Implementation - Skills

	Use Scientific Vocabulary	Hypothesise	Perform Scientific Enquiries	Evaluate and Conclude
EYFS (Nursery)	Use appropriate vocabulary to explain what they see	Ask questions about what they see and feel	Use all senses to explore materials Observe differences, E.g. In settings, in materials	Realise that repeated actions have an effect Talk about what they see, hear and feel
EYFS (Reception)	Describing what they see, hear and feel	Ask questions to help them understand their world	Explore the natural world around them Observe, physically examine and listen carefully	Talk about changes they notice
Year 1	Define simple scientific language. E.g., Names of plants and animals, weather and seasons, measure, fair test, carnivores, herbivores and omnivores, everyday materials	Ask simple questions. E.g., How do plants change over the year? What is the best material for an umbrella? A spoon? Make a simple prediction about what will happen in an experiment.	Observe closely, using simple equipment. E.g., a magnifying glass Perform and observe simple tests. E.g., to find out if a material is waterproof. Identify and classify. E.g., types of trees Gather and record data. E.g. Measuring the distance travelled in a table.	Describe what happened during an experiment. Use their observations and ideas to suggest answers to questions. E.g., fabric would not be a good material for an umbrella because it is not waterproof. Recognise that questions can be answered in different ways. E.g., a written statement, a diagram, a simple chart
Year 2	Define further scientific language. E.g., habitats and micro-habitats, food chain, classify, physical, observe, record, compare, offspring, basic needs, survive			
Year 3	Define further scientific language. E.g., measurements using standard units, results, conclusions, observations, similarities, differences, nutrition, organic matter, rocks, reflected, light source, attract, repel, magnets	Ask questions that could be made into a hypothesis. E.g. What happens when we heat up a liquid? Make a prediction for an experiment based on scientific facts. E.g.	Explain why it is a fair test. Make systematic and careful observations and take accurate measurements using standard units. Use a range of equipment. E.g. thermometers and data loggers. Gather, record, classify and present data in a variety of ways to help answer questions. Identify differences, similarities or changes related to simple scientific ideas and processes.	Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. Eg. using simplified drawings, labelled diagrams, keys, simple bar charts, and simplified tables Make scientific conclusions about the experiment. Suggest improvements for the experiment based on the quality of the data gained. Use the experiment conclusion to see if the prediction was correct. Use straightforward scientific evidence to decide if the conclusion was correct.
Year 4	Define further scientific language. E.g., environmental changes, digestive system, predators, prey, producers, solids, liquids, gases, evaporation, condensation, water cycle, vibrations, medium, volume, circuit, electricity, loop, switch, conductors, insulators			
Year 5	Use scientific language correctly in response to scientific questions. E.g., diagrams, classification keys, graphs, accuracy, precision, comparative and fair tests, conclusions, causal relationships, support, refute, reproduction, solubility, thermal and electrical conductivity, filtering, evaporating, dissolving, change of state, orbit, gravity, air resistance, gravity, hypothesis	Explain what a hypothesis is. Suggest a hypothesis in relation to the topic being studied that could be tested in an experiment Plan a simple experiment to test a hypothesis and ensure it is a fair test (by controlling variables where necessary).	Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate. E.g. thermometers, etc. Understand what variables in an experiment are. Explain scientific evidence that has been used to support or refute ideas or arguments	Report and present findings from enquiries, including conclusions, causal relationships, and explanations of results, in oral and written forms such as displays and other presentations. E.g., using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. Use test results to make predictions to set up further comparative and fair tests.
