



Subject Report 2023-2024

Subject	Science	Report prepared by	Chloe Nolan
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Overview of the year:

Science has continued to evolve this year, following stability in the subject leaderships. The three highlights include:

- We have attained the prestigious Primary Science Quality Mark (PSQM) award to showcase our high-quality, knowledge-rich Science curriculum to develop children's substantive knowledge.
- The evolution of children's scientific enquiry has been enriched by more enquiry activities enhanced by practical science, developing children's disciplinary knowledge.
- The repository of science resources has expanded significantly to support the creation of high-quality lessons, fostering the development of scientific knowledge and, consequently, enquiry skills. This expansion has proven essential, particularly in the context of introducing a new year group and exploring novel topics such as Earth and Space along with Mixtures and Reactions in Year 5.



Curriculum: Intent, implementation, Impact

Intent

The teaching of Science at The Cambridge should nurture a child's curiosity and encourage them to be inquisitive about our universe. Lessons should provide children with the memorable opportunities to experience different materials, concepts and phenomena in a hands-on way. Through Science lessons we should teach children to investigate problems, acquire subject knowledge and discover why science matters in the world.

"Human beings are curious" - Unknown

Our Science Principles outline what our Science Curriculum outcomes:

Pupils work collaboratively to develop knowledge and obtain scientific skills. Pupils reflect on prior learning and enable them to see links between previous and future learning throughout school. Children learn subject specific vocabulary to enrich their substantive knowledge. They develop an inquisitiveness and question their knowledge and to understand the world around them. The children would leave having memorable experiences of science which will continue to engage them further in the subject as they move into higher education.

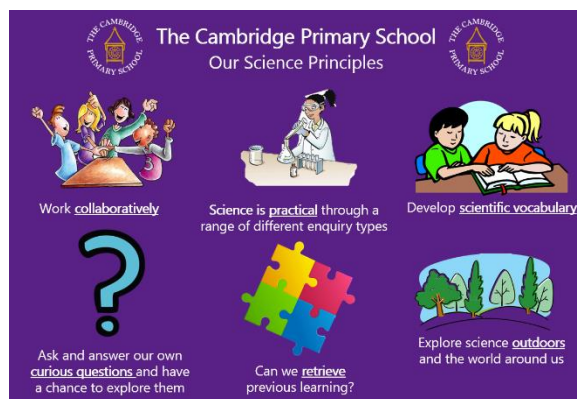
Our Science Curriculum is planned to ensure there is clear progression throughout The Cambridge from EYFS into KS1 to KS2 and further into KS3 curriculum to progress their science knowledge.

In Science, A Cambridge Pupil will leave with:

Key Skills	Qualities
<ul style="list-style-type: none"> • Ask curious questions about scientific enquiry for a purpose • Apply scientific knowledge to carry out careful observations, to answer questions and therefore draw conclusions. • Take ownership to carry out science investigations using a range of scientific equipment. • Choose scientific diagrams to record and analyse data. • Draw conclusions or identify evidence from scientific enquiries to support or refute ideas. • Expose and develop awareness of scientific connections in everyday life and the possibly of careers in STEM. 	<p>A Cambridge pupil has a clear understanding that science is present in our everyday life and have developed a natural curiosity towards investigating more. They will have taken ownership in their learning and are brave to plan, conduct and conclude their own experiments. We believe science encompasses the acquisition of knowledge, concepts, skills and positive attitudes. Pupils work collaboratively to develop knowledge and acquire scientific skills. The Cambridge continues to reflect on prior learning and enable the children to see links between previous and future learning. We provide a curriculum that gives each child the confidence and motivation to further develop their science skills into the next stage of their education.</p>

Implementation

Science teaching at The Cambridge follows the National Curriculum (NC) objectives and often Science topics link to a thematic approach however this is not compulsory. Leveraging the Engaging Science scheme as a foundation, we have meticulously designed long-term and medium-term plans to ensure progressive development in both substantive and disciplinary



knowledge among students. These plans comprehensively cover all NC objectives, integrating opportunities for enquiry alongside high-quality rich texts to expose students to specialized vocabulary.

