Arboretum Skills Progression

Science

The nature, processes and methods of science

'Working scientifically' specifies the understanding of the nature, processes and methods of science for each year group. It should not be taught as a separate strand. The notes and guidance give examples of how 'working scientifically' might be embedded within the content of biology, chemistry and physics, focusing on the key features of scientific enquiry, so that pupils learn to use a variety of approaches to answer relevant scientific questions. These types of scientific enquiry should include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. Pupils should seek answers to questions through collecting, analysing and presenting data.

Children will develop enquiry skills around 5 key areas:

- Questioning
- Fair testing
- Seeking patterns and relationships
- Research
- Grouping and classifying over time

Nursery	Reception	Year 1 and 2	Year 3	Year 4	Year 5	Year 6
Asking questions						
Beginning to understand why and how questions	Make comments about what they have heard and ask questions to clarify their understanding. Listen attentively and respond to what they hear with relevant questions, comments and actions.	With support: Ask questions about the world around me. Ask questions about how and why things change. Ask questions about why things are similar or different. Ask how and why questions about observations and the way things work.	Raise their own relevant questions about the world around them.		Use their science experiences to explore ideas and raise different kinds of questions.	
		Talk about the different ways of answering questions, suggesting things to observe or measure and ways of doing this.	Start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions. answers		Select and plan the most appropriate type of scientific enquiry to use to answer scientific questions	
		Ask people questions and use simple secondary sources to find answers.	Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations.		Recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact	
		IALT use scientific vocabulary to ask and answer questions. **See vocab progression.**	**IALT use scientific vocabulary to ask and answer questions (increasing complexity)** **See vocab progression.**		**IALT use my scientific knowledge to ask a range of questions. (yr6) With support (yr5)** **IALT use scientific vocabulary to ask and answer questions with greater complexity.** **See vocab progression.**	

Nursery	Reception	Year 1 and 2	Year 3	Year 4	Year 5	Year 6
Making Observations						
Use talk to connect ideas, explain what is happening and anticipate what might happen next.	Offer explanations for why things may happen, making use of recently introduced vocabulary.	Observe closely using simple equipment with help. Observe changes over time.	Make systematic and careful observations Help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used.		Make their own decisions about what observations to make, what measurements to use and how long to make them for.	
		With guidance, they should begin to notice patterns and relationships.	Begin to look for naturally occurring patterns and relationships and decide what data to collect to identify them.		Look for different causal relationships in their data and identify evidence that refutes or supports their ideas	
		Use their observations and ideas to suggest answers to questions Talk about what they have found out and how they found it out.	With help, pupils should look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions.		Identify scientific evidence that has been used to support or refute ideas or arguments.	
		IALT use all my senses when I am observing. **I can observe changes and say what I have seen.** **IALT explain what I have seen.I can observe similarities and differences (with help).** **IALT observe patterns, including over time I can work as part of a team.**	**IALT decide what observations and measurements I need.** **IALT make organised and careful observations.** **IALT say how long to observe for.** **IALT ask questions about the world around me.**			

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Classification and Identification						
	Knowing some similarities and differences between the natural world around them and contrasting environments.	Use simple features to compare objects, materials and living things and, with help, decide how to sort and group them (identifying and classifying).	Talk about criteria for grouping, sorting and classifying; and use simple keys. I can decide what to observe.		Use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment.	
		IALT sort by what I observe and how things behave **IALT explain why I chose my classifications.** **IALT record my sorting in circles and tables.** **IALT sort by a given criteria.**	**IALT sort by what I observe and how they behave (using more complex properties)** **IALT explain why I chose my classifications.** **IALT record my sorting in circles and tables and simple sorting keys and branching data bases.**		**IALT use a series of tests when classifying and sorting.** **IALT make my own key or branching databases. (yr5)** **IALT evaluate how well my classification keys have worked. (yr6)**	
Nursery	**Reception**	**Year 1 and 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Comparative and fair testing						
		Carry out simple comparative tests. Experience different types of science enquiries, including practical activities	Set up simple practical enquiries, comparative and fair tests with support. Understand that tests need to be fair by introducing the constant and independent variable. Recognise when a **simple fair test** is necessary and **help** to decide how to set it up. Should be given a range of scientific experiences including different types of science enquiries to answer questions		Recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why. To pose their own question and set up a fair test to test their predictions. The question they are asking. To understand the need for fidelity in the results of a test and the need to repeat the same test multiple times. Talk about how scientific ideas have developed over time	

