



Cranford Primary School
Berkeley Avenue
Hounslow
TW4 6LB

Science Policy

Date: September 2023

Review Date: September 2024 (or sooner if changes to the law or practice).

The Philosophy of Science

For young children Science is an introduction to the world of living things, materials and forces. It is largely a practical subject, which develops a spirit of enquiry by encouraging curiosity and reason. They do this in practical ways of exploring and interacting with their physical environment.

They explore ideas, observe their effects, develop new ideas and then test them. The concepts that young children develop are based on first hand exploration. Working with others, learning to persevere and learning how to ask questions are attitudes, which encourage work to be carried out in a scientific way.

Each child needs to enjoy the experiences associated with Science by increasing and developing their knowledge and by starting to use the skills associated with scientific methods of investigation.

Aims of Our Science Teaching (Based on Curriculum Aims 2013)

The aim of Science is to develop knowledge and conceptual understanding of the world through scientific disciplines.

This will include helping children to:-

- Develop scientific knowledge and conceptual understanding through the specific themes outlined in the National Curriculum.
- Develop their enjoyment and interest in Science and an appreciation of its contribution to all aspects of everyday life.
- Build upon their curiosity and sense of awe of the natural world.
- Use a planned range of investigations, practical activities to develop a greater understanding of the knowledge and concepts of Science.
- Understand the vocabulary of Science.
- Develop practical skills and scientific enquiry skills to answer scientific questions about the world
- Develop their use of ICT in their scientific studies.
- To provide opportunities for children to develop knowledge required to understand the uses and implications of Science today and the future.

Intent:
To develop knowledge and conceptual understanding of the world through scientific disciplines.
Implementation:
Through practicals, enquiries, investigations, recording data, analysis, assessment, making real-life links, researching scientific historical figures, using scientific vocabulary.
Impact:
An enthusiasm for Science and development of working scientifically skills. Children have greater scientific knowledge and are able to make scientific links to real life.

Science in the National Curriculum

At Cranford Primary we base our teaching upon the Foundation Stage for Early Years; from year 1 to year 6 we use the current National Curriculum through the use of the Kent Education scheme of work.

Kent Scheme of Work

This scheme of work is to aid teachers in their planning and to ensure a deeper subject knowledge. It provides teachers with key terminology and background knowledge linked to topics. It provides us with overviews of topics and how it is linked in with the National Curriculum and shows progression of learning. The scheme has a diverse range of resources such as websites, videos and ideas for practical experiments and research.

Development of skills

As in other subjects, Science develops a range of skills, some of which are subject specific and others of a general application. Pupils should be given opportunities to:

- Know and appreciate the contribution made by famous scientists to our knowledge of the world;
- Explain their scientific knowledge and relate it to effects within the real world;
- Recognise and recall essential information about Science contained within the National Curriculum Programmes of Study;
- Question and make suggestions;
- Predict the likely outcome of their investigations;
- Plan, carry out and evaluate Science investigations;
- Understand the meaning of 'fair test';
- Use scientific vocabulary correctly;
- Use and read a range of simple scientific measuring instruments e.g. force metres, thermometers;
- Record and store results for future retrieval;
- Obtain information using various sources;
- Develop observational skills;
- Apply mathematical knowledge to their understanding of Science, including collecting, presenting, analysing data.
- Record results using diagrams, graphs, tables and charts;

Teaching Strategies and Planning

At Cranford Primary School, we believe that the best way to learn Science is through first-hand experience.

We incorporate prior and previous knowledge in our planning based on the National Curriculum (see Appendix 1). Where possible, Science is taught as a stand-alone subject while making cross-curricular links.

In the Classroom

- Children are encouraged to work as individuals, in pairs, in groups and also as a whole class when appropriate with due consideration to health and safety.
- The children are encouraged to use a variety of means for communicating and recording their work. Participating as a speaker and a listener is valued at our school.
- Information and Communication Technology plays an important role in researching scientific information.
- From KS1 onwards, every classroom has a CPS Science rocket displayed and is referred to during experiments. The CPS rocket can be seen on the learning intention for experiment lessons.
- Vocabulary walls have been implemented to show the key vocabulary that is being covered during the different topics. Each class (KS1 and above) will have a display of Science vocabulary words showing the words which children are confident and not confident in understanding. The words that they are not confident in are covered in the unit of learning.

