

## **Derwent Vale Primary School**

# **Science Skills Progression**

\*Note – These materials were created by Phil Watkins of Stem Learning Solutions LTD. Although we work in partnership with Phil, we are not the creator of this document.

SLS Science Planning & Assessment Board	Knowledge & Understanding			Working Scientifically					
	Explaining Science		lassification	Designing Experiments		Data, Tables & A Graphs Cor		aking Iusions	
	EYFS→ KS1 →		→ Secure	LKS2 ──→ Secure		UKS2 → Secure		>	
	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 6+	
Explaining Science	I remember simple science facts within an activity	I remember simple science facts within a topic	I remember a range of <b>science facts</b> within a topic	I am using pre- learning to build connected knowledge	I <b>connect</b> knowledge within a topic & from <b>pre-learning</b>	I connect knowledge between topics & from pre-learning	I <b>connect</b> knowledge across science & the wider curriculum	I connect knowledge fluently across science & curriculum	
	I use science words during an activity	I use & remember relevant science words during activity	I use & <b>remember</b> science words over time (short term)	I remember science words I have used before (longer term)	I <b>remember &amp; use</b> science words correctly (apply)	I begin to use complex science words correctly	I use <b>complex</b> science words correctly ( <b>fluency</b> )	I use complex science words accurately & fluently	
	I describe what is happening using words & actions	I describe what is happening using science	I use <b>science</b> to describe & <b>recall</b> what I have seen	I begin to use science models to describe (sequence)	I use <b>science models</b> to <b>describe</b> (what, where)	I use science models to describe & begin to explain (why, how)	I use <b>science models</b> to describe & <b>explain</b> (why, how, logical)	I begin to apply science models to explain new events	
	I match appropriate pictures & words to label diagrams	I add science word labels to diagrams	I <b>add science labels</b> & information (help) to diagrams	I add science labels & information to diagrams	I <b>annotate</b> diagrams to help describe & explain	I begin to create & annotate my own 2D/3D diagrams	I create & annotate my <b>own</b> 2D/3D diagrams	I create & annotate my own complex 2D/3D diagrams	
	I begin to use science facts to explain my answer	I select science facts to use in an answer	I <b>select</b> relevant science facts to use in an answer	I link relevant facts together in an answer	I ' <b>cluster</b> ' related facts together into points (recalled)	I select & prioritise facts to create an argument/answer	I present a <b>clear &amp;</b> logical argument / answer	I present an extended & logical argument / answer	
Classification	I sort using pictures or instructions	I sort using simple yes/no statements	I use simple spider keys with obvious differences	I use large spider keys with obvious differences	I use a range of spider keys with fine differences	I construct spider & use number keys	I <b>construct</b> both spider & number keys	I construct both spider & number keys (complex)	
	I group by familiar features (size, colour, shape, etc)	I group by difference or similarity	I <b>group</b> by difference, similarity or change	I create groups for sorting (create criteria)	I <b>create</b> appropriate groups for sorting (create criteria)	I group & sub-group by easily observation (create criteria)	I group & <b>sub-group</b> by fine observation (create criteria)	I group & re-group using combinations of criteria	
	I use my senses to identify properties of materials	I link properties of materials to an application (help)	I <b>link properties</b> of materials to an application	I combine properties required for an application (help)	I describe combined properties required for an application	I explain how properties suit an application	I <b>explain the</b> science behind a range of properties	I describe how material properties can change	
ST Learning	Copyright©2	2023 P Watkins	Explain	Explaining Science			Classification		





Designing Experiments





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Data, Tables & Graphs

	EYFS KS1 Secure			LKS2> Secure		UKS2		
	EYFS	Year 1	Year 2		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 <b>describe</b> simple features & <b>patterns</b> in data & charts	I describe simple patterns in data, charts & graphs	I <b>describe</b> simple patterns, <b>trends</b> & 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' to compare observations	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 <b>repeated</b> data	I spot anomalous data that doesn't fit the pattern	I <b>spot anomalous</b> <b>data</b> & explain from the method	I deal with anomalous data to increase reliability
Conclusions	I talk about changes through my senses 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 <b>describe trends</b> & begin to use science models to <b>explain</b>	I use data in my conclusion & science models to explain	I use <b>primary &amp;</b> secondary data in my conclusions	I use a range of data in conclusions to support validity
	I explore 'what if' questions through talk & play	I explore different ways to do things through play	I suggest a <b>different way</b> to do things with help	I suggest improvements to my method	I suggest <b>sensible</b> <b>improvements</b> to my method	I identify strengths & weaknesses & improvements	I suggest limitations (data) & practical improvements	I suggest limitations (use data) & justify improvements

#### Working Scientifically – word lists <u>KS1</u>

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



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#### LKS2 (plus KS1)

Bar chart/graph = visual tool that uses bars to compare discrete data Comparative test = fair test comparing discrete differences 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 Spider key = branching classification key where each branch has a yes/no choice (dichotomous key) leading to further choices Trend = the outcome when two variables (cause & effect) are linked UKS2 (blus KS1/LKS2)

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

### Making Conclusions

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

Number key = classification key that is a written, condensed version of a spider key 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

 $\mbox{Trend line}$  = 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)