Lessons teach children to use scientific vocabulary, develop their understanding of topics taught and investigate real-life problems through a range of enquiry types. To promote inclusivity and a diversity of perspectives, lessons are intentionally mixed ability. At the beginning of each topic, children are asked to reflect on what they already know about this topic area and retrieve prior learning to ensure they are recapping this. They are also encouraged to be curious by asking questions they would like to find out by the end of the topic. These are displayed for everyone to see on working walls and are referred back to during the topic. At the end of each topic, children have the opportunity to investigate any further questions which might still be unanswered fostering student-led enquiry and allowing exploration of their curiosity within the scientific topic. This allows the children to investigate a problem and demonstrate their knowledge and skills using methods of their scientific enquiry too. Lessons are planned to ensure each child gets a hands-on experience. Children are encouraged to *'feel the Science'* by being practical and explore a variety of enquiry types to investigate an array of different things.

There is a strong focus on vocabulary as this helps students understand and communicate using appropriate, subject specific terminology. At the start of each topic, children are given their own individual glossary of key terminology they will explore over the topic. Children are encouraged to RAG rate this highlighting their prior understanding and development throughout the topic. Teachers encourage the children to collect definitions throughout the topic. This fosters a deeper understanding of science as students grasp key vocabulary and incorporate it contextually, with the glossary serving as a valuable reference throughout the academic year. This is also supported by liaising with local secondary schools to identify knowledge and skills to support transition to secondary school and enable them to be successful scientists.

Continuous assessment by class teachers ensures a proactive approach to addressing gaps and misconceptions. Concept cartoons serve as a valuable assessment tool, visually representing science concepts and stimulating rich discussions. They not only identify misconceptions but also spark curiosity, offering challenges, and facilitating a comprehensive review of students' learning experiences.

Topics taught across each year group:

	Animals including Humans	Materials	Plants	Habitats	Forces	Electricity	Lights
	AT1	AT2	SP1	SP2	SU1	SU2	
EYFS	Do you want to be friends?	What happens when I fall asleep?	What is in the Ocean?	Tell me a story	Are we there yet?	Do cows drink milk?	
Y1	Bug's Life Animals including Humans	Moon Zoom! Animals including Humans	Enchanted Woodland Plants	Memory Box Materials	Superheros Materials	Paws, Claws and Whiskers Animals including Humans	
Y2	Castles Living Things	Street Detectives Habitats	Fire! Fire! Materials	Land Ahoy! Animals including Humans	Up Up and Away Animals including Humans	Movers and Shakers Plants	
Y3	Through the Ages & Tribal Tales Animals and Skeletons	Rocks, Relics and Rumbles (Tremors) Rocks	Rioting Romans Forces		Flow (Rivers) Plants	Scrumdiddlyumptious (Bake Off) Light	
Y4	Ancient Greeks Classification	Misty Mountain States of Matter	South America Electricity		Anglo Saxons and the Scott Sound	Vikings Digestion	
Y5	Ancient Egypt* Forces	North America Earth & Space	Tudors (Shakespeare)* Mixtures and Reactions		Settlements Life Cycles	Scream Machine Human Development	

*2023-2024 Mixtures and Reactions has been taught over Autumn 1 and Spring 1 and Forces in Spring 2. This progression above shows the plan moving forward.

Rationale for curriculum organisation:

Science is a weekly subject at The Cambridge, with lessons in Key Stage 1 (KS1) spanning one hour each week and extending to an hour and a half in Key Stage 2 (KS2). Additionally, Science Week offers supplementary, theme-specific learning experiences. The alignment of science topics with the overarching theme of each term creates a cross-curricular approach, emphasizing that Science is intricately woven into various aspects of our lives. This interconnectedness is designed to showcase that Science is not isolated but integrated into broader contexts.

Throughout the academic year, students explore diverse scientific areas that relate back to the term's thematic focus. For instance, in the "Moon Zoom!" theme of Year One, students investigate materials suitable for astronauts, while Year 2, engaged in "Street Detectives," delves into the exploration of different habitats nearby. The planning of Science lessons ensures a progressive learning experience within the subject. Above you can see highlighted are the same topic areas however across four different year groups; new colours highlight the start of a new topic area which will later be built upon in further year groups. This strategic planning ensures a seamless integration of topics, with concepts such as electricity in Year 6 linking back to the curriculum from earlier years.

The sequencing of knowledge and concepts in the National Curriculum for Key Stages 1 and 2 is meticulously followed. Extracted statements from the National Curriculum, along with the PLAN knowledge matrices from the Association for Science Education (ASE), have been mapped to ensure a logical progression from Early Years Foundation Stage (EYFS) to Upper Key Stage 2 (KS2). In each year group, students not only acquire new scientific knowledge specific to the topic but also deepen their understanding of previously covered concepts.