Year 6	Use further scientific language correctly in response to scientific questions. E.g., Circulatory system, nutrients, evolution and inheritance, adaptations, offspring, voltage, diagrams			
Year 7	Use scientific language to talk and, write about what has been observed in experiments. E.g. observations, data, Prediction, Hypothesis, Independent/ Dependent/ Controlled Variables, Analysis and Evaluation	Ask scientific enquiry questions E.g. What happens if I change the intensity of light a plant receives? What factors can affect the speed of a toy car travelling down a ramp? Write questions in the format 'How does... change over time?' Suggest a hypothesis and justify your hypothesis with scientific concepts. Devise a suitable plan to test the hypothesis. Predict what will happen if your hypothesis is correct.	Identify an observation that can be recorded or measured over time and select a suitable range of equipment to use. Explain the difference between dependent, independent and controlled variables. Identify a dependent variable. Identify an independent variable. Decide how to measure the dependent variable. Identify all the control variables which would need to be kept the same for the test to be fair. Write a question linking variables in the form 'How does... affect...?' Identify two variables which may show a correlation. Write a question in the form 'Is there a correlation between… and…' Identify features of an investigation which are hazardous. Identify ways of reducing the hazard. Use test results to make secondary predictions for comparative results to be collected. Follow a step-by-step method to conduct the experiment. Gather sufficient data for the investigation and repeat if appropriate. Make accurate measurements and include units. Prepare a table with space to record all measurements. Use scientific evidence to support the evidence/ data collected.	Decide the type of chart or graph to draw based on its purpose or type of data. Label the x axis with the name of the independent variable and the y axis with the dependent variable. Decide which numbers to start and finish with on each axis. Write unit labels on the axes. Mark out an equal scale showing what each square of graph paper represents. Draw a straight line or a curve of best fit through the points. Incorporate the pattern you found into an answer to the enquiry question. Record/present data and results of increasing complexity. E.g., using scientific diagrams scatter graphs, bar and line graphs State whether or not the hypothesis is correct. Make a detailed scientific conclusion and explain it with scientific reasoning for your findings. Decide whether the conclusion of the experiment agrees with your prediction. Judge whether the conclusion is supported by the data. Justify whether anomalous results can be explained or ignored. Suggest other possible conclusions that could be drawn from your data. Explain why an explanation is more believable when supported by data from an experiment. Identify further questions arising from the investigation.
Year 8	Use further science language when formulating answers to verbal and written questions/ explanations e.g. increasing, decreasing, plateau, elements, reactions, current, adaptation, force, photosynthesis Use relevant scientific language to explain why scientific processes occur. E.g., The rate of photosynthesis increases as the intensity of light increases, because if there is more light, more photosynthesis can take place			
Year 9	Use scientific language to explain theoretical concepts. E.g., Respiration, Immune Responses, Electricity, Current, Gravity, Energy Transfers, Displacement, Separation Techniques			
Year 10	Use relevant scientific language and illustrations to discuss, communicate and justify scientific ideas. E.g., Describe, Explain, Suggest, Predict, State, Analyse, Compare, Justify	Use scientific theories and explanations to develop a hypothesis and support it in detail. Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data and explore phenomena. Describe a practical procedure for a specified purpose. E.g. Investigating the effect of temperature on the rate of enzyme activity or Investigating the reactivity of group 1 elements with water, as we move down a group Explain why a given practical procedure is well designed for its specified purpose of testing a hypothesis. Comment on the extent to which collected data is consistent with a given hypothesis. Identify which of two or more hypotheses provides a better explanation of data in a given context.	Devise a suitable, relevant and precise method that can investigate a scientific question. Select a suitable range of equipment to use, with justifications of equipment choices in relation to precision and accuracy e.g. a syringe has smaller intervals than a measuring cylinder and therefore more accurate volumes of a liquid can be measured Identify the difference between qualitative and quantitative observations. Choose a suitable range for the independent and dependent variable. Identify the dependent and independent variables within the investigation and decide on a suitable range for the independent variable. Identify the most suitable method to make accurate measurements of the dependent variable. Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment. Check that the measuring instrument can measure the complete range of the independent variable. Check you can detect differences in the dependent variable. Use the measuring instrument correctly.	Present data using bar chart, histogram, pie charts, diagrams. Plot two variables from experimental or other data. Recognise or describe patterns and trends in data presented in a variety of tabular, graphical and other forms. Draw conclusions from given observations. Decide whether the conclusion of the experiment agrees with your prediction. State whether or not the hypothesis is correct. Quote any secondary data you have which led to the same conclusion Evaluate methods and suggest possible improvements and further investigations e.g. repeating the experiment if anomalous data is collected, using more precise equipment, such as a syringe, with smaller graduations Apply ideas to evaluate data to suggest improvements to procedures and techniques. I.E. • An accurate measurement is one that is close to the true value. • Measurements are repeatable when repetition, under the same conditions by the same investigator, gives similar results.
