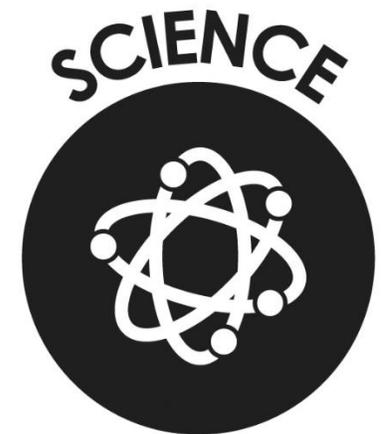




# Science Disciplinary Knowledge Progression Document



# Disciplinary Knowledge (working scientifically)

Key Concepts		Enquiry Types	
<b>Variables</b>	Something in an enquiry that can be changed or controlled.	Comparative and Fair Testing	
<b>Validity</b>	How accurate or correct the results of an enquiry are.	Pattern Seeking	
<b>Design</b>	How a scientific question was investigated	Grouping and Classifying	
<b>Reporting</b>	How the findings of an enquiry are communicated to others	Observations Over Time	
		Research using Secondary Sources	

# Disciplinary Knowledge

## Years 1 & 2

Know that we can ask questions about the world and that when we observe the world to answer these questions, this is science.

Variables	Validity	Design	Reporting
		<p>Appreciate that objects can be identified or sorted into groups based on their observable properties.</p> <p>Understand that we can use magnifying glasses to observe objects closely.</p> <p>Appreciate that we can test our questions to see if they are true.</p>	<p>Appreciate that we can write down numbers and words or draw pictures to record what we find.</p>

# Disciplinary Knowledge

## Years 3 &4

**Know that we can ask questions and answer them by setting up scientific enquiries**

**Know how to make relevant predictions that will be tested in a scientific enquiry**

Variables	Validity	Design	Reporting
Appreciate that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same.	<p>Appreciate that scientific enquiries can suggest relationships, but that they do <u>not</u> prove whether a prediction is true.</p> <p>Appreciate that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary even.</p> <p>Appreciate that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry.</p>	<p>Understand how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches.</p> <p>Appreciate that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts.</p> <p>Appreciate that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry.</p>	<p>Understand when to draw bar charts, a neat table or a classification key.</p> <p>Label a diagram using lines to connect information to the diagram and how to use a coloured key.</p> <p>Show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table.</p> <p>With structured guidance – know how to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion.</p> <p>Draw conclusions from the findings of other scientists.</p> <p>Shorten a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry.</p>

# Disciplinary Knowledge

## Years 5 & 6

- Know that we can ask questions and answer them by setting up scientific enquiries
- Know how to make relevant predictions that will be tested in a scientific enquiry

Variables	Validity	Design	Reporting
Choose appropriate variables to test a hypothesis (e.g., plant height as a dependent variable when measuring effect of light on plant growth).	<p>Identify conditions that were imperfectly controlled and can explain how these might affect results.</p> <p>Accurately use further measuring devices, including digital and analogue scales, measuring cylinders and beakers, recognizing the relative accuracy of each device.</p> <p>Evaluate the validity of the data collected and suggest improvements for future enquiries.</p>	Appreciate how and when to repeat measurements, how to find an average of a set of measurements and how to recognize and remove outliers from a set of data, justifying the removal as a potential mis-measurement.	<p>Independently write up a simple scientific enquiry, including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion.</p> <p>Present brief oral findings from an enquiry, speaking clearly and with confidence and using notes where necessary.</p> <p>Appreciate instances where scientific evidence has been used to support or refute ideas or arguments (e.g., fossil records as evidence of natural selection).</p>

# Opportunities for using Disciplinary Knowledge

## Year 1

	<b>Comparative and Fair Testing</b>	<b>Observations over time</b>	<b>Research using Secondary Sources</b>	<b>Grouping and Classifying</b>	<b>Pattern Seeking</b>
<b>Seasonal Changes</b>		Observe changes in temperature throughout the year			Identify length of daylight throughout the year
<b>Animals, including humans</b>			Research animals that live in a particular habitat	Group or classify animals according to what they eat	Note height changes as we get older
<b>Plants</b>		Observe changes to plants or trees as they grow or in different seasons		Identify local trees and plants	
<b>Everyday Materials</b>	Compare the suitability of everyday materials for a specific job, e.g., building a bridge			Identify different materials based on their properties	

