

## Subject Report 2022-2023

<b>Subject</b>	Science	<b>Report prepared by</b>	Chloë Nolan
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### Overview of the year:

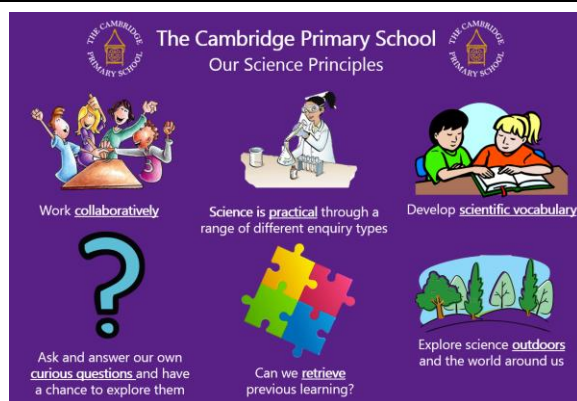
Science has continued to evolve this year, following stability in the subject leaderships. The three highlights include:

- The Science Curriculum across Key Stage 1 & 2 has developed and been strengthened by incorporating high-quality books to influence science vocabulary and develop children’s substantive knowledge.
- Alongside the developed curriculum, children’s scientific enquiry has been enriched by more enquiry activities as children are curious about the subject.
- The bank of science resources has grown to facilitate quality-first lessons developing science knowledge and in turn, enquiry skills. This has been a necessary step in also developing a new year group and with new topics such as electricity and sound.

### 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. 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.



When children leave The Cambridge Primary School, a good learner of science would have developed an inquisitiveness and question their knowledge and understanding of 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. Children will have developed a range of enquiry skills allowing them to be problem solvers when faced with real life problems. They will be able to be specific in the vocabulary used and investigate problems in their own way from developed disciplinary knowledge. All learners will have developed the science knowledge needed and enquiry skills to investigate the world further. 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"> <li>• <b>Ask curious questions</b> about scientific enquiry for a purpose</li> <li>• <b>Apply scientific knowledge</b> to carry out careful observations, to answer questions and therefore draw conclusions.</li> <li>• Take ownership to <b>carry out science investigations</b> using a range of scientific equipment.</li> <li>• Choose scientific diagrams to <b>record and analyse data</b>.</li> <li>• <b>Draw conclusions</b> or identify evidence from scientific enquiries to support or refute ideas.</li> <li>• Expose and develop <b>awareness of scientific connections</b> in everyday life and the possibly of careers in STEM.</li> </ul>	<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 <b>ownership</b> in their learning and are <b>brave</b> to plan, conduct and conclude their <b>own experiments</b>. We believe science encompasses the acquisition of knowledge, concepts, skills and positive attitudes. Pupils work <b>collaboratively</b> 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. Using the Engaging Science scheme as a base, long term and medium term plans have been developed to ensure they show progression in both children’s substantive and disciplinary knowledge. Plans are created to ensure they cover all NC objectives, opportunities for enquiry are complemented by high-quality rich texts to expose children to rich, subject specific 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. All lessons are mixed ability to ensure children are exposed to all opinions and ideas in scientific thinking. 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. This encourages child lead enquiry so they can explore their curiosity within that 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. Teachers encourage the children to collect definitions throughout the topic. This will develop a deeper understanding of science as children learn key vocabulary and are able to use it within the correct context. Children are able to refer back to this throughout the 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.

Through Science lessons SMSC and British values are promoted. For example; individual liberty and the social development of children is developed through collaborative learning opportunities. Group tasks encourage children to share and make choices based on different viewpoints or ideas. Science is taught mixed ability groupings so children can experience different viewpoints and coach each other to understand new concepts. Science is taught in a range of different ways across Key Stage 1 and 2. Outdoor spaces can be used to let children explore Science outdoors, especially in EYFS and KS1. Now Press Play is also another brilliant tool to allow children to experience Science in a different way through dramatizing problems and listening to solutions.

