Progress in Scientific Enquiry Skills

Asking questions
Asking questions that can be answered using a scientific enquiry.

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Posing Questions		Exploring the world around them and raising their own simple questions. Recognising there are different types of enquiry (ways to answer a question). Responding to suggestions on how to answer questions.		Beginning to raise further questions during the enquiry process. Considering what makes a testable question. Beginning to recognise that there are different types of enquiry and that they are suitable for different questions. Beginning to make suggestions about how different questions could be answered.		Raising questions throughout the enquiry process. Identifying testable questions. Selecting the most appropriate enquiry method to answer questions and give justification.	
		- "Why is the sky blue?" *- Chooses an enquiry method only when prompted.* *- Follows a suggested method without explaining why.*		*- "What if we changed the size of the ramp?"* *- "We could test it by measuring..."* *- Chooses between observation, testing, or research with some reasoning.*		*"This is a comparative test because we're changing one variable."* *- "We should observe over time because the change is slow."* *- Justifies method choice using scientific reasoning.*	
Research		Gathering specific information from one simplified, specified source.		Gathering specific information from a variety of sources.		Gathering answers to open-ended questions from a variety of sources.	
		- Uses a single text, image, or table provided by the teacher. *- Identifies simple facts when directed.*		*Uses two or more sources to find answers.* *- Selects relevant facts with some accuracy.* *- Begins to notice differences or similarities between sources.*		*- Chooses which sources to use for a broad question.* *- Extracts key points and synthesises information.* *- Answers questions that require judgement, explanation, or interpretation.*	

Making predictions

Using prior knowledge to suggest what will happen in an enquiry.

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Predicting		Suggesting what might happen, often justifying with personal experience.		Making predictions about what they think will happen by: ● Using scientific knowledge and/or personal experience to explain their prediction (because...) ● Beginning to consider cause and effect when making predictions, where appropriate. ● Predicting a trend by considering how the changing variable will affect the measured variable. (The smoother the surface, the longer the distance the car will travel)		Making increasingly scientific predictions by: ● Using previous scientific knowledge and evidence to inform their predictions. ● Using scientific language to describe a potential outcome or explain why they think something will happen. ● Making links between topics to evidence a prediction.	
		- I think it will float because it looks light. *- Last time it rolled far, so it will again.*		*- If the ramp is steeper, the car will go faster.* *- The smoother the surface, the further it will travel.*		*- Because friction is lower on smooth surfaces, I predict the car will travel further.* *- Evaporation increases with temperature, so the water level will drop faster.*	

Setting up tests

Deciding on the method and equipment to use to carry out an enquiry.

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Planning		Beginning to recognise whether a test is fair. Deciding if suggested observations are suitable, with support. Ordering a simple method.		Beginning to select from options which variables will be changed, measured and controlled. Beginning to suggest what observations to make and how long to make them for. Planning a simple method, verbally and in writing. Beginning to write a simple method in numbered steps. Selecting and beginning to decide what simple equipment might be used to aid observations and measurements.		Suggesting which variables will be changed, measured and controlled. Making and explaining decisions about what observations to make and how long to make them for. Writing a method including detail about how to ensure control variables are kept the same. Writing a method that considers reliability by planning repeated readings. Suggesting the most appropriate equipment to make observations and measurements and justifying their choices	
		- "That's not fair because we changed two things." *- Chooses correct observations when prompted.* *- Puts jumbled method cards into the right order.*		*- "We should change the ramp height and measure the distance."* *- "We need to watch it for 5 minutes."* *- Writes a short, ordered method with some support.* *- Chooses rulers, timers, or other basic equipment.*		*- "We must keep the mass the same to make it a fair test."* *- "We'll take three readings and calculate the average."* *- "A digital thermometer is more accurate than a strip thermometer."* *- Write their own method explaining how the test will be fair and reliable.*	

Observing and measuring

Using senses and measuring equipment to make observations about the enquiry.

