Science at St Andrew's CE (VA) Infant School

Contents

Content of lessons

Lessons should be planned carefully to allow all pupils to meet the EYFS Early Learning Goal outcomes or the appropriate National Curriculum requirements. Lessons should include a range of resources, rich and accurate vocabulary and opportunities for children to engage with activities, explore resources, discuss and share ideas with other children and their peers and time to ask questions. Each lesson should conclude with reiteration of **what** the learning was, not just the activity carried out.

Planning

Science at St Andrew's Infants aims to build on children's prior learning, with opportunities to think in scientific ways and make links, therefore supporting our spiral curriculum approach.

EYFS

In EYFS, topics are planned following children's interests and following changes in seasons, in order to allow hands-on, explorative learning. In line with the EYFS Development Matters document, opportunities to explore, discover and question will be planned and supported by the EYFS staff both as adult directed tasks and 'in the moment' planning.

Adult directed opportunities will begin with capturing a snap shot of children's current knowledge, which may be recorded on sticky notes. Children will be given time to think, consider outcomes and share ideas with a partner or small group, as this will help to form the basis of their critical thinking skills. All activities need to be interactive, hands-on and allow for trial and error of the children's ideas. This will be concluded with careful and vocabulary focussed summary of **what we found out,** which will help children recall the learning that occurred, rather than just the activity.

As the children in EYFS spend a considerable amount of time in continuous provision (indoors and outdoors), all adults are continually 'planning in the moment' as situations, discoveries and questions arise. This could be ice, a rainbow, or an interesting or unusual insect. It is these situations which provide rich learning outcomes and develop the child's innate desire to explore. Adults should use open ended questioning, model vocabulary, support with resources and enable children's exploration to allow them to think critically, make links with their prior learning and importantly, find ways to explore and learn.

Key Stage 1

In KS1, planning will use the Cornerstones Curriculum as a basis, but this will be adapted to meet the needs of the individual children and class.

As with EYFS, each topic will begin with a snapshot of the children's current knowledge and understanding of a subject. This is to be recorded on the first page of the 'big book'. This will then influence the planning, questioning and pitch of the topic moving forward.

Planning should ensure there are opportunities for scientific skills, critical thinking skills and hands-on learning. Children should have opportunities to experiment and question with their peers. The learning should focus heavily on **how** we learn and **what we found out**. Lessons should conclude with a vocabulary rich recap of **what we found out**, ensuring children remember the learning that occurred, not just the activity.

Rainbow Skills Continuum

The Rainbow Continuum will be used alongside the Curriculum to extend the children's scientific thinking skills. This should be highlighted to show coverage and used to inform planning. A copy must be kept up to date for the Science Co-ordinator to collect at half term intervals.

Inclusion

Where possible, children should not be taken from science lessons to complete interventions. Lessons should be planned to be accessible to all, and all staff should consider that children who may need support in other subjects may excel and feel confident in science. Teaching should be adaptive to ensure individualised support is tailored to specific needs and all children have the opportunities to meet expectations. With this is mind, recording of experiments, use of worksheets and written work should be used only when they are critical to or enhance the scientific skills, and should not prevent a barrier to scientific learning.

Marking:

As we strive to instil critical thinking skills in science, we should be aware of the value of verbal feedback and discussion and this may be reflected in our marking. Marking should be appropriate to the activity, whilst following the schools marking policy. Some activities and lessons may require annotation and verbal feedback.

Assessment

Science will be assessed following school policy and using Cornerstones to track coverage. Teachers should use assessment strategies throughout lessons as part of quality first teaching. Data will be collected half termly by the science co-ordinator.

Lesson Resources

To allow learning to be current, hands-on and accessible resources should be of good quality. The school grounds and local environment should be used frequently. St Andrew's Infants is well resourced, and there is a wide range of video, photographic and interactive resources available through the school's various subscriptions.

Intent, Implementation and Impact

Intent

At St Andrew's, we follow the National Curriculum and work towards the EYFS Early Learning goals. We aspire to instil a love of learning in all children, delivered through a spiral curriculum which purposefully revisits and extends previous learning. We aim to enable children to explore science with confidence, to investigate the world around them, making observations based on first hand experiences, performing simple tests and answering questions.

