Heronsgate School Science Policy

"Science is a way of thinking much more than it is a body of knowledge."
Carl Sagan

Vision and Aims for Pupils:

At Heronsgate, we provide all children with a rich, broad and challenging Science curriculum, as well as an engaging and safe environment. We aim to promote a lifelong love of Science; to enable a spark of interest for future scientists; to encourage them to explore, question, take risks and discover the world around them.

At Heronsgate we strongly believe that Science is good when:

Teachers	Students
• set high expectations; • are prepared to lessons; • have good subject knowledge; • provide engaged resources; • provide opportunities for practical tasks and experiments; • enrich lessons by learning trips / inviting visitors to share their knowledge and experience; • use scientific language/ terminology; • are enthusiastic and engage all pupils; • challenge and guide children; • let children to make mistakes; • address misconceptions; • provide opportunities for independent investigations; • model how to carry on experiments; • provide high standard examples of tasks; • link lessons to previous learning; • link learning to real world and life experiences; • meet all the needs of their learners; • prepare students for further educations;	• are engaged and excited; • ask questions; • explore and investigate; • gain subject knowledge; • using tools, equipment and practical resources; • help to shape lessons; • apply knowledge and skills; • develop skills; • share findings; • make mistakes; • take risks; • learn from mistakes; • use scientific language; • analyse data; • draw conclusions; • record data and interpret it; • can recognise stages of an experiment; • learn how to carry on and record a fair experiment; • are able to hypothesise / predict; • develop own understanding; • work collaboratively;

The aim of the science curriculum at Heronsgate is to:

- Develop scientific knowledge and concept understanding. To challenge what the children know and what they thought they knew.
- To foster an appreciation and concern about the natural world and environmental issues.
- Develop understanding of the nature, processes and methods of science through different types of enquiry that aid the children to answer scientific questions about the world around them.
- Equip children with the scientific knowledge and skills required to understand and test the uses and implications of science, both today and into the future.

Children's attitudes towards science should also be developed through:

- The encouragement of positive attitudes towards science and all its branches.
- Building on children's natural curiosity.
- The development of a problem solving approach and associated skill set.
- The encouragement of an open-mind and optimistic approach.
- The building of self-confidence and perseverance to enable independent work.
- Active encouragement to enjoy the science experience - leading to a desire for studying science further.

Curriculum Structure

Heronsgate aims to provide a broad, scientific curriculum that develops scientific knowledge, understanding and vocabulary and empowers children to ask scientific questions and to probe what they think they know. Above all, Heronsgate strives to provide a curriculum that is structured, logical, interesting and exciting. Concepts and ideas taught should be reinforced through the application of key vocabulary and working scientifically skills.

Heronsgate uses the Cornerstones curriculum for all its science, history and geography planning. In turn, Cornerstones takes its lead from the national curriculum where certain topics and areas are repeated across year groups, meaning that children may revisit a particular subject across their primary school years. Each visit will increase in difficulty, depth, vocabulary and focus. Science should be taught on a weekly basis and it is recognized to be independent but where appropriate – linked to the Cornerstones drive subject being undertaken that term. This will be monitored by the science lead.

Planning and Teaching:

To ensure that the coverage of knowledge and skills within the Science curriculum are effective, teachers should use the Cornerstones Curriculum Maestro online platform to inform their planning and teaching of science-based projects. Progression is key to ensure all learning is building on prior knowledge and skills, therefore it is crucial that all teachers are aware of the progression of knowledge and skills of each planned lesson (this can be viewed using the progression tab in the skill section of every lesson on the cornerstones online platform). The details of Science coverage are provided in the curriculum documents – Layers 1, 2 and 3.

Lesson plans should be clear and informative, presented as quality teaching slides (an ActivInspire flip), which for each lesson should include:

1. A slide (1st) which clearly presents the knowledge and skills demonstrated in the lesson (this can be taken directly from cornerstones but may require to be adapted and presented in child friendly language) with reference to skill progression from previous year groups.
2. A clear learning objective (based on the skill being taught) and 'steps to success'(success criteria)
3. Links to a range of multi-media resources/ source such as online videos, audio files and images (when appropriate).
4. A visual aid of the task and supported documents (i.e., screenshots of worksheets and other resources).

See subject check list

Please note any cornerstone presentations/ teaching slides and resources should be uploaded into the lesson plan flipchart via *insert > link > file* option and stored locally in the flipchart.

