Bantock Primary School

Progression in Working Scientifically Skills (PWSS)

Progression in Working Scientifically Skills document

This document is designed to support the teaching and learning of Working Scientifically in Science at Bantock Primary School. It is to be used alongside and to inform the school's Long Term, Medium Term and Short Term Planning. The document is to be used to support teachers in their understanding of the Working Scientifically National Curriculum requirements for Science.

The document identifies the age related expectations for each year group when working scientifically. It details the planning process, investigation process and evaluation process when carrying out a scientific investigation.

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ARE	***Questions***	***Investigate***	***Research***	***Predict***	***Observe & Measure***			***Present Information***		***Analysis***		***Evaluate***
					Planning	***Resources***	***Observation***	***Recording***	***Graphs***	***Patterns***	***Conclusion***	
Beyond Year 6	• I ask questions & develop a line of enquiry based on my prior knowledge & experience.	• I **identify the key factors** in complex contexts and in contexts in which variables cannot readily be controlled, and **plan appropriate procedures**	• I **synthesise** information from a range of sources, and identify possible limitations in secondary data	• I use scientific knowledge & understanding to make predictions	• I use scientific ideas to decide how ideas and questions can be tested	• I select and use appropriate equipment, including ICT, to make observations and measurements correctly	• I select and use appropriate equipment, including ICT, to make observations and measurements correctly. • I can measure a variety of quantities with precision using instruments with fine scale divisions	• I can select and use appropriate methods for communicating qualitative and quantitative data using scientific language and conventions	• I can choose scales for graphs and diagrams that enable them to show data and features effectively	• I use diagrams, tables charts & graphs including lines of best fit to identify and describe patterns or relationships in data	• I draw conclusions that are consistent with evidence	• I evaluate the strength of my evidence. Eg. I consider if the collected data is sufficient for the conclusions that have been drawn.

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Year 6 ARE	• I can n write/identify a question that others could use. • I recognize that other people may interpret evidence in different ways • I can **explain how** experimental evidence & creative thinking combine to make an explanation	**Identify & Classify** • I use more than 1 piece of scientific **evidence** to I & C • I use keys/data bases to I & C **Pattern Seeking** • I identify some variables that cannot be controlled & **explain** why PS is required **Fair Testing** • I plan a ft recognising & **controlling variables** where necessary & can **explain** which variables need to be controlled and why. **Obs over Time** • I recognise the **significance of things changing** over time & **explain** them scientifically.	• I recognise **a range of secondary sources** that will be most useful & select relevant information to answer questions &explain their research using scientific vocab. • I am beginning to separate opinion from fact	• I can make predictions • I can **explain** a prediction with evidence, **abstract ideas & models** • I know some questions do not have definitive answers	• I plan different types of enquiries inc. recognising & controlling variables where necessary. • I can **select & plan** the most appropriate type of enquiry to answer a question. • I **decide** about what observations to make • I recognise that a larger sample size will get more reliable results • I can **explain how** my method/approach is best.	• I **decide** on the most appropriate equipment to use. • I can **explain** how to use the equipment accurately • I can **make** my own keys. • I **can use keys** to classify & identify a range of things.	• I take measurements using a range of equipment with **increasing accuracy & precision** taking **repeated readings** when necessary. • I **decide** what measurements to make and how long to make them. • I **explain how** repeating obs & m.ments helps reduce errors to obtain reliable evidence. • I **decide** about what observations to make	• I record data on results of increasing complexity in an appropriate format, using scientifc labelled diagrams, keys, line graphs, bar charts Venn or Carroll diagrams • I report & present findings from enquiries inc. conclusions, causal r.ships & explanations of results in oral & written form. Eg displays & presentations. • I **decide** how to record my data from a **variety** of choices.	• I know that only continuous data can be presented as a line graph.	• I report & present findings from enquiries inc. conclusions, causal r.ships & explanations of results in oral & written form. Eg displays & presentations. • I look for causal relationships in my data. I can talk about how ideas have changed over time • I can use data to identify patterns • I can extract data from line graphs	• I use **relevant scientific language** & illustrations to discuss, communicate & justify my ideas • I **identify evidence** that supports/refutes my ideas	• I identify scientific evidence to support/refute ideas or arguments • I use test results to identify further questions, to set up further comparative tests/fair tests & to make predictions. • I **explain** reject results & differences of reject observations • I suggest **how & why** my method should change. • I suggest larger sample sizes & collaboration are needed to improve.

