Working Scientifically

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|  | **PLANNING AND TESTING** ***LKS2 - Making decisions about and setting up simple practical enquiries, comparative tests and fair tests.******KS1 - Performing simple tests.*** | **USING EQUIPMENT AND MEASURES*****LKS2 - Making accurate measurements and gathering data.******KS1 - Using simple equipment and gathering data to help in answering their questions.*** | **COMMUNICATING*****UKS2 / LKS2 / KS1******Reporting findings, recording data, presenting findings.******Read, spell and pronounce scientific vocabulary correctly linked to the relevant Year Group.***  | **CONSIDERING THE RESULTS OF AN INVESTIGATION / WRITING A CONCLUSION** |
| **DESCRIBING RESULTS / LOOKING FOR PATTERNS*****LKS2 - Describing their findings / results.******KS1 - Talk about what happened / what they noticed.*** | **DESCRIBING RESULTS / LOOKING FOR PATTERNS*****LKS2 - Describing their findings / results.******KS1 - Talk about what happened / what they noticed.*** | **DESCRIBING RESULTS / LOOKING FOR PATTERNS*****LKS2 - Describing their findings / results.******KS1 - Talk about what happened / what they noticed.*** |
| Nursery | In play, children can follow their own innate curiosity and drives to find things out. | Explores differences in size, length, weight and capacity. | Uses language to experiences and thoughts.Learns new words very rapidly and is able to use them in communicating. | Notices detailed features of objects in their environment. | Can talk about some of the things they have observed such as plants, animals, natural and found objects. | Can make meaning as they notice patterns and build their own working theories to make sense of their experiences, then make predictions and test them to refine their understanding. |
| Foundation | Choose the resources they need for their chosen activities and say when they do or don’t need help. Have their own ideas Find ways to solve problems and find new ways to do thinks Make simple predictions Plan and make decisions about how to solve a problem or reach a goal. | Test their ideas. Safely explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function. Know about similarities and differences in relation to objects, materials and living things. Make observations of animals and plants. | Recognise findings and talk about what they have found out in simple terms. Talk about the features of their immediate environment and how environments might vary from one another. Explain why some things occur and talk about changes. | Gather and record basic data alongside an adult e.g. observational drawing / scribed pupil voice. | Use their observations to suggest simple answers to basic questions, with the necessary scaffolding from an adult. | High quality interactions with skilled adults support children to make links, notice patterns and talk about things they have observed.  |
| Year 1 | * With help**, carry out** a simple test / comparative test.
* With help, make a simple prediction or suggestion about what might happen.
* Begin to suggest some ideas e.g. choose which equipment to use, choose which materials to test from a selection.
* **Talk** about ways of setting up a test.
 | * **Measure** using non-standard units e.g. how many lolly sticks / cubes / handfuls, etc.
* Observe closely, using simple **equipment** (e.g. hand lenses, egg timers).
* Use senses to **compare** different textures, sounds and smells.
 | * Communicate their ideas to a range of audiences in a variety of ways.
* Complete a pre-constructed table / chart using picture records or simple words.
* Contribute to a class display.
* Add annotations to drawings or photographs.
* Begin to use some simple scientific language from Y1 PoS.
* **Record** simple visual representations of observations made.
 | * Use recordings to talk about and describe what happened.
* Sequence photographs of an event / observation.
 | * Begin to use simple scientific language (from Y1 PoS) to talk about what they have found out or why something happened.
 | * With help**, carry out** a simple test / comparative test.
* With help, make a simple prediction or suggestion about what might happen.
* Begin to suggest some ideas e.g. choose which equipment to use, choose which materials to test from a selection.
* **Talk** about ways of setting up a test.
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| Year 2 | * Carry out simple comparative tests as part of a group, following a **method** with some independence.
* Make a simple prediction about what might happen and try to give a vague reason (even though it might not be correct).
* With support, make suggestions on a **method** for setting up a simple comparative test.
* Talk about a practical way to find answers to their questions.
 | * **Measure** using non-standard and simple standard measures (e.g. cm, time) with increasing accuracy.
* Begin to make decisions about which equipment to use.
* Correctly and safely use **equipment** provided to make observations and/or take simple measurements.
 | * **Record** and communicate their findings in a range of ways to a variety of audiences.
* Use simple scientific language with increasing accuracy (from Y2 PoS).
* **Record** simple data with some accuracy to help in answering questions;
* With support or using frameworks, make decisions about how to complete a variety of tables/charts *(e.g. a 2 column table, tally charts, Venn diagram, pictograms, block graphs with 1:1 scale).*
* *Present findings in a class displays.*
* *Sequence / annotate photographs of change over time.*
* *Produced increasingly detailed drawings which are labelled / annotated.*
 | * With guidance, begin to notice **patterns** in their data *e.g. order their findings, sequence best to worst, say what happened over time, etc.*
* Recognise if **results** matched **predictions** (say if results were what they expected).
* Use their recordings to talk about and describe what has happened.
 | * Begin to use simple scientific language (from Y2 PoS) to explain what they have found out.
* Give a simple, logical reason why something happened *(e.g. I think … because…).*
 | * Begin to discuss if the test was un**fair.**
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| Year 3 | * Help to decide about how to set up a simple **fair test** and begin to recognise when a test is not **fair**.
* Make a **prediction** based on everyday experience.
* With support / as a group, set up simple practical enquiries including comparative and **fair tests** e.g. make a choice from a list of a things (variables) to change when conducting a **fair test**. *(e.g. choose which magnets to compare and which method to use to test their strength).*
* As a group, begin to make some decisions about the best way of answering their questions.
* Find / suggest a practical way to compare things *e.g. rocks, magnets.*
 | * Collect data from their own observations and measurements using notes / simple tables / standard units.
* Help to make some decisions about what observations to make, how long to make them for, the type of simple equipment that might be used and how to work safely.
* Make simple **accurate** measurements using whole number standard **units**, using a range of equipment.
* Gather data in a variety of ways to help in answering questions.
* Use equipment **accurate**ly to improve the detail of their measurements / observations *(e.g. microscopes, measuring syringes, measuring cylinders, hand lenses).*
 | * Record and present findings using simple scientific language and vocabulary from the Y3 PoS,

