Caythorpe Primary School

Working Scientifically Progression

Source: Primary Science Teaching Trust

skills \ stage	EYFS	KS1	Lower KS2	Upper KS2
PLAN	➢ choose the resources they need for their chosen activities and say when they do or don't need help	➢ ask simple questions and recognising that they can be answered in different ways	➢ ask relevant questions and using different types of scientific enquiries to answer them ➢ set up simple practical enquiries, comparative and fair tests	➢ plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
DO	➢ know about similarities and differences in relation to places, objects, materials and living things ➢ make observations of animals and plants ➢ explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function. ➢ select and use technology for particular purposes	➢ observe closely, using simple equipment ➢ perform simple tests ➢ identify and classify	➢ make systematic and careful observations and, where appropriate, take accurate measurements using standard units, use a range of equipment, including thermometers and data loggers	➢ take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
RECORD	➢ represent their own ideas, thoughts and feelings through design and technology, art, music, dance, role play and stories	➢ gather and record data to help in answering questions.	➢ 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, keys, bar charts, and tables	➢ record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
REVIEW	➢ talk about the features of their own immediate environment and how environments might vary from one another ➢ explain why some things occur and talk about changes	➢ use their observations and ideas to suggest answers to questions	➢ report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions ➢ use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions ➢ identify differences, similarities or changes related to simple scientific ideas and processes ➢ use straightforward scientific evidence to answer questions or to support their findings	➢ use test results to make predictions to set up further comparative and fair tests ➢ report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations ➢ identify scientific evidence that has been used to support or refute ideas or arguments

EYFS - - - - → KS1 → Secure			LKS2 → Secure		UKS2 → Secure - - - - →		
Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 6+

Observed Variables — Categoric Data (words) - Charts → **Design** → **Measured Variables** — Continuous Data (numbers) - Graphs

Prediction

I suggest what might be the 'best' or 'worst'	I suggest what might happen with help	I **suggest** what might happen in my investigation	I predict cause & effect (causal prediction)	I predict a trend (**relationship prediction**)	I use K&U to explain my prediction (relationship)	I reason K&U to make a **hypothesis** (relationship)	I reason K&U to generate a testable hypothesis

Equipment

I use a range of everyday items to investigate	I use a limited range of science equipment correctly (help)	I **use** a range of science equipment correctly	I select suitable equipment for the task	I **select & use** suitable equipment for the task	I select equipment with the right scale for the task (help)	I **select & use** equipment with **right scale** for the task	I select & use equipment for increased precision
I work safely when given instructions (some supervision)	I notice risk (help) & can list some common dangers	I **notice risk** in my investigation & know common dangers	I predict obvious risk & act on safety suggestions	I predict obvious risk & **work safely** (mostly)	I begin to plan to minimise risk & work safely (consistently)	I plan to **minimise risk** & describe safe use of equipment	I predict & control a range of risks independently

Design

I suggest an idea to investigate with help	I suggest an idea to investigate & ask questions	I **suggest** an idea to investigate from observations	I identify cause & effect in my investigation	I **plan** a **fair test** by selecting variables to change & measure	I plan a fair test & ensure controlled variables kept same	I **plan** a **reliable** fair test (use of variable terminology)	I plan a reliable fair test with increased precision
I'm aware that factors change in an investigation	I begin to identify variables in an investigation	I **identify variables** in investigations (label & describe)	I suggest a suitable data range for a variable	I suggest a data **range & interval** for a variable	I suggest a data range, interval & sufficient readings	I plan to collect repeat readings (>3) & calculate mean	I plan to reduce error by care of measurement
I follow short demo & spoken instructions (help)	I follow short demo, spoken & picture instructions	I **follow** short spoken & written instructions in order	I follow written instructions & write a simple method	I **design & write** a simple **ordered** method (from plan)	I design & write an ordered method (controls variables)	I **design & write** an **ordered reliable** method (repeats)	I design & write a reliable method (repeats; precision)