# Opportunities for using Disciplinary Knowledge

## Year 2

	<b>Comparative and Fair Testing</b>	<b>Observations over time</b>	<b>Research using Secondary Sources</b>	<b>Grouping and Classifying</b>	<b>Pattern Seeking</b>
<b>Uses of everyday materials</b>	Compare materials to see which is the most waterproof			Group different materials based on their properties	
<b>Animals, including humans</b>			Research different food groups and design a balanced menu	Identify the offspring of different animals	
<b>Living things and their habitats</b>			Research animals and how they adapt to their environment	Group animals based on their natural habitats	
<b>Plants</b>	Investigate which conditions plants need to grow	Change in plant growth over time		Identify parts of a plant	
<b>Forces (Introduction)</b>	Investigate the effect of force on the speed an object moves			Group materials based on how they react to a force (e.g., stretchy)	

# Opportunities for using Disciplinary Knowledge

## Year 3

	<b>Comparative and Fair Testing</b>	<b>Observations over time</b>	<b>Research using Secondary Sources</b>	<b>Grouping and Classifying</b>	<b>Pattern Seeking</b>
<b>Rocks and soil</b>			Research how fossils and different types of rocks are formed	Identify different rocks and the group they belong to	
<b>Animals, including humans</b>		Observe the effect of excess sugar over time (based on egg shells)	Research animals to identify their animal group and habitat	Group/ classify and animal based on its group and species	
<b>Plants</b>		Observe how water travels up the stem	Research different types of seed dispersal		
<b>Light</b>	Compare materials based on reflectiveness	Shadow length throughout the day		Group materials based on their opacity and transparency	Object size compared to shadow
<b>Forces and magnets</b>	Compare materials based on the amount of friction they generate			Group magnetic and non-magnetic materials	

# Opportunities for using Disciplinary Knowledge

## Year 4

	<b>Comparative and Fair Testing</b>	<b>Observations over time</b>	<b>Research using Secondary Sources</b>	<b>Grouping and Classifying</b>	<b>Pattern Seeking</b>
<b>Electricity</b>	Determine which materials are electrical conductors or insulators			Classify/ group materials into electrical conductors or insulators	
<b>Animals, including humans</b>			Research the different body parts involved in digestion	Classify plants/ animals into either producer, consumer or predator	
<b>Living things and their habitats</b>			Research the effect of climate change on animals around the world	Classify animals based on their observable characteristics	
<b>States of Matter</b>		Measure temperature changes in water over time	Research the water cycle and how it works	Identify solids, liquids or gases	
<b>Sound</b>	The affect of distance from the source on volume				Compare how length and width of tubes affect pitch

# Opportunities for using Disciplinary Knowledge

## Year 5

	<b>Comparative and Fair Testing</b>	<b>Observations over time</b>	<b>Research using Secondary Sources</b>	<b>Grouping and Classifying</b>	<b>Pattern Seeking</b>
<b>Earth and Space</b>			Research the plants in our solar system, including length of orbit		Compare the distance a planet is from the Sun and its temperature
<b>Animals, including humans</b>			Research changes in humans at different stages in our lives		Compare height with physical task e.g., distance a ball is thrown
<b>Forces</b>	Shape of an object and the time it takes to travel through water				Surface material on a ramp and the distance/ speed it travels
<b>Properties and changes of materials</b>	Factors that affect the speed a solute dissolves in water, e.g., temperature	Observe over time the separation of a solute and solvent via evaporation		Classify/ group materials as either soluble or insoluble	
<b>Living things and their habitats</b>			Research the life cycle of different animal groups	Classify/ group and animal based on its group and species	

# Opportunities for using Disciplinary Knowledge

## Year 6

	<b>Comparative and Fair Testing</b>	<b>Observations over time</b>	<b>Research using Secondary Sources</b>	<b>Grouping and Classifying</b>	<b>Pattern Seeking</b>
<b>Electricity</b>	Effect of increasing voltage on the brightness of a bulb				Compare brightness of bulb in series and parallel circuits
<b>Animals, including humans</b>	Impact of exercise on the heart rate		Research how drugs affect the body		Compare resting heart rate of different people
<b>Living things and their habitats</b>		Conditions needed for bread to go mouldy	Research the different types of micro-organisms	Classify different types of arthropod	
<b>Evolution and Inheritance</b>			Research Charles Darwin and his work		Compare skulls/ body parts of animals as they have evolved
<b>Light</b>				Group materials based on transparency	Compare distance from light source and shadow