Throughout lessons class teachers are assessing children's scientific understanding, addressing any gaps and covering any misconceptions that may have occurred. Through the developed Science Curriculum concept cartoons are one way class teachers are assessing children's understanding within the topic. Concept cartoons are a visual representation of science ideas and provide children with a range of viewpoints about science opinions designed to motivate and engage them. This stimulates a rich discussion as it invites students to justify their own ideas and clarify their scientific thinking as well as to considering others. Teachers can use these as a way of identifying misconceptions, stimulate starting points, offer challenging, simulate curious questions or as an assessment tool to review a piece of learning.

Topics taught across each year group including progression:

	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?	Commotion in the Ocean	Tell me a story	Are we there yet?	Do cows drink milk?	
Y1	Bright lights, Big City Seasonal Change	Memory Box Animals including Humans	Moon Zoom! Materials	Superheroes Materials	Claws, Paws and Whiskers Animals	Enchanted Wood Plants	
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 Light		Flow (Rivers) Plants	Scrumdiddlyumptious (Bake Off) Forces	
Y4	Ancient Greeks Classification	Misty Mountain States of Matter	South America Electricity		Anglo Saxons and the Scott Sound	Vikings Digestion	

Rationale for curriculum organisation:

Science is taught weekly. In KS1, lessons are one hour long each week and in KS2 they are an hour and a half. This is further supported by a Science Week made up of additional Science themed learning. Science topics are planned to match that terms overarching topic theme to give a cross-curriculum feel. This way children are able to see that Science is not a standalone subject but instead embedded into every aspect of our lives. Pupils get to explore science in many different topical areas and where possible relates back to the topic. For example, Year One Moon Zoom! Link back to materials by investigating the best material for an astronaut or Year 2 as part of Street Detectives explore the different Habitats found nearby. Science is planned to ensure there is progression within the subject area. 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 (*for example, electricity will later link in with the Year 6 curriculum.*) The National Curriculum describes a sequence of knowledge and concepts set out year-by-year for key stages 1 and 2. Statements from the National Curriculum have been taken and mapped out to ensure they progress from year to year along with the PLAN knowledge matrices (ASE). This has been mapped out into a progression document from EYFS to Upper KS2. In each year group children are acquiring new scientific knowledge within that scientific topic and deepening their prior understanding. For example: Within plants children move from being able to label a plant (Year 1), to understanding how they stay healthy (Year 2) and then to investigating water transportation (Year 3). Each year children's previous knowledge is built upon and enriched further.

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

The Science Scheme of Work has been rewritten to incorporate the Engaging Science Scheme to ensure all science substantive knowledge is covered as well as integrating a practical way of learning too. All MTP are ready for teachers to use, adapt and update through their topics. The Subject Leader has a clear understanding of each topic area, what is being taught and confidence that each objective and skill is covered. Each year group have been provided a document outlining their focus science objectives for each term and therefore the objectives they will also be assessing against. This enables class teachers to focus on the skills required for that topic area. Each half term a book look is completed to review the previous science topic. This looks at the coverage to ensure objectives are covered as well as progression from each year group and accessibility for all learners. Teachers are given feedback and guidance to understand and conclude development points to ensure learning is progressing. These areas of improvement are then the focus of the follow up book scrutiny. This is complimented by also popping into Science lessons, reviewing working walls and speaking to pupils about their views of science.

**Impact**

Monitoring shows that children are confident and understand their scientific learning; they retrieve knowledge from prior years to assist them when the topic progresses. Children enjoy Science throughout school and are excited about their lessons. This is evident when speaking to pupils but also the progression within their books. Our focus upon substantive knowledge and vocabulary is noticeable within children's books as clear vocabulary is being use and knowledge is more evident. Pupils are developing high-order thinking as they are using more reasoning within science through concept cartoons.