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Year 5 ARE	• I can write/identify a question to be investigated that others could use • I recognize that other people may interpret evidence in different ways • I can **explain how** experimental evidence& creative thinking combine to make an explan[ation].	**Identify & Classify** • I recognise when I & C will help answer a question. • I choose information that will help me I & C **Pattern Seeking** • **I understand** PS is required when variables cannot be controlled • I am trying to explain **cause & effect patterns** **Fair Testing** • I can **select** the most suitable variables to measure /change /keep the same **Obs over Time** • I include more detail/**criteria** into my observation plans	• I can **select** suitable sources of information, and **explain why** it is appropriate. • I select relevant information from the sources	• Where appropriate, I can make predictions • I can **explain** a prediction with evidence, **abstract ideas & models** • I know some questions do not have definitive answers	• I can **select** an appropriate way to work • I recognise that we need larger sample sizes to get more reliable results • I can **explain how** my approach or method is the best one	• I **select** apparatus for a range of tasks & plan to use it effectively • I **explain how** repeating observations & measurements helps reduce errors to obtain more reliable evidence	• I can make a series of observations, comparisons or **measurements** with **precision** appropriate to the task • I **select** suitable ranges and intervals • I make risk assess., controlling obvious risk to myself & others	• I always put my results in an appropriate format, e.g. line graphs, bar charts, Venn or Carroll diagrams, tables • I can **choose** an appropriate method of recording and **explain why**	• Where appropriate, I can present data as **line graphs** • I recognise the difference between continuous and discontinuous data • I know that only continuous data can be presented as a line graph	• I can use data to identify patterns • I can extract data from line graphs • I **explain** any patterns using my scientific language & conventions, even if they are **abstract** ideas, or **models**.	• I use my experiments to generate further predictions on other data and experiments • I draw conclusions based on evidence I have collected • I use **scientific ideas** to **explain them** • I identify some evidence that does / doesn't support the prediction	• I suggest **how & why** my method should be changed • I being to identify if conclusions are sufficiently backed • I suggest a larger sample size & collaboration are needed to improve evidence (Sc2) • I **explain** differences of repeated observations • I reject a result with a reason

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Year 4 ARE	• I can recognize that scientific ideas are based on evidence • With help, I can ask relevant questions with **scientific ideas**, that can be investigated scientifically • I begin to recognise that people may form opinions without considering evidence • I recognise which questions can't be investigated	**Identify & Classify** • I decide what questions can be answered using I & C • I can talk about similarities & differences **using sci vocab.** **Pattern Seeking** • I recognise where patterns may be found & **identify patterns** in results **Fair Testing** • I **decide** if a ft is required & **explain with key vocab** why and how it is fair • I show when I do my activity how to change one factor & control others **Obs over Time** • I decide what observations to make & their f**requency** • I make **systematic** observations & **accurate** measurements	• Talk about the way things are and the way they work • I can talk about what I have found out and what it means **using scientific vocabulary**	• I am beginning to consider likely outcomes while planning investigations • I try to use a comparative sentence for predictions • I can make a **clear prediction** and try to **explain it**, with **scientific ideas**	• I can come up with ideas that can be investigated scientifically • I can **decide** how to find answers • I **decide** on the best approach	• I can measure **distances, time, volume, mass, temperature** and force **accurately** • I can use ICT to make some measurements • I can use equipment safely • I can select suitable equipment and information from sources provided	• I use a range of skills including ICT to make some measurements and observations & answer my question, • I identify the range & interval to use • I recognise that a series of measurements or observations should be made in an investigation • I identify obvious risks • I can make careful observations	• I record my observations and measurements in simple charts and tables • I can **decide** a method of recording data to suit the results, e.g. a two column table	• I can draw bar charts to show results • I am **beginning** to plot **line graphs**	• I can re-order results to show a pattern • I can use graphs to identify and interpret patterns in my data • With help, I can extract data from simple line graphs • I use appropriate **scientific language** and conventions to communicate	• I can use my patterns and trends to help draw conclusions, e.g. tell the story of a graph, • I begin to use a **comparative sentence** and appropriate **scientific language** • I relate my patterns & conclusions to **scientific ideas** • I refer back to my prediction when interpreting data	• I consider if the activity provides adequate information • Now I have done the experiment I **describe** how to improve the method • I begin to consider whether to ignore any inaccurate or unsuitable results

