Science - Whole School Overview Working Scientifically Skills

	PLAN • Asking questions • Make predictions • Decide on the method and equipment • Recognise enquiry types	DO • Make observations • Take measure • Engage with practical enquiry	RECORD • Use drawings, tables or graphs to record and present evidence	REVIEW • Interpret evidence to answer questions and draw conclusions • Evaluate enquiries and make further predictions
KS1 **Children are taught to and develop confidence in:**	**Asking simple questions and recognising that they can be answered in different ways** • what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen. • children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered.	**Observing closely, using simple equipment** **Performing simple tests** **Identifying and classifying** • use simple features to compare objects, materials and living things • with help, decide how to sort and group these objects • observe changes over time • with guidance, they should begin to notice patterns and relationships • ask people questions and use simple secondary sources to find answers. • use rulers / measuring cylinders / hand lenses / egg timers/ scales Measure using standard units where all the numbers are marked on the scale. length (m/cm); mass (kg/g); capacity (litres/ml)	**Gathering and recording data to help in answering questions** • Record simple data • With help, they should record and communicate their findings in a range of ways such as block diagrams, simple labelled diagrams, pictograms, pictures, photographs, tally charts, simple tables to record their observations – these will be pre-prepared	**Using their observations and ideas to suggest answers to questions** • Talk about what they have found out and how they found it out. • With help, begin to use simple scientific language.

Science - Whole School Overview Working Scientifically Skills

Working Scientifically specific vocabulary KS1	Questions, answers, equipment, gather, measure, record, results, sort, group, test, explore, observe, compare, describe, similar/ities, different/ces, beaker, pipette, syringe, observe, changes over time, notice patterns, secondary sources, hand lenses, egg timers, identify, classify, data.			
Y3 recap from KS1	**Recap from KS1:** Using what, how, why questions and understanding that there are different ways to answer questions. Being involved in teacher led decisions about their science learning.	**Recap from KS1:** Simple investigations with support in making observations.	**Recap from KS1:** Simple data collected, with support, in pre-prepared templates.	**Recap from KS1:** talk about what they have found out and how they found it out using simple scientific language.
Y3 **Children are taught and develop these skills:**	**Ask relevant questions and use different types of scientific enquiries to answer them** • raise their own questions about the world around them using a range of question stems • begin to know the different types of scientific enquiry they might use to answer questions; • with support, recognise when a simple fair test is necessary and help to decide how to set it up; • with support, talk about criteria for grouping, sorting and classifying; • taught to use simple keys • begin to recognise when and how secondary sources might	**Make systematic and careful observations** • begin to look for naturally occurring patterns and relationships • with support, decide what data to collect to identify these patterns • help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used **Take accurate measurements using standard units, using a range of equipment,** • learn how to use new equipment appropriately: Data loggers / newton meters / rulers /	**Gather, record, classify and present data in a variety of ways to help in answering questions** • help to make decisions about how to record and analyse this data. **Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables** • Draw own tables and tally charts, • Use pre-prepared templated to create basic Venn/Carroll diagrams, pictograms and bar charts.to which they add headings independently • Draw own labelled diagrams or use pre-drawn images depending on context.	**Use results to draw simple conclusions and** **Report/present findings in a range of ways** • Present in a range of styles (oral and written explanations, displays or presentations of results and conclusions) • use relevant scientific language (see science knowledge overviews) to discuss ideas and communicate findings in ways that are appropriate for different audiences (eg letter of recommendation to head teacher for Rocks and Soils, posters to share dietary advice, magnetic menu for the Iron Man).

Science - Whole School Overview Working Scientifically Skills

	help them to answer questions that cannot be answered through practical investigations.	measuring cylinders and jugs / scales / hand lenses / beaker / pipette / syringe • collect data from their own observations and measurements, using notes, simple tables and standard units: length (m/cm/mm); mass (kg/g); capacity (litres/ml); time (min, sec); • Measure using standard units (whole numbers) where not all the numbers are marked on the scale.		**Use results to make predictions for new values, suggest improvements and raise further questions** • With support, they should identify new questions arising from the data, making predictions for new values within or beyond the data they have collected, • With help, find ways of improving what they have already done. **Identifying differences, similarities or changes related to simple scientific ideas and processes** • with help, look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions. **Using straightforward scientific evidence to answer questions or to support their findings** • use secondary sources (researched or provided) to support children's findings or to answer questions
Working Scientifically specific new vocabulary Y3	**Enquiries Vocab**: Scientific enquiry, changes over time, pattern seeking, secondary sources, comparative tests, fair tests, grouping and classifying, results, conclusions, predictions, support, **Skills Vocab:** careful, accurate, evidence, **Recording Vocab:** keys, bar charts, Venn Diagram, Carroll Diagrams, **Equipment Vocab:** data logger, newton meters, measuring jugs			

