

Stoneraise School Curriculum Statement



Subject: Science

Subject Leader: Sam Armstrong

Overarching Curriculum Statement

At Stoneraise School, our vision statement is, 'Living and learning together to care for each other and our world.' Our curriculum has been designed to focus the children's learning on this statement. We are based on the rural outskirts of the historic city of Carlisle and the majority of our pupils travel from local housing estates within the city. We try to make the very most of our beautiful surroundings at every opportunity. From Hadrian's Wall to the mountains of the Lake District, we ensure that our children gain an awe of the majestic landscape on our doorstep. Developing friendships, keeping ourselves safe and preparing our children to be the 'citizens of tomorrow' are all key parts of our curriculum as we follow the journey on our 'Pathway to Success'.

Our curriculum ensures excellent coverage of the National Curriculum (Years 1-6) and Foundation Stage Early Years Curriculum (Reception children). We have fully embraced the higher expectations set out in both curriculums and have devised our own units of work for each subject area so that we can ensure a sound progression of learning. We also have a core team of specialist teachers who are passionate about their curriculum area; these teachers work with different groups of children each year. Our team includes PE, music, art and computing specialists.

Our 'Sticky Knowledge' approach is used to help children to be aware of what they will learn through each unit or topic and help staff and pupils to make an assessment of what has been learned. We share key knowledge that we would like to 'stick' in the children's long-term memory, present vital vocabulary they will come across to encourage the children to expand and develop their use of a wide range of words. Sticky notes (which include word banks, diagrams and other important information) are often used to support the children in the short term in their learning.

Subject Curriculum Statement

From Reception, our children learn through a topic-based approach to science at Stoneraise School. As they enter Key Stage 1 and beyond, they move to a more formal approach to learning. At Stoneraise School, we encourage the children to explore and explain their local environment and the wider world. Our science classroom utilises all of our facilities— the playground, our hen coop, the school garden, as well as educational sites in the wider community. These are used to support scientific enquiry and develop thinking and reasoning skills. We often bring science into the classroom (through a range of interactive resources and visitors) to excite, develop scientific questioning and encourage enquiry. We ensure that children learn about fundamental scientific developments and the important role science plays in our future.

Intent

At Stoneraise, we recognise how science impacts every aspect of daily life, and how it has aided the progress of humankind throughout history. As one of the core subjects taught at primary level, we give the teaching and learning of science the prominence it deserves.

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

At Stoneraise we strive to increase our pupils' knowledge of the world and develop skills associated with science through a process of enquiry. Our science curriculum develops the natural curiosity of each child and encourages them to have respect for living organisms. We instil in pupils the importance of caring for the natural environment.

Implementation

At Stoneraise School, teachers foster a positive attitude to learning within their classrooms and reinforce that all children can achieve high standards in science. Science is taught as set out by the year group requirements of the National Curriculum. This enables the accumulation of knowledge and allows progress in repeated topics through the years. We build upon the learning and skill development of previous years. Through our planning, we involve problem solving opportunities, allowing children to find out for themselves how to answer questions in a variety of practical means. Children are encouraged to ask questions and are given appropriate equipment to use their scientific skills to discover answers. Teachers use precise questioning in class to test conceptual knowledge and skills and children are regularly assessed using quizzes to identify any gaps in learning. As the children's knowledge and understanding increases, and they become more proficient in selecting and using scientific equipment, collating and interpreting results, they become increasingly confident in their growing ability to come to conclusions based on real evidence. Working Scientifically skills are explicit in lessons to ensure these skills are being developed throughout the children's school career and new vocabulary and challenging concepts are introduced through direct teaching. Teachers demonstrate how to use scientific equipment, and the various Working Scientifically skills in order to embed scientific understanding. Our staff find opportunities to develop children's understanding of the world around them by accessing outdoor learning and workshops with experts.