*including discussions, oral and written explanations, notes, annotated drawings, pictorial representations, labelled diagrams, simple tables, bar charts (using scales chosen for them), displays or presentations.* * With scaffold / support record, and present data in a variety of ways to help in answering questions.
* Communicate their findings in ways that are appropriate for different audiences. (linked to Y3 PoS).
 | * With scaffold / support, describe and compare the effect of different factors on something

*(e.g. we noticed that larger magnets are not always stronger).** With help, look for changes and simple patterns in their observations, data, chart or graph.
* Use their results to consider whether they met their **predictions**.
 | * Use their experience and some **evidence** or results to draw a simple **conclusion** to answer their original question.
* Write a simple explanation of why things happened (using the word ‘because’) and using simple scientific language and vocabulary from the Y3 PoS.
 | * Say whether what happened was what they expected and notice any results that seem odd.
* Begin to recognise when a test is not **fair** and suggest improvements.
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| Year 4 | * Carry out simple **fair tests** with increasing confidence investigating the effect of something on something else (linked to Y4 PoS).
* Start to make their own decisions about the most appropriate type of science enquiry they might use to answer scientific questions *(is a fair test the best way to investigate their question?)*
* Make a **prediction** based on the knowledge acquired from previous explorations / observations and apply it to a new situation.
* Explain their planning decisions and choices.
* Make some of the planning decisions about what to change and measure / observe.
* Begin to recognise when a **fair test** is necessary.
 | * Begin to identify where patterns might be found and use this to begin to identify what data to collect.
* Make more of the decisions about what observations to make, how long to make them for and the type of equipment that might be used.
* Recognise obvious risks and how to keep themselves and others safe.
* Learn how to use new equipment, such as data loggers and measure temperature in degrees Celsius (°C) using a thermometer.
* Collect data from their own observations and measurements, using notes / simple tables / standard **units**.
* Make **accurate** measurements using standard **units** [and more complex units and parts of units] using a range of equipment and scales.
 | * Record findings using relevant scientific language and vocabulary (from Y4 PoS), including discussions, oral and written explanations, notes, drawings (annotated), pictorial representations, labelled diagrams, tables and bar charts [where intervals and ranges agreed through discussion], displays or presentations.
* Begin to select the most useful ways to collect, record, classify and present data from a range of choices.
* Make decisions on how best to communicate their findings in ways that are appropriate for different audiences.
 | * Notice / find patterns in their observations and data. (Describe the effect of something on something else).

