

Progression of Skills
in Scientific Enquiry

Curriculum Intent:

At Highfield, we aim to increase pupils’ knowledge and understanding of our world. Our curriculum will develop the natural curiosity of the child, encourage respect for living organisms and the physical environment and provide opportunities for critical evaluation of evidence. We believe children should behave as **real** scientists – engaging in research, answering questions and carrying out investigations.

We believe children need to understand the value of a good question and how to answer it. We believe that children should have the skills to carry out a sequence of steps, valuing the importance of accuracy in their working. We believe children need to build upon their knowledge using credible and reliable sources that they can access and understand in their own words.

Our teaching should include substantive (subject) AND disciplinary (method, thought process, history) science. We do not assume that children are picking up the disciplinary knowledge unless we teach it. We teach how to be/ think like a scientist- the process and method and whys. History links can also be a way to support this plus engaging in OPEN, vocabulary driven class ongoing conversations.

Assessment Points

Enquiry



Research



Investigation



Implementation

Teachers create a positive attitude to science learning within their classrooms and reinforce an expectation that all pupils are capable of achieving high standards in science. Our whole school approach to the teaching and learning of science involves the following;

- Science will be taught, planned and arranged in blocks by the class teacher, to have a project-based approach OR can be drip drip, regular and often lessons to help give more frequent opportunities for questioning. Daily science is also evident through a culture of open discussion and mini ongoing projects like weather diaries.
- Existing knowledge and understanding is checked at the beginning of each topic. This ensures that teaching is informed by the children’s starting points and that it takes account of pupil voice, incorporating children’s interests. Concept cartoons are used often to check pupil understanding.
- Through our planning, we involve problem solving opportunities that allow children to apply their knowledge, and find out answers for themselves. Children are encouraged to ask their own questions and be given opportunities to use their scientific skills and research to discover the answers. This curiosity is celebrated within the classroom. Planning involves teachers creating engaging lessons, often involving high-quality resources to aid understanding of conceptual knowledge. Teachers use precise questioning in class to test conceptual knowledge and skills, and assess pupils regularly to identify those children with gaps in learning, so that all pupils keep up. Tasks are selected and designed to provide appropriate challenge to all learners, in line with the school’s commitment to inclusion.
- We build upon the knowledge and skill development of the previous years, closing gaps. As the children’s knowledge and understanding increases, they become more proficient in selecting, 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 embedded into lessons to ensure that skills are systematically developed throughout the children’s school career and new vocabulary and challenging concepts are introduced through direct teaching. This is developed through the years, in-keeping with the topics.
- Teachers demonstrate how to use scientific equipment, and the various Working Scientifically skills in order to embed scientific understanding. Teachers find opportunities to develop children’s understanding of their surroundings by accessing outdoor learning and workshops with experts.
- At the end of each topic, key knowledge is reviewed by the children and checked by the teacher and consolidated as necessary.



Cultural Capital

- Cultural capital is considered with opportunities given for real life science (visitors, virtual talks, and hands-on practical experiences). We also choose our yearly famous scientists from a wide range of backgrounds, time periods and genders. We aim to mark British Science week each year too which promotes science as an open and equal opportunity career path for our pupils.
- Children are offered a range of extra-curricular activities, visits, trips and visitors to complement and broaden the curriculum. These are purposeful and link with the knowledge being taught in class. For example, Marwell Zoo, botanical gardens and the science museum in Winchester.
- Events, such as project days, allow all pupils to come off-timetable, to provide broader provision and the acquisition and application of knowledge and skills. These events can involve families and the wider community.

Impact

The successful approach at Highfield results in a fun, engaging, high-quality science education, that provides children with the foundations and knowledge for understanding the world. Our engagement with the local environment ensures that children learn through varied and first hand experiences of the world around them. Frequent, continuous and progressive learning outside the classroom is embedded throughout the science curriculum. Through various workshops, trips and interactions with experts and local charities, children have the understanding that science has changed our lives and that it is vital to the world’s future prosperity. Data is collected at the end of topics and recorded on SIMS so teachers can see year on year which pupils are exceeding, meeting or working below national expectations.

