SCIENCE AT THONGSLEY FIELDS

Growing hearts and minds through **STEM.**

Our Science curriculum is ambitiously constructed to engage, inspire, challenge and develop strong foundations for understanding of the world.

A high-quality science education should encompass essential aspects of biology, chemistry and physics. As pupils progress through our curriculum, they will build key foundational **knowledge** and conceptual **understanding**, exploring the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They will be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

BIG IDEAS

Our children will:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics.
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them.
- be equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

Science is everywhere in today's world. It is part of our daily lives, from cooking and gardening, to medical advances. Our children's future will be filled with leaps in scientific advances that we can only imagine.

CONTENT & SEQUENCING

Our curriculum for Science is sequenced to ensure that pupils are building upon and strengthen their prior knowledge and skills across the subject area. The content encourages children to ask questions, explore possibilities and enquire throughout their learning. Pupils will recognise the importance of Scientific advances on their lives and how these continue to contribute to benefit the world we live in.

- **Early Years and Key Stage 1** – The key focus is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly constructed world around them. They will be encouraged to be curious and ask questions about what they notice. Within the key stage, pupils will use simple scientific language to talk about what they have found out. Most of the learning will be through practical experiences

- **Key Stage 2** – The curriculum builds up to enable pupils to develop a deeper understanding of a wide range of scientific ideas. The pupils will encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. Within the key stage, they will select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Alongside this, pupils will be encouraged to draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.

DIRECT INSTRUCTION

- Modelling of a range of scientific enquiry, questioning and evaluating occur throughout pupils learning journey.
- Lessons are led by teachers with pupils making significant contributions to support their understanding.
- Pupils are encouraged to share their ideas and work effectively within groups.

RETRIEVAL PRACTISE

- Pupils will make continual links between prior and current learning. Making connections will support their recall of key concepts.
- Questioning within lessons will support retrieval e.g. 'What are two things you learned so far today?'
- Scientific vocabulary will be taught and developed throughout the key stages with pupils regularly making use of this.

PROGRESS

- The science units are organised to ensure that knowledge and skills are both developed through the year groups.
- They will begin to understand the impact that prominent Scientists made on the world and the key events within Science.
- Learners will evaluate, question, enquire and review their findings throughout their learning.

SUPPORT

- Teachers will provide exciting and engaging lessons that are accessible to our pupils.
- Units of work will provide sufficient scaffolding and challenge to meet the needs of all pupils.
- Within Science, a considerable amount of support is provided through peer work and pupils challenging one another.

Excellence for all - a **curriculum** to be **proud** of.

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STEM: Science, Technology & Computing

Year Group	Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Cycle (A or B)	FS1	FS2	Year 1/2 A	Year 1/2 B	Year 3/4 A	Year 3/4 B	Year 5/6 A	Year 5/6 B

Science

Key Themes
Animals & Humans
Living Things
Plants
Materials
Forces
Electricity
Sound
Light
Earth & Space

Children's learning will include significant people e.g. prominent Scientists, events and changes in Scientific knowledge and understanding over time.
Outcomes will focus on a ***big question*** and conclude with a presentation, investigation or experiment in an appropriate format e.g. a class book, video, presentation, debate, etc.

Skills relating to scientific enquiry must be embedded throughout all relevant learning and directly linked to scientific knowledge.

Animals & Humans Name familiar animals e.g. farm animals/zoo animals, name the key features of an animals. Observe animals and talk about what they notice, identify parts of their own body including features of their face.	**Animals & Humans** Group animals by habitat e.g. farm, pond, jungle, sea. Animal body parts. Animal diets. Effects of exercise on our body. Our senses.	**Animals & Humans** Identify groups of animals e.g. herbivore/ carnivore/omnivore, Identify and classify groups of animals. E.g. fish, birds, mammals, amphibians and reptiles. Food chain inc. predators & prey. Habitats: variations for different animals. Parts of the human body & senses.	**Animals & Humans** Basic human & animal needs (water, food and air). Healthy eating and living: right amounts of different types of food, exercise and hygiene. Reproduction: Animals, including humans, have offspring which grow into adults.	**Animals & Humans** Identify that animals, including humans, need the right types and amount of nutrition (protein, carbohydrates, dairy, fats etc.) and that they cannot make their own food. Skeletons & muscles for support, protection and movement.	**Animals & Humans** Human digestive system inc. teeth Food chains and webs inc. producers, predators and prey. Habitats and adaptations.	**Animals & Humans** Life cycles of a mammal, an amphibian, an insect and a bird. Reproduction in plants and animals.	**Animals & Humans** **(PSHE link: how we change as we age.)** Human circulatory system. Impact of diet, exercise, drugs and lifestyle on the body's function. Nutrients and water transport around the body.
Living Things	**Living Things**	**Seasonal Changes** Identify key features of each season, to name all the seasons and know their order. Identify seasonal changes and the effect they have on lifestyle and animals.	**Living Things** Living / never alive / dead – identification & categorisation. Is a candle flame living? It moves, reacts to its environment, absorbs and excretes, can grow, etc.	**Living Things**	**Living Things**	**Living Things**	**Evolution and inheritance** Living things change over time - fossils as evidence; Offspring not usually identical to parents – enables evolution. Animals and plants are adapted to suit their environments and that adaptation may lead to evolution.
Plants Observing and caring for plants - growth and decay.	**Plants** Growing vegetables – identifying lifecycles. Compare conditions i.e. what happens to a plant in the sun compared to a plant in a cupboard. Where our food comes from.	**Plants** Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. Basic structure of a variety of common flowering plants, including trees.	**Plants** Seeds & growing -Compare wild and cultivated plants/ flowers. Structure of plants, how does water move around the plant Begin to understand types of seeds and seed dispersal.	**Plants**	**Plants** Functions of parts of flowering plants. Requirements for healthy plant life and growth (air, light, water, nutrients from soil, and room to grow). Water transport. Lifecycles – pollination.	**Plants**	

