Science at Bentham CP School

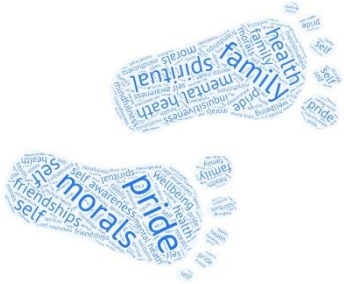
Our Science Curriculum Aims:

At Bentham Primary School we encourage our children to develop an enquiring mind and analytical thinking skills through an interesting and relevant enquiry-based science curriculum. Science continues to change our lives in many different ways and learning about scientific knowledge, methods, processes and uses provides the foundations for understanding the world in which we live, today and for the future. We study a varied curriculum which is carefully planned to build on knowledge year by year and covers the three scientific disciplines of Biology, Physics and Chemistry.

Our Curriculum Drivers:

Our place in our world

Our Voice



Ourselves

Our Ambitions

Characteristics of a Scientist

- The ability to think independently and raise questions about working scientifically and the knowledge and skills that it brings.
- Confidence and competence in the full range of practical skills, taking the initiative in, for example, planning and carrying out scientific investigations.
- Excellent scientific knowledge and understanding which is demonstrated in written and verbal explanations, solving challenging problems and reporting scientific findings.
- High levels of originality, imagination or innovation in the application of skills.

- The ability to undertake practical work in a variety of contexts, including fieldwork.
- A passion for science and its application in past, present and future technologies.

Science and our locality

We have the following opportunities available to us to enhance our Science curriculum:

- Workshops and specialist physics activities provided by The Craven Partnership via the Ogden Trust.
- Trips within our immediate locality or school grounds to enhance our teaching of habitats, plants, animals and living things.
- Trips further afield provided by the Yorkshire Dales National Park Association.
- Visits from or to 'Growing with Grace' to focus on plants.
- Visits to Keasden Head Farm to focus on plants, animals and habitats.

Implementation

Our children should be able to organise their knowledge, skills and understanding around the following key learning concept:

Work scientifically		
Biology:	**Chemistry:**	**Physics:** 
To understand plants To understand animals and humans To investigate living things To understand evolution and inheritance	To investigate materials	To understand movement, forces and magnets To understand the Earth's movement in space To investigate light and seeing To investigate sound and hearing To understand electrical circuits

This key learning concept underpins learning in each milestone. This enables children to reinforce and build upon prior learning, make connections and develop subject specific language.

The vertical accumulation of knowledge and skills from Years 1 to 6 is mapped as follows:

Key Learning Concept	Milestone 1 Years 1 and 2	Milestone 2 Years 3 and 4	Milestone 3 Years 5 and 6
Work scientifically	*Please see Working Scientifically Assessment Sheets attached.*	*Please see Working Scientifically Assessment Sheets attached.*	*Please see Working Scientifically Assessment Sheets attached.*
Knowledge & Understanding	*Please see Knowledge & Understanding Assessment Sheets attached.*	*Please see Knowledge & Understanding Assessment Sheets attached.*	

Aspirations for the Future

Children develop an understanding of how subjects and specific skills are linked to future jobs. Here are some of the jobs you could aspire to do in the future as a Scientist:

- Aquatic vet
- Astronaut
- Animal researcher
- Marine biologist
- Helicopter mission control
- Weather presenter

Impact

Assessment

Through the explicit teaching of the Science skills, both the teachers and the children assess their learning continuously throughout the lesson. Throughout and at the end of a unit of work, children will reflect on their learning alongside their peers and their teacher. Our assessment systems enable teachers to make informed judgements about the depth of their learning and the progress they have made over time.

Subject Leader Portfolios will collate evidence of learning across the year. This will include pupil and parent voice, photographs and examples of children's learning both within and beyond the school day.

