The Science Curriculum at Crowthorne – Upper Key Stage 2 Working Scientifically:

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

NC Objective Programme of Study	Progression of Enquiry skills Upper Key Stage 2	Year 5	Year 6
planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary	Use their science experiences to explore ideas and raise different kinds of questions Select and plan the most appropriate type of scientific enquiry to use to answer scientific questions Recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why	**Properties and Change of Materials**: Children come up with a test to compare the time taken for different sugars to dissolve in water at room temperature. Children set up a comparative test to explore an aspect of the question: Which dissolves at a faster rate: salt or sugar? Children use knowledge gained through Marvellous Mixtures Unit to devise an experiment to separate a solution of salt, glitter and water using the equipment provided: warm eater, table salt, glitter, stirring rod, filter paper and funnel + any other equipment they may need. Explain that the children will need to write a prediction, a numbered method which should include scientific explanations to show the knowledge that they acquired in the unit. (Au 1) **Forces:** Scientific enquiry into how the material a raft is made from effects the effort needed to pull it along (measure friction produced by different surfaces). Children set up comparative experiments to test Aristotle and Galileo's theories into why an object falls controlling variables such as: height from which an object is dropped, surface area of object, weight of an object. Children test plan and test variables which effect affect the time it takes for the parachute to fall to the ground controlling variables including: weight of object attached to parachute, height from which dropped, material parachute made from , surface area of parachute, length of strings on parachute. As a class experiment set up as to how the shape of a bow effects its movement through water. They control variables including: amount and type of liquid used; weight of moulding clay (AU 2). **Earth and Space:** Children investigate the formation of 'craters' by dropping meteors (e.g. marbles or balls) into a tray of sand and observing the craters produced (SPR 1) **Properties and changes of Materials:** Children to carry out a simple comparative test to establish a rough order of softness across the materials in the selection Children plan and carry out a fair test to investigate different materials (SPR 2)	**Classification: The Nature Library** Sort materials / plants to demonstrate understanding of scientific classification systems. Children set up a comparative test to investigate the effects of temperature on growth of micro-organisms on bread. **Evolution and Inheritance:** Explore how different environments can affect plant growth. **Light: sight, properties of light, shadows:** Plan an investigation: How can you change the length of a shadow? Set up a fair comparative test to explore which variables affect the size of a shadow. Explore how light can change direction without a mirror (set of mini experiments using oil and water to show refraction of light). **Electricity: Introducing resistors and changing voltage:** Use a range of equipment to investigate different ways to light up a bulb. Investigate how switches are used to complete/break circuits. Investigate whether the position or number of switches in a circuit make a difference to how a circuit works. Investigate how increasing the number of cells in a circuit affects how different components (buzzer/motor) work. Plan an investigation into how the brightness of a bulb in a circuit can be changed. Children need to identify how to make the test fair and how to record results. (TAPS investigation) **Humans: Body Health – diet and fitness:** Classify foods to demonstrate understanding of healthy balanced diet. Investigate the contents of a snack product using packaging information to evaluate whether it is healthy /unhealthy. Investigate the variables which affect heart rate. Find out what a pulse rate is and how to record it and explore what happens to our pulse rate when we exercise. Plan an investigation to answer the question 'What do you think happens to your heart when you do a headstand'? (TAPS investigation)
taking measurements, using a range of scientific equipment, with increasing accuracy and	Make their own decisions about what observations to make, what measurements to use and how long to make them for	**Properties and Change of Materials**: Measure quantity of water used to dissolve different solids. Measure out equal amounts of a solid to dissolve in liquid.	**Classification: The Nature Library** The effect on temperature on growth of micro-organisms - cut slices of bread to specific size, measure water added to bread.