Scheme of Work Selection

We follow the Kapow scheme of work for science. This scheme of work fulfils the statutory requirements outlined in the National curriculum (2014). The scheme of learning is used as a basis for teachers to tailor and adapt to the needs of our pupils. Teachers are able to choose the order of the units they teach to best support our topic-based approach. The Kapow Primary curriculum aims to familiarise pupils with all types of scientific enquiry, so that by the end of Key stage 2 they are able to choose the most suitable enquiry type to answer questions. In Key stage 1, pupils are introduced to enquiry types as 'Super science skills' and are encouraged to reflect on which skills they have used to answer questions. In addition to working scientifically, the National curriculum also states that pupils should understand the uses and implications of science in the past, present and for the future. References to real-world examples are incorporated into all units, providing the rationale and motivation for why we learn Science. The Making connections units are an integral part of the Kapow Primary Science scheme, designed around the principle that deep learning occurs when pupils can link new information with existing knowledge. They are the culminating unit in each year group and allow pupils an opportunity to revisit, revise and apply their learning in a new context. The units integrate and connect scientific concepts and working scientifically skills studied in recent units, as pupils engage in full enquiries and apply the enquiry cycle in new contexts. The emphasis on practical, hands-on lessons and guided enquiries supports the development of independent learning skills and scientific thinking.

CPD and Training

- Subject Leader attended Effective Subject Leadership (Science Intent) Training with Cumbria County Council Learning Improvement Service
- Staff Meetings provided by the Subject Leader
- Resources provided to support teachers with teaching of science e.g.
- Teachers are encouraged to see good practice in other local schools and regularly visit other practitioners

Assessment Strategy

- Formative assessment strategies include:
 - o Regular quizzes (Kapow, Kahoot!, Google Forms, Quizziz)
 - o Observation of teachers and Teaching Assistants
 - o Exercise books – daily work
 - o Questioning within class
 - o End of unit assessments e.g. Kapow quizzes, Past SATs Papers
 - o Pre-teaching and intervention work with staff
- Teacher assessment results are input into our tracking system (Insight Tracking) where school leaders are able to analyse the data.

Inclusive Curriculum

At Stoneraise School, we believe that every child can make progress and achieve. We ensure that our curriculum and the teaching and learning opportunities provided meet the needs of all of our pupils. We respond to pupils' diverse learning needs, and seek to identify potential barriers to learning quickly. We support parents through EHCP needs assessments and work closely with specialist teachers to ensure our curriculum is accessible. Targeted support through our Assess Plan Do Review cycle and resources are then used to ensure all pupils are engaged and confident learners. Pupils with SEND are monitored regularly and communication between pupils, parents, staff and external specialists underpins their success.

The role of governors

Our governors determine, support, monitor and review the school's approach to teaching and learning. In particular they:

- support the use of appropriate teaching strategies by allocating resources effectively;
- ensure that the school buildings and premises are used optimally to support teaching and learning;
- check teaching methods in the light of health and safety regulations;
- seek to ensure that our staff development and our performance management
 - both promote good-quality teaching;
- monitor the effectiveness of the school's teaching and learning approaches
 - through the school's self-review processes, which include reports from the headteacher, senior leaders and subject leaders, and a review of the continuing professional development of staff.

Monitoring and review of this curriculum document

Senior leaders monitor the school's curriculum planning and implementation so that we can take account of new initiatives, research or any changes in the curriculum. We will therefore review this policy every three years or sooner if required.

Long Term Plan

Year 1			
Autumn 1	Forces, Earth and space	Autumn 2	Materials
	<p>Seasonal changes (6 lessons)</p> <p>Reflecting on their own experiences, children learn about the four seasons and the weather associated with each. Pupils explore how seasonal changes affect trees, daylight hours and our choices about outfits. They plan and carry out their own weather reports, considering the knowledge required for this job.</p>		<p>Everyday materials (6 lessons)</p> <p>Identifying the difference between objects and materials, children explore their surroundings to find examples of each. They work scientifically by planning tests, making observations and recording data. Pupils use results to answer questions and sort and group materials based on their properties.</p>
Spring 1	Animals, including humans	Spring 2	Animals, including humans
	<p>Sensitive bodies (6 lessons)</p> <p>Familiarising themselves with the basic parts of the human body, children investigate their senses through stimulating experiences that highlight how we interact with the world around us. They work scientifically, using their senses to make observations, spot patterns and use data to answer questions. They develop an understanding of how science can support those who have lost sensory function and consider how firefighters use their senses at work.</p>		<p>Comparing animals (6 lessons)</p> <p>Studying both local and global animals, children recognise common characteristics and physical features. They use this information to make comparisons and classify animals. Pupils consider the most effective way to collect data about class pets and record their findings in a block chart. They develop their understanding of classification by comparing the dietary habits of different animals and role play as Jane Goodall carrying out research into chimpanzees in the wild.</p>
Summer 1	Plants	Summer 2	Making connections
	<p>Introduction to plants (6 lessons)</p> <p>Venturing outside, children identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. They use magnifying glasses to observe and name plant parts and draw and label diagrams of flowers. Children closely observe leaves and sort them into groups based on their appearance. They use non-standard units to measure leaf length and record their observations in a table. Pupils investigate if beans need water for growth and identify edible plant parts.</p>		<p>Investigating science through stories (5 lessons)</p> <p>Using picture books and hands-on outdoor activities, children broaden their understanding of plants and animals. They gather and record data to find out if taller trees have larger trunks and recap the features of different animal groups. They identify animals by closely observing footprints and construct waterproof animal homes with natural materials. Pupils sort birds according to their diet and seek patterns in their physical characteristics.</p>