Working Scientifically – Skills Progression Key Stage 1

Plan	Do	Review
Identifying, Classifying and grouping		
I ask questions about how and why things are similar or different. I decide what to observe to identify or sort things.	I make comparisons between simple features of objects, materials or living things. I sort objects by observable and behavioural features. I record my observations, using words or pictures, in sorting circles or tables.	I identify similarities and differences and talk about them using simple scientific language. I use my observations to suggest how and why things are similar or different. I try to use my records to help sort or identify other things.
Observing over time		
I ask questions about how and why things change. With help, I identify changes to observe and measure and suggest how to do it.	I use non-standard units and simple equipment to observe or measure change. I record in words or pictures, or in simple prepared formats such as tables and charts.	I identify simple changes and talk about them using simple scientific language. I sequence the changes. I use my observations to suggest how and why things change.
Pattern seeking		
I ask questions about why and how things are linked. With help, I decide what patterns to observe and measure and suggest how to do it.	I use non-standard units and simple equipment to observe or measure events that might be related. I record in words or pictures, or in simple prepared formats such as tables, tally charts and maps.	I identify simple patterns and talk about them using simple scientific language. I make links between two sets of observations. I use my observations to suggest why and how things are linked.
Research using secondary sources		
I ask questions about the way things are and the way they work. With help, I make suggestions about how to find things out.	I use books and simple electronic media to find things out. I ask questions to find out what people do and to find out how things work. I record in words or pictures what I found out.	I begin to use simple scientific language to talk about what I have found out. I talk about whether the information source was useful and whether or not it answered my questions. I give an opinion about some of the things I found out.
Comparative and fair testing		
I ask questions about why and how and what if. With help, I notice links between cause and effect. With help, I plan simple comparative tests.	I use non-standard units and simple equipment to observe or measure data. I record in words or pictures, or in simple prepared formats such as tables and tally charts.	I interpret and talk about my data using simple scientific language. I use my observations to suggest why there are links between cause and effect.

Working Scientifically – Skills Progression Lower Key Stage 2

Plan	Do	Review
Identifying, Classifying and grouping		
I talk about things that can be grouped and decide when questions can be answered by sorting and classifying. I talk about what criteria I will use to sort and classify things. I decide what equipment to use to identify and classify things.	I carry out simple tests to sort and classify according to properties or behaviour. I use Carroll diagrams, Venn diagrams and more complex tables to sort things. I use simple keys and branching databases to identify things. I make simple branching databases (keys) for things that have clear differences.	I draw simple conclusions and answer questions about the things I have sorted and classified. I communicate the similarities and differences I identified using scientific ideas. I suggest improvements to the way I sort and identify things.
Observing over time		
I talk about things changing and decide when questions can be answered by observing over time. I decide what observations to make, how often and what equipment to use.	I select and use a range of equipment accurately to collect data using standard units. I make records using tables, bar charts or labelled diagrams. I begin to use and interpret graphs produced by e.g. dataloggers	I draw simple conclusions and answer questions using the changes I observed, make predictions for new values, and raise further questions. I communicate the changes using scientific ideas. I suggest improvements to the way I observe.
Pattern seeking		
I talk about where patterns might be found and decide when questions can be investigated by pattern seeking. I decide on which sets of data to collect, what observations to make and what equipment to use.	I select and use a range of equipment accurately to collect data using standard units. I make records using tables, bar charts or simple scatter graphs. I begin to use and interpret data collected through e.g. dataloggers.	I draw simple conclusions and answer questions about simple patterns between two sets of data, and raise further questions. I communicate the patterns using scientific ideas. I suggest improvements to the way I looked for patterns.
Research using secondary sources		
I talk about how things are and the way they work and decide when questions can be answered by research using secondary sources.	I use information sources to find the information I need. I record what I found out in my own words. I present information in different ways.	I draw simple conclusions and answer questions from what I found out, and raise further questions. I communicate what the information and data means using scientific ideas. I suggest ways to improve how I find out things.
Comparative and fair testing		
I talk about links between cause and effect and (with help) pose a relevant fair test question. I plan a fair test and decide what data to collect. I decide what equipment to use to make observations.	I select and use a range of equipment accurately to collect data using standard units. I make records using tables and bar charts. I begin to use and interpret data collected though e.g. dataloggers.	I draw simple conclusions and answer questions from my fair tests, make predictions for new values and raise further questions. I communicate and explain simple causal relationships using scientific ideas. I suggest ways that I can improve my fair tests.