precision, taking repeat readings when appropriate	Choose the most appropriate equipment to make measurements with increasing precision and explain how to use it accurately. Take repeat measurements where appropriate.	(Au 1) **Forces:** Children use newton meters to measure the force required to pull weighted rafts (made of different materials) along a surface. Children use stop watches to time the effect of air resistance and water resistance on objects. They take repeat readings and find the average (AU 2) **Earth and Space:** Children use shadow sticks to track how the apparent movement across the sky effects the length of shadows Homework: Over the course of a month, children track the phases of the moon by completing an observational drawing the moon each night For meteors investigation calculate/plot mean or median if repeat measurements have been taken (SPR 1) **Properties and Change of Materials:** Children select and use equipment to answer their investigation based on the use of materials (SPR 2)	Accurately measures percentage of mould on bread over a period of time. **Light: sight, properties of light, shadows:** Choose appropriate equipment to set up shadow experiment, take repeated accurate measurements of shadow and distances between background and /or light source. **Electricity: Introducing resistors and changing voltage:**Choose appropriate equipment to set up circuit (TAPS) experiment, make observations and decide how the brightness of the bulb is measured. Be able to explain choices of components in above circuit and explain how it works. **Humans: Body Health – diet and fitness:** Record what happens to our pulse rate when we exercise – accurate timings and repeated activities needed to make test fair. Choose appropriate equipment to set up handstand experiment (TAPS), set out safety rules, make observations and decide how results can be measured.
recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs	Decide how to record data and results of increasing complexity from a choice of familiar approaches: scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs	**Properties and Change of Materials:** Scientific diagram- Create a labelled diagram of solids recovered from a mixture. Tables- Use of tables to record results for identifying which solids dissolved in liquids; use of tables to record variables that affect the rate at which salt or sugar dissolves (tables include a column for observations) Scientific diagram- Children use a diagram to explain the processes of evaporation and condensation and how these might help to produce drinkable water from a plentiful supply of seawater (AU 1) **Forces:** Table- Children record results from investigations into air resistance and water resistance in a table as time taken. They repeat and record their results three times for a given variable before calculating the average time taken. Scientific diagram- Children use force arrows to explain forces acting up a still and a moving object Bar Graphs and Scientific Diagram- Chn create bar graphs to present finding from shadow stick investigations. They also draw a diagram to explain how the position of the sun over the course of a day effects the position and length of a shadow (SPR 1). **Earth and Space:** For meteors investigation each group to make measurements and record them in a table/graph of their own design (SPR 1) Classification keys- Children compare and group a selection of materials according to their own criteria **Properties and Change of Materials:** Classification keys: Children sort plastics and record their grouping describing the properties of the plastic that make it suitable for the purpose to which it has been put. Children select their own way of recording results from their investigation into the use of materials (SPR 2) **Living Things and their Habitats**	**Classification: The Nature Library** Record groupings of materials / plants into clearly labelled classification charts. Use of classification keys to identify vertebrates and invertebrates. Tables - Use of tables to record results for identifying rate of growth of mould on bread over a period of time. Line Graphs - to plot the rate of growth of mould on bread **Evolution and Inheritance:** Photos and observational drawings – record how different environments can affect growth of plants. **Light: sight, properties of light, shadows:** Tables - Design table to record results of shadow experiment. Line Graphs - to plot the length of shadow related to distance from background or light source. **Electricity: Introducing resistors and changing voltage:** Use recognised symbols in labelled diagrams to represent simple circuits and describe how they work. Use labelled diagram and written explanations to show whether the position or number of switches in a circuit make a difference to how a circuit works. Decide how to record results of investigation into how the brightness of a bulb in a circuit can be changed (TAPS investigation). **Humans: Body Health – diet and fitness:** Record what happens to our pulse rate when we exercise in a results table. Decide how to record results of headstand investigation (TAPS).

