# ESF Science Skills Continuum

| | Phase 1 | | | Phase 2 | | Phase 3 | | Phase 4 |
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| | K1 | K2 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
| **Observe carefully in order to gather data** | Explore their environment to identify an attribute.<br><br>Manipulate objects to explore its properties (e.g. explore playdough for its physical properties).<br><br>Record data using simple pictures (or mark making) and charts (tally).<br><br>Explore objects for specific attributes.<br><br>Observe changes over time (e.g. seed-seedling-fully grown plant). | | | Examine objects for specific attributes (with specific objectives - e.g. is it watertight?)<br><br>Observe and record changes over time (sequence of a decaying plant).<br><br>Examine objects for specific properties and investigate their changing states (e.g. How does water change when it is frozen?)<br><br>Record data using a variety of strategies (e.g. flow charts, picture sequencing, key words and labelled diagrams)<br><br>Take relevant observations and use standard measuring equipment for quantities e.g. temperature, volume<br><br>Record data orally, in pictures and/or in written words or sentences | | Take series of observations<br><br>Record and organizes data using standard measurements in sentences, list sand/or simple labeled diagrams<br><br>Take detailed observations over time<br><br>Record and organizes data using standard measurements in simple tables, graphs, charts or in labeled diagrams<br><br>Take repeat readings to determine experiment accuracy | | Record and organize data using standard measurements in simple tables, graphs, charts or in labeled diagrams<br><br>Take repeat readings when required for unusual or inaccurate readings |
| **Use a variety of instruments and tools to measure data accurately** | Use observation & scientific tools during structured and unstructured scientific investigations.<br><br>Make comparisons in measurement during structured activities.<br><br>Use non-standard units for measurement and record.<br><br>Make comparisons of measurement between mass, weight and temperature. | | | Use appropriate scientific tools during structured scientific investigations.<br><br>Use standard units for measurement and record in variety of ways.<br><br>Make comparisons of measurement between mass, weight, temperature and time.<br><br>Select and safely use tools and equipment to extend the sense for observation. | | Select and safely use tools and equipment to observe and measure<br><br>Use a range of tools according to context e.g. weighing scales, thermometers<br><br>Identify Intervals used in standard or non-standard units<br><br>Make comparisons, rank objects, estimate within reason and uses | | Select and safely use tools and equipment to observe and measure<br><br>Account for the scale and the degree of accuracy required on measuring equipment<br><br>Pupils use appropriate range to enable patterns and trends to be identified<br><br>Uses standard units for measurement |

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| | Choose appropriate equipment from a prescribed range. | | | Select and safely use tools and equipment to observe and measure<br>-Range of materials or object chosen by students to suit investigations e.g. 3 to 4 parachutes<br><br>Intervals may use non-standard units e.g. coarse, medium, fine<br><br>Use various measuring devices appropriately with some teacher guidance. | | standard measuring instruments accurately.<br><br>Select and safely use tools and equipment to observe and measure<br><br>Consider the scale and the degree of accuracy required with measuring equipment (with support)<br><br>Range used independently and with standard and non-standard units of measurement<br><br>Makes comparisons, ranks objects, estimates with increased precision and uses standard measuring instruments accurately. | Make comparisons, rank objects, estimate with precision and use measuring instruments accurately |
| **Use scientific vocabulary to explain their observations and experiences** | Discuss what is observed<br><br>Respond to questions regarding attributes of objects (e.g. What colour is it? What does it feel like? What can you do with it? Where does it come from?).<br><br>Discuss what is happening in a scientific investigation (initially using non scientific language, then with some scientific language (e.g. 'I saw the reflection get lighter/darker') with initial teacher modeling of scientific vocabulary.<br><br>Discuss what is observed with a teacher/peers using specific scientific vocabulary (e.g. float/sink).<br><br>Name and describe several attributes of an object and event (e.g. 'When the | | | Discuss in small group situations what is observed with specific scientific vocabulary (e.g. This material is translucent and allows light to pass through).<br><br>Name and describe several attributes of an object and events in the context of a specific scientific investigation. (e.g. when I exercise my heart beats faster and I burn more energy).<br><br>Students talk about what is happening in a scientific investigation using teacher modelled scientific vocabulary<br><br>Record findings using relevant scientific vocabulary.<br><br>Students report back and try to explain their observations and findings. | | Share and explain findings using relevant scientific vocabulary.<br><br>Use a range of presentation formats to present findings.<br><br>Use evidence to support findings.<br><br>Share using all relevant details and uses scientific vocabulary effectively to explain findings and identify trends.<br><br>Use a range of presentation formats to present findings.<br><br>Use evidence to support those findings.<br><br>Explore bias e.g. validity, reliability, social acceptance and credibility. | Share using all relevant details and use scientific vocabulary effectively to explain findings and identify trends.<br><br>Communicate through presentations in the form of written reports, models, charts graphs, films etc.<br><br>Provide supporting evidence.<br><br>Is aware of bias e.g. validity, reliability, social acceptance and credibility. |