Working Scientifically – Skills Progression Upper Key Stage 2

Plan	Do	Review
Identifying, classifying and grouping		
I recognise when identifying and classifying will be the best way to answer my question. I decide what equipment, tests and secondary sources of information to use to identify and classify things.	I use a series of tests to sort and classify materials. I use secondary sources to identify and classify things. I make my own classification keys and branching databases with four or more items. I use more than one piece of scientific evidence to identify and classify things.	I draw valid conclusions when sorting and classifying. I report and explain what I have done using scientific ideas. I evaluate how well my key/branching database worked.
Observing over time		
I recognise when observing changes over time will be the best way to answer my question. I decide how detailed my observations need to be and what equipment to use, to make my observations/measurements as accurate as possible.	I select scientific equipment and use it with increasing accuracy. I take repeat readings when appropriate. I record data and results of increasing complexity. I present data in line graphs. I recognise the effect of changing the time and number of observations.	I draw valid conclusions from data about changes. I interpret changes in the data. I report and explain changes using scientific ideas. I evaluate how well I observed over time. I use my results to predict and set up further observations.
Pattern seeking		
I recognise when variables cannot be controlled and pattern seeking will be the best way to answer my question. I decide how detailed my data needs to be and which equipment to use, to make my measurements/observations as accurate as possible.	I select scientific equipment and use it with increasing accuracy. I take repeat readings when appropriate. I record data and results of increasing complexity. I present data in scatter graphs and frequency charts. I recognise patterns in results. I recognise the effect of sample size on reliability.	I draw valid conclusions from data about patterns and recognise their limitations. I report and explain cause and effect patterns using scientific ideas. I evaluate how well I looked for patterns. I use my results to predict and set up further pattern seeking.
Research using secondary sources		
I recognise when research using secondary sources will be the best way to answer my question. I decide which sources of information might answer my question.	I use relevant information and data from a range of secondary sources. I recognise how data has been obtained. I present my findings in a variety of suitable formats.	I draw valid conclusions from my research. I am beginning to notice when information and data is biased or based on opinion rather than facts. I evaluate how well my research has answered my questions and recognise that some scientific questions may not have been answered definitively.
Comparative and fair testing		
I recognise when variables need to be controlled and a fair test is the best way to answer my question. I plan a fair test, recognising the most suitable variables to measure, change and keep the same and what equipment to	I select scientific equipment and use it with increasing accuracy, I take repeat readings when appropriate. I record data and results of increasing complexity.	I draw valid conclusions based on the data. I report and explain causal relationships using scientific ideas, I evaluate the effectiveness of my fair testing, recognising variables that were difficult to control and where my results

use to make my measurements as accurate as possible.	I present data in line, bar and scatter graphs.	were trustworthy. I use my results to predict and set up further comparative or fair tests. I identify scientific evidence that supports or refute ideas or arguments.

Knowledge & Understanding – Key Stage 1

End of Key Stage 1

	Emerging *Working towards*	Expected *Achieved*	Beyond *Mastered*
Seasonal changes - observe changes across the four seasons			
Seasonal changes - observe and describe weather associated with the seasons and how day length varies			
Plants - identify and name a variety of common wild and garden plants, including deciduous and evergreen trees			
Plants - identify and describe the basic structure of a variety of common flowering plants, including trees			
Plants - observe and describe how seeds and bulbs grow into mature plants			
Plants - find out and describe how plants need water, light and a suitable temperature to grow and stay healthy			
Animals including humans - identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals			
Animals including humans - identify and name a variety of common animals that are carnivores, herbivores and omnivores			
Animals including humans - describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)			
Animals including humans - identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense			
Animals including humans - notice that animals, including humans, have offspring which grow into adults			
Animals including humans - find out about and describe the basic needs of animals, including humans, for survival (water, food and air)			
Animals including humans - describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene			
Everyday materials - distinguish between an object and the material from which it is made			
Everyday materials - identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock			
Everyday materials - describe the simple physical properties of a variety of everyday materials			
Everyday materials - compare and group together a variety of everyday materials on the basis of their simple physical properties			
Everyday materials - identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses			
Everyday materials - find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching			
Living things and their habitats - explore and compare the differences between things that are living, dead, and things that have never been alive			
Living things and their habitats - identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other			
Living things and their habitats - identify and name a variety of plants and animals in their habitats, including micro-habitats			
Living things and their habitats - describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food			

N.B Although the National Curriculum *suggests* the school year in which the statements will be taught, Year 1 statements can be taught in Year 2 and vice versa, so long as everything above has been taught by the end of Key Stage 1.

