

Science Progression in Working Scientifically

Essential characteristics of scientists

- The ability to think independently and raise questions about working scientifically and the knowledge and skills that it brings
- Confidence and competence in the full range of practical skills, taking the initiative in, for example, planning and carrying out scientific investigations
- Excellent scientific knowledge and understanding which is demonstrated in written and verbal explanations, solving challenging problems and reporting scientific findings
- High levels of originality, imagination or innovation in the application of skills
- The ability to undertake practical work in a variety of contexts, including fieldwork
- A passion for science and its application in past, present and future technologies

Year Group	Key Skills	Key Vocabulary
EYFS	• Listen attentively and respond to what they hear with relevant questions, comments and actions when being read to and during whole class discussions and small group interactions • Make comments about what they have heard and ask questions to clarify their understanding • Participate in small group, class and one-to-one discussions, offering their own ideas, using recently introduced vocabulary • Explore the natural world around them, making observations and drawing pictures of animals and plants • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter	
Year 1/2	• Ask simple questions • Observe closely, using simple equipment • Perform simple tests • Identify and classify • Use observations and ideas to suggest answers to questions • Gather and record data to help in answering questions	• question • answer • observe • observing • equipment • identify • classify • sort • group • record - diagram, chart, map • data • compare, contrast • describe

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Year 3/4	• Ask relevant questions • Set up simple, practical enquiries and comparative and fair tests • Make accurate measurements using standard units, using a range of equipment, e.g. thermometers and data loggers • Gather, record, classify and present data in a variety of ways to help in answering questions • Record findings using simple scientific language, drawings, labelled diagrams, bar charts and tables • Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • Use results to draw simple conclusions and suggest improvements, new questions and predictions for setting up further tests • Identify differences, similarities or changes related to simple, scientific ideas and processes • Use straightforward, scientific evidence to answer questions or to support their findings	• research - relevant questions, scientific enquiry • comparative and fair test • systematic, careful observations • accurate measurements • equipment - data logger, thermometer • data - gather, record, classify, present • record - drawings, labelled diagrams, keys, bar charts, tables • oral and written explanations • conclusion • predictions • differences, similarities, changes • evidence • improve • secondary sources • guides • keys • construct • interpret
Year 5/6	• Plan enquiries, including recognising and controlling variables where necessary • Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work • Take measurements, using a range of scientific equipment, with increasing accuracy and precision • Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs, and models • Report findings from enquiries, including oral and written explanations of results, explanations involving causal relationships, and conclusions • Present findings in written form, displays and other presentations • Use test results to make predictions to set up further	• plan • variables • measure • accuracy • precision • repeat readings • record data - scientific diagrams, labels, classification keys, tables, scatter graphs, bar graph, line graph • predication • further comparative and fair tests • report and present - conclusions, explanations, degree of trust, oral and written display and presentation • evidence - support, refute ideas or arguments • identify, classify and describe • patterns

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	• Use simple models to describe scientific ideas, identifying scientific evidence that has been used to support or refute ideas or arguments • systematic • quantitative measurements
KS 3	<i>Scientific attitudes</i> • Pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility • Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review • Evaluate risks <i>Experimental skills and investigations</i> • Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience • Make predictions using scientific knowledge and understanding • Select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables • Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety • Make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements • Apply sampling techniques Analysis and evaluation • Apply mathematical concepts and calculate results • Present observations and data using appropriate methods, including tables and graphs • Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions • Present reasoned explanations, including explaining data in relation to predictions and hypotheses • Evaluate data, showing awareness of potential sources of random and systematic error • Identify further questions arising from their results Measurement • Understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature • Use and derive simple equations and carry out appropriate calculations • Undertake basic data analysis including simple statistical techniques