		IALT carry out a comparative test and use what I find to answer a question.	**IALT recognise and carry out a comparative test.** **IALT recognise a fair test and what would make it unfair.** **IALT make some decisions about planning.** **IALT recognise the need for a fair test. (yr4)** **IALT can plan a fair test and say why it is fair. (mainly independent)(yr4)** **IALT can make a prediction based on my scientific knowledge.** **IALT can identify variables and say why one variable should be changed. Which ones would need to stay the same, be measured or change.** **IALT can compare my prediction with what actually happened and explain the result.**		**IALT identify the factors to be controlled or varied in a fair test. (yr5)** **IALT confidently plan and conduct a fair test, including the identification of variables.(yr6)** **IALT identify some factors that cannot be controlled.** **IALT select the most appropriate type of scientific enquiry to answer my question.** **IALT make a prediction using my scientific knowledge. (yr5)** **IALT make a prediction and sketch the results in a graph. (yr6)** **IALT compare my conclusion with my prediction.** **IALT use my scientific knowledge to make a conclusion.** **IALT say how I could improve my experiment.** **IALT understand how to make my results more accurate.** **IALT explain how to collect reliable results.** **IALT use results (data) to answer my initial question.**	
Nursery	**Reception**	**Year 1 and 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**
Collecting and using data						
		Record simple data. To measure using non-standard units. To measure using meters, kg, litres <>	Collect and record data from their own observations and measurements in a variety of ways: notes, bar charts and tables, standard units, drawings, labelled diagrams, keys and help to make decisions about how to analyse this data.		Decide how to record data and results of increasing complexity from a choice of familiar approaches: scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.	

			To measure with increasing accuracy using m/cm/mm Kg,g L,ml Degrees Celsius Introduce log boxes to record and analyse temperature, sound and light	
		IALT use ICT to help me gather and record information. **IALT record what I find in tally charts, diagrams, circles, pictures, bar charts and maps.** **IALT label using horizontal writing.** **IALT use non-standard units and simple equipment to record changes.** **IALT use what I find out to explain what I think.** **IALT can say what I found out is what I expected.** **IALT talk about simple similarities and differences, simple patterns, findings from research.**	**IALT use standard measures when carrying out investigations.** **IALT read scales to the nearest division, labelled and unlabelled.** **IALT use and interpret graphs produced by data loggers. (yr4)'** **IALT collect enough results to make a suitable conclusion.** **IALT draw my own 2 column table.** **IALT draw and interpret bar charts.** **IALTdraw bar charts including fractions and decimals. (yr4)** **IALT plot points on a simple line and scatter graph. (yr4)** **IALT decide what evidence to collect.** **IALT decide what to measure.** **IALT spot patterns and trends in my results. (yr4)** **IALT find a way to improve my investigation.**	**IALT choose appropriate ways of recording results and record in a systematic way.** **IALT with help construct a table for repeat readings.** **IALT draw a line graph.** **IALT choose which type of graph to draw.** **IALT research using different media.** **IALT understand how to make my results more accurate. (yr6)** **IALT explain how to collect reliable results. (yr6)** **IALT find an average from repeat findings to eliminate mistakes. (yr 6)** **IALT draw a line graph and use it to find data that I have not collected.(yr6)** **IALT choose appropriate ways of recording, e.g scientific diagrams, classification keys, tables, bar charts, graphs. (yr6)** **IALT construct table for repeat findings. (yr6)** **IALT identify when further observations need to be made to form a conclusion.**

Nursery	Reception	Year 1 and 2	Year 3	Year 4	Year 5	Year 6	
Collecting and using data							Selecting and using equipment
Children will choose equipment such as magnifying glasses to look at things in detail. Possible use of: Pipettes Syringes Tweezers Tongues Magnetic wands	Children will choose equipment such as magnifying glasses to look at things in detail. Possible use of: Pipettes Syringes Tweezers Tongues Magnetic wands	Observe closely using simple equipment.	Make systematic and careful observations Help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used.		Make their own decisions about what observations to make, what measurements to use and how long to make them for.		
		Use simple measurements and equipment (e.g. hand lenses, egg timers) to gather data	Take accurate measurements using standard units learn how to use a range of (new) equipment, such as data loggers / thermometers appropriately		Choose the most appropriate equipment to make measurements with increasing precision and explain how to use it accurately. Take repeat measurements where appropriate.		
		IALT choose from a given selection what equipment to use. **IALT use the equipment sensibly to help with my observations and predictions**	**IALT select the equipment that I will need.** **IALT use a range of equipment, scales, rulers, thermometers, stop watches with growing accuracy.**		**IALT choose the equipment I need for my investigation.** **IALT decide what measurements I will need to take.**		
Nursery	**Reception**	**Year 1 and 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	
Use of scientific language							Selecting and using equipment
		With help, they should record and communicate their findings in a range of ways	Use relevant simple scientific language to discuss their ideas and communicate their findings in ways that are appropriate for		Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas, use oral and		

	and begin to use simple scientific language.	different audiences, including oral and written explanations, displays or .presentations of results and conclusions	written forms such as displays and other presentations to report conclusions, causal relationships and explanations of degree of trust in results.