Equal Opportunities and Special Needs

- Every effort is made to ensure that Science activities and investigations are equally interesting for both boys and girls, value cultural diversity and avoid stereotyping any ethnic groups.
- Teachers' planning grids show how the activities have been adapted or extended for children of different abilities.
- This policy was developed with reference to the school's Equality Policy.

Assessment

See Marking and AFL and Monitoring policies.

In Science, we have introduced an extended write (see Appendix 4). This assessment informs teacher judgement and allows them to assess children and input data on target tracker. In addition, we have Quizics resources for quick formative assessment as a mini plenary or recap activity. These simple quizzes are based on the National Curriculum. Reading comprehensions linked to Science topics are used to support knowledge assessment.

For Science we have implemented the Science Skills assessment and tracker. The skills are displayed in the classrooms and on the learning intention. The Science skills are used in every experiment lesson where the children focus on a specific set of skills. The Science Skills tracker is used by class teachers to make a judgement on how the children have displayed the skills set in the particular topic.

Health and Safety

It is important that children carry out Science in a safe environment. Consideration must be given to this. Children should be made aware of potential hazards, and be taught how to handle equipment safely. We aim to involve children in ensuring safety by encouraging them to recognise hazards and assess risks in order to take action to control these risks. In Appendix 2 some guidelines are indicated but teachers should check with the Science Coordinator if they are unsure of safe procedures.

The safe use of equipment is promoted at all times. Refer to health and safety policy for further guidance.

Resources

Knowledge organisers are provided at the start of a new unit to provide children with key vocabulary and concepts. The children are encouraged to choose from a range of equipment when designing investigations. Children are encouraged to be considerate towards living things, use equipment safely and to be careful with consumables and materials.

Equipment is kept centrally in the resource area and some specific to year groups. We as a staff are responsible for returning this equipment when the activity is completed.

Science is also taught through storytelling. Specific topic related books are read to the children where they are getting a deeper understanding of the topic (see Appendix 3).

The Conservation Area (Wild Paradise)

We are very fortunate to have a conservation area, which has been developed so that children with adult support can acquire a unique environment at various levels. The area can be used for varied and interesting investigations. The key is kept in the main office.

Science Ambassadors

Science ambassadors have been assigned to promote the love of Science learning across the school.

The overall responsibilities of a Science ambassador would be:

- To clearly explain to the Science lead what they have been learning in Science each term using scientific vocabulary and naming the skills they have learnt.
- To discuss what they have enjoyed about their Science teaching during the term and identify where any improvements can be made.
- To carry out practical experiments at home or create posters linked to their learning in school and feedback to the class.
- To help promote and run Science competitions.
- To support and lead Science week or a Science day.
- To assist visitors around the school and discuss Science in Cranford Primary.

The responsibilities of a Science ambassador in class would be:

- To help with the organisation of Science resources.
- To assist the teacher in setting up investigations. They can demonstrate the investigation if it is safe to do so with the teacher's support.
- Run in-class competitions.
- Select fun activities for homework projects (which are checked with the class teacher first).
- Write about what investigation/concept the class has been learning about that week and have it published in the school newsletter. This would be done under the heading 'Shout out for Science'.

Review

Parents are most welcome to request the document and comments are invited from anyone involved in the life of the school.