Exploring:
Ideas are tried out to see what happens. Can lead to further investigation

Observing & measuring over time:
Over short (seconds / minutes) or long (days / months) periods of time

Fair testing:
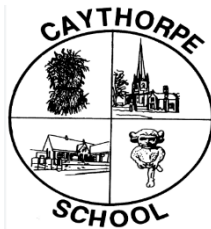One variable changed; others are kept the same. Cause & effect

Identification & classification:
Sorting into groups

Surveys:
Counts or measurements by category

Comparative testing:
Fair test comparing categories / conditions

CAYTHORPE SCHOOL

	EYFS →	KS1 → Secure		LKS2 → Secure		UKS2 → Secure →		
	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 6+

Data

Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 6+
I can position numbers on a number track up to 20	I can position numbers on a number track up to 100	I measure **labelled** divisions on a number line (inc. in steps)	I measure unlabelled divisions on a number line (+ve values)	I measure **unmarked** divisions on a number line (+ve values)	I measure divisions on a number line past zero (-ve values)	I **scale up/down** a number line (axis) & decide on limits	I scale up/down a number line (axis) confidently
I use non-standard units to measure & compare	I measure in non-standard & compare e.g. heavier/lighter	I measure **standard units** (inc. length, mass, capacity)	I measure/compare values in standard units	I **measure/convert** values in standard units (inc. time)	I measure/convert values in standard units (inc. area)	I **measure/calculate** with standard units (inc. area & volume)	I calculate compound units (e.g. acceleration)

Tables

Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 6+
I use a simple table by recording in pictures & words	I use a simple table by recording in words and numbers	I **use** a simple table recording in words & numbers (inc. tally)	I use a frame to construct a simple table of results	I **construct** a **simple table** to compare cause & effect	I use a frame to construct a complex table of results	I **construct** a **complex table** to show repeated data	I construct complex tables to include calculations

Graphs

| Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 6+
I use prepared pictograms to record my observations	I use a frame to add to pictograms & block charts	I **construct** simple pictograms & **block charts**	I use a frame to construct a bar chart (help)	I **construct bar charts** correctly (inc. numerical axis)	I use a frame to construct a graph & can scale axes (help)	I **construct graphs** & can scale at least one axis independently	I construct graphs & can scale each axis confidently
I add to pictograms by counting up	I add to block charts by counting up	I **use the scale** on a block chart to add the correct blocks	I draw bars on a bar chart (one axis coordinate)	I **plot coordinates** on a graph in the first quadrant	I join plotted coordinates with straight lines	I plot mean values & draw a **trend line** for linear data	I plot mean values & draw a trend line for non-linear data

	EYFS ------>	KS1 ------>	Secure	LKS2 ------>	Secure	UKS2 ------>	Secure ------>	
	Reception	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 6+**
Patterns	I recognise, create & describe simple patterns (e.g. size)	I recognise, create & describe simple number patterns	I **describe** simple features & **patterns** in data & charts	I describe simple patterns in data, charts & graphs	I **describe** simple patterns, **trends** & relationships in data	I describe patterns, trends & relationships in data	I **describe changing patterns**, trends & relationships	I compare changing patterns, trends & relationships
	I begin to use 'more or less', etc to compare observation	I use 'more or less' to compare numbers	I see obvious **differences in sets of numbers**	I see subtle differences in sets of numbers	I see **differences (error) in repeated data**	I spot anomalous data that doesn't fit the pattern	I **spot anomalous data** & explain from the method	I deal with anomalous data to increase reliability
Conclusions	I talk about changes that I observe during activities	I describe the changes that are happening	I **describe the changes** that have happened	I describe my results by linking cause & effect	I **describe trends** & begin to use science to **explain**	I use data in my conclusions & use science to explain	I **use 1°/2° data** & science ideas in my **conclusions**	I use a range of data in conclusions & models to explain
	I explore 'what if ...' questions through play	I explore different ways to do things through play	I suggest a **different way** to do things with help	I suggest improvements to my method	I suggest **sensible improvements** to my method	I identify strengths & weaknesses & improvements	I suggest **limitations (data) & practical improvements**	I suggest limitations (use data) & justify improvements