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Observing		Using their senses to describe, in simple terms, what they notice or what has changed. Observe closely, using simple equipment.		Using their senses to describe, in more detail and with simple scientific vocabulary, what they notice or what has changed. Make systematic and careful observations using scientific equipment.		Using their senses to describe, in detail and with a broader range of scientific vocabulary, what they notice or what has changed. Use a range of scientific equipment to make systematic and careful observations with increased complexity.	
		- "It's wet." *- "It changed colour."* *- "It feels hot."*		*- "The surface is smooth and shiny."* *- "It has melted and become a liquid."* *- "It smells stronger now."*		*- "The material has become more brittle after cooling."* *- "The colour has darkened gradually."* *- "The texture is granular rather than smooth."*	
Measuring		Using non-standard units to measure and compare. Beginning to use standard units and read simple scales to measure and compare. Beginning to use simple measuring equipment to make approximate measurements.		Using standard units to measure and compare. Using measuring equipment with increasing accuracy. Reading scales with unmarked intervals between numbers.		Using standard units to measure and compare with increasing precision (decimals). Reading a wider variety of scales with unmarked intervals between numbers.	
		- Measures length using cubes or blocks. *- Reads whole numbers on a ruler or jug.* *- Gives rough estimates ("about 10 cm").*		*- Measures to the nearest cm, g, or ml.* *- Interprets halfway points or thirds on a scale.* *- Uses equipment such as rulers, timers, and thermometers more precisely.*		*- Records measurements like 12.4 cm or 37.5°C.* *- Reads scales with increments of 2, 5, 0.2, etc.* *- Chooses the most precise tool for the task.*	

Recording data

Using tables, drawings and other means to note observations and measurements.

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Recording (diagrams)		Drawing and labelling simple diagrams.		Beginning to draw more scientific diagrams by: ● Using some standard symbols. ● Drawing in 2D to produce simple line diagrams. ● Labelling with more scientific vocabulary		Drawing scientific diagrams by: ● Using a wider range of standard symbols. ● Drawing with increasing accuracy. ● Labelling with a broader range of scientific vocabulary. ● Annotating diagrams to explain concepts and convey opinions.	
		- Simple shapes (circles, boxes, stick-style drawings). *- No use of scientific symbols.* *- Diagrams may be rough or not to* *- Everyday words ("leaf", "stem", "light").* *- Labels may be placed inconsistently.*		*- 2D line diagrams with clearer structure.* *- Some standard symbols used (e.g., simple circuit symbols).* *- More deliberate layout and proportions.* *- Uses scientific terms ("filament", "battery").* *- Labels placed more accurately.* *May add short notes when prompted.* *- Notes may describe simple functions.*		*- Accurate 2D scientific diagrams.* *- Wider range of standard symbols used correctly.* *- Clear, precise layout and proportions.* *- Uses a wide range of correct scientific terms.* *- Labels are precise and consistently placed.* *- Adds explanatory notes showing understanding.* *- Annotations may explain processes, functions, or reasoning.*	
Recording (Tables)		Using a prepared table to record results including: ● Numbers. ● Simple observations. ● Tally frequency.		Using a prepared table to record results including more detailed observations. Using tables with more than two columns. Identifying and adding headings to tables. Beginning to design simple results tables.		Using tables with columns that allow for repeat readings. Suggesting headings to tables, including units. Designing results tables with increasing independence with consideration of variables where applicable. Calculating the mean average	

		- Records numbers in the correct row/column when given a table. *- Writes simple observations such as "red", "long", "melted".* *- Uses tally marks correctly to count frequency.* *- Needs a pre-made table to work from*	*- Records more descriptive observations (e.g., "partially melted", "faster than before").* *- Completes tables with more than two columns.* *- Begins to add missing headings when prompted.* *- Starts to design simple tables with support.*	*- Uses tables with columns for repeat measurements (e.g., Trial 1, Trial 2, Trial 3).* *- Suggests appropriate headings, including units (e.g., "Temperature (°C)").* *- Designs tables independently, considering variables (changed, measured, controlled).* *- Calculates mean averages from repeated readings.*
Grouping and Classifying		Grouping based on visible characteristics. Organising questions to create a simple classification key	Grouping based on visible characteristics and measurable properties. Populating a pre-prepared branching and number key. Choosing appropriate questions for classification keys	Grouping in a broader range of contexts. Organising the layout of number and branching keys. Formulating appropriate questions for classification keys.
		- Sorts items by obvious features (colour, shape, number of legs). *- Groups objects using simple categories such as "big/small", "smooth/rough".* *- Suggests simple yes/no questions based on visible features.* *- Uses everyday language to distinguish between items.* *-using questions like 'is it red?' Does it have wings?*	*- Groups using measurable features (length, mass, temperature).* *- Uses more than one property to justify grouping.* *- Fills in missing items on a branching key.* *- Uses given questions to place items correctly.* *- Understands the structure of a simple key.* *'Uses questions like 'does it conduct electricity?;'*	*- Groups using more abstract or scientific criteria (habitat, function, material properties).* *- Applies grouping skills across unfamiliar contexts.* *- Designs the structure of a classification key independently.* *- Places questions and branches in a logical order.* *Creates precise, discriminating questions that separate items effectively.* *- Uses scientific vocabulary (e.g., "Is it vertebrate?", "Does it have a waterproof coating?").*
Graphing		Representing data using pictograms and block graphs.	Representing data using bar charts. Drawing bars with greater accuracy.	Representing data by using line graphs and scatter graphs. Plotting points with greater accuracy. Reading the value of plotted points with greater accuracy