A clear illustration of this progression is evident in the study of plants. Starting from labelling plants in Year 1, students advance to understanding how plants maintain health in Year 2, culminating in the investigation of water transportation in Year 3. This structured approach builds upon and enriches children's prior knowledge, ensuring a continuous and comprehensive learning journey.

Readjustments and considerations are made each year to ensure the Science topic best fits, for example Year 3 topic of 'Light' has moved from Spring 1 & 2 to Summer 1 to ensure children can observe shadows easier outside likewise in Year 5 Mixtures and Reactions will fall across Spring Term to ensure all objectives are covered as it is a larger topic to cover.

What have you done to ensure that every skill is covered?

The Science Scheme of Work has undergone revision to incorporate the Engaging Science Scheme, ensuring comprehensive coverage of substantive science knowledge while fostering a practical approach to learning. All Medium-Term Plans (MTP) are readily available for teachers, offering flexibility for adaptation and updates aligned with their specific topics.

The Subject Leader possesses a thorough understanding of each topic area, confidently overseeing what is taught and ensuring that each objective and skill is addressed. To guide each year group effectively, a document outlining focus science objectives for each term has been provided. This document serves as a valuable resource for teachers, aiding them in concentrating on the specific skills required for each topic area and aligning their assessments accordingly. This matches the MTP of the topic which outlines in which lesson the objective is taught.

Regular reviews of the previous science topic are conducted through a half-termly book look. This review assesses coverage, ensuring that objectives are addressed and progression is evident across year groups, while also assessing accessibility for all learners. Teachers receive constructive feedback and guidance, facilitating a careful understanding and the identification of areas for development to ensure continual progress in learning. These areas of improvement subsequently become the focal point of the follow-up book scrutiny.

Complementing this, proactive engagement in science lessons, scrutiny of working walls, and discussions with pupils provide additional insights into the overall effectiveness of the science curriculum. This multi-faceted approach to evaluation, encompassing various aspects of teaching and learning, contributes to a holistic understanding of the impact and ongoing enhancement of the Science Scheme of Work.

In monitoring, it's clear that children are confident and grasp their scientific learning well. They retrieve knowledge from previous years, showing a solid foundation as they progress in the topic. Students express enjoyment and excitement about science, evident not only in conversations but also in the progression seen in their books. The emphasis on substantial knowledge and vocabulary is apparent, with clear and evident use of vocabulary in the children's work.

What does marking and assessment look like in your subject? How do you know this has been effective for children's progress?

Live marking primarily involves questioning and verbal discussions. This approach allows teachers to provide immediate feedback, addressing misconceptions and closing gaps in children's understanding. For any written work completed in science lessons fast feedback is given. Each piece of work has a learning objective, and students self-assess by RAG rating a circle associated with the objective. If the teacher agrees with the rating, they will initial the circle. Corrections focus solely on scientific vocabulary and understanding. Children rectify spellings in their books using purple polishing pens, promoting reuse for future pieces of work.

What CPD have you received / research have you carried out in your subject area? What has been the impact of this on the children?

Last year, The Cambridge Primary School, enrolled within the Primary Science Quality Mark and successfully concluded and was awarded the Quality Mark for Science. Over the course of the year this provided great CPD for the Subject Leader and developed the curriculum. The Subject Leader has then been able to provide staff with guidance on how to evolve the subject of science and support teachers in various thematic areas.

Ahead of introducing new science concepts, the Subject Leader ensures uniformity across the school by promoting and explaining them during staff meetings. This practice fosters consistency and allows staff to seek clarification,