*(e.g. as I lengthen the ruler I notice that the pitch gets lower).* * With some independence, analyse results / observations by writing a sentence that matches the **evidence** i.e. deciding the important aspect of the result and summarising in a **conclusion** *(e.g. metals tend to be good conductors of electricity).*
 | * Begin to develop their ideas about relationships and interactions between things and explain them.
* Use relevant scientific language and vocabulary (from Y4 PoS) to begin to say / explain *why* something happened.
 | * Use results to suggest improvements, new questions and / or predictions for setting up further tests.
* Compare their results with others and give reasons why results might be different.
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| Year 5 | * Carry our **fair tests** and other investigations with increasing independence.
* Suggest more than one possible prediction and begin to suggest which is the most likely. Justify their reason with some knowledge and understanding of the scientific concept.
* Make decisions about which **variables** to change, measure and keep the same (linked to the appropriate units in the Y5 PoS).
* Make most of the planning decisions for an investigation.
* Recognise when it is appropriate to carry out a **fair test**.
 | * Make their own decisions about what observations to make or measurements to use and how long to take them for (recognising the need for repeat readings on some occasions).
* Take measurements using a range of scientific equipment with increasing accuracy and using more complex scales / **units.**
* Identify possible risks to themselves and others and suggest ways of reducing these.
* Choose the most appropriate equipment and make **accurate** measurements.
 | * Use theirdeveloping scientific knowledge and understanding and relevant scientific language and terminology to communicate more abstract concepts (linked to Y5 PoS).
* Present and explain their findings through talk, in written forms or in other ways (e.g. using technology) for a range of audiences / purposes.
* Record data and results of increasing complexity using different formats e.g. tables, annotated scientific diagrams, classification keys, graphs and models.
* Make decisions about the most appropriate way of recording data.
 | * Describe straightforward patterns in results linking cause and effect e.g. using er or the word ‘more’

*(e.g. the longer, thinner shapes move through the water more quickly OR the larger the wings, the longer it takes the spinner to fall).** Look for / notice relationships between things and begin to describe these.
* Comment on the results and whether they **support** the initial **prediction.**
 | * Use theirscientific knowledge and understanding and appropriate scientific language and terminology (linked to Y5 PoS) to explain their findings and data and answer their initial question.
* Draw a valid **conclusion** (explain *why* it happened) based on their data and observations (from Y5 PoS).
 | * Begin to recognise how repeated readings improve the **reliability** of results.
* Compare results with others and comment on how **reliable** they are.
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| Year 6 | * Predict what a graph might look like before collecting results.
* Make a hypothesis where they say how one thing will affect another and give a reason for their suggestion with a developing understanding of the scientific concept.
* Identify **variables** to change, measure and keep the same in order for a test to be **fair.**
* Independently plan investigations and explain planning decisions.
* Decide when it is appropriate to carry out a **fair test** investigation, comparative test or alternative.
 | * Decide whether to **repeat** any **readings** and justify the reason for doing so.
* Make their own decisions about what measurements to take (and begin to identify the ranges used).
* Make, and act on, suggestions to control / reduce risks to themselves and others.
* Use equipment fit for purpose to take measurements which are increasingly **accurate** and precise.
* Decide the most appropriate equipment to use to collect data.
 | * Articulate understanding of the concept using scientific language and terminology when describing abstract ideas, observations and findings (linked to the Y6 PoS).
* Record data and results of increasing complexity using scientific diagrams and labels, recognised symbols, classification keys, tables, bar and line graphs, and models.
* Make decisions about how to present and explain their findings through talk, in written forms or in other ways (e.g. using technology).
 | * Spot unexpected results that do not fit the pattern (anomalies).
* Identify patterns in results collected and describe them using the **change and measure variables** (causal relationships)

*(e.g. as we increased the number of batteries the brightness the bulb increased.* | * Identify **evidence** that refutes or **supports** their ideas.
* Independently form a conclusion which draws on the **evidence** from the test (linked to Y6 PoS).
* Use scientific language and terminology (linked to Y6 PoS) to explain why something happened.
 | * Be able to suggest reasons for unexpected results (anomalies).
* Describe how to improve planning to produce more **reliable** results.
* Say how confident they are that their results are **reliable** and give a reason.
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