Our Lady Queen of Peace Progression of Skills: Science

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Disciplinary knowledge (working scientifically skills) with 'best fit' enquiry area and vocabulary progression over year groups.

When working scientifically, we have split up the skills the children will practise into different areas to help track coverage and progression more effectively. These areas are:

Asking Questions and Planning Enquiry	PLAN
Set up/carry out Enquiry Observe and Measure Record	DO
Interpret and Report Evaluate	REVIEW

These sections split down further into 'Plan, Do, Review' skills. Across different keys stages, children will have the chance to practise skills in all three of these areas to ensure they are confident with the disciplinary areas of being a scientist as well as the substantive knowledge.

N/B: For KS1-KS2 the statement in bold are the National Curriculum outcomes. Guidance for more detail is in italics below.

Enquiry Skills	Reception experiences - which act as prerequisite to working scientifically in KS1
Asking Questions	• Listen attentively and respond to what they hear with relevant questions. • Show curiosity and ask questions.
Set up/carry out Enquiries	• Show an ability to follow instructions involving several ideas or actions. • Be confident to try new activities. • Use a range of small tools.
Observe and Measure	• Safely use and explore a variety of materials, tools and techniques. • Make observations using their senses and simple equipment. • Use equipment to measure (inc. non-standard)
Recording	• Explore the natural world around them, making observations and drawing pictures of animals and plants. • Record their observations by drawing, taking photographs, using sorting rings or boxes or on simple tick sheets. • Identify, sort and group.
Interpret and Report	• Participate in discussions, offering their own ideas, using recently introduced vocabulary. • Offer explanations for why things might happen…
Evaluate	• Express their ideas and feelings about their experiences. • Know some similarities and differences… drawing on their experiences. • Make direct comparisons. • Use their observations to help them to answer their questions. • Talk about what they are doing and have found out.

PLAN

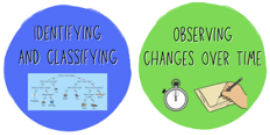
Asking Questions and Planning Enquiry	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
	• **Asking simple questions and recognising that they can be answered in different ways.** *While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions.* *The children answer questions developed with the teacher often through a scenario.* *The 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.*	• **Asking relevant questions and using different types of scientific enquiries to answer them.** *The children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions.* *The children answer questions posed by the teacher.* *Given a range of resources, the children decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have chosen to answer their question.*	• **Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.** *Children 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 the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work.*

PLAN
DO

Set up/carry out Enquiry	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
	• **Performing simple tests.** *The children use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. They carry out: tests to classify; comparative tests; pattern seeking enquiries; and make observations over time.*	• **Setting up simple practical enquiries, comparative and fair tests.** *The children select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher.* *They follow their plan to carry out: observations and tests to classify; comparative and simple fair tests; observations over time; and pattern seeking.*	• **Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.** *The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample.*

Observe and Measure

Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
• **Observing closely, using simple equipment.** • **Gathering and recording data to help in answering questions.** *Children explore the world around them. They make careful observations to support identification, comparison and noticing change. They use appropriate senses, aided by equipment such as magnifying glasses or digital microscopes, to make their observations.* *They begin to take measurements, initially by comparisons, then using non-standard units.*	• **Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.** *The children make systematic and careful observations.* *They use a range of equipment for measuring length, time, temperature and capacity. They use standard units for their measurements.*	• **Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.** *The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel.* *During an enquiry, they make decisions 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 further secondary sources (researching); in order to get accurate data (closer to the true value).*



Recording

Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
• **Identifying and classifying.** • **Gathering and recording data to help in answering questions.** *The children record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing.* *They record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs.* *They classify using simple prepared tables and sorting rings.* *Children use their observations and testing to compare objects, materials and living things. They sort and group these things, identifying their own criteria for sorting.* *They use simple secondary sources (such as identification sheets) to name living things. They describe the characteristics they used to identify a living thing.*	• **Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.** • **Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.** *The children sometimes decide how to record and present evidence. They record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. They record their measurements e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings). They record classifications e.g. using tables, Venn diagrams, Carroll diagrams.* *Children are supported to present the same data in different ways in order to help with answering the question.*	• **Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.** *The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g. using tables, Venn diagrams, Carroll diagrams and classification keys.* *Children present the same data in different ways in order to help with answering the question.*

REVIEW

Interpret and Report

Key Stage 1

- **Using their observations and ideas to suggest answers to questions.**

Children use their experiences of the world around them to suggest appropriate answers to questions. They are supported to relate these to their evidence e.g. observations they have made, measurements they have taken or information they have gained from secondary sources.

The children recognise 'biggest and smallest', 'best and worst' etc. from their data.

Lower Key Stage 2

- **Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.**
- **Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.**
- **Identifying differences, similarities or changes related to simple scientific ideas and processes.**
- **Using straightforward scientific evidence to answer questions or to support their findings.**

They communicate their findings to an audience both orally and in writing, using appropriate scientific vocabulary.

They draw conclusions based on their evidence and current subject knowledge.

Children interpret their data to generate simple comparative statements based on their evidence. They begin to identify naturally occurring patterns and causal relationships.

Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. The answers are consistent with the evidence.

Upper Key Stage 2

- **Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations.**
- **Identifying scientific evidence that has been used to support or refute ideas or arguments.**

They communicate their findings to an audience using relevant scientific language and illustrations.

Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. When doing this, they discuss whether other evidence e.g. from other groups, secondary sources and their scientific understanding, supports or refutes their answer.

They talk about how their scientific ideas change due to new evidence that they have gathered.

They talk about how new discoveries change scientific understanding.

In their conclusions, children: identify causal relationships and patterns in the natural world from their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge.

REVIEW

Evaluate	Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
		• **Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.** *They identify ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry.* *Children use their evidence to suggest values for different items tested using the same method e.g. the distance travelled by a car on an additional surface.* *Following a scientific experience, the children ask further questions which can be answered by extending the same enquiry.*	• **Using test results to make predictions to set up further comparative and fair tests** • **Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations.** *Children use the scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests.* *They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used.* *They identify any limitations that reduce the trust they have in their data.*

Vocabulary progression

Key Stage 1			Lower Key Stage 2		Upper Key Stage 2	
biology	difference/ different	questions	accurate	observations	accuracy and precision	patterns
chemistry	enquiry	record	bar chart	plan (What will we do?)	bar graphs	plan
physics	equipment	same	chart	enquiry	causal relationship	prediction
answer	explore	table	classify	prediction (What do you think will happen?)	classification keys	measurement
changes	findings	sort	comparative test	reasoning	conclusions	refute
compare	gather	tally charts	conclusion (What have we found out?)	relationships	degree of trust	repeat results
contrast	group	test	data	results (What happened?)	dependent variable	scatter graphs
classify	identify (name) investigate	What will we do? (plan)	labelled diagram	secondary sources	explanations	scientific diagrams
describe	measure	What do you think will happen? (prediction)	evaluate	units	evidence	tables
diagram	notice	What happened? (results)	evidence	table	further comparative/fair tests	support
	observe	What have we found out? (conclusion)	explanation	What do we change, what do we keep the same, what are we measuring?	independent variable	systematic
			key		identify	variables (what do we change, what do we keep the same, how and what are we measuring?)
			fair test		justify	
					line graphs	