabulary	Names of animals On land, live, in water, jungle, desert, North Pole, South Pole. Sea, hot, wet, cold, dry Hair, range of colours, eye colour, skin colour, old, younger, family members	Head, body, eyes, ears, mouth, teeth, leg, tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves Names of animals experienced first-hand from each vertebrate group Parts of the body including those linked to PSHE teaching (see joint document produced by the ASE and PSHE Association)• Senses – touch, see, smell, taste, hear, fingers (skin), eyes, nose, ear and tongue	Offspring, reproduction, growth, child, young/old stages (examples – chick/hen, baby/child/adult, caterpillar/butterfly), exercise, heartbeat, breathing, hygiene, germs, disease, food types (examples – meat, fish, vegetables, bread, rice, pasta)	Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, support, protect, move, skull, ribs, spine, muscles, joints	Digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, nutrients, large intestine, rectum, anus, teeth, incisor, canine, molar, premolars, herbivore, carnivore, omnivore, producer, predator, prey, food chain	growth, aging, changes, human, description, puberty, growing, gestation, baby, toddler, adult, teenager	Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs, lifestyle

Recommended texts and Scientists	Lost and Found Oliver Jeffers Shark in the Park Nick Sharratt I love my hair What I like about me	Chris Packham (Animal Conservationist)	Steve Irwin (Crocodile Hunter) Robert Winston (Human Scientist) Joe Wicks (Personal Trainer)	Adelle Davis (20th Century Nutritionist) Marie Curie (Radiation/ X-Rays)	Ivan Pavlov (Digestive system mechanisms) Joseph Lister (Discovered Antiseptics)		Justin Von Leibig (Theories of Nutrition and Metabolism) Sir Richard Doll (Lining smoking and Health problems) Leonardo Da Vinci (Anatomy)

	Light						
	EYFS	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
National Curriculum Expectations	Describe what they see, hear and feel whilst outside Explore shadows Explore rainbows **ELG** **Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter**	**Children explorer shadows linked to time of day and seasons during Space Topic**		Recognise that light is needed 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 the eyes Recognise that shadows are formed when the light from a light source is blocked by a solid object Find patterns in the way that the size of shadows change **Design and Technology** **Make torches**			Recognise 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 eye 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.
Opportunities to work scientifically	Compare the shape of shadows made by different objects. Find out about shadows and rainbows			**Which materials are more reflective?** The children will have different materials they will test.			Is light always bright? The children will use a light meter to measure the strength of light at different distance. Classifying light sources The children will classify different light sources.
Vocabulary	Sun, sunny, light, shadow, shady, clouds, torch, see-through, non-see-through			Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous			As for Year 3 - Light, plus straight lines, light rays

Recommended texts and Scientists	Suddenly Where is the Dragon?			James Clerk Maxwell (visible and invisible Waves of Light)			Thomas Young (Wave Theory of Light) Percy Shaw (Cats Eyes)

Forces (and magnets in year 3)							
	EYFS	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
National Curriculum Expectations	Explore the natural world around them. Describe what they see, hear and feel whilst outside. Explore changes on how things work Explore how the wind can move objects. Explore how water moves objects Explore and talk about different forces they feel	**Through CP children explore forces and magnets**		Compare how things move on different surfaces Notice that some forces need contact between two objects and some forces act as a distance Observe how magnets attract or repel each other and attract some materials and not others 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 having two poles Predict whether two magnets will attract or repel each other, depending on which poles are facing **Design and Technology** **Making a pneumatic toy**		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.	
Opportunities to work scientifically	**How many small plastic animals can fit in a boat?** **Compare how objects fall.**			**Which materials are magnetic?** The children will create a fair test to find out which materials in the class are magnetic and which are not. Classifying materials The children will sort different materials due to their properties.		**What effect does weight have on gravity?** The children will drop different objects at different heights and observe the speed they fall.	

Vocabulary Float, sink, move, roll, fly, drop, slowest, fastest, furthest, bounce	Float, sink, move, roll, fly, drop, slowest, fastest, furthest, bounce			Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole		Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears	
Recommended texts and Scientists	Gingerbread Man Mr Gumpy's Outing			William Gilbert (Theories of Magnetism) Andre Marie Ampere (Founder of Electro-Magnetism)		Galileo Galilei (Gravity and Acceleration) Isaac Newton (Gravitation) Archimedes of Syracuse (Levers) John Walker (The Match)	