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Science (continued)

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Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Materials Experience and talk about different materials, linked to weather and clothing.	**Materials** Identify similarities and differences between different materials – natural or man-made, flexible or rigid, soft or hard.	**Materials –** keeping things warm or cool Distinguish between an object and the material from which it is made; identify, name and describe the properties of everyday materials. Explore and classify materials based on purpose e.g. insulating	**Materials –** keeping things dry or wet Distinguish between an object and the material from which it is made; identify, name and describe the properties of everyday materials. Explore and classify materials based on purpose e.g. waterproofing.	**Materials** Rocks – compare and group together different kinds of rocks on the basis. Describe how fossils are formed. Recognise that soils are made from rocks and organic matter.	**Materials** Solids, liquids and gases – compare and group. Changing state through heating or cooling. Evaporation and condensation in the water cycle and associate the rate of evaporation with temperature	**Materials** Dissolving materials in a liquid to form a solution. Separating mixtures, including through filtering, sieving and evaporating. Reversible and irreversible changes inc. those associated with burning and the action of acids.	**Materials**
Forces Exploring floating and sinking.	**Forces** Explore cause and effect using their bodies and toys – push, pull, twist.	**Forces**	**Forces**	**Forces**	**Forces** Compare and group materials on the basis of magnetism. Compare how things move on different surfaces. Some forces need contact between two objects, but magnetic forces can act at a distance.	**Forces** Gravity as a force acting between the Earth and a falling object. Effects of air & water resistance and friction. Mechanisms, including levers, pulleys and gears, that allow a smaller force to have a greater effect.	**Forces**
Electricity	**Electricity**	**Electricity**	**Electricity**	**Electricity** Identify appliances that run on electricity. Construct a simple series circuits, 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 inc. switches. Recognise conductors and insulators.	**Electricity**	**Electricity**	**Electricity** Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. Use recognised symbols when representing simple circuits in a diagram.

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Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Light Explore light; making shadows, light and dark, puppets **Sound** Explore sound through musical instruments, quiet and loud. Sound walks. (e.g. forest, classroom, office etc)	**Light & Sound** Explore language such as light/ dark, quiet/ loud through everyday objects. High and low pitch.	**Light** Being Sun Safe Reflections & shadows Understand and explore the movement of the sun through shadows; explore what materials can block, reflect or allow light through. Sources of light.	**Sound** Explore how sound is made and can travel inc. pitch & volume. Making instruments e.g water in glass bottles, drums and elastic band guitars.	**Light & Sound**	**Sound** Recognise that vibrations from sounds travel through a medium to the ear. Explore relationships e.g. pitch and features of source object; volume of a sound and the strength of the vibrations.	**Light & Sound**	**Light & Sound** Light appears to travel in straight lines. Light travels from light sources to our eyes or from light sources to objects and then to our eyes. Explain why shadows have the same shape as the objects that cast them.
Earth & Space	**Earth & Space**	**Earth & Space**	**Earth & Space**	**Earth & Space**	**Earth & Space**	**Earth and Space** Movement of the Earth, and other planets relative to the Sun. Movement of the Moon relative to the Earth. Shape and relative sizes and positioning of the Sun, Earth and Moon. Explain day and night and the apparent movement of the sun across the sky.	**Earth & Space**