Year 2

Living things and their habitats

Autumn 1

Habitats (6 lessons)

Considering the life processes that all living things have in common, pupils classify objects into alive, was once alive or has never been alive. Pupils explore global habitats, naming plants and animals that can be found there. They learn how a range of different living things depend on each other for food or shelter. Pupils explore this further by creating food chains to show the sequence that living things eat each other for energy to grow and stay healthy.

Autumn 2

Microhabitats (6 lessons)

Developing their understanding of scientific enquiry, pupils learn that scientists use a range of skills to answer questions. They discover that microhabitats provide what minibeasts need to survive and carry out a survey to find out where different minibeasts live in the school grounds. They practise asking scientific questions and follow a method to investigate which conditions woodlice prefer. Pupils explore the job role of a botanist by identifying flowering plants.

Spring 1

Materials

Uses of everyday materials (6 lessons)

Building on their knowledge of everyday materials and their properties, pupils recognise that materials are suited to specific purposes and explore how actions such as stretching and bending affect the shape of solid objects. They compare the suitability of materials; gather and record data in tables and block graphs and use their results to answer questions. Children learn about the harmful effects of plastic and explore eco-friendly alternatives.

Spring 2

Animals, including humans

Life cycles and health (6 lessons)

Studying the life cycles of various animals, children learn what animals need to survive and how they change over time. Pupils collect data that allows them to observe changes in their peers, while also developing their ability to take measurements and record data. They consider how scientific knowledge helps people to make healthy choices.

Summer 1

Plants

Plant growth (6 lessons)

Carrying out comparative tests, pupils identify the conditions required for seed germination and compare these to the survival needs of plants in later growth phases. Pupils use rulers to measure stem growth and record data in a table. They use their results to conclude that plants need water, light and a suitable temperature to grow and stay healthy. Children identify the stages in a plant's life cycle and discover how humans impact plants in the environment.

Summer 2

Making connections

Plant-based materials (5 lessons)

Identifying ways to reduce, reuse and recycle, children draw on their knowledge of properties to invent creative uses for old objects. They discover some natural materials derived from plants and look at the processes involved in making paper. Using their observational skills, they conduct simple tests to choose the most suitable material for homemade plant pots, venturing outdoors to find natural materials to decorate them.