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

Live marking is largely based through questioning and verbal discussion. Through questioning and discussions teachers can give instant feedback to address misconceptions and close gaps in the children's understanding. For any written work completed in science lessons fast feedback is given. There will be a learning objective for each piece of work and the children will RAG rate a circle placed on the learning objective in response to self-assessment. The teacher will initial the RAG rated circle if they agree with the RAG rating. Teachers will correct there is a focus on scientific vocabulary only. Children correct the spellings in their books using purple polishing pens and reuse for future pieces of work. The impact on children's progress should be evident during verbal discussions with children during lessons, when addressing misconceptions and recapping learning in subsequent lessons. Teachers may give the children a 'concept cartoon' as an assessment tool to ensure they understand the topic and identify any misconceptions.

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

From September 2022, The Cambridge Primary School, enrolled within the Primary Science Quality Mark which has provided great CPD for the Subject Leader and developed our curriculum. As the curriculum has been reviewed during this process it has highlighted a clear action plan. The Subject Leader has then been able to provide staff with guidance on supporting the action plan and enriching the curriculum. Being part of the local science network with local primary and secondary schools has been beneficial the progression of disciplinary knowledge as well as networking ideas for topics. As a large focus this year is developing disciplinary knowledge throughout our curriculum, the Subject Leader has spent time researching how it implement this across all year groups. In line with the PSQM journey, staff meetings have been held to help support the roll out and provide staff with opportunities for feedback. Assessment and ideas have been provided to ensure staff are clear on implementing this into our curriculum moving forward.

**What Performance Information is monitored? What are the 3 questions are you considering for future developments?**

Progression in Science is good. It is clear students are making progress within both their substantive and disciplinary knowledge. This is evident from reviewing books and seeing pupils work. As the use

**How are Fundamental British Values, the Cambridge Learning Characteristics and personal development promoted within your subject?**

Fundamental British Values  
Fundamental British Values In Science we ensure all four the British Values are respected. We promote democracy through working in a team and show mutual respect and tolerance by sharing our opinions and views to each other within our teams. Every child gets to have their say and are encouraged to express their own

<p>of assessment is developed within Science progress will become clearer as misconceptions and gaps are addressed within lessons.</p> <p>Monitoring within Science has taken place with:</p> <ul style="list-style-type: none"> <li>• Book looks</li> <li>• Reviewing and updating planning</li> <li>• Check in with staff</li> <li>• Learning walks and feedback</li> <li>• Pupil conferencing</li> </ul> <p>Key Questions:</p> <ol style="list-style-type: none"> <li>1. How can we utilise and develop our outdoor spaces to support Scientific Learning?</li> <li>2. How are children using practical resources to deepen their understanding?</li> <li>3. Are children being challenged and supported to ensure it is accessible for all?</li> </ol>	<p>views within the lesson as children work within their KAGAN mixed ability teams. Individual Liberty is encouraged as pupils make their own choices in a safe and supportive environment. Appropriate differentiation allows children to achieve and progress, they are able to choose from a variety of different methods of scientific enquiry to investigate their own curious questions.</p> <p><u>The Cambridge Learning Characteristics (BICO)</u></p> <p>Within Science all four of The Cambridge Learning Characteristics are being showcased within each topic. Pupils take ownership in their work by asking curious questions, conducting experiments and applying their knowledge to questions or situations. Pupils their curious questions to be brave and innovative by planning, conducting and then concluding their own investigations based on this. Pupils continue to work collaboratively together to develop knowledge and acquire scientific skills, evident in the KAGAN teaching strategies used to engage pupils in their learning.</p> <p><u>Opportunities for Personal Development</u></p> <p>Science afterschool club has been offered in each term to a different year group. This has enabled all children at The Cambridge the opportunity to explore their interest and curriculum area. In Spring Term a Tech Club was also offered to children from an outside agency which promoted the use of STEM. There has been a range of school trips linking to science such as Marwell Zoo (<i>Year 1 – Animals</i>), Gilbert White (<i>Year 2 – Pond Dipping – Habitats</i>) and Buster Farm (<i>Year 3 – Fossils</i>).</p>
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What have we done in 2022?	
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Implementation	Impact
Primary Science Quality Mark	Reviewing the curriculum to ensure the curriculum is well around in all areas such as Leadership, Teaching and Learning and Wider Opportunities. The action plan drawn up from this directly impacts the children’s education for the better. Enriching our curriculum and leadership within the subject.
Purchasing of new resources	We have invested in a number of resources for Science to be used across school. Our main focus has been setting for new curriculum areas in Year 4 and there new topic of Electricity and Sound. The resources have assisted and supported students learning of science have been able to explore and understand new concepts. It has enriched their understanding and knowledge by providing a hands on experience which is memorable for them too. The resources have also added to student’s collaboration together as children are able to now apply their understanding to concepts. The use of resources in the classroom has seen an increase in motivation and engaging learning taking place.
High-quality Science Reading Books	Expanding science through good quality reading books opens up a new world from pupils. Not only are they able to research new facts, concepts and answer questions but see their love of reading developed into the subject of science. Providing pupils with high-quality literature for Science can pre-teach new concepts, develop a pupils’ interest or passion and provides a great resource for lesson. The use of science reading books also crosses over the link to English and using these books within guided reading or further English topics. Rich vocabulary has also been used to enhance our science curriculum.
Development of assessment	The purchasing of Concept Cartoons helps teachers identify any misconceptions within science teaching. It also supports a collaboration as pupils discover the correct answer together and reason with their own understanding while listening to viewpoints of others. These have been purchased from KS1 and KS2.
Development of Curriculum	Subject Leader has planned all MTP for all science topics ensuring objectives have been covered. A document outlining which objectives should be taught in each topic gives teachers the confidence as they know the expectation. Subject Leader continues to develop enquiry types and working scientifically knowledge by ensuring there is progression in all year groups.