Implementation

Children will develop their interest in scientific learning in EYFS with open ended opportunities to explore environments, materials and the world around them, begin to predict and experiment, observe changes and contribute ideas. These skills will be extended and enhanced throughout Key Stage 1, using a broad range of resources and opportunities for hands on, scientific working, in order to develop inquisitive, aspirational scientists and lifelong learners. By the end of Key Stage 1, children will be able to name, describe, compare and contrast features of living things, environments and the changing seasons. All children will be supported in accessing the curriculum and assessment will be used in a timely manner to ensure all pupils are suitably challenged in their learning.

Impact

Lessons are 'hands on' and interactive as much as possible to allow pupils to develop critical thinking skills, problem solving and collaborative working, and engagement is developed through visits, visitors to school and opportunities to further develop their culture capital. This will develop inquisitive learners and ensure our children are ready for their next stage of learning in Key Stage 2 and beyond, in which they will apply these skills, liked with embedded subject knowledge. We aspire to instil confidence in exploring, a love of learning and a fascination with science that will stay with them throughout their education.

Policy

Rationale

At St Andrew's CE (VA) Infant School, we teach science through the Cornerstones Curriculum, Development Matters (the World), National Curriculum 2014 and coverage of the skills of the Rainbow Continuum. The principal focus of science teaching in Key Stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. Pupils are encouraged to be curious and ask questions about what they notice and helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information. Pupils will use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science will be through the use of first-hand practical experiences, with some use of secondary sources, such as books, photographs and videos.

Aims

The National Curriculum for science aims to ensure that all pupils:

- 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
- are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future
- read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at Key Stage 1.

Working Scientifically

At St Andrew's Infant School, pupils will be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking simple questions and recognising that they can be answered in different ways
- observing closely, using simple equipment
- performing simple tests
- identifying and classifying
- using their observations and ideas to suggest answers to questions
- gathering and recording data to help in answering questions.

Pupils will explore the world around them and raise their own questions and experience different types of scientific enquiries, including practical activities, and begin to recognise ways in which they might answer scientific questions. They will use simple features to compare objects, materials and living things and, with help, decide how to sort and group them, observe changes over time, and, with guidance, they will begin to notice patterns and relationships. They will ask people questions and use simple secondary sources to find answers. They will use simple measurements and equipment (for example, hand lenses, egg timers) to gather data, carry out simple tests, record simple data, and talk about what they have found out and how they found it out. With help, they will record and communicate their findings in a range of ways and begin to use simple scientific language. These opportunities for working scientifically will be provided across Years 1 and 2 so that the expectations in the programme of study can be met by the end of Year 2.

Early Years Foundation Stage Development Matters – Understanding the World

Throughout Reception, teachers will plan learning experiences based on the Characteristics of Effective Learning, moving through all areas of learning, playing and exploring, active learning and creating and thinking critically so that pupils can:

• comment and asks questions about aspects of their familiar world such as the place where they live or the natural world
• talk about some of the things they have observed such as plants, animals, natural and found objects
• talk about why things happen and how things work
• developing an understanding of growth, decay and changes over time
• show care and concern for living things and the environment
• look closely at similarities, differences, patterns and change **to ultimately achieve the Early Learning Goal**:

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 Programme of Study

Pupils will use the local environment throughout the year to explore and answer questions about plants and animals in their habitat. Where possible, they will observe the growth of flowers and vegetables that they have planted. They will become familiar with common names of flowers, examples of deciduous and evergreen trees, and plant structures (including leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem) and the common names of some fish, amphibians, reptiles, birds and mammals, including those that are kept as pets. Pupils should have plenty of opportunities to learn the names of the main body parts (including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth) through games, actions, songs and rhymes.

They will understand how to take care of animals taken from their local environment and the need to return them safely after study. Pupils might work scientifically by: using their observations to compare and contrast animals and plants at first hand or through videos and photographs, describing how they identify and group them; grouping animals according to what they eat; and using their senses to compare different textures, sounds and smells.