Science - Whole School Overview Working Scientifically Skills

Y4 **Children are consolidating and confidently using the skills taught in Y3**	**Ask relevant questions and use different types of scientific enquiries to answer them** • raise their own questions about the world around them using a range of question stems • start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions; • recognise when a simple fair test is necessary and help to decide how to set it up; • help to decide criteria for grouping, sorting and classifying; • use simple keys • recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations.	**Make systematic and careful observations** • independently look for naturally occurring patterns and relationships • independently decide what data to collect to identify these patterns • independently make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used **Take accurate measurements using standard units, using a range of equipment,** • learn how to use new equipment appropriately: thermometers/ Newton meters / Data loggers / rulers / measuring cylinders and jugs / scales / hand lenses • collect data from their own observations and measurements, using notes, simple tables and standard units: length (m/cm/mm); mass (kg/g); temperature (°C); capacity (litres/ml); time (min, sec) • Measure using standard units (whole numbers)	**Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions** • Independently make decisions about how to record and analyse this data. **Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables** • Draw own tables and tally charts, pictograms and bar charts, food chains • Use pre-prepared templated to create basic Venn/Carroll diagrams and classification keys to which they add headings/questions independently • Draw own labelled diagrams (occasionally use pre-drawn images depending on context- e.g. the digestive system).	**Use results to draw simple conclusions and** **Report/present findings in a range of ways** • Present in a range of styles (oral and written explanations, displays or presentations of results and conclusions) • use relevant scientific language (see science knowledge overviews) to discuss ideas and communicate findings in ways that are appropriate for different audiences (e.g. posters/information texts about school habitats, classification keys/food chains, use within DT designs, iPad documentaries about changing habitats). **Use results to make predictions for new values, suggest improvements and raise further questions** • Independently identify new questions arising from the data, making predictions for new values within or beyond the data they have collected, • Suggest ways of improving what they have already done. **Identifying differences, similarities or changes related to simple scientific ideas and processes** • independently look for changes, patterns, similarities and differences in their data in order

Science - Whole School Overview Working Scientifically Skills

		where not all the numbers are marked on the scale • Begin to decide when repeat readings are needed.		to draw simple conclusions and answer questions. **Using straightforward scientific evidence to answer questions or to support their findings** • use secondary sources (researched or provided) to support children's findings or to answer questions
Working Scientifically specific new vocabulary Y4	**Enquiries Vocab**: increase, decrease, identify, order, relationships, appearance, present results, repeat readings, fair testing **Skills Vocab:** no new vocabulary **Recording Vocab:**food chains, classification key, identification key **Equipment Vocab:** thermometers			
Y5: Recall of LKS2	**Ask relevant questions and use different types of scientific enquiries to answer them** • raise their own questions • start to make their own decisions about the most appropriate scientific enquiry to answer questions; • help to set up simple fair tests • help to decide criteria for grouping, sorting and classifying; • use simple keys • recognise when and how secondary sources are needed	**Make systematic and careful observations** • independently look for naturally occurring patterns and relationships, decide what data to collect, make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used. **Take accurate measurements using standard units, using a range of equipment,** • thermometers/ Newton meters / Data loggers / rulers / measuring	**Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions** • Independently make decisions about how to record and analyse this data. **Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables** • Draw own tables and tally charts, pictograms and bar charts, food chains • Use pre-prepared templated to create basic Venn/Carroll diagrams and classification keys to which they add headings/questions independently	**Use results to draw simple conclusions and** **Report/present findings in a range of ways** • Present in a range of styles • use relevant scientific language **Use results to make predictions for new values, suggest improvements and raise further questions** • Independently identify new questions arising from the data, making further predictions • Suggest ways of improving what they have already done. **Identifying differences, similarities or changes related to simple scientific ideas and processes** • independently look for changes, patterns, similarities and

Science - Whole School Overview Working Scientifically Skills

		cylinders and jugs / scales / hand lenses • collect own data using notes, simple tables and standard units: length (m/cm/mm); mass (kg/g); temperature (°C); capacity (litres/ml); time (min, sec) • Measure using standard units (whole numbers) where not all the numbers are marked on the scale • With support, consider when repeat readings are needed.	• Draw own labelled diagrams (occasionally use pre-drawn images depending on context- e.g. the digestive system).	differences in their data in order to draw simple conclusions and answer questions. **Using straightforward scientific evidence to answer questions or to support their findings** • use secondary sources (researched or provided) to support children's findings or to answer questions
Y5 **Children are taught and develop these skills:**	**Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary** • With support ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. • Given a wide range of resources, begin to decide for themselves how to gather evidence to answer a scientific question. • Begin to choose a type of enquiry to carry out and justify their choice, recognising how secondary	**Take measurements, using a range of scientific equipment, with increasing accuracy and precision,** • Begin to make their own decisions about what observations to make, what measurements to use and how long to make them for, and whether to repeat theme .g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value).	**Record data and results of increasing complexity** • record observations by using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing • record measurements in tables including columns for taking repeat readings and calculating an average (mean), tally charts, bar charts, line graphs and scatter graphs that they draw themselves • record classifications using tables, Venn diagrams, Carroll diagrams (drawn independently) and classification keys (beginning to create own, some heading may be given)	**Use test results to make predictions to set up further comparative and fair tests** • Use the scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests. **Reporting and presenting findings from enquiries, including conclusions, causal relationships** • In their conclusions, children identify causal relationships and patterns in the natural world from their evidence, they identify results that do not fit the overall pattern; and explain their findings using their subject knowledge. • Communicate their findings to an audience using relevant scientific language and illustrations.