What is the action plan for 2023?	
Implementation	Impact
Science Resources for New Year Group (Year 5)	As the Science Curriculum grows we develop new topic areas such as Space and the development of States of Matter and Forces. For these topics to promote curiosity, enable pupils to develop scientific enquiry and apply concepts learnt, new resources will be purchased.
Science Resources through school	Replenishing, upgrading and purchasing addition resources for each year group will enable pupils to develop their knowledge. Teachers will be able to plan for new investigations with new resources. It will also allow for smaller group sizes, with more resources, allowing them to have a greater understanding as they have a smaller ratio. As pupils have high quality resources, used in the right way, they will develop higher-order thinking as they are able to see science happen. We hope this also inspires and sparks new questions from the children to develop inquisitiveness. This encourages children's disciplinary knowledge and enriches our scientific enquiry types.
Developing Science Capital	Providing children with more opportunities within Science, such as: Whole School Themed Weeks or a Science Club. The aim of Science is to engage and inspire people of all ages with science, engineering and technology. Children's experience of Science will separate from their everyday learning in the classroom. Children will develop a love of Science through hands on and child led activities. The profile of science will be raised within both school and local community.
High-quality Science Reading Books	High-quality reading books opens up a new world from pupils. As children use secondary sources to help them research new facts, concepts and answer questions. This will also support rich vocabulary within topics to enhance our science curriculum.
Outdoor Learning Space	Learning in a real context can turn the abstract into the concrete. Outdoor learning inspires curiosity and investigation, which inspires enquiring minds and enables them to achieve. Research studies show that outdoors is a dynamic environment that stimulates creativity and enables learning to happen faster. It also supports the emotional and physically well-being of pupils. Children feel free within the constraints of the classroom and inspires the learning of children who find the classroom environment difficult. Outdoor Science opens up children's learning as it can incorporate so many topic areas such as Habitats, Life Cycles, Animals and Plants. It would be a fantastic opportunity to encourage wildlife as children release butterflies and tadpoles into this area. Children can set-up a gardening and nature club to encourage ownership within this area too.