Pupils will be taught to:

Plants

- 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

Animals, including humans

- 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

Everyday materials

- distinguish between an object and the material from which it is made
- identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock
- describe the simple physical properties of a variety of everyday material
- compare and group together a variety of everyday materials on the basis of their simple physical properties

Seasonal changes

- observe changes across the four seasons
- observe and describe weather associated with the seasons and how day length varies

Year 2 Programme of Study

Pupils will be taught:

Living things and their environment

- to explore and compare the differences between things that are living, dead, & 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

Plants

- observe and describe how seeds and bulbs grow into mature plants
- find out and describe how plants need water, light and a suitable temperature to grow and stay healthy

Animals, including humans

- 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 of exercise, eating the right amounts of different types of food, and hygiene for humans

Use 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

Assessment and monitoring

- Teachers will make continuous assessments, adjusting planning to the pupils learning on the subject.
- Opportunities for assessment will be highlighted in planning for each topic area.
- Parents will have the opportunity to discuss their child's progress at Pupil Progress Meetings and will be reported on in the end of year report.
- Work samples and photographic evidence will be kept as evidence of attainment in Science.
- Moderate with local schools.

- Y2 staff will assess children's level of attainment at the end of the KS1 programme of study.

The Subject Leader will:

- Monitor teachers' planning, assessments, work books, displays, conduct lesson observations or learning walks.
- Analyse data using the school tracking system.
- Review and audit the key skills alongside SLT.

Health and safety

- Pupils will be actively encouraged to take responsibility for their own safety and also that of others.
- Equipment will only be used if considered safe and this will be up to the adult in charge to check it.
- Protective clothing will be worn for activities that require it (aprons, glasses, gloves etc).
- Any accidents will be recorded in accordance with the school's health and safety policy.

Consultation and Review:

The Science Lead will liaise regularly with staff, both at staff meetings and informally, to monitor the effectiveness of the policy and the Science curriculum. Meetings with subject leaders will also ensure that the use of Science technologies across the curriculum is planned for and evaluated.

This policy will be reviewed regularly by the Science Lead in consultation with staff.

Reviewed : January 2025

STICKY KNOWLEDGE - Science

Science 'Sticky Knowledge' Tracker

Essential Knowledge map from EYFS to KS1.

	EYFS	Year 1	Year 2
Plants	Observe changes to plants throughout the seasons, understanding the basic needs of plants.	Identify and describe the basic structure of common local plants including trees.	Find out and describe how plants need water, light and a suitable temperature to grow.
Children can name:	Poppy, daffodil, hawthorn	Oak, horse chestnut, sycamore, crocus, snowdrop, buttercup, bluebell	Lavender, mint, thyme, lime
Animals	Understand the basic needs of animals and humans, and how they stay healthy including food and water. Sort and name the groups fish, birds, insects.	Identify, name and label basic parts of a human body and common animals. Sort and name the groups mammals, reptiles, amphibians- naming 2 examples of each. Identify herbivores, carnivores and omnivores. **Habitats**	Describe how animals obtain their food from plants and other animals in simple food chains. **Micro Habitats**
Children can name birds	Robin, owl, penguin, duck, chicken	Blackbird, magpie, blue tit, sparrow	Seagull, hawk
Materials	Explore a range of materials and everyday objects and use these to create and construct with purpose. Understand when an object is solid, stretchy, liquid, hard/soft.	Compare and group a variety of everyday materials based on their simple physical properties. Including wood, glass, rock, metal and plastic. Use terms transparent, flexible.	Identify and compare the suitability of a variety of everyday materials for different uses. Name and talk a local person who has developed a product based on its properties Percy Shaw.
Changing seasons	Observe and talk about changes in the seasons and how this affects plants. Children can talk about the changes that occur in **Autumn, Winter, Spring, Summer.**	Name each season and describe the associated weather and changes to the environment.	Talk about and describe how temperature and seasons affect and influence habitats and environments. Compare 2 habitats.

What does Greater Depth look like in Science?

What Greater Depth means in Science

Although we do not report Greater Depth levels in Science, this document sets out what we are looking for in terms of planning and questioning.

We should be setting our standards and expectations at the highest level for all learners and be mindful that children who are 'working towards' in other subjects may excel in science.