Year 3

<p>Autumn 1</p>	<p>Animals, including humans</p> <p>Movement and nutrition (6 lessons) Studying the human skeleton, children identify key bones and compare them to other animals explaining the role within the body. Pupils explore how changes in muscles result in movement and the implications these discoveries have in the scientific development of prosthetic limbs. They study how energy is used by the body, what constitutes a balanced diet in humans and how research contributes to nutritionist expertise.</p>	<p>Autumn 2</p>	<p>Forces, Earth and space</p> <p>Forces and magnets (6 lessons) Investigating the movement of vehicles on different surfaces, children learn about the impact of friction and compare uses and drawbacks. They broaden their experience in writing scientific methods and recording data as they investigate contact and non-contact forces. Pupils explore the properties of different magnets and use this to understand their uses.</p>
<p>Spring 1</p>	<p>Materials</p> <p>Rocks and soil (6 lessons) Studying rocks and their properties, children learn how to classify rocks and identify how they were formed. They look at the work of paleontologists to learn about fossil formation and use models to explore how fossils tell us about the past. Pupils investigate the physical properties of rocks and link these to their particular uses. Pupils also explore soil formation, separate soil using a sedimentation jar and test soil drainage.</p>	<p>Spring 2</p>	<p>Energy</p> <p>Light and shadows (6 lessons) Identifying examples of light sources, children learn that light is needed to see and how its absence causes darkness. Children investigate reflection and shadow formation, including how different factors affect shadows. They explore how shadows can be used to entertain in the arts and create shadow puppets to recount how different people work or experiment with light.</p>
<p>Summer 1</p>	<p>Plants</p> <p>Plant reproduction (6 lessons) Building on their prior knowledge of plant structures, children describe the functions of named parts and use evidence to explain their significance in plant development. Pupils investigate factors that may affect plant growth and how water is transported. They explore how seeds vary and create models to show seed dispersal methods.</p>	<p>Summer 2</p>	<p>Making connections</p> <p>Does hand span affect grip strength? (5 lessons) Experimenting, analysing data and drawing conclusions allows children to explore the relationship between hand span and grip strength. They test different gloves to improve grip strength and applying their newfound knowledge to design friction gloves, fostering scientific inquiry and problem-solving skills.</p>

Year 4

Autumn 1	<p>Animals, including humans</p> <p><u>Digestion and food</u> (6 lessons) Using models, children describe the function of key organs in the digestive system. Pupils identify the types of human teeth to create their own model and investigate factors that impact our dental health. They compare human teeth to other animals' and consider this in the light of prior knowledge about predators, prey and food chains. Children take on the role of a naturalist investigating animal faeces for clues about diet, digestion and dentition.</p>	Autumn 2	<p>Energy</p> <p><u>Electricity and circuits</u> (6 lessons) Exploring appliances that use electricity in their setting, children learn how to work with electricity safely and build circuits. Pupils investigate electrical conductors and insulators and explore the relationship between the number of bulbs and bulb brightness. Real scenarios and historical discoveries inform children about scientific progression and home safety.</p>
Spring 1	<p>Materials</p> <p><u>States of matter</u> (6 lessons) Investigating the properties of solids, liquids and gases, children learn about the different states of matter. They explore changes of state using relatable examples and use this to explain changes to water through the water cycle. Pupils investigate the relationship between temperature and rate of evaporation while broadening their experience of working scientifically.</p>	Spring 2	<p>Energy</p> <p><u>Sound and vibrations</u> (6 lessons) Exploring different ways of producing sounds, children learn about the relationship between vibrations and what they hear. They study dolphins and whales to develop their understanding of how sound travels between objects and investigate the role of insulation to protect our ears. Pupils explore how pitch and volume can be altered and make their own musical instruments to demonstrate these principles.</p>
Summer 1	<p>Living things and their habitats</p> <p><u>Classification and changing habitats</u> (6 lessons) Identifying different ways to group living things, children make classification keys to explore which grouping methods are most effective. Pupils study ways habitats change over time and understand that humans can have both positive and negative effects on their surroundings. They play the role of conservationists and design conservation pamphlets.</p>	Summer 2	<p>Making connections</p> <p>How does the flow of liquids compare? (5 lessons) Revising the states of matter, children consider methods for measuring how liquids flow differently from each other. They plan and execute an enquiry, considering different ways of representing data to support a conclusion. Revisiting the digestive system, the children explore how the flow of different liquids should be considered when producing different medicines.</p>