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Skill Development

Year Group	Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Cycle (A or B)	FS1	FS2	Year 1/2 A	Year 1/2 B	Year 3/4 A	Year 3/4 B	Year 5/6 A	Year 5/6 B
Questioning	• Ask appropriate questions. • Uses a variety of questions (e.g. what, where, who). • Respond to questions.		• Explore the world around them and raise their own simple questions • Begin to recognise different ways in which they might answer scientific questions • Ask people questions and use simple secondary sources (e.g. books, photos or videos) to find answers		• Raise their own relevant questions about the world around them • Should be given a range of scientific experiences including different types of science enquiries to answer questions • Start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions		• Use their science experiences to explore ideas and raise different kinds of questions • Select and plan the most appropriate type of scientific enquiry to use to answer scientific questions	
Enquiry	• Investigate the natural world through play. • Discover how things work e.g. push and pull.		• Experience different types of science enquiries, including practical activities Carry out simple tests • Use simple features to compare objects, materials and living things and, with help, decide how to sort and group them (identifying and classifying)		• Set up simple practical enquiries, comparative and fair tests • Recognise when a simple fair test is necessary and help to decide how to set it up		• Recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why • Recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact	
Collecting Results	• Count, sort and order items up to 20. • Notice similarities and differences.		• Observe closely using simple equipment with help, observe changes over time • Use simple measurements and equipment (e.g. hand lenses, egg timers) to gather data • With help, they should record their findings. • Record simple data		• Talk about criteria for grouping, sorting and classifying; and use simple keys • Make systematic and careful observations • Help to make decisions about what observations to make, how long to make them for • Begin to look for naturally occurring patterns and relationships and decide what data to collect to identify them • Take accurate measurements using standard units Learn how to use a range of (new) equipment, such as data loggers / thermometers appropriately • Collect and record data from their own observations and measurements in a variety of ways: notes, bar charts and tables, standard units, drawings, labelled diagrams and keys		• Make their own decisions about what observations to make, what measurements to use and how long to make them for • Choose the most appropriate equipment to make measurements with increasing precision and explain how to use it accurately. Take repeat measurements where appropriate. • Decide how to record data and results of increasing complexity from a choice of familiar approaches: scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs	
Interpreting Results	• Make observations e.g. melting, temperature changes. • Notice differences, patterns and changes.		• Talk about what they have found out and how they found it out • With guidance, they should begin to notice patterns and relationships • Use their observations and ideas to suggest answers to questions		• With support, they should identify new questions arising from the data, making predictions for new values within or beyond the data they have collected and finding ways of improving what they have already done • With help, pupils should look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions • Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations • Help to make decisions about how to analyse data they have recorded		• Use their results to make predictions and identify when further observations, comparative and fair tests might be needed. • Use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment • Look for different causal relationships in their data and identify evidence that refutes or supports their ideas • Identify scientific evidence that has been used to support or refute ideas or arguments • Talk about how scientific ideas have developed over time	
Scientific Language	• Begin to recognise simple scientific language.		• Begin to use simple scientific language		• Use relevant simple scientific language to discuss their ideas and communicate their findings in ways that are appropriate for different audiences, including oral and written explanations, displays or presentations of results and conclusions		• Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas, Use oral and written forms such as displays and other presentations to report conclusions, causal relationships and explanations of degree of trust in results	

Science Curriculum Unit Planner

Unit Topic	Earth and Space	**Year**	5/6	**Term**	Autumn
Key Question	What's in our solar system?				

Links to *Relevant* Prior Learning	Preparation for *Relevant* Future Learning
• Forces: explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • Stone Henge – Stone Age prehistorical groups lived together in communities.	• The composition of the Earth • The structure of the Earth • The rock cycle and the formation of igneous, sedimentary and metamorphic rocks • Earth as a source of limited resources and the efficacy of recycling • The carbon cycle • The composition of the atmosphere • The production of carbon dioxide by human activity and the impact on climate.

Core Content

- Scientist Study: Tim Peake – who is he and why is he an important figure in recent British History and Science?
- 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.
- Pupils might work scientifically by: comparing the time of day at different places on the Earth through internet links and direct communication; creating simple models of the solar system; constructing simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day; finding out why some people think that structures such as Stonehenge might have been used as astronomical clocks.
- Pupils should learn that the Sun is a star at the centre of our solar system and that it has eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006).
- They should understand that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones).

FORCES

- 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.

Key Vocabulary

Planet names	Atmosphere	Diameter
Planet	Axis	Phase
Star	Rotate	Waxing
Spherical	Revolve	Waning
Solar System	Satellite	Pollution (light pollution and in space)
Orbit	Longitude	
Equator	Latitude	

Enrichment Options

The National Space Centre Leicester Cambridge Observatory (night)	Mobile planetarium visit to school	Space Race exploration: The first man-made satellite to orbit the Earth was Sputnik 1 in 1957. This kick-started the space race between the USSR and the US.

Assessment Opportunity

Tim Peake biography – include his training for going to space, activities and experiments he took part in once in space and how he felt on return to Earth e.g. interviews etc.