	EYFS	Y1-2	Y3-4	Y5-6
Observing Over Time	<p>Plan</p> <ul style="list-style-type: none">● I am curious about things that change● With help I ask questions about things changing● I talk about my ideas for finding out how things change <p>Do</p> <ul style="list-style-type: none">● I use all my senses to observe changes● I look closely at how things change● I make simple records of how things change (with help where necessary)● I use simple equipment to observe and record changes <p>Review</p> <ul style="list-style-type: none">● I talk about what I have done and what I noticed <p><u>Vocabulary:</u> Explore Change Senses Notice/ look Measure Seasons/ weather</p>	<p>Plan</p> <ul style="list-style-type: none">● I ask questions about how and why things change● With help, I identify changes to observe and measure and suggest how to do it <p>Do</p> <ul style="list-style-type: none">● I use non-standard units and simple equipment to record changes● I record in words or pictures, or in simple prepared formats such as tables and charts <p>Review</p> <ul style="list-style-type: none">● I identify simple changes and talk about them● I sequence the changes● I begin to use scientific language to talk about changes● I talk about whether the change was what I expected <p><u>Vocabulary:</u> Investigate Equipment/ resources/ what I need Summary Experiment Observe/ look Measure Fair test Record Results Table/ chart Sequence Sensible guess Same/ different</p>	<p>Plan</p> <ul style="list-style-type: none">● I talk about things changing and decide when questions can be answered by observing over time● I decide what observations to make, how often and what equipment to use <p>Do</p> <ul style="list-style-type: none">● I use a range of equipment to collect data using standard measures● I make records using tables and bar charts● I begin to use and interpret graphs produced by dataloggers <p>Review</p> <ul style="list-style-type: none">● I draw simple conclusions from the changes I observed● I talk about changes using some scientific language● I suggest improvements to the ways I observe <p><u>Vocabulary:</u> Evaluation/ conclusions Scientific (as in language) enquire explanation accurate graph Prediction Interpret Observation Equipment Record information/ data Similarities/ differences</p>	<p>Plan</p> <ul style="list-style-type: none">● I recognise when observing changes over time will help to answer my questions● I decide how detailed my observations need to be, and what equipment to use, to make my measurements as accurate as possible <p>Do</p> <ul style="list-style-type: none">● I use equipment accurately without support● I record data appropriately● I present data in line graphs● I interpret changes in the data● I recognise the effect of changing the time and number of observations <p>Review</p> <ul style="list-style-type: none">● I draw valid conclusions from data about changes● I recognise the significance of things changing over time● I talk about and explain changes using scientific knowledge and understanding● I evaluate how well I observed over time <p><u>Vocabulary:</u> Hypothesis Source Variables conditions recognise/ identify record/ present data analyse significance (in changes)</p>
Identifying and Classifying	<p>Plan</p> <ul style="list-style-type: none">● I am curious about similarities and differences● With help I ask questions about similarities and differences● I talk about my ideas for sorting or matching things <p>Do</p> <ul style="list-style-type: none">● I use my senses to sort and match things● I match things that are the same● I find things that are similar or different	<p>Plan</p> <ul style="list-style-type: none">● I ask questions about how and why things are similar or different● I decide what to observe to identify or sort things <p>Do</p> <ul style="list-style-type: none">● I make comparisons between simple features of objects, materials or living things● I record my observations in words or pictures or simple tables	<p>Plan</p> <ul style="list-style-type: none">● I talk about what criteria I will use to sort and classify things● I decide what equipment to use to identify and classify things● I talk about things that can be grouped and decide when questions can be answered by sorting and classifying <p>Do</p>	<p>Plan</p> <ul style="list-style-type: none">● I recognise when identifying and classifying will be helpful to answer my questions● I decide what equipment, tests and secondary sources of information to use to identify and classify things <p>Do</p> <ul style="list-style-type: none">● I use a series of tests to sort and classify materials● I use secondary sources to identify and classify things