All **lesson resources** should be taken directly from cornerstones (if available for the lesson be taught) with lesson objectives (LO's) added - to be clearly presented at the top of the task (worksheets) being completed by the children (documents should be edited to include this). Tasks should be differentiated to be accessible for all learners and an extension task available to challenge learners working at age expectation and above. If additional resources are required, other appropriate sources can be used to benefit teaching but should not alter the lesson outcome. Please note - Twinkl **should not** be used as the main lesson resource.

All teaching resources once created should be uploaded to year group folders to be accessible for all teaching staff and available for adaption for the next academic year (if needed). At the end of every project Year group teams should feedback to the subject lead to evaluate project and suggest any possible changes.

During a typical lesson, any key vocabulary (tier 3) associated with the topic area should be given allocated time to discuss and develop the children's understanding with appropriate examples if possible. All written work should be clearly presented in topic books with a new styled subject knowledge title page. This title page should include:

1. The name of the topic and the area of knowledge and skill to be explored.
2. Key questions that relate to the outcomes of the topic (e.g. What is a Solar System?)
3. Key vocabulary with meanings – Tier 3 vocabulary should be present with clear definitions.

Please see examples for reference

It is strongly recommended that all Science topics begin with a hook/ stunning starter/ memorable experience, if possible, to develop children's enthusiasm and interest in the subject i.e.:drama activity or a trip outing/ visitor.

The first lesson in each new block of work is expected to determine and revise the children's prior learning in a particular subject (initial assessment). This informs the teacher of prior knowledge retention and depth of interest.

In addition to the impartment of knowledge, practical scientific skills, processes and methods are also taught. These areas are detailed in the national curriculum and in the Cornerstones 'Working Scientifically' part of their programme. They are not taught as separate elements.

It is expected that a typical lesson will be focused around three key areas - concept, testing, recording.

- Concept - a key idea/theory in science that should be introduced and discussed. The use of key scientific vocabulary should be paramount here.
- Testing - confirming (or disproving) the concept through a scientific approach that encompasses such skills as observation over time; pattern seeking and recognition; identifying, grouping and classifying; the use of fair testing; and constants versus variables.
- Recording - this area provides opportunities for assessment by a teacher and is where the vast majority of cross-curriculum links are made - computing, maths, English, history, geography, design & technology (many related skills) and art. Again, the correct use of key scientific vocabulary should be paramount here.

Assessment and Feedback:

Progress of all children is monitored with key question assessment grids. Key questions should be taken from project knowledge and skills to create a broad overview of the unit. A series of multiple choice, interactive and reasoning answers should be presented to allow children to demonstrate their understanding, which can be compared at the start and end of a project. This will allow teachers to monitor children's learning and identify clear progression of children's knowledge and skills. Assessment grids and new subject knowledge title pages aim to engage the children in a new topic, activate prior knowledge and share unit objectives.

Marking should be undertaken as per the schools' marking policy – Learning objectives should be highlighted to clearly show whether it has been achieved (Pink – achieved / Pink and Green – partly achieved / Green – Not achieved). Marking during lesson time and class teachers should provide face to face verbal feedback on written tasks and activities to ensure misconceptions and corrections are addressed.

Further in school, pupil voice activities can be utilized to indicate how effective the teaching of science is in engaging the children, in developing their scientific knowledge and curiosity.

Homework and Parental Engagement:

Homework within a science topic is set on a termly basis using a project-style approach, introduced and issued at the start of the term where the science subject is to be looked out and taught. Children are expected to complete at least one activity and hand it in before the set deadline - usually the start of the final week of that term.

External education visits are also undertaken where appropriate. An example of this would be a visit to the National Space Centre during the term when Space is the topic. This provides a 'stunning starter' or equally a 'fantastic finisher' for the children; cementing knowledge through an engaging and exciting adventure.

The employment of a project approach to science homework enables parental engagement in an participative, non-time critical setting. A project is something that all the family can get involved in.

Inclusion and SEND:

Science is taught in such a way that the inclusion of all children at Heronsgate is possible regardless of ability or additional needs. Through our science teaching, we provide a broad and balanced education to all children and provide learning opportunities that enable them to make good progress. All children have access to the full range of activities whilst learning science; these activities are differentiated by the class teacher to meet specific education needs and to enable all children to find success.

Resources and Displays:

All classes have access to a bank of resources for science lessons; these are located in the science cupboard near the hall. The resources are arranged in boxes by themes and topic. Year managers are responsible for the collection, care and timely return of these boxes. Replenishment should be undertaken via the school office. Boxes and resources should be treated and maintained as a valuable whole school resource. Word mats/posters that depict and explain key vocabulary should be available in each classroom.

Displays in individual classrooms are encouraged and should depict key concepts, vocabulary and ideas associated with a science subject. In shared areas, each year group should display examples of science work plus homework projects for the benefit and enjoyment of other children, visiting parents and adults.