Year 11	Use scientific ideas to explain processes. E.g., The rate of diffusion is dependent on the temperature of the solution, as particles move along the concentration gradient from an area of high concentration to low with more kinetic energy.			

			Select important control variables. Identify how to control each control variable. List variables you cannot control. Identify the main hazards in the practical and complete a risk assessment which identifies hazards and suggest precautions to reduce the risk of harm. Prepare a table, with column headings for the independent and dependent variables to record all measurements. Ensure the table includes repeats. Include units in the headings of the table. Carry out experiments appropriately having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations. Make and record accurate measurements to the same significant figures. See if repeated measurements are close. Identify and remove outliers when calculating the mean of repeats. Use scientific evidence to justify the evidence/ data collected.	• Measurements are affected by random error due to results varying in unpredictable ways; these errors can be reduced by making more measurements and reporting a mean value. • Any anomalous values should be examined to try to identify the cause and, if a product of a poor measurement, ignored
Year 12 and 13	Use scientific ideas to explain and justify processes. "E.g., Adherence to a treatment for Type 2 diabetes is important to evaluate the clinical evolution of a pathology. Studies indicate that 50% of people with chronic diseases comply with their treatment."	Use scientific theories and explanations to support and test given hypothesis. Devise methods for experiments and choose suitable equipment to carry out practicals, make observations and test hypotheses. Carefully check and scrutinise data collected. Devise a suitable practical procedure to investigate a specified purpose. E.g. Investigating the effect of concentration on titrations Analyse and evaluate on the extent to which collected data is consistent with a given hypothesis. Compare which of two or more hypotheses provides a better explanation of data in a given context.	Design or choose the most suitable method to make accurate measurements of the dependent variable. Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment. Compare equipment to choose the most suitable measuring instrument that can measure the complete range of the independent variable. Check you can detect differences in the dependent variable. Use the measuring instrument correctly. Select important control variables. Identify how to control each control variable. List variables you cannot control. Identify the main hazards in the practical and complete a risk assessment which identifies hazards and suggest precautions to reduce the risk of harm. Design a table, with column headings for the independent and dependent variables to record all measurements, with no guidance. Ensure the table includes repeats. Include units in the headings of the table using the correct units. Carry out experiments appropriately, following the risk assessment having due regard for the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations. Carefully record accurate measurements to the same significant figures. See if repeated measurements are close. Identify and remove outliers when calculating the mean of repeats. Use scientific evidence to justify the evidence/ data collected.	Construct an appropriate form of data representation i.e. using a bar chart, histogram, pie charts, diagrams. Plot two variables from experimental or other data. Describe patterns and trends in data presented in a variety of tabular, graphical and other forms. Draw valid conclusions from given observations. Decide and justify whether the conclusion of the experiment agrees with your prediction. State whether or not the hypothesis is correct. Quote any secondary data you have which led to the same conclusion Evaluate methods and suggest possible improvements and further investigations e.g. repeating the experiment if anomalous data is collected, using more precise equipment, such as a syringe, with smaller graduations Evaluate data to suggest improvements to procedures and techniques and consider how equipment can be changed to provide you with more concise data. I.E. • An accurate measurement is one that is close to the true value. • Measurements are repeatable when repetition, under the same conditions by the same investigator, gives similar results. • Measurements are affected by random error due to results varying in unpredictable ways; these errors can be reduced by making more measurements and reporting a mean value. • Any anomalous values should be examined to try to identify the cause and, if a product of a poor measurement, ignored