	<ul style="list-style-type: none"> ● I sort or group things in my own way ● I use simple equipment to help me sort things (e.g., boxes, hoops) <p>Review</p> <ul style="list-style-type: none"> ● I talk about how I sorted or matched things <p><u>Vocabulary:</u> Explore Change Notice/ look Sort</p> <p>Senses alive, not alive Same/ different Picture</p>	<ul style="list-style-type: none"> ● I sort objects by observable and behavioural features ● I record my sorting in sorting circles or tables <p>Review</p> <ul style="list-style-type: none"> ● I identify similarities and differences and talk about them ● I begin to use simple scientific language to talk about how things are similar or different ● I try to use my records to help sort or identify other things <p><u>Vocabulary:</u> Investigate Equipment/ resources/ what I need Summary Observe/ look Table/ chart Sensible guess Same/ different Chains/ lifecycle Diet Materials Sort</p>	<ul style="list-style-type: none"> ● I carry out simple tests to sort and classify according to properties or behaviour ● I use Carroll diagrams, Venn diagrams and more complex tables to sort things ● I use simple keys and branching databases to identify things ● I make simple branching databases (keys) for things that have clear differences <p>Review</p> <ul style="list-style-type: none"> ● I draw simple conclusions about the things I have sorted and classified ● I talk about the similarities and differences I identified using some scientific language ● I suggest improvements to the way I sort and identify things <p><u>Vocabulary:</u> Evaluation/ conclusions Scientific (as in language) explanation graph/diagram Prediction Interpret Equipment Record information/ data Similarities/ differences Features Classify Chains/ lifecycle/ diagram Criteria key</p>	<ul style="list-style-type: none"> ● I make my own keys and branching databases with 4 or more items ● I use more than one piece of scientific evidence to identify and classify things <p>Review</p> <ul style="list-style-type: none"> ● I draw valid conclusions when sorting and classifying ● I recognise the significance of sorting and classifying ● I talk about and explain what I have done using scientific knowledge ● I evaluate how well my keys worked <p><u>Vocabulary:</u> Source conditions recognise/ identify significance (in changes) classification compare systematically connect relationship</p>
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	EYFS	Y1-2	Y3-4	Y5-6
Pattern Seeking	<p>Plan</p> <ul style="list-style-type: none"> ● I am curious about patterns ● With help I ask questions about patterns ● I talk about my ideas for finding out about patterns <p>Do</p> <ul style="list-style-type: none"> ● I use my senses to look closely for patterns ● I observe more than one thing at a time ● I make simple records of what I notice (with help where necessary) ● I use simple equipment to observe and record patterns <p>Review</p> <ul style="list-style-type: none"> ● I talk about what I have done and the patterns I noticed <p><u>Vocabulary:</u> Explore Change Notice/ look Sort Same/ different</p>	<p>Plan</p> <ul style="list-style-type: none"> ● I ask questions about why and how things are linked ● With help, I decide what patterns to observe and measure and suggest how to do it <p>Do</p> <ul style="list-style-type: none"> ● I use non-standard units and simple equipment to record events that might be related ● I record in words or pictures, or in simple prepared formats such as tables, tally charts and maps <p>Review</p> <ul style="list-style-type: none"> ● I identify simple patterns and talk about them ● I make links between two sets of observations ● I begin to use scientific language to talk about patterns ● I talk about whether the pattern was what I expected <p><u>Vocabulary:</u> Investigate Equipment/ resources/ what I need Summary</p>	<p>Plan</p> <ul style="list-style-type: none"> ● I talk about where patterns might be found and decide when questions can be investigated by pattern seeking ● I decide on which sets of data to collect, what observations to make and what equipment to use <p>Do</p> <ul style="list-style-type: none"> ● I use a range of equipment to collect data using standard measures ● I make records using tables, bar charts or simple scatter graphs ● I begin to use and interpret data collected through dataloggers <p>Review</p> <ul style="list-style-type: none"> ● I draw conclusions about simple patterns between two sets of data ● I talk about patterns using some scientific language ● I suggest improvements to the way I looked for patterns <p><u>Vocabulary:</u></p>	<p>Plan</p> <ul style="list-style-type: none"> ● I recognise when variables cannot be controlled and when pattern seeking will help to answer my question ● I decide how detailed my data needs to be, and which equipment to use, to make my measurements as accurate as possible <p>Do</p> <ul style="list-style-type: none"> ● I use equipment accurately to collect observations ● I record data appropriately and accurately ● I present data in scatter graphs and frequency charts ● I recognise patterns in results ● I recognise the effect of sample size on reliability <p>Review</p> <ul style="list-style-type: none"> ● I draw valid conclusions from data about patterns and recognise their limitations ● I recognise the significance of relationships between sets of data ● I talk about and explain cause and effect patterns using scientific knowledge and understanding