Guidance from professional bodies

Key Stage 1 science teacher assessment framework

Working at the expected standard
Working scientifically The pupil can, using appropriate scientific language from the national curriculum: • ask their own questions about what they notice • use different types of scientific enquiry to gather and record data, using simple equipment where appropriate, to answer questions relating to: • observing changes over time • noticing patterns • grouping and classifying things • carrying out simple comparative tests • finding things out using secondary sources of information • communicate their ideas, what they do and what they find out in a variety of ways

The above framework will be planned for all children, but a GD child may pursue some of these questions on their own and would be expected to fully meet all the Expected Standards in 'Working Scientifically'.

Planning for Greater Depth

Our planning should be based on a good understanding of the children's prior learning and structured to extend, scaffold and develop this further. It is crucial our planning, lessons, questioning and resources encourage critical thinking, discussion between both children and adults and allow children the time to consider, evaluate, make links and share ideas. It is through these scientific skills that children will begin to work at Greater Depth. The Rainbow Continuum and Cornerstones Curriculum should be used alongside the National Curriculum for Key Stage One, to plan and resources lessons tailored to the individual class, ensuring the needs of all children are met and all children can access the scientific learning.

When planning from the Cornerstones Curriculum, teachers should use the key vocabulary from Blooms Taxonomy to create more imaginative and deepening lessons. E.g. State, Identify, Classify, Explain, Demonstrate, Compare, Test, Question, Experiment, Formulate, Predict, etc.

Teaching for Greater Depth

Each and every science lesson should foster a culture of Growth Mindset (the children know that this is when we keep on trying when things are tricky and this helps us to learn) and the process of learning should be encouraged, praised and celebrated. The local environment features heavily in the scientific learning across school, and adults model how we explore sensitively and ethically. Lessons are 'hands on' and interactive as much as possible to allow pupils to develop critical thinking skills, problem solving and

collaborative working, and engagement is developed through visits, visitors to school and opportunities to further develop their culture capital.

Digging Deeper into Science Skills

Children demonstrating Greater Depth in National Curriculum science will ask questions, make links, evaluate and adapt. They will begin to talk about why things have happened, make sensible predictions and clear links to prior learning and other experiences. They will be able to think of different ways to do things. They will be eager to find out and think of ways to test. They will show a can- do attitude and use their initiative. They will be able to say why a test is fair test.

Adults will use open ended questions to encourage independent and critical thinking. It is important that quality time for discussion is allowed and that this is valued.

Possible Misconceptions

	Possible misconceptions EYFS/Year 1	Possible misconceptions Year 2
Plants	Plants are not alive: As plants do not move, a child may think they are not alive. However, plants grow, breathe, reproduce and respond to environmental changes. Trees are not plants: Children need to challenge the misconception that trees are not plants by pointing out a tree's roots, leaves, flowers and trunk that acts just like a stem! Leaves are always green: This misconception can be addressed by looking at a variety of different species of plants. *This concept may also be addressed in the Seasonal Changes topic.*	All plants start out as seeds: Children should learn that some plants start out as bulbs. They will be able to draw comparisons between bulbs and seeds and be able to give examples of plants with seeds and plants with bulbs. Seeds and bulbs need sunlight to germinate: Seeds and bulbs are planted underground! Within a seed or bulb, there is enough food for the plant until it can start producing its own. The plant will grow its roots and stem under the ground and will start producing its own food once it has risen out of the soil and into the sunlight.
Animals (inc humans) Habitats	Only our hands can feel the sense of touch: When we talk about touching, we often refer to the act of touching with our hands or fingertips. However, it is not our hands that feel the sense of touch but our skin. This is why we can feel the sense of touch all over our bodies and why our knees hurt if we fall over! Our sense organs act alone: The building of the larger concept of how different parts of our bodies work together needs to be addressed. Our eyes, ears, noses, skin and tongues are really just messengers that give information for our brains to decipher. Our brain then tells the rest of our body how to react. All animals are the same: For some children, their experiences so far might have taught them that all animals have four legs and fur and look much like a family pet. Children need the opportunity to expand their knowledge of mammals, birds, amphibians, reptiles and fish. Humans are not animals: This is likely to be a common misconception amongst the class. Class discussion should identify all the human features that categorise us as mammals.	Growth is only about getting taller: Children may think that growth can only be measured by height. However, in this unit, children will learn that as their bones grow, so too do their muscles and strength. All foods are equally nutritious: Children will start to understand that foods have a different nutritional value and it is important for our health that we eat the right proportions of each food group. All animals reproduce in the same way: A common misconception is that all animals reproduce like mammals. Children should be aware of the life cycle of the frog, chicken and butterfly to dispel this myth. All offspring look like their parents: This is true in many cases, but it is not a universal fact. Good examples to help with this is to look at a swan and the slivered leaf monkey A habitat is an animal's 'home': A common misconception is that a habitat is where an animal makes its den or lair. However, the term 'habitat' refers to the much wider area where a living thing can survive.