Appendix 1

SUBJECT OVERVIEW

Subject:	Science	Academic year:	2022- 2023
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	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year R	Understanding the Natural world	Understanding the Natural world	Understanding the Natural world	Understanding the Natural world	Understanding the Natural world	Understanding the Natural world
Year 1	Animals inc Humans (Humans)	Forces/Space (Solar system, gravity, push, pull)	Materials	Materials x3 weeks Seasonal Changes x1 week Plants x1 Week	Plants x6 weeks	Animals inc Humans (Animals) Seasonal Changes x1 week
Year 2	Animals inc Humans (Health and hygiene)	Materials	Living things and their habitats	Living things and their habitats	Plants	Animals inc Humans (Animals)
Year 3	Light and Shadows	Rocks, Soils & Fossilisation	Animals inc Humans (Animals- Skeletons & Nutrition)	Animals inc Humans (Animals- Skeletons & Nutrition)	Plants & Lifecycle	Forces & Magnets
Year 4	Electricity, simple circuits and conductors	Living things	Space - Earth, Sun and Moon (recap of solar system – expanding out to galaxies. Light sources and properties of stars. Meteors, comets, asteroids and orbits. Exploration of space including telescopes).	Materials - Changing state and water cycle	Sound as Vibrations	Animals inc Humans (Digestive System & Teeth)
Year 5	Living things and their habitats	Earth, Sun and Moon	Properties of materials	Animals including humans	Forces	Forces
Year 6	Living Things and Habitats	Animals inc. Humans	Electricity	Electricity (carried over by 2 weeks)	Evolution (carried over by 4 lessons - to include making fossil practical) Light (6 lesson unit)	Evolution (carried over by 4 lessons - to include making fossil practical) Light (6 lesson unit)

Early Years - Integrated in other learning: learning through topic and play using basic scientific language. Child centred investigations (e.g. if a child asks why does it melt, they will set up an experiment using ice from the fridge to investigate that question).

Understanding of the World

Nursery

- Use all their senses in hands-on exploration of natural materials.
- Explore collections of materials with similar and/or different properties.
- Talk about what they see, using a wide vocabulary.
- Begin to make sense of their own life-story and family's history
- Show interest in different occupations.
- Explore how things work.
- Plant seeds and care for growing plants.
- Understand the key features of the life cycle of a plant and an animal.
- Begin to understand the need to respect and care for the natural environment and all living things.
- Explore and talk about different forces they can feel.
- Talk about the differences between materials and changes they notice.
- Continue to develop positive attitudes about the differences between people.
- Know that there are different countries in the world and talk about the differences they have experienced or seen in photos.

Reception

- Talk about members of their immediate family and community.
- Name and describe people who are familiar to them.
- Comment on images of familiar situations in the past.
- Compare and contrast characters from stories, including figures from the past.
- Draw information from a simple map.
- Understand that some places are special to members of their community.
- Recognise that people have different beliefs and celebrate special times in different ways.
- Recognise some similarities and differences between life in this country and life in other countries.
- Explore the natural world around them.
- Describe what they see, hear and feel whilst outside.
- Recognise some environments that are different to the one in which they live.
- Understand the effect of changing seasons on the natural world around them.

The Natural World

These need to be achieved by the end of Reception:

- **Explore the natural world around them, making observations and drawing pictures of animals and plants.**
- **Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.**
- **Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter**

Appendix 2

Health and Safety

The following safety points should be noted when organising Science activities.

1. Objects placed in unaccustomed places during experiments may cause falls or breakage of equipment.
2. The ways in which germs can be transferred are many.
Hands should be washed after touching animals and plants, before touching things to be put into the mouth. Some things may need to be disinfected.
3. Children should not carry heavy loads, e.g. buckets full of water.
4. Some animals, materials and plants cause allergies.
5. Children should know that some plants are poisonous and they should be aware of what these are.
6. Extreme physical exertion may not be wise for some children. (E.g. taking pulse rates).
7. Pupils should not look directly at the sun even through dark glass or plastic.
8. Hot water should not be put into glass containers since they may crack due to uneven expansion setting up strain in the glass.
9. Liquids which produce inflammable vapours (e.g. methylated spirits) should not be used by children.
10. Even low voltages from batteries can cause short lengths of thin wire to become hot, even to glow and ignite things.
11. Extreme caution should be taken with glass or hot water. Very close supervision should be exercised if it is necessary to use these.

We should encourage the children to identify risks themselves. A checklist of things to think about will encourage sound attitudes towards safety and guide children to find ways of making activities safer.

A suggested list is as follows:

Think especially about safety when:-

- You use strong heat, main electricity, fast-moving or heavy objects.
- You use any chemicals
- You handle animals or plants
- You do work involving lifting, cutting or heating things, or use any tools or instruments
- You visit possibly risky places (e.g. ponds, rivers, and the seashore)

Teachers might find it helpful to display principles appropriate in their Science focus in their class room.