		Scientific diagrams: Children create diagrams showing the life cycles of different animals Classification keys: Children use a Venn diagram to compare reproduction in mammals and birds (SUM)	
using test results to make predictions to set up further comparative and fair tests	Use their results to make predictions and identify when further observations, comparative and fair tests might be needed	**Properties and Change of Materials:** From results to experiment into investigating which solids dissolve in a liquid. Children set up a further experiment to find out which variables will make a difference to the rate at which a solid dissolves (AU 1) **Forces:** Children use test results about air resistance as a starting point for further investigative work by using test results about air resistance to test variables that will slow down a falling parachute (SPR 1). **Properties and Change of Materials:** Use research into materials and their properties and everyday uses set up a comparative test into the uses of materials (SPR 2)	**Light: sight, properties of light, shadows:** Use evidence from mirror investigations to predict what different shapes and writing will look like in a mirror. **Electricity: Introducing resistors and changing voltage:**From results of TAPS experiment into investigating how the brightness of a bulb in a circuit can be changed, children can investigate how they can get the same results by controlling different variables. **Humans: Body Health – diet and fitness:** From results of TAPS experiment into investigating the effect of doing headstands on our pulse rate, children can investigate whether results would look the same if the pulse rates of different groups of children was measured.
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	Use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas, Use oral and written forms such as displays and other presentations to report conclusions, causal relationships and explanations of degree of trust in results	**Properties and Change of Materials:** Children use scientific vocabulary to record their findings from each experiment listed in Au 1 topic and Au 2 as a written paragraph including: answering the original questions; compare their findings with their prediction; comment on any surprises; comment on reliability of results (did anything go wrong/improvements of the experiment was repeated); whether the investigation raised further questions (AU1/AU2) **Forces:** As above and children also look for anomalies in their data and decide whether to discredit certain readings (AU 2) **Properties and Change of Materials:** Children choose their own way to present findings from investigation into everyday use of materials (SPR 2)	**Classification: The Nature Library** Be able to explain how and why objects are classified and the importance of classification systems to scientists around the world. Use scientific vocabulary to record their findings from the micro-organism experiment as a written paragraph including: answering the original questions; comparing their findings with their prediction; comment on how the experiment could be improved. **Evolution and Inheritance:** Share findings using scientific language to describe how different environments can affect growth of plants. **Light: sight, properties of light, shadows:** Record findings using diagrams and explanations when investigating how a mirror reflects an image of an object. Use scientific vocabulary to record their findings from the shadow experiment as a written paragraph including: answering the original question; comparing their findings with their prediction; comment on how the experiment could be improved. Share findings about how light can change direction without a mirror (set of mini experiments using oil and water to show refraction of light). **Electricity: Introducing resistors and changing voltage::** Use written explanations and report findings to other groups to show whether the position or number of switches in a circuit make a difference to how a circuit works. Use scientific vocabulary to record their findings from the TAPS experiment as a written paragraph including: answering the original questions; comparing their findings with their prediction; comment on how the experiment could be improved. **Humans: Body Health – diet and fitness:** Represent findings of classification of foods demonstrating understanding of a healthy balanced diet in the form of an information poster.

			Record results in a table of investigation of nutritional information of snacks from packaging and report findings orally to class. Record what happens to our pulse rate when we exercise – report findings to class. Report research findings as annotated diagrams and written explanations to show how the heart functions and the role of blood in our circulatory system
identifying scientific evidence that has been used to support or refute ideas or arguments	Look for different causal relationships in their data and identify evidence that refutes or supports their ideas Talk about how scientific ideas have developed over time Identify scientific evidence that has been used to support or refute ideas or arguments Recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact	**Forces:** Children carry out investigations to test Aristotle's with Galileo's theory on why objects fall. In their conclusions, the children argue whether their results support of refute the ideas of these famous thinkers. Children use research to create fact files on mechanisms including: levers gears and pulleys. In DT they design and make a toys using levers and as part of the research look at how science has been I the design of moving toys. They use K'nex to build mechanisms during STEM Science week (AUT 2) **Earth and Space:** Talk about how ideas about the solar system have changed over time e.g. evidence used to dispute the fact the world was flat Look at the first calendar makers: how the movement of the stars was tracked which led to a way of marking time in Years; how farmers split this up into seasons so they knew when to sow, grow, reap and harvest; how the moon was tracked which led to marking the passing of time as months (SPR 1) **Properties and Change of Materials:** Children use secondary sources of information to research metals (SPR 2) **Living Things and their Habitats:** Children use a wide variety of secondary sources to help them select relevant information about the breeding cycle of specific birds Children use secondary sources to investigate the variety of amphibian life around the world (SUM)	**Evolution and Inheritance:** Use a variety of secondary sources to investigate the variation of characteristics in humans, animals and plants and how they can be inherited, affected by the environment or result from a combination of both. Look at how characteristics of living things change due to breeding and/or environment and how humans have used this knowledge over time for selective breeding purposes. Research fossils to investigate living things that no longer exist and how organisms have changed / adapted over time. Investigate through research how living things are adapted to suit different environments and how different behaviours can help them survive. Use images or real fossils and evidence from secondary sources to develop ideas about what an animal may have looked like, what it would eat, how it would behave and where it might live. Use these ideas to draw a labelled picture of the animal and design its habitat (TAPS investigation). **Light: sight, properties of light, shadows:** Research how scientific evidence has been used to support or refute ideas e.g. damage sun can do to eyes, how light travels and how some objects are easier to see than others. **Electricity: Introducing resistors and changing voltage:** Use research to understand how electricity is generated and reaches our homes. Discuss how electricity supply has developed over time and how it might evolve in the future. Discuss scientific arguments for and against any of the methods of generation. **Humans: Body Health – diet and fitness:** Explore scientific evidence linking the impact of diet and exercise on human health. Use research to support or refute questions about health.