	<p>Picture patterns</p>	<p>Experiment Observe/ look Measure Fair test/ test Record Results Table/ chart Sequence Sensible guess Same/ different</p>	<p>Evaluation/ conclusions Scientific (as in language) enquire explanation graph/diagram Prediction Interpret Equipment Record information/ data Similarities/ differences</p>	<p><u>Vocabulary:</u> conditions recognise/ identify record/ present data analyse significance (in changes) compare connect relationship</p>
Research	<p>Plan</p> <ul style="list-style-type: none"> I am curious about things in my surroundings <p>Do</p> <ul style="list-style-type: none"> I listen carefully I know that information in books and electronic media can be used to answer questions I find pictures of things I talk to people about what they do and how things work <p>Review</p> <ul style="list-style-type: none"> I talk about things I found out <p><u>Vocabulary:</u> Explore Senses Notice/ look Find out</p>	<p>Plan</p> <ul style="list-style-type: none"> I ask questions about how things are and the way they work With help, I make suggestions about how to find things out <p>Do</p> <ul style="list-style-type: none"> I use simple books and electronic media to find things out I ask questions to find out what people do and how things work I record in words and pictures what I found out <p>Review</p> <ul style="list-style-type: none"> I begin to use scientific language to talk about what I found out I talk about whether the information source was useful I give an opinion about some things I found out <p><u>Vocabulary:</u> Experiment Observe/ look Record Results Table/ chart How to stay safe/ danger Research gather information collect</p>	<p>Plan</p> <ul style="list-style-type: none"> I talk about how things are and the way they work and decide when questions can be answered by research using secondary sources <p>Do</p> <ul style="list-style-type: none"> I use information sources to find the information I need I use someone else's data I record what I found out in my own words I present information in different ways <p>Review</p> <ul style="list-style-type: none"> I draw conclusions from what I found out from different sources I talk about what the information and data means using some scientific language I suggest ways to improve how I find out and use information <p><u>Vocabulary:</u> enquire accurate graph Prediction Interpret Observation Safety/ danger Equipment Record information/ data Source findings</p>	<p>Plan</p> <ul style="list-style-type: none"> I recognise when research using secondary sources will help to answer my questions I decide which sources of information might answer my questions <p>Do</p> <ul style="list-style-type: none"> I use relevant information and data from a range of secondary sources I recognise how data has been obtained I present my findings in suitable formats <p>Review</p> <ul style="list-style-type: none"> I talk about and explain my research using scientific knowledge and understanding I evaluate how well my research has answered my questions I recognise that some scientific questions may not have been answered definitively <p><u>Vocabulary:</u> Hypothesis Variables conditions recognise/ identify record significance (in changes) precautions significance (in changes) compare data source reliable/ valid obtain (gather)</p>



	EYFS	Y1-2	Y3-4	Y5-6
Fair Testing	<p>Plan</p> <ul style="list-style-type: none"> I am curious about how things behave With help, I ask questions about things I can test I talk about my ideas for testing how things behave <p>Do</p> <ul style="list-style-type: none"> I use my senses to look closely at how things behave I carry out simple tests I make simple records of what I notice (with help where necessary) I use simple equipment to observe and record <p>Review</p> <ul style="list-style-type: none"> I talk about what I have done and what I noticed I talk about whether something makes a difference <p><u>Vocabulary:</u> Explore Change Senses Notice/ look Measure Make Safe Sort Same/ different</p>	<p>Plan</p> <ul style="list-style-type: none"> I ask questions about why and how With help, I notice links between cause and effect With help, I identify simple variables to change and measure <p>Do</p> <ul style="list-style-type: none"> I use non-standard units and simple equipment to record data I record in words or pictures, or in simple prepared formats such as tables and tally charts <p>Review</p> <ul style="list-style-type: none"> I interpret and talk about my data I begin to use simple scientific language to identify and describe simple causal relationships With help, I can say if my test was fair I say if the relationship was what I expected <p><u>Vocabulary:</u> Investigate Equipment/ resources/ what I need Summary Experiment Observe/ look Measure Fair test Record Results Table/ chart Sequence Sensible guess Same/ different Create Safe/ danger Materials Sort</p>	<p>Plan</p> <ul style="list-style-type: none"> I talk about links between cause and effect and (with help) pose a fair test question I help to plan a fair test I decide what data to collect I decide what equipment to use and how to make observations <p>Do</p> <ul style="list-style-type: none"> I use a range of equipment to collect data using standard measures I make records using tables and bar charts I begin to use and interpret data through dataloggers <p>Review</p> <ul style="list-style-type: none"> I draw simple conclusions from my fair tests I talk about, and explain, simple causal relationships using some scientific language I suggest ways that I can improve my fair tests <p><u>Vocabulary:</u> cause and effect Evaluation/ conclusions Fair test Scientific (as in language) enquire explanation accurate graph Prediction Interpret Observation Equipment Record information/ data Similarities/ differences Design Safety/ danger Equipment Record information/ data Similarities/ differences Features method</p>	<p>Plan</p> <ul style="list-style-type: none"> I recognise when variables need to be controlled and when a fair test is the best way to answer my question I plan a fair test, selecting the most suitable variables to measure, change and keep the same I decide what equipment to use to make my measurements as accurate as possible <p>Do</p> <ul style="list-style-type: none"> I use equipment accurately to collect observations I record data appropriately and accurately I present data in line graphs I identify causal relationships <p>Review</p> <ul style="list-style-type: none"> I draw valid conclusions based on the data I recognise the significance of the results of fair tests I talk about and explain causal relationships using scientific knowledge and understanding I evaluate the effectiveness of my fair testing, recognising variables that were difficult to control <p><u>Vocabulary:</u> Hypothesis Source Variables conditions recognise/ identify record/ present data analyse significance (in changes) precautions significance (in changes) classification compare systematically connect relationship function control effective</p>