	Miscellaneous Themes						
	EYFS	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
National Curriculum Expectations	**<u>Sound</u>** Describe what they see, hear and feel whilst outside	**Topic - Earth and Space, Geography Daytime** **Pitch and Sound within Music lessons**		**Rocks** 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 rock. Recognise that soils are made from rocks and organic matter.	**Sound** Identify how sounds are made associated some of them with something vibrating. Recognise that vibrations from sounds travel through a medium to the ear. 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.	**Earth and Space** 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.	**Evolution and Inheritance** 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.
Opportunities to work scientifically	Opportunities to listen to sounds and identify the source Opportunities to make sounds **Comparative testing** **How does rain sound different when it lands in different containers?** **Observing over time** **Listen to a siren of an emergency vehicle as it approaches and moves away.**			**How are rocks different?** The children will be given different rocks and will have to group and classify them. **Which rock would be suitable to make a statue from?** The children perform the scratch test to see which rocks are the least hard. **What is soil made of?** The children will have soil in water and watch how it separates over time.	**What makes a sound louder?** Children investigate how dropping a weight from different heights on to a drum affects the volume of the sound produced.	**How does the length of daylight hours change in each season?** **How does the angle of a launch affect how fa a paper rocket will go?** **How have the ideas of about the solar system changed over time?**	**Classifying animals –** Workshops on classification of different animal skulls Adaption and evolution – adaptations over animals over time and why they have adapted.

Vocabulary	Sound, noise, listen, hear, music, voices, bird song, traffic, sirens, thunder, high, low, loud, soft			Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil	Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation	Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, solar system, rotates, star, orbit, planets	Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils
Recommended texts and Scientists	Pass the secret round Splish, Splash, Splosh Alfie's Weather			Mary Anning (Discovery of fossils) Inge Lehmann (Earth's Mantle)	Alexander Graham Bell (Invented the Telephone) Aristotle (Sound Waves) Gailileo Galilei (Frequency and Pitch of Sound Waves)	Claudius Ptolemy and Nicolaus Copernicus Neil Armstrong (First man on the moon) Helen Sharman (first British astronaut) Tim Peake (First British ESA astronaut)	Charles Darwin and Alfred Russell Wallace (Theory of evolution by Natural selection) Jane Goodall (Chimpanzees)

Working Scientifically Progression of skills

	Year 1 and 2		Year 3 and 4		Year 5 and 6
Asking simple questions and recognising that they can be answered in different ways	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. 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.	**Asking relevant questions and using different types of scientific enquiries to answer them**	The children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions. 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.	**Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary**	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
Observing closely, using simple equipment	Children explore the world around them. They make careful observations to support identification, comparison and noticing change. They use	**Making systematic and careful observations and, where**	The children make systematic and careful observations. They use a range of equipment for measuring length, time,	**Taking measurements, using a range of scientific equipment,**	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.

	appropriate senses, aided by equipment such as magnifying glasses or digital microscopes, to make their observations. They begin to take measurements initially by comparisons, then using non-standard units.	**appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers**	temperature and capacity. They use standard units for their measurements.	**with increasing accuracy and precision, taking repeat readings when appropriate**	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).
Performing simple tests	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.	**Setting up simple practical enquiries, comparative and fair tests**	The children select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher. They follow their plan to carry out: observations and tests to classify; comparative and simple fair tests; observations over time; and pattern seeking.	**Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs**	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
Identifying and classifying	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.	**Gathering, recording, classifying and presenting data in a variety of ways to help**	• 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	**Identifying scientific evidence that has been used to support or refute ideas or arguments**	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

	They use simple secondary sources (such as identification sheets) to name living things. They describe the characteristics they used to identify a living thing.	**in answering questions** **Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables**	required, to which they can add headings). They record classifications e.g. using tables, Venn diagrams, Carroll diagrams. Children are supported to present the same data in different ways in order to help with answering the question.		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.
Gathering and recording data to help in answering questions	The children record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing. They record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs. They classify using simple prepared tables and sorting rings	**Using straightforward scientific evidence to answer questions or to support their findings**	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.	**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**	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
Using their observations	Children use their experiences of the world around them to suggest	**Identifying differences,**	Children interpret their data to generate simple comparative	**Using test results to make**	Children use the scientific knowledge gained from enquiry

and ideas to suggest answers to questions	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. The children recognise 'biggest and smallest', 'best and worst' etc. from their data	**similarities or changes related to simple scientific ideas and processes**	statements based on their evidence. They begin to identify naturally occurring patterns and causal relationships.	**predictions to set up further comparative and fair tests**	work to make predictions they can investigate using comparative and fair tests.
		Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions	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.		
		Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions	They communicate their findings to an audience both orally and in writing, using appropriate scientific vocabulary		

EYFS – Communication and Language through Science

Understand 'why' questions, like 'why do you think the caterpillar got so fat?'

Learn new vocabulary

Ask questions to find out more and to check what has been said to them.

Articulate their ideas and thoughts in well-formed sentences

Describe events in detail

Use talk to help work out problems and organise thinking and activities, and to explain how things work and why they might happen

Use new vocabulary in different contexts