Science - Whole School Overview Working Scientifically Skills

	sources can be used to answer questions that cannot be answered through practical work.	• Measure using standard units using equipment that has scales which are not all numbered, involving decimals. • Length (m/cm/mm); mass (kg/g); temperature (°C, incl negative numbers); capacity (litres/ml); time (min, sec, ms) – data to include some decimals. • Begin to decide when repeat readings are needed. **Select equipment to give the most precise data** • choose the most appropriate equipment to make measurements and explain how to use it accurately: thermometers/ Newton meters / Data loggers / rulers / measuring cylinders and jugs / scales / hand lenses / stop watches / tape measure / candles	• Use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment. • Children present the same data in different ways in order to help with answering the question. • With support, decide how to record data from a choice of familiar approaches;	**Give explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations** • Evaluate their methods, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used. • Identify any limitations that reduce the trust they have in their data. **Identifying scientific evidence that has been used to support or refute ideas or arguments** (discuss how scientific arguments have developed over time) • use their results to identify when further tests and observations might be needed; • recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact • use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas • talk about how scientific ideas have developed over time (how their scientific ideas change due to new evidence that they have gathered about how new discoveries change scientific understanding more generally)

Science - Whole School Overview Working Scientifically Skills

Working Scientifically specific new vocabulary Y5	**Enquiries Vocab**: variables, independent variable, dependent variable, control variable, evidence, justify, argument (science), causal relationship, **Skills Vocab:** no new vocabulary **Recording Vocab:** accuracy, precision, scatter graphs, bar graphs, line graphs, support/refute, degree of trust, decimals **Equipment Vocab:** stop watches, tape measure, candles			
Y6 **Children are consolidating and confidently using the skills taught in Y5**	**Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary** • Independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. • Given a wide range of resources, decide for themselves how to gather evidence to answer a scientific question.	**Take measurements, using a range of scientific equipment, with increasing accuracy and precision,** • Independently make their own decisions about what observations to make, what measurements to use and how long to make them for, and whether to repeat them e .g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check	**Record data and results of increasing complexity** • record observations by using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing • record measurements in tables including columns for taking repeat readings and calculating the mean, median or mode average , tally charts, bar charts, line graphs and scatter graphs that they draw themselves • record classifications using tables, Venn diagrams, Carroll diagrams (drawn independently)	**Use test results to make predictions to set up further comparative and fair tests** • Independently use the scientific knowledge gained from enquiry work to make predictions that can investigate using comparative and fair tests. **Reporting and presenting findings from enquiries, including conclusions, causal relationships** • Independently write conclusion which identify causal relationships and patterns in the natural world from their evidence, they identify results that do not fit the overall pattern; and explain their

Science - Whole School Overview Working Scientifically Skills

	• Independently choose a type of enquiry to carry out and justify their choice, recognising how secondary sources can be used to answer questions that cannot be answered through practical work.	further secondary sources (researching); in order to get accurate data (closer to the true value). • Measure using standard units using equipment that has scales which are not all numbered, involving decimals. • length (m/cm/mm); mass (kg/g); temperature (°C, incl negative numbers); capacity (litres/ml); time (min, sec, ms) – data to include some decimals. • Decide when repeat readings are needed. **Select equipment to give the most precise data** • Independently choose the most appropriate equipment to make measurements and explain how to use it accurately: thermometers/ Newton meters / Data loggers / rulers / measuring cylinders and jugs / scales / hand lenses / stop watches / tape measure / candles	and classification keys (create own, some heading may be given if needed) • Use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment. • Children present the same data in different ways in order to help with answering the question. • Independently decide how to record data from a choice of familiar approaches;	findings using their subject knowledge. • Effectively communicate their findings to an audience using relevant scientific language and illustrations. **Give explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations** • Independently evaluate their methods, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used. • identify any limitations that reduce the trust they have in their data. **Identifying scientific evidence that has been used to support or refute ideas or arguments** (discuss how scientific arguments have developed over time) • use their results to identify when further tests and observations might be needed; • recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact • use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas

Science - Whole School Overview Working Scientifically Skills

				• talk about how scientific ideas have developed over time (how their scientific ideas change due to new evidence that they have gathered about how new discoveries change scientific understanding more generally)
Working Scientifically specific new vocabulary Y6	Children in Y6 should be able to confidently communicate scientifically and use all of the vocabulary introduced above in a self-assured and appropriate fashion.			