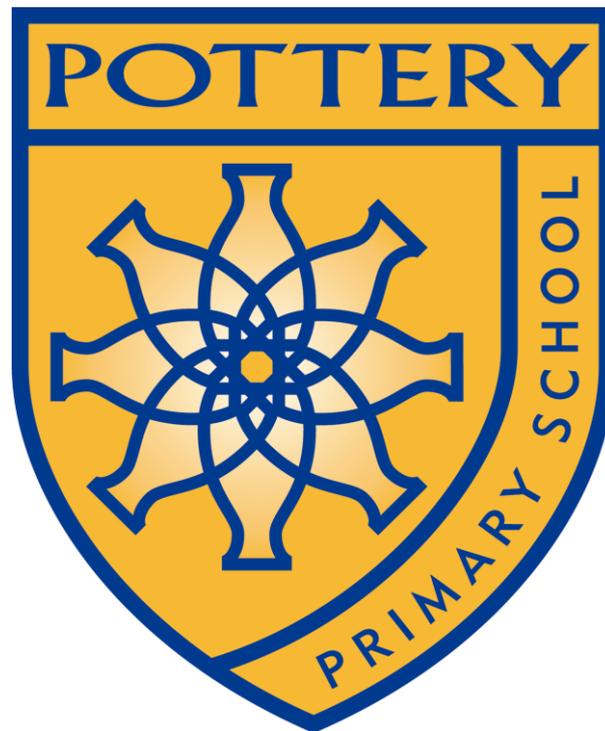


Science Policy and practical guidance



GHa March 2019

SCIENCE POLICY

Introduction

This policy is for the information of staff, governors, parents and all those concerned with the learning and welfare of the children at Pottery School.

It is the responsibility of all staff and governors to ensure that the agreed policy is understood by all and implemented by all those concerned.

Science is one of the five core curriculum subjects in the National Curriculum. This policy outlines the purpose, nature and management of the science taught in our school.

The Philosophy of Science

Science is about children developing a sense of enquiry and extending their knowledge about the world in which they live, through the disciplines of biology, chemistry and physics.

It is a largely practical subject concerned with investigations that are designed to increase the child's awareness, knowledge and skills in these areas of study. Science encourages children to develop their sense of excitement and curiosity about natural phenomena.

Throughout the school, science teaching will offer children the opportunities to:

- develop knowledge and understanding of important scientific ideas, processes and skills and relate these to everyday experiences.
- learn about ways of thinking and of finding out about and communicating ideas.
- explore values and attitudes through science.

These aims and purposes are expanded below:

Scientific knowledge and conceptual understanding

Children should:

- develop secure understanding of key blocks of knowledge and concepts in order to progress to the next stage.
- use this experience to develop their understanding of key scientific ideas and make links between different phenomena and experiences.
- develop their skills as describing processes and key characteristics with common language.
- use technical terminology accurately and precisely.
- use their mathematical knowledge to explain their understanding of science, which will include collecting, presenting and analysing data.

Nature, processes and methods of science

Children should:

- use a variety of approaches to answer relevant scientific questions.
- use a range of types of scientific enquiry including: observing over time, pattern seeking, identifying, classifying and grouping, comparative and fair tests (controlled assessments); and researching from secondary sources.

Spoken language

Children should:

- develop their spoken language skills across the whole curriculum.
- use spoken language cognitively, socially and linguistically.
- develop their skills at hearing and using quality scientific language to articulate scientific concepts clearly and precisely.
- develop secure foundations by using discussions to probe and remedy their misconceptions.

Values and Attributes

Children should:

- work with others, listening to their ideas and treating these with respect.
- develop respect for evidence and evaluate critically ideas which may or may not fit evidence available.
- develop a respect for the environment and living things and for their health and safety.

Throughout the school children will develop the scientific skills necessary for scientific investigations:

Observing

Using their senses

Sorting

Grouping

Classifying

Raising Questions

Comparing

Measuring

Communicating

Predicting an Outcome

Testing (progressing to an understanding of a fair test/scientific test)

Recording

Interpreting

Identifying and Changing Variables

Reflecting

Drawing Conclusions

Developing skills associated with recording information: graphs, charts, tables etc.

Entitlement

It is the entitlement of every child to be given access to the knowledge and skills associated with science and scientific investigation. In the National Curriculum science, these are:

Everyday materials (including their use)

Animals, including humans

Plants

Forces and magnets

Light and electricity

Sound

Living things and their habitats

States of matter

Properties and changes of materials (including rocks)

Earth and space

Evolution and inheritance

These concepts fall into the following areas:

Experimental and Investigative Science

This area sets down the way in which children will investigate their surroundings. Investigation is achieved through developing appropriate skills that the children can then draw upon when working as 'scientists'. These skills must be integrated into the teaching of *all* science activities, content strands and investigations.

Life Processes and Living Things.

This area involves the study of plants and animals within the local environment. Children will learn about types of plants and animals including humans, what they require to survive and keep healthy, how they grow, move and reproduce. They will also study food chains and the classification and variation of species. The growth of plants through their many stages starting from when the seed or bulb is planted will be observed.