		- Uses simple pictograms with one-to-one or simple key. *- Draws block graphs with equal-sized blocks.* *- Chooses pictograms/block graphs when prompted.*	*- Draws bar charts with increasing accuracy.* *- Bars are evenly spaced and correctly aligned to categories.* *- Reads bar heights with improving precision.* *- Bars drawn to correct height using a scale.* *- Uses ruler and straight lines.* *- Bars match the data more precisely.*	*- Plots points accurately on line or scatter graphs.* *- Connects points correctly for line graphs.* *- Chooses appropriate graph type for continuous data.* *- Points plotted precisely at correct coordinates.* *- Uses scale consistently across axes.* *- Graphs are neat, clear, and proportional.*

Interpreting and communicating results

Using information from the data to say what you found out.

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Present Findings **Analysing and Drawing Conclusions**		Explain what they found out to an adult and a partner Talk about what they have found out and how they found it out Using their results to answer simple questions. Beginning to recognise when results or observations do not match their predictions.		Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. Use straight-forward scientific evidence to answer questions or to support their findings. • Use results to draw simple conclusions. • Beginning to suggest how one variable may have affected another Recognising when results or observations do not match their predictions.		Report and present findings from enquiries, in oral and written forms such as displays and other presentations. Write conclusions including causal relationships and explanations Comment on the degree of trust in results, Make conclusions based on scientific evidence and from their own testing and findings. Identify scientific evidence that has been used to support or refute ideas or arguments.	
		- Verbally shares what happened in the enquiry. *- Uses simple language ("It went faster", "It melted").* *- Can say how they did the test when prompted.* *- Answers questions like "Which went the furthest?" or "What changed?".* *- Refers to results in a basic way ("This one is biggest").*		*- Writes or speaks in full sentences about what happened.* *- Uses simple scientific vocabulary ("temperature", "distance", "evaporated").* *- Presents results using tables, charts, or short explanations.* *- Summarises what the results show.* *- Begins to explain why something happened.* *- Uses results as evidence ("The longest distance was 30 cm").*		*- Uses more precise terms ("rate", "increase", "variable", "relationship").* *- Writes structured conclusions with clear reasoning.* *- Communicates findings confidently and independently* *- Uses specific data to justify statements ("As the temperature increased from 20°C to 40°C, the rate doubled").* *- Explains relationships clearly.*	

		- Notices when something unexpected happens. *- Says "It didn't do what I thought".* *- Spots when something "looks wrong" or "didn't work".* *- Only refers to their own result.*	*- Makes simple links ("It went faster because the ramp was higher").* *- Begins to use patterns to predict new values.* *- Points out results that don't fit the pattern.* *- Begins to explain why they might be unusual.* *- Notices when results match or differ from predictions.*	*- Explains cause-and-effect relationships clearly.* *- Uses scientific reasoning to justify ideas.* *- Recognises outliers in repeated trials.* *- Excludes unreliable data and explains why.* *. - Notices when results match or differ from predictions.*

Evaluating

Reflecting on the success of the enquiry approach and identifying further questions for enquiry.

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Evaluating				Suggest questions for further investigation. Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions		Continue to use results to draw simple conclusions, suggest improvements and raise further questions for possible testing. Using test results to make predictions to set up further comparative and fair tests Provide some simple examples of how to extend the investigation.	
				- Points out steps that were unclear or difficult to follow. *- Suggests simple improvements ("We should measure for longer", "We should use the same amount each time").* *- Notices when equipment or timing caused issues.* *- Recognises when a variable changed accidentally.* *- Suggests simple ways to improve control ("Hold the ramp still", "Use the same amount of water").* *- Spots results that don't fit the pattern.* *- Comments on measurement accuracy ("We might have read the scale wrong").* *- Recognises when control variables were not maintained.* *- Suggests simple follow-up questions ("What if we used a bigger ramp?").* *- Shows curiosity about extending the investigation.*		*- Clearly identifies weaknesses in the method.* *- Suggests specific, justified improvements ("Use a digital timer for greater accuracy", "Control the temperature more carefully").* *- Explains why changes would improve the investigation.* *- Explains which variables were hard to control and why.* *- Suggests more precise or systematic control methods.* *- Identifies human error ("We started the timer late").* *- Recognises the value of repeated readings for reliability.* *- Comments on the trustworthiness of secondary sources (books, websites).* *- Generates purposeful, testable questions based on the data.* *- Identifies what additional data would help test relationships.* *- Suggests how to gather that data systematically.*	