<p>The impact on children's progress becomes apparent during verbal discussions in lessons, particularly when addressing misconceptions and reviewing learning in subsequent sessions. As an assessment tool, teachers may use a 'concept cartoon' to ensure children comprehend the topic and to identify any misconceptions. Teachers can also use a starter or plenary like activity from, 'Explorify' alongside quizzes created in Kahoot at the beginning and end of a topic to review progress.</p>	<p>ultimately positively impacting the children's learning experiences. Furthermore, the Subject Leader has written a guide, 'Teaching of Science at The Cambridge,' serving as a handbook for teachers. This resource provides insights into locating materials, outlining expectations, and offers additional CPD opportunities, thereby facilitating a comprehensive understanding of the school's approach to science education.</p>
<p>What Performance Information is monitored? What are the 3 questions are you considering for future developments?</p>	<p>How are Fundamental British Values, the Cambridge Learning Characteristics and personal development promoted within your subject?</p>
<p>Science progression is notable, evident in students' work in both substantive and disciplinary knowledge. This is apparent through book reviews and observation of pupils' work. Monitoring in Science has been conducted through various methods including:</p> <ul style="list-style-type: none"> • Reviewing children's books • Checking curriculum coverage • Updating and revising MTP • Regular check-ins with staff • Learning walks with feedback • Pupil conferencing <p>Key Questions:</p> <ol style="list-style-type: none"> 1. How can we utilise and develop our outdoor spaces to support Scientific Learning? 2. Are children being challenged and supported to ensure it is accessible for all? 3. Is Science being adapted effectively to ensure children can access all of the curriculum, including those working on out of year group expectation in other curriculum areas? 	<p><u>Fundamental British Values</u> Foundational British Values in Science are rigorously upheld at The Cambridge, with a focus on all four values. Democracy is promoted through teamwork, fostering mutual respect and tolerance as students share opinions and views within their KAGAN mixed-ability teams. Every child is encouraged to voice their thoughts, emphasising individual liberty within a safe and supportive environment. Adaptations to learning allows for all children to achieve and progress, empowering children to explore various scientific inquiry methods and pursue their own curious questions.</p> <p><u>The Cambridge Learning Characteristics (BICO)</u> The Cambridge Learning Characteristics (BICO) are prominently displayed within science topics. Students take ownership of their work by posing curious questions, conducting experiments, and applying their knowledge to real-world situations. Encouraged to be brave and innovative, students plan, conduct, and conclude their own investigations based on their inquiries. Collaborative work is evident through KAGAN teaching strategies, fostering the development of knowledge and acquisition of scientific skills.</p> <p><u>Opportunities for Personal Development</u> To support personal development, a science afterschool club have been offered each term to different year groups, providing all Cambridge children the chance to explore their interests in the curriculum area. Various school trips linked to science, such as The Wonder Dome visiting Reception, Year 1 and Year 5 to support with learning bout Space, Buster Farm in Year 3 to enhance Fossils Recently, Year 4 and % Pupil Premium girls were chosen to participate in an exciting collaboration with STEMETTS, Lenovo, and Dreamworks. This involved creating a 3D model of a trolls' house, showcasing various career opportunities available for girls in STEM fields. We are looking for more opportunities like this,</p>
<p>What have we done in 2023?</p>	
<p>Implementation</p>	<p>Impact</p>
<p>Purchasing of new resources</p>	<p>We've allocated resources to enhance the Science curriculum school-wide, with a primary focus on Year 5 and the introduction of a new module on Mixtures and Reactions. Additionally, efforts have been directed towards refining Science Resources for Earth and Space, evolving Electricity, Sound</p>