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| | towel was absorbing water, I saw it go inside.').<br><br>Share findings using scientific vocabulary (e.g. 'This is heavier because it has more weight'). | | | Use scientific vocabulary when planning, recording and explaining findings e.g. dissolving, evaporating, prediction, evidence.<br><br>Discuss/describe findings or learning through pictures, simple tables and graphs.<br><br>Use evidence to support findings. | | | | |
| **Identify or generate a question or problem to be explored** | Respond to the world around them by using their senses.<br><br>Engage in scientific investigations by making observations (e.g. How does this work? What can you see happening? What makes it do that?).<br><br>Ask questions about the world around them, including about the scientific inquiry e.g. How? What will happen if? Why?<br><br>Recall scientific investigations.<br><br>Discuss scientific ideas and, with teacher support, ask questions.<br><br>Recall scientific investigations by identifying the problem investigated and suggest next steps. | | | Ask their own questions about the scientific inquiry (e.g. What do I need to carry out this investigations )<br><br>Use wonderings to build a scientific investigation upon ( by identifying a problem suggest next steps)<br><br>Discuss scientific ideas and ask questions.<br><br>Ask questions related to the specific topic that lead to further scientific inquiry<br><br>Recall teacher led scientific investigations<br><br>Use scientific ideas to pose problems | | Ask questions related to the specific topic that lead to further scientific inquiry<br><br>Recognise the need for a scientific investigation.<br><br>Generate questions to investigate.(with support)<br><br>Design and ask questions specifically related to the topic.<br><br>Identify a problem that can lead to a scientific investigation.<br><br>Pose questions to clarify practical problems or inform a scientific explanation. | | Design and asks questions specifically related to the topic<br><br>Identify a problem that can lead to a scientific investigation.<br><br>Poses questions to clarify practical problems or inform a scientific explanation.<br><br>Evaluate the need to design further tests. |
| **Plan and carry out systematic investigations, manipulating variables as necessary** | Identify changes in their immediate environment.<br><br>Use methods to collect information from observations.<br><br>Identify problems to solve during scientific investigations. | | | Identify variables within a scientific investigation.<br><br>Identify and think of ways to solve problems during scientific investigations. | | Create a plan to investigate a scientific problem or question.<br><br>Build fair testing elements into the plans for an experimental procedure. | | Create a plan to find an answer to the question he or she has formulated<br><br>Plan an investigation knowing how to manipulate the variables e.g. constant, independent and dependent. |

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| | Begin to think of ways they can solve scientific problems.<br><br>Begin to think of ways to change outcomes in a scientific investigation (variables)<br><br>Identify variables within a scientific investigation. | | | Recognize ways scientific experiments can be unfair.<br><br>Use appropriate methods to collect information from a scientific investigation.<br><br>Recognize ways scientific experiments can be unfair.<br><br>Plan the main steps of an investigation, building fair testing elements into the plans (with support).<br><br>Suggest observations and measurements required.<br><br>Recognize the variables within a fair test with teacher support e.g. measured, keep the same, change. | | Compare and contrast observations and measurements to determine accuracy of results<br><br>Create a plan to find an answer to the question he or she has formulated<br><br>Plan an investigation knowing how to manipulate the variables e.g. constant, independent and dependent.<br><br>Consider whether to take repeat readings (with support) | | Consider whether enough evidence will be yielded for the task and whether repeat readings may be required. |
| **Make and test predictions** | Identify ways their environment can be the same and different.<br><br>Guess an outcome during structured activity working towards predicting a reasonable outcome during a structured experience.<br><br>Propose simple ideas to test during exploration (scientific or otherwise).<br><br>Identify similarities and differences in a range of contexts.<br><br>Make a prediction based on observations during a scientific investigation. | | | Identify similarities and differences in a range of contexts using scientific vocabulary (e.g. properties: rough/smooth; hot/cold).<br><br>Make an informed prediction with explanations based on observations during scientific investigations.<br><br>Propose simple theories to test out during scientific investigations.<br><br>Discuss and describe similarities and differences in a range of contexts using scientific vocabulary (e.g. properties: rough/smooth; hot/cold).<br><br>Predict outcomes of investigations using their personal experiences | | Justify predictions, based on the results of an investigation<br><br>Propose simple hypothesis to test out during scientific investigations.<br><br>Justify predictions, based on the results of an investigation<br><br>Suggest relevant reasons for their predictions using prior knowledge and understanding<br><br>Develop a hypothesis using a statement. | | Suggest reasons to justify their predictions using scientific knowledge<br><br>Offer predictions about possible patterns in results<br><br>Discuss how changing the variables will affect the outcome of a given hypothesis |