Appendix 3

Topic 5.5 FORCES – MAGNETISM

Story: The Magic Stone



Topic: Magnetism

Plot type: Quest

Genre: General fiction

This is a story about a lodestone – a naturally occurring magnet. The lodestone is used by a boy to find his way home after playing in the forest. He pretends he is using magic to find his way but his sister becomes suspicious and eventually works out how to use the lodestone for herself.

The science content of the story includes the attraction of iron to a magnet and the use of magnets to make compasses.

Appendix 4

Extended write

Below are the criteria, which should be included when planning extended writes for each half term. These should inform Target Tracker data.

- Towards the middle or end of the unit (once some lessons have been taught)
- Can be part of research, but cannot be copy and paste (should be written and showcase children's knowledge and understanding)
- Relate to the real world
- Use scientific key vocabulary*
- Scientific explanation*
- Link to NC outcome
- Differentiate appropriately by providing relevant support so that every child can produce a written piece in their books (not a cloze type piece of work).

Teachers can be creative and link it to a style of writing that they are doing in English for example, a letter, flyer, fact file, newspaper report, a blog post etc. This an opportunity to do some research using the computers. However, they should be careful and ensure that it is based on scientific facts and covers the points above.

*a child with a good understanding will be able to use scientific vocabulary correctly in context. They will also be able to write a mostly clear explanation using scientific reasoning. These children will be your 'at' and 'greater depth'.

Year 1

Simple sentences to do with forces including gravity, push and pull forces and Isaac Newton.

To understand what causes motion.

- Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
- Identify the effects of (push, pull)

Technically forces comes into the curriculum later, but as it is such a tricky topic, introduce simple forces here.

- Gravity is a force that pulls us down to the ground.
- Sir Isaac Newton was a famous scientist who first discovered gravity.
- An example of a pushing force would be pushing on a swing. The force moves the swing further away.
- An example of a pulling force would be pulling a door closed. The door moves towards you.
- Friction is a force when two objects rub together. Friction warms things up.
- Magnetism is a type of force, which pulls and pushes objects away using a magnet.

Year 2

You could consider linking this to a simple diary or a letter, perhaps you went to an antique shop, car boot sale or junk yard and were investigating the furniture to get a good quality bargain.

- Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick. Rock, paper and cardboard for particular uses.

This is related to the real world because the children understand why particular materials are used in the everyday objects they see around them.

In the corner, there is a purple chair made out of plastic and metal. I check the legs and see that they are made of metal and the metal is strong, smooth and unbreakable. In my opinion, this is a good choice, because I can be confident that when I sit down the chair will hold my weight. I investigate the seat of the chair and see that it is made of plastic. The seat has one side which is smooth and one side which is rough. The plastic is opaque and is flexible. When I sit down, the flexible material makes it more comfortable. Excited, I decide the chair is an excellent bargain!

They could write sentences for other objects e.g. a table, bicycle, scooter, mirror etc.

Year 3

You could create an information sheet, or, as the unit has many experiments, you could write a written report (instead of a method) on what you have done and found out.

- Recognise that they need light in order to see things and that dark is the absence of light.
- Recognise that shadows are formed when the light from a light source is blocked by an opaque object.
- Notice that light is reflected from surfaces.

This is related to the real world because it will help children to understand how they see the world around them in terms of light and shadows.

Why do objects appear the way they do?

In order to see the things around us, we need light. Light travels in straight lines from a source of light, like the sun or a lightbulb. When it reaches the object, the light rays reflect off it. We can see the object because the light enters our eyes. Objects appear different depending on how much light they let through. Wood and cardboard are opaque objects, which light cannot travel through. Glass is a transparent material, which allows light to pass through. Tissue paper is translucent, which will let some light travel through. When an object blocks out the light a shadow is formed. Shadows are shortest at midday, when the sun is high in the sky and longest at the end of the day when the sun is low down.

Year 4

The topic lends itself nicely to a fact file and picking an animal that is endangered.