Materials and their Properties

This area introduces the children to a broad study of materials: rocks, minerals, soils, and types of materials. They will study their origin, grouping and classification, changes in their state and experiment with the separation of mixtures of materials.

Physical Processes

This area involves a study of: electricity, forces and motion; light; sound and the earth and its place in the solar system.

Delivery - Teaching strategies and planning

In reception, the EYFS curriculum guidance is implemented and science is taught through the strand 'Understanding the world'.

In key stages 1 and 2 science is taught through the topic, wherever possible, in conjunction with Rising Stars Switched on Science. The topics covered ensure that on a two-year rolling programme that all areas of science are covered by year 6.

When school organisation allows for pure year groups, each year group will have a number of units of work. Where it does not, an A and B year are implemented ensuring coverage of all science areas.

Year 1
Plants
<ul style="list-style-type: none"> • identify and name a variety of common wild and garden plants, including deciduous and evergreen trees
<ul style="list-style-type: none"> • identify and describe the basic structure of a variety of common flowering plants, including trees
Animals including humans
<ul style="list-style-type: none"> • identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals
<ul style="list-style-type: none"> • identify and name a variety of common animals that are carnivores, herbivores and omnivores
<ul style="list-style-type: none"> • describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)
<ul style="list-style-type: none"> • identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense
Everyday Materials
<ul style="list-style-type: none"> • distinguish between an object and the material from which it is made
<ul style="list-style-type: none"> • identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock
<ul style="list-style-type: none"> • describe the simple physical properties of a variety of everyday materials
<ul style="list-style-type: none"> • compare and group together a variety of everyday materials on the basis of their simple physical properties
Seasonal Changes
<ul style="list-style-type: none"> • observe changes across the four seasons
<ul style="list-style-type: none"> • observe and describe weather associated with the seasons and how day length varies
Year 2
Living things and their habitats
<ul style="list-style-type: none"> • explore and compare the differences between things that are living, dead, and things that have never alive
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • identify and name a variety of plants and animals in their habitats, including microhabitats
<ul style="list-style-type: none"> • 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.
Plants
<ul style="list-style-type: none"> • observe and describe how seeds and bulbs grow into mature plants
<ul style="list-style-type: none"> • find out and describe how plants need water, light and a suitable temperature to grow and stay healthy
Animals including humans
<ul style="list-style-type: none"> • notice that animals, including humans, have offspring which grow into adults
<ul style="list-style-type: none"> • find out about and describe the basic needs of animals, including humans, for survival (water, food and air)
<ul style="list-style-type: none"> • describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene
Uses of everyday materials
<ul style="list-style-type: none"> • identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses

- find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

Scientists (non-statutory): John Dunlop, Charles Macintosh and John McAdam

Year 3
Plants
<ul style="list-style-type: none"> • identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers
<ul style="list-style-type: none"> • explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant
<ul style="list-style-type: none"> • investigate the way in which water is transported within plants
<ul style="list-style-type: none"> • explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.
Animals including humans
<ul style="list-style-type: none"> • identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat
<ul style="list-style-type: none"> • identify that humans and some other animals have skeletons and muscles for support, protection and movement.
Rocks
<ul style="list-style-type: none"> • compare and group together different kinds of rocks on the basis of their appearance and simple physical properties
<ul style="list-style-type: none"> • describe in simple terms how fossils are formed when things that have lived are trapped within rock
<ul style="list-style-type: none"> • recognise that soils are made from rocks and organic matter
Light
<ul style="list-style-type: none"> • recognise that they need light in order to see things and that dark is the absence of light
<ul style="list-style-type: none"> • recognise that light from the sun can be dangerous and that there are ways to protect their eyes
<ul style="list-style-type: none"> • recognise that shadows are formed when the light from a light source is blocked by a solid object
<ul style="list-style-type: none"> • find patterns in the way that the size of shadows change
Forces and Magnets
<ul style="list-style-type: none"> • compare how things move on different surfaces
<ul style="list-style-type: none"> • notice that some forces need contact between two objects, but magnetic forces can act at a distance
<ul style="list-style-type: none"> • observe how magnets attract or repel each other and attract some materials and not others
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • describe magnets as having two poles
<ul style="list-style-type: none"> • predict whether two magnets will attract or repel each other, depending on which poles are facing.