Year 5			
Autumn 1	Materials		
	Mixtures and separation (6 lessons) Pupils explore different types of mixtures and the different methods that can be used to separate them. They dissolve a range of substances, identify different solutions and investigate how temperature affects the time taken to dissolve. They design and create a water filter, sieve soil and evaporate solutions.	Autumn 2	Properties and changes (6 lessons) Broadening their experience of the properties of materials, children investigate hardness, transparency and conductivity and consider how these properties influence the uses of materials. They explore reversible changes, including dissolving and changes of state. Children compare these to irreversible changes, including rusting, burning and mixing vinegar and bicarbonate of soda.
Spring 1	Forces, Earth and space	Spring 2	Living things and their habitats
	Earth and space (6 lessons) Exploring some of the key celestial bodies in our Solar System, children learn their names and compare their movements. Pupils discover the relationship between the Earth's rotation and daylight, making models to represent their knowledge. They make their own sundials and consider how and why humans' ideas about the universe have changed over time.		Life cycles and reproduction (6 lessons) Studying animal life cycles, children learn about the significance of reproduction for a species' survival. Pupils compare asexual and sexual reproduction in plants and grow cuttings to measure and plot root growth over time. Children compare the life cycles of mammals, birds, amphibians and insects identifying key differences. They analyse secondary data to investigate how the amphibian life cycle is affected by predators and climate change.
Summer 1	Forces, Earth and space	Summer 2	Animals, including humans
	Unbalanced forces (6 lessons) Building on their knowledge of forces, children explore gravity, air resistance and water resistance in more depth and consider the effect of these forces being unbalanced. They demonstrate key principles in the classroom and plan investigations to further their understanding of the effects of these forces. Pupils test their ideas using models and compete to build the most effective pulley system.		Human timeline (3 lessons) Studying human development and changes, children identify key stages and consider what data may help determine if a child is growing normally. They describe how puberty affects girls and boys and produce graphs to compare how gestation periods vary across different mammals, including humans.
			Making connections Does the size of an asteroid affect the size of its impact crater? (3 lessons) Experimenting, analysing data and drawing conclusions to explore the relationship between the size of model asteroids and the size of the impact crater they create. They apply their understanding of gravity, air resistance and the Earth and space to make predictions and plan and carry out an enquiry.

Year 6

Autumn 1	<p>Living things and their habitats</p> <p><u>Classifying big and small</u> (6 lessons) Children broaden their knowledge of how vertebrates, invertebrates, plants and micro-organisms are grouped using shared characteristics. They discover how Carl Linnaeus developed the Linnaean and binomial systems for classifying and naming living things. Pupils use and produce classification keys to sort and identify organisms.</p>	Autumn 2	<p>Energy</p> <p><u>Light and reflection</u> (6 lessons) Proving that light travels in a straight line, children use this information to explain observations of reflection and shadows. They explore how our eyes allow us to see and how mirrors can be used in a variety of ways. Pupils investigate factors affecting the size of shadows and the laws of reflection. Children apply what they have learned about light by exploring real-life uses of mirrors.</p>
Spring 1	<p>Living things and their habitats</p> <p><u>Evolution and inheritance</u> (6 lessons) Studying patterns in humans and other species, children learn about characteristics that are inherited from parents and those that are environmental. Through the eyes of Darwin and Wallace, pupils understand how observations lead to theories and explore natural selection. By modelling the variation and natural selection of Darwin's finches, they begin to explain how species evolve over time and the role of fossil evidence that supports this theory.</p>	Spring 2	<p>Energy</p> <p><u>Circuits, batteries and switches</u> (6 lessons) Using their prior knowledge of electrical circuits, children learn to draw conventional circuit diagrams and use models to explain current, resistance and voltage. They compare different batteries and consider the effect on bulb brightness. Pupils apply their knowledge of switches and electrical circuits to design and produce their own practical devices.</p>
Summer 1	<p>Animals, including humans</p> <p><u>Circulation and health</u> (6 lessons) Studying the human circulatory system, children learn about the role of the heart, blood and blood vessels and use models to demonstrate their function. They explore how lifestyle choices affect our health and use secondary sources to advise patients. Pupils devise their own investigation to look at the relationship between exercise and heart rate, applying their knowledge of variables and then analysing secondary data to understand fitness better.</p>	Summer 2	<p>Making connections</p> <p><u>Are some sunglasses safer than others?</u> (5 lessons) Exploring sun safety, children investigate the efficacy of different sunglasses. They devise enquiries to test light and UV transmission of the lenses to form a conclusion about which sunglasses are best, applying their knowledge of electrical circuits to provide a light source in the experiment. The children summarise their findings through presentations and advertisements.</p>

Progression of knowledge and skills

As the progression of knowledge and skills document is lengthy, a link to the document has been included below.

https://www.kapowprimary.com/featured_documents/science-progression-of-skills-and-knowledge/