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| | | | | Propose simple hypothesis to test out during scientific investigations. | | | | |
| **Interpret and evaluate data gathered in order to draw conclusions** | | | Sort and classify by teacher/student selected criteria and draw a simple conclusion (e.g. collect smooth/rough stones and observing that not all rocks feel the same).<br><br>Recognise general patterns (e.g. If I water the plant it will grow) and patterns with specific criteria (e.g. most fabrics are absorbent).<br><br>Interpret information and offer simple explanations with one or two variables (e.g. the ball rolls fast because it is going down a hill).<br><br>Interpret information from a scientific learning engagement and offer their own explanations and predictions (e.g. this boat will sink because I put a heavy stone on top and now I will try a lighter stone to see if it sinks).<br><br>Compare results by observing another's investigation (e.g. My boat floated, but his boat sank when he pushed it under the water). | Compare and classify using given criteria (begins to suggest criteria for comparisons).<br><br>Recognise repeated patterns in teacher-directed experiments (e.g. all types of elastic are stretchy).<br><br>Compare results by observing another's investigation and offer explanations (e.g. my cup held water because it is made of glass, my cup didn't because it is made of cardboard).<br><br>Identify where to go next.<br><br>Identify patterns in the data and summarize the data<br><br>Draw a simple conclusion on the basis of observations<br><br>Locate information from simple charts and graphs<br>-Describe observations in detail and provide explanations for them<br><br>Make a simple evaluation of the investigation<br><br>Develop ability to make simple judgements based on a given criteria. | Identify patterns and summarize the data<br>-Draw conclusions on the basis of the data gathered and make further predictions<br><br>Evaluate the experimental procedure orally, in charts, graphs or diagrams and/or sentences<br><br>Use supporting evidence to defend judgements.<br><br>Identify patterns and discrepancies in the data, and summarize the data<br><br>Make decisions and judgements based on a given criteria e.g. comparisons, anomalies and patterns<br><br>Develop the use of supporting evidence to defend judgments | Identify patterns and discrepancies in the data, suggests explanations for discrepancies, and summarizes the data<br><br>Draw conclusions on the basis of the data gathered<br><br>Make decisions and judgements based on a given criteria e.g. comparisons, anomalies and patterns<br><br>Can explain and defend judgement. |

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| **Consider scientific models and applications of these models (including their limitations)** | Discuss and show observations within a scientific investigation with teacher/peers (e.g. 'Look, my water turned blue'.)<br><br>Demonstrate their understanding using concrete examples (e.g. make a ramp to make cars roll down faster) drawings and flow charts.<br><br>Draw simple conclusions and with teacher support and apply new scientific understandings to the current context (e.g. All living things need food, If I don't eat I will die because I'm a living thing).<br><br>Orally recounts steps in a scientific investigation to answer a specific question. | | | Discuss and demonstrate their understanding using concrete examples and drawings and flow charts.<br><br>Draw conclusions and with teacher support and apply new scientific understandings to the current context (e.g. All living things need food, If I don't eat I will die because I'm a living thing).<br><br>Recount steps in a scientific investigation using labelled diagrams.<br><br>Recognise the difficulties encountered. With support, suggests how the inquiry might be improved.<br><br>Present steps in and results of an experimental procedure orally and in charts, graphs or diagrams and/or sentences.<br><br>Use simple tables and graphs to record observations and results of experiments.<br><br>Can use pictures, labels, sentences, observational drawings and tallies. | | Present steps in and results of an experimental procedure orally and in charts, graphs or diagrams and/or sentences<br><br>Suggest how the inquiry might be improved<br><br>Recognize some of the limitations of their evidence<br><br>Organise results using graphs, tables and diagrams.<br><br>Record data using tallies, lists, charts, drawings and notes. Realises a need for keeping records.<br><br>Present steps in and results of an experimental procedure orally and in charts, graphs or diagrams and/or sentences<br><br>Evaluate the experimental procedure, explains changes that could be made to improve it<br><br>Consider some of the pattern and the limitations of their evidence<br><br>Select and use appropriate format to record data<br><br>Record data using tallies, lists, charts drawings and notes. | | Present steps in and results of an experimental procedures using numeric, symbolic, graphical and/or linguistic methods<br><br>Evaluate the experimental procedure, explains changes that could be made to improve it, and give reasons for the changes<br><br>Consider the spread of repeated measurements<br>-Recognizes some of the limitations of their evidence<br><br>Select and use appropriate format to record data using tallies, lists, charts drawings and notes |