KS1	LKS2	UKS2
Axis = reference line drawn on a graph to show the range of data for each variable (shows values) Block chart = visual toll to show data/counts as bars built up by adding component blocks. Used to compare data visually. Cause = the variable we chose to change in an investigation Data = a measured or counted outcome for a variable (numbers) Effect = the variable that changes when we change the cause Experiment = investigation that looks for a link between variables (fair or comparative test) Observation = sensed outcome for a variable (described in words) Pictogram = chart that uses pictures to represent data Prediction = suggests what might happen based upon prior knowledge or experience (not a guess) Results table = way of presenting data from an investigation Risk = dangers when doing an investigation, using equipment or working in an area Standard units = a quantity of a variable that is used as a standard measure (e.g. litre, meter, gram, etc) Variable = a factor that can change	Bar chart/graph = visual tool that uses bars to compare discrete data Comparative test = fair test, where only one variable is changed to observe the effect on another. Conclusion = the answer you give to a question (based upon data) Continuous data = values are numbers (result from counting/measuring) Coordinate = used to plot data (x/y) on a graph Data interval =numerical gap between data points for a variable Data point = a coordinate for a variable Data range = maximum & minimum values for a variable Discrete data = values are distinct/separate (e.g. male/female; counts) Fair test = an investigation where only one variable is changed (cause); all others are kept the same and at their best value Line graph = visual tool that shows a relationship trend between two continuous variables (it is essentially a scatter graph) Method = ordered sequence of steps taken during an investigation. It can be written or in diagram form Prediction (correlation/relationship) = describes the expected trend for two variables (cause & effect) that are linked Prediction (scientific/causal) = suggestion as to what might happen based upon prior knowledge, experience or observation. Links the cause with the predicted effect. Does not have to describe the trend Trend = the outcome when two variables (cause & effect) are linked	Anomalous data = data that does not fit a pattern Controlled variable = variables kept at the same value so they do not influence the dependent variable in a fair test Data set = vales for repeated data Data spread = variation of the data away from a mean (often due to imprecise measuring or when the controlled variable have not been kept the same) Dependent variable = changed (effect) as a result of changing another. This is observed or measured and demonstrates a relationship in a fair test Hypothesis = a reasoned prediction based upon theory, experience or direct observation Independent variable = chosen variable (cause) changed in a fair test. Mean = 'average' value from a data set Precision = how similar your repeated data is (good technique & equipment choice) Primary data = your experimental data or observations from an investigation Reliability = if your data can be repeated (i.e. no error). Can be improved through collecting repeated values and calculating a mean Results table (complex) = Table that contains multiple columns to show repeated data, calculations or a variety of features of a variable Risk assessment = formal assessment of risk leading to improved safety recommendations or change in practice Secondary data = researched data or observations. It can also be data gathered from others doing a similar experiment. Used to compare/support Trend line = line drawn roughly between coordinates to show the trend (does not have to go through all data points) Valid data = reliable, accurate & no bias or error (we are measuring what is expected)
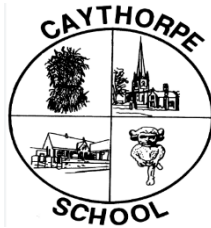
Comparative / fair testing
Changing one variable to see its effect on another, whilst keeping all others the same.

Research
Using secondary sources of information to answer scientific questions.

Observation over time
Observing changes that occur over a period of time ranging from minutes to months.

Pattern-seeking
Identifying patterns and looking for relationships in enquiries where variables are difficult to control.

Identifying, grouping and classifying
Making observations to name, sort and organise items.

Problem-solving
Applying prior scientific knowledge to find answers to problems.

ASK QS + PLAN ENQUIRY

SET UP ENQUIRY

EVALUATE

???

OBSERVE + MEASURE

INTERPRET + REPORT

REVIEW

PLAN

DO

RECORD

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