	Insects are not animals: Although insects and microhabitats are not taught until Year 2, it is important to discuss the fact that insects are also animals and are classified as invertebrates. Planting these simple facts now will help children grasp more complex classifications further up the school.	All animals can survive in the same habitat: Children might think that all animals are transportable and able to live anywhere in the world. It is important children know that animals have adapted to suit the conditions and temperatures of their environment. Only fish live in the sea: Some children might classify all animals that live in the sea as fish. Children need opportunity to explore the many varieties of animals that live in our oceans**.**
Materials	The word 'material' refers only to fabrics: Children will likely have heard people talk about 'materials' in reference to our clothes or other fabrics, so this is a misconception that needs to be addressed quickly so that the fundamental concepts of this unit are understood. Objects are only made from one material: Children need to know that most objects are made from more than one material. Each material has been carefully chosen to suit the purpose of that object. Materials cannot be changed: This misconception can be addressed when children learn about natural and manmade materials.	Materials can only be used for one purpose: Through investigations, the children will understand that the properties of materials can be changed or altered, enabling them to be used for different purposes. Wood can be used as an example to demonstrate that it can be hard enough to be used as furniture but also manufactured to become paper!
Changing seasons	It is always hot and sunny in summer. It always snows in winter: We do tend to generalise what the weather is like in each season, which might encourage children to forget that weather can also vary within each season. Discussions within this topic should demonstrate to children that the summer season can also bring with it rain and thunderstorms, just as we can also have milder winter months. Flowers only grow in spring: A child's drawing of spring is likely to depict colourful flowers and leafy, green trees; however, this unit is an opportunity to highlight the many flowers that also bloom in the winter and the evergreen trees that keep their leaves all year round. Trees and flowers die in winter: It is not surprising that when colourful flowers disappear and the trees drop their leaves	

	to reveal bare branches, children often think that these plants have died. Discussions around seasonal changes should teach children that many plants 'rest' over winter, releasing their flowers and leaves to conserve energy so they can withstand the colder months. During the spring and summer months, plants store energy in their roots or bulbs which allows them to be dormant during the winter – much like hibernating animals!	
Mini-beasts	Children may believe that all mini-beasts are insects. They may have unfounded fears about mini-beasts being dangerous such as all bees sting and all spiders bite. Some children may not think that invertebrates are animals as they are more familiar with animal types such as mammals and birds. Children may have heard of the term 'ecosystem' when describing a rainforest but they may not be aware that all environments can be an ecosystem Children may have misconceptions about bees, such as that they all sting and all make honey. They may also think that all bees live in a hive. Children may not know anything about pollination and think that plants will grow fruit and vegetables without pollination. Children may not realise that some animals eat dead and decaying matter. Children may think that arrows in a food chain show what is being eaten. Children may think that all mini-beasts have the same set of basic needs that a microhabitat will need to provide for them. Children may think that animals choose to live in a certain place. However, where they live is based on what is suitable for them and animals may have adapted to live in certain places. Children may think that animals always live in the same place. However, habitats and microhabitats can change, for example, through the weather or during different seasons. Therefore, animals may also change where they live. Children may not know exactly what soil is as they may just call it 'mud' or 'dirt'. Children may have the misconception that if a worm is cut in two, it becomes two worms.	

Misconceptions taken from Developing Experts