	and Forces. These resources have played a vital role in supporting students' exploration and comprehension of new scientific concepts. Through hands-on experiences facilitated by these resources, students have gained a deeper understanding and knowledge, creating memorable learning experiences. The incorporation of these materials has also fostered collaboration among students, enabling them to apply their newfound understanding to various concepts. Notably, the integration of resources in the classroom has resulted in increased motivation and more engaging learning experiences.
Replenishing Science Resources	Renewed, enhanced, and acquired additional resources for each year group allows learners to explore Science in practical ways. Furthermore, the provision of more resources facilitated smaller group sizes, consequently, a deeper comprehension of scientific concepts. Students access to high-quality resources, strategically utilized, they were developed higher-order thinking skills by witnessing scientific principles in action. We anticipated that this exposure would not only inspire but also elicit new questions from the students, fostering a sense of curiosity.
Development of the curriculum including, Year 5 Curriculum	The Subject Leader has meticulously designed all Medium-Term Plans (MTP) for various science topics, ensuring comprehensive coverage of objectives. A document specifying the objectives for each topic provides teachers with confidence, as they are clear about the expectations. The Subject Leader remains committed to advancing enquiry types and knowledge of working scientifically, ensuring a progressive approach across all year groups.
Outdoor Science Learning	We acquired playground science bags for children to foster their interest in science during playtime and lunchtime. Additional equipment is required, and these initiatives will be officially implemented next year, with a focus on selecting science ambassadors from Year 6.
What is the action plan for 2024?	
Implementation	Impact
High-quality Science Reading Books	Access to high-quality reading materials unfolds a realm of possibilities for students. As children employ secondary sources to delve into new facts, concepts, and address enquiries, they simultaneously contribute to enriching their vocabulary within various scientific topics. This symbiotic relationship between reading books and scientific exploration serves to enhance our science curriculum significantly.
Outdoor Learning Space (Development of Pond Areas for a Wildlife Garden as well as Science Outdoor Learning Equipment)	Improving the pond development within the scientific curriculum holds significant influences on children's learning and engagement. Enhancing the pond development provides a tangible and dynamic ecosystem for children to explore. It fosters a direct connection with various organisms, promoting a first-hand understanding of ecological interactions. The module of 'Animals' and 'Habitats' is throughout KS1 and EYFS as well as Year 5. A well-improved pond becomes a thriving habitat. This offers children a unique opportunity to study and appreciate the rich biodiversity present in aquatic environments, contributing to a broader scientific understanding. Interacting with an improved pond setting allows students to engage in hands-on learning experiences. Practical exposure to scientific concepts, such as life cycles and ecosystems, significantly enhances their comprehension and retention of this scientific learning. The development of the pond area can also improve children and staff wellbeing. The pond would be designed as a Wildlife Garden and tranquil, calming environment. Children can be taken here with an adult to calm down and reflect. Children's connection with nature, fosters a sense of wonder and appreciation for the environment. Not only can it bring the educational opportunities previously mentioned, as they learn about different species of plants and animals it can also help with sensory needs. Children interacting with sights, sounds and textures of a pond can stimulate children's senses and enhance their sensory development. Spending time

	with nature has been shown to reduce stress and anxiety levels in children, providing a calming and therapeutic environment. Caring for the plants and animals in the pond and garden can teacher children responsibility and empathy towards living creatures, fostering a sense of stewardship for the environment
Data Loggers https://www.tts-group.co.uk/bluetooth-data-logger/1011738.html?cgid=Primary-Computing -- ICT-Science -- Data logging £599 – Set of 6	As our science curriculum advances, there is a growing demand for children to enhance their substantial knowledge through investigative activities. In Key Stage 2, students are expected to delve deeper into scientific enquiries and maintain accurate records. The incorporation of data loggers becomes instrumental in enabling children to conduct thorough investigations into light, temperature, and sound, thereby facilitating the production of scientific data. This will enable children to incorporate their mathematical skills of producing graphs, tables and representing their data to draw conclusions.
Developing Science Capital	Offering children additional opportunities in science, such as Whole School Themed Weeks or participation in a Science Club, aligns with the objective of captivating and inspiring individuals of various age groups with science, engineering, and technology. These experiences in science are designed to distinguish themselves from the routine classroom learning, providing children with hands-on and child-led activities. Through these engaging activities, children are expected to cultivate a genuine fondness for science. Moreover, the visibility and significance of science will be elevated not only within the school but also in the local community.
Science Resources through school	Renewing, enhancing, and acquiring additional resources for each year group will empower students to expand their knowledge base. Teachers will have the capability to design novel investigations utilizing these new resources. Furthermore, the provision of more resources facilitates smaller group sizes, leading to a more favourable student-to-resource ratio and consequently, a deeper comprehension of scientific concepts. By affording students access to high-quality resources, strategically utilized, they are poised to cultivate higher-order thinking skills by witnessing scientific principles in action. We anticipate that this exposure will not only inspire but also elicit new questions from the students, fostering a sense of curiosity. This, in turn, contributes to the development of disciplinary knowledge among the children and enhances the diversity of our scientific inquiry approaches.
Science Resources for New Year Group (Year 6)	As the Science Curriculum expands, we introduce new topic areas, including Evolution, and Hearts and Lungs. To foster curiosity, facilitate the development of scientific inquiry skills, and encourage the application of learned concepts within these topics, we will acquire new resources.
Development of assessment	Enhance the assessment processes across all year groups throughout the school to ensure a comprehensive record of objectives, particularly for end-of-key-stage reporting. Courses: <ul style="list-style-type: none"> • Teaching and Assessment in Primary Science Network RK121 / A55 - £90 • Leading change in Primary Science Assessment RK198 / A240 - £40