- Recognise that environments can change and that this can sometimes pose dangers to living things

This is related to the real world because it will help children understand habits, living things around them and also the effects of climate change.

The Polar Bear

What does it look like?

The Polar Bear is a very large **mammal**, which weighs up to 600kg. It is white in colour with thick fur and large claws.

Where does it live?

The Polar Bear's **habitat** is within the ice masses of the Arctic Circle. It can also northern parts of Canada and Russia. In these areas, the **climate** is very cold.

How does it survive?

Generally, Polar Bears live to be about 25 years old. They are **adapted** to survive the cold because they have thick fur and blubber to keep it **insulated**. As well, their padded paws help them to walk on slippery ice and swim in the sea. Their powerful sense of smell helps them to find food.

What are some problems it faces?

The Polar Bear is classed as **Vulnerable**. This is mainly due to the rising temperatures caused by **climate change**. This causes the sea ice to melt and means that they have limited access to seals, which is their main food source. Unfortunately, some Polar Bears have resorted to trespassing in human settlements and eat their garbage.

Creative Solution to Save the Species!

We must reducing **global warming** by minimising carbon emissions. We can do this by using energy-saver appliances and light bulbs, as well as recycling.

Year 5

As year 5 look at newspapers this term, you could write a newspaper article linking to a scientist and their discoveries.

- Describe the movement of the Moon relative to the Earth
- Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky

Great Galileo Discovers Secrets of the Moon

Throughout the ages, people have been fascinated by the moon and its many **phases**. Recently, through his **observations** using **telescopes**, **Galileo** has discovered why the moon appears to change through our night sky. Most scientists believed that the Moon was a smooth sphere but Galileo discovered that the Moon has mountains, pits and other features just like the Earth. Galileo's discoveries about the **Moon**, **Jupiter's moons**, **Venus** and **sunspots** supported the idea that the Sun – not the Earth – was at the centre of the **Universe**.

There are eight phases of the moon, which are seen in the following order every month – **new moon**, **waxing crescent**, **first quarter**, **waxing gibbous**, **full moon**, **waning gibbous**, **third quarter** and **waning crescent**. When the Moon is 'waxing' that means it is getting bigger whereas when it is 'waning' the moon is getting smaller. These phases we see result from the angle the Moon makes with the Sun as viewed from Earth. We only see the Moon because sunlight reflects back to us from its surface. During the course of the month, the Moon **orbits** once around the Earth. Half of the moon is facing towards Earth and the other half is facing the Sun where it's always lit but the lit side does not always face the Earth. As the Moon orbits the Earth, the amount of the lit side we see changes. That's why these changes are known as the phases of the Moon.

Year 6

This could be a fact file or information sheet.

- Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences including microorganism plants and animals

Comparing good and bad microorganisms

Bacteria are single-celled and have adapted to live everywhere. Most bacteria are actually helpful, however a few can be very harmful. An example of good bacteria includes probiotics, which live in your gut and help you to digest your food. However, there are also some really bad bacteria, such as *E.coli* and salmonella, which can be found in raw, contaminated or spoiled food. These can give you bad food poisoning.

Compared to bacteria (which are already microscopic), viruses are even smaller. They need to make copies of themselves to survive. Unlike bacteria, very few viruses are good for you, instead most are very harmful. The common cold, flu, and the notorious coronavirus are all examples of viruses that can make people very ill. Unfortunately, there are not many medicines to treat a viral infection and antibiotics do not work on them (only for bacteria). Thankfully, inactive or small doses of viruses can be turned into effective vaccinations, such as the famous cowpox vaccine, which could protect people against the more harmful smallpox disease. However, it could be argued that good hygiene is the best protection against viruses.

Fungi is another type of microbe, which can be found as multi-cellular organisms. This means that unlike for both viruses and bacteria, you can actually see fungi. Fungi cannot make their own food, so they have to get their nutrients from other organisms. There are many good fungi, even edible ones like mushrooms! Yeast is a key fungi, necessary for making bread, wine, beer and soy sauce. However, care should be taken, because some mushrooms can be very poisonous. Some fungi can cause irritation, such as Athlete's Foot.