Knowledge & Understanding – End of Key Stage 2

End of Key Stage 2 (Year A)

	Emerging *Working towards*	**Expected** *Achieved*	**Beyond** *Mastered*
Animals, including humans - identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get their nutrition from what they eat			
Animals, including humans - identify that humans and some other animals have skeletons and muscles for support, protection and movement			
Animals, including humans - describe the simple functions of the basic parts of the digestive system in humans			
Animals, including humans - identify the different types of teeth in humans and their simple functions			
Animals, including humans - construct and interpret a variety of food chains, identifying producers, predators and prey			
Animals, including humans - describe the changes as humans develop to old age			
Animals, including humans - identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood			
Animals, including humans - recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function			
Animals, including humans - describe the ways in which nutrients and water are transported within animals, including humans			
Light - recognise that they need light in order to see things and that dark is the absence of light			
Light - notice that light is reflected from surfaces			
Light - recognise that light from the Sun can be dangerous and that there are ways to protect their eyes			
Light - recognise that shadows are formed when the light from a light source is blocked by a solid object			
Light - find patterns in the way that the size of shadows change			
Light - recognise that light appears to travel in straight lines			
Light - use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye			
Light - explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes			
Light - use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them			
Rocks - compare and group together different kinds of rocks on the basis of their appearance and simple physical properties			
Rocks - describe in simple terms how fossils are formed when things that have lived are trapped within rock			
Rocks - recognise that soils are made from rocks and organic matter			
Evolution and inheritance - recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago			
Evolution and inheritance - recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents			
Evolution and inheritance - identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution			
Plants - identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers			
Plants - explore the requirements of plants for life and growth and how they vary from plant to plant			
Plants - investigate the way in which water is transported within plants			
Plants - explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal			
Forces - compare how things move on different surfaces			
Forces - notice that some forces need contact between two objects, but magnetic forces can act at a distance			
Forces - observe how magnets attract or repel each other and attract some materials and not others			
Forces - compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials			
Forces - describe magnets as having two poles			
Forces - predict whether two magnets will attract or repel each other, depending on which poles are facing			
Forces - explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object			
Forces - identify the effects of air resistance, water resistance and friction, that act between moving surfaces			
Forces - recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect			

N.B Although the National Curriculum *suggests* the school year in which the statements will be taught, Year 3 statements can be taught in Year 6 and vice versa, so long as everything above and on Ks2 Page 2, has been taught by the end of Key Stage 2.

Knowledge & Understanding – End of Key Stage 2

End of Key Stage 2 (Year B)

	Emerging *Working towards*	**Expected** *Achieved*	**Beyond** *Mastered*
Materials - compare and group materials together, according to whether they are solids, liquids or gases			
Materials - observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius			
Materials - identify part played by evaporation and condensation in water cycle and associate the rate of evaporation with temperature			
Materials - compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets			
Materials - know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution			
Materials - use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating			
Materials - give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic			
Materials - demonstrate that dissolving, mixing and changes of state are reversible changes			
Materials - explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda			
Electricity - identify common appliances that run on electricity			
Electricity - construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers			
Electricity - identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a loop with a battery			
Electricity - recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit			
Electricity - recognise some common conductors and insulators, and associate metals with being good conductors			
Electricity - associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuits			
Electricity - compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches			
Electricity - use recognised symbols when representing a simple circuit in a diagram			
Earth and space - describe the movement of the Earth, and other planets, relative to the Sun in the solar system			
Earth and space - describe the movement of the Moon relative to the Earth			
Earth and space - describe the Sun, Earth and Moon as approximately spherical bodies			
Earth and space - use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky			
Sound - identify how sounds are made, associating some of them with something vibrating			
Sound - recognise that vibrations from sounds travel through a medium to the ear			
Sound - find patterns between the pitch of a sound and features of the object that produced it			
Sound - find patterns between the volume of a sound and the strength of the vibrations that produced it			
Sound - recognise that sounds get fainter as the distance from the sound source increases			
Living things and their habitats - recognise that living things can be grouped in a variety of ways			
Living things and their habitats - use classification keys to help group, identify and name a variety of living things in local & wider environment			
Living things and their habitats - recognise that environments can change and that this can sometimes pose dangers to living things			
Living things and their habitats - describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird			
Living things and their habitats - describe the life process of reproduction in some plants and animals			
Living things and their habitats - describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals			
Living things and their habitats - give reasons for classifying plants and animals based on specific characteristics			

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