A general display board for whole school science activities is to be maintained in the library area. This board is under the control of the science leader for depicting that, overtime, children develop a range of skills across all scientific branches.

Monitoring:

Progress of all children is monitored through lesson and activity observations and drop-in sessions. The subject leader should also undertake regular book scrutinies, audits of the learning environment (in classrooms and in shared areas), and discussion with class teachers and year managers, plus examination of long/medium term planning. The subject lead will also provide guidance and advice to all staff when required. It is the responsibility of the subject lead to share such findings with the appropriate designated governor.

Cross Curricular links:

Numerous cross curricular links are made when teaching science; this has the benefit of also reinforcing basic numeracy and literary skills. Examples of such links are:

- Maths - the collection and presentation of data and statistics. Calculation of and analysis of results.
- English - report writing skills, non-chronological reports, reading, debating and discussions.
- History - comparisons with events from the past. Changes in cultural and sociological understanding.
- Geography - biomes and environmental changes.
- Computing - calculation of and presentation of results, research skills.
- PSHE - connections with citizenship and welfare, especially climate change.
- Art - depicting concepts and ideas through creativity.
- Design and Technology – physics laws understading used in practical projects, chemistry knowlegde applied in cooking sessions.

Health & Safety:

Safe working practices are an integral and paramount part of all science lessons and activities. All staff are aware of the safe and correct handling of chemicals, tools, apparatus and equipment. Teachers should demonstrate to pupils how to work safely and ensure that all children using equipment are properly supervised.

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Update: September 2023

Annex A - National Curriculum (Science Years 1 to 6)

Appendix 1 - Format of a formal science write-up.

Appendix 1

Format Of A Formal Science Write-Up

Scientific reports allow their readers to understand the experiment without doing it themselves. In addition, scientific reports give others the opportunity to check the methodology of the experiment to ensure the validity of the results. Ultimately, they enable an individual to recreate the experiment should they wish and to compare results.

A scientific report is written in several stages using sub-headings, which should be underlined.

When	Stage/Sub-heading	Details
Before the experiment is conducted.	**Aim**	What are we trying to find out? Vocab: discover, assess, find out, what/ where/when/how/why. *The aim of this experiment is to assess if sunlight has an effect on the growth of plants.*
	Hypothesis	The prediction - what do you think will happen and why. Vocab: idea, theory, predict, because, therefore. *As plants require sunlight for photosynthesis, the theory is that a plant kept in the dark over a period of time will inhibit growth.*
	Constants	What elements/items/test conditions will remain the same throughout the experiment. Vocab: equal, remains the same, identical, consistent. *All plants will receive 20ml of water per day.*
	Variables	What elements/items/test conditions will change throughout the experiment. Vocab: changes, variables, alter, vary. *One plant will be kept under constant sunlight (lamp), another will be kept in a dark cupboard, and.....*
	Equipment	What resources (materials, beakers, trays, chemicals, etc) will you need for the experiment - include quantities, measurements and specific details. Vocab: quantity, amount, type, variety, resource. *4 x plants of the same variety and size.* *2 x thin pointed metal tweezers.* *100g uncooked long-grain rice* *1 x 500ml beaker...*

	Safety	Health & Safety - what materials/procedures might potentially cause harm? Vocab: danger, heat, ensure, immediately, beware, care, attention. *Take care adding the hydrochloric acid to the beaker. Spillages should be wiped up immediately.*
	Method	This is a step by step set of instructions on how to undertake the experiment - much like a recipe. Formal language should be used throughout using imperatives and time connectives and without contractions or pronouns. This can be started before the experiment is conducted and completed/added to afterwards. *Firstly, measure out 120g of uranium and place in the...*
	Diagram	A single (or series of) of clear line drawings (created using a ruler!) that depict how the experiment was set-up and carried out. Labels and captions should be used. This can be started before the experiment is conducted and completed/added to afterwards.
After the experiment.	**Results**	Informs the reader clearly of what happened during the experiment. Could be in the form of a write-up, a series of photos, a graph or a table. Graphs should include a title and have labelled axis. Should <u>not</u> attempt to explain any of the findings.
	Conclusion	Explains what you found out and why you obtained the results you did in a clear, formal style. Should relate back to the hypothesis - was it proved true or not? Ideas for future research/experiments or questions arising from this experiment may be proposed during this stage. *The plant kept in the cupboard died which proves that plants require sunlight to remain healthy. Plants create energy through photosynthesis. This confirms that photosynthesis requires sunlight to occur. Our hypothesis was proved correct in that...*