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Year 3 ARE	•I can pose questions that we can investigate •I can give **simple reasons** to support my ideas when I am asked to do so •I ask questions in different ways	**Identify & Classify** •I know the **criteria** I am using to sort/classify & this is linked to properties /behaviour •I am beginning to answer questions using the outcomes **Pattern Seeking** •I know when a PS investigation is required to answer a question •I look for natural patterns **Fair Testing** •I am beginning to **pose questions that require a ft** and I think of various variables •I can help design and set up an investigation that is fair **Obs over Time** •I am trying to make systematic /careful obs & accurate m.ments •I talk about the **change**s I observe with some scientific vocab	•I am beginning to decide when secondary sources are needed to answer a question •I **research on my own** using sec sources & talk about my findings **using some scientific vocabulary.**	•I can make **simple predictions** with a **simple reason** based on my experiences	•I **begin to decide** what evidence to collect that is sufficient for a conclusion •I **begin to decide** on an appropriate approach •I **describe** why it is important to collect data to answer questions	•I can choose & measure things using a range of equipment I have been given •I can measure quantities such as **length or mass** •To the **nearest whole no.** I measure accurately from a range of equipment	•I can suggest what relevant observations to make •I can **measure** accurately to the **nearest whole number** •I follow instructions to control obvious risks	•I can record my observations in a **variety** of ways, including pictures and words •I **describe** why we need to collect data	•With help I can draw a **bar chart, diagram or table** to show what happened	•I can see patterns in my recorded results, that show **cause and effect** •I make **comparisons** using simple scientific vocab.	•I can write what I found out and try to **explain it simply** •I **begin** to communicate what I found out in a **scientific way** •Give **simple explanations** to support my ideas and claims and patterns	•I can recognise unexpected results •I can suggest improvements in my work •I **describe** simple advantages to collaborative working

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Year 2 ARE	• With help I can ask simple questions • I can ask questions like 'what will happen if…' or 'why…' or 'how…'	**Identify & Classify** • I **ask question**s about how and why things are similar or different • I make scientific **comparisons** (vocab) between features of things **Pattern Seeking** • I decide what patterns to observe or measure • I **make links** & identify patterns 7 relationships between 2 sets of observations **Fair Testing** • I recognise when questions require a comparative test • With help I can **choose variables** of what to measure / change & **describe** fairness **simply** **Obs over Time** • I can **sequence** changes • I identify what & how to observe/measure including equipment required	• I make suggestions about how I might find things out • I can find and use pictures in books that are about my activity with help • With help, I can use **simple books & other sources** to find out about scientific ideas	• I can **suggest** what might happen	• I can respond to suggestions about how to find out • I **follow instructions** for simple activities • I challenge / agree observations described by peers	• I can use simple equipment given to me • I make some **measurements** in **non-standard units**	• I make simple qualitative & **comparative** obs **e.g. group/sort** • I use **all** my senses • I **describe** obs. **simply** with a range of vocab	• I **begin** to record what I found out in a **scientific way,** trying to put headings in tables drawn for me	• I can interpret simple data from **simple bar charts and tables** • I can finish charts & tables started for me	• I can try & **describe** my observations and **comparisons** in simple language • I sometimes notice a simple pattern	• I can write a short **simple description** about what happened • I use annotate drawings and simple sentences to communicate	• I **describe simply** if what happened is what I expected • I agree / challenge obs **described** by peers, recognising their contribution • With help I suggest other ways of doing

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Year 1 ARE	• I make contributions to discussion, asking about what is being done • With help, I can use: Why, What, How and When	**Identify & Classify** •With support I can **compare sort & group** & spot some similarities & differences **Pattern Seeking** •With help I can spot patterns & **describe** them **Fair Testing** •I **recognise** that we need to have 'rules' when doing activities (shows need for keeping some things the same – beginnings of a fair test) **Obs over Time** •I can identify what to **observe & sequence** changes with help	•I ask questions about how things are & the way they work •With help I suggest how to find things out **& use simple books** to find information	•I make a guess/simple prediction, if asked or with help	•I **state** what I am doing now •I am beginning to **say** what to do next •With help I can sometimes **talk** about what affects the test in simple situations	•I recognise some simple equipment we use •With help, I can use simple equipment to collect data	•I use my senses to **observe** & start to describe simple features of objects, events / living things •I respond & **begin to sort** appropriately with regard to simple features	•I can show what I see & do using pictures & other ways of showing like drama and songs •I use pictures & talk •I fill in a tally chart if the teacher makes it for me or with help	•I can use simple chart templates provided to communicate with help	•I begin to tell others some differences and similarities •I begin to make **simple comparisons**	•I can **state** what happened or what we did •I understand the reason we did the activity & refer back to our question •I say if my guess/I was correct/right	•I **notice** when something hasn't worked
Below Year 1 ARE	•I sometimes respond to teacher question •I can sometimes ask a question with more than one question starter.	•I am aware of amounts when using things, **asking questions** like 'How much?' (showing the start of variable)	•I know that information is in books •I can find relevant pictures of things	•Sometimes I have a go at guessing what will happen •I can refer back to something I've done before	•I am interested in what teacher plans •I sometimes make suggestions about what to do next / change	•I can use simple pieces of equipment	•I can observe more than one thing at a time & begin to sort •I can observe a change	•I can display some of my collections • I communicate and draw simple pictures of my findings with help	•I can add blocks to towers, showing early measurement •I can stick pictures onto a chart drawn for me	•We all talk about the what we saw	•I notice unusual or interesting things	•With prompts I can say things like 'it was easy/ hard'.