Year 4
Living things and their habitats
<ul style="list-style-type: none"> • recognise that living things can be grouped in a variety of ways
<ul style="list-style-type: none"> • explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment
<ul style="list-style-type: none"> • recognise that environments can change and that this can sometimes pose dangers to living things.
Animals including humans
<ul style="list-style-type: none"> • describe the simple functions of the basic parts of the digestive system in humans
<ul style="list-style-type: none"> • identify the different types of teeth in humans and their simple functions

<ul style="list-style-type: none"> construct and interpret a variety of food chains, identifying producers, predators and prey.
States of Matter
<ul style="list-style-type: none"> compare and group materials together, according to whether they are solids, liquids or gases
<ul style="list-style-type: none"> 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 (°C)
<ul style="list-style-type: none"> identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.
Sound
<ul style="list-style-type: none"> identify how sounds are made, associating some of them with something vibrating
<ul style="list-style-type: none"> recognise that vibrations from sounds travel through a medium to the ear
<ul style="list-style-type: none"> find patterns between the pitch of a sound and features of the object that produced it
<ul style="list-style-type: none"> find patterns between the volume of a sound and the strength of the vibrations that produced it
<ul style="list-style-type: none"> recognise that sounds get fainter as the distance from the sound source increases.
Electricity
<ul style="list-style-type: none"> identify common appliances that run on electricity
<ul style="list-style-type: none"> construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
<ul style="list-style-type: none"> identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery
<ul style="list-style-type: none"> recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
<ul style="list-style-type: none"> recognise some common conductors and insulators, and associate metals with being good conductors.

Year 5
Living things and their habitats
<ul style="list-style-type: none"> describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird
<ul style="list-style-type: none"> describe the life process of reproduction in some plants and animals
Animals including humans
<ul style="list-style-type: none"> describe the changes as humans develop to old age.
Properties and changes of materials
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution
<ul style="list-style-type: none"> use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
<ul style="list-style-type: none"> give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
<ul style="list-style-type: none"> demonstrate that dissolving, mixing and changes of state are reversible changes
<ul style="list-style-type: none"> 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.
Earth and Space
<ul style="list-style-type: none"> describe the movement of the Earth, and other planets, relative to the Sun in the solar system
<ul style="list-style-type: none"> describe the movement of the Moon relative to the Earth
<ul style="list-style-type: none"> describe the Sun, Earth and Moon as approximately spherical bodies
<ul style="list-style-type: none"> use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun

across the sky.
Forces
<ul style="list-style-type: none"> explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.
<ul style="list-style-type: none"> identify the effects of air resistance, water resistance and friction, that act between moving surfaces recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to greater effect.
Scientists(non-statutory): Isaac Newton, Galileo Galilei, Ptolemy, David Attenborough, Alhazen, Copernicus, Spencer Silver, Ruth Benerito and Jane Goodall.

Year 6
Living things and their habitats
<ul style="list-style-type: none"> describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals give reasons for classifying plants and animals based on specific characteristics.
Animals including humans
<ul style="list-style-type: none"> identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function describe the ways in which nutrients and water are transported within animals, including humans.
Evolution and inheritance
<ul style="list-style-type: none"> recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
Light
<ul style="list-style-type: none"> recognise that light appears to travel in straight lines 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 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 use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.
Electricity
<ul style="list-style-type: none"> associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit 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 use recognised symbols when representing a simple circuit in a diagram.
Scientists(non-statutory): Carl Linnaeus, Alfred Wallace, Charles Darwin and Mary Anning.

The year group teaching team will identify the science and will do this by strand taking into account usage of equipment and the topic the class are undertaking so that cross-curricular work can be delivered.

The individual teacher will identify the most appropriate teaching strategy to deliver a specific unit of work but with the knowledge that where possible, the children should be investigating (hands-on experiences).

There are a variety of ways in which the teaching of science is effective and our school has a tradition for encouraging learning through investigation. It is however, acceptable to use demonstration, research, exploration, and teacher led investigations when circumstances: units of work; resources and the needs of individuals or groups of pupils necessitate this.

Equal Opportunities

Teacher's plans will indicate where and when necessary, how activities/investigations are adapted or extended to cater for children of differing ability.

Every effort is made to ensure that science activities are as equally interesting and accessible to both boys and girls.

Teachers strive to avoid any bias according to a child's sex, ethnic origin, disability or social background in accordance with procedures outlined by Derbyshire County Council.

Information Communication Technology (ICT)

Whenever possible, children will use information technology in their science work. This will involve the use of:

Digital scales

Digital microscopes

Digital camera

Pulse meter measure

Spring balance

Force meter

Digital stopwatches and clocks

Ammeter and Voltmeter

Calculators

Data logging sensory equipment

Access to quality websites

Software e.g. data bases/spread sheets and research/study material

Health and Safety

All children are made aware of the relevance to health and safety when undertaking work in science. The safe use of equipment and handling of living things is promoted at all times. The Association for Science Education (A.S.E) safety policy: 'Be Safe! Some aspects of safety in school science and technology for key stages 1 and 2' is practiced by all staff at this school

The school's Health and Safety policy should be consulted for details regarding the use of scissors, use of electrical equipment, using wet areas and the use of tools and heavy equipment.

Any animals, insects and plants used for study should be treated with respect and wherever possible, be returned to their environment as soon as the activity is completed.

Leaves and berries of a poisonous nature should not be used in the classroom and their dangers made clear to the children.

The role of the science co-ordinator

All teachers are responsible for ensuring that they deliver the appropriate areas of the science National Curriculum to their children and that they assess each child's progress in science.

However, the co-ordinator will do the following:

- monitor and evaluate the teaching of science on a three-year cycle.
- where possible, assist staff in the delivery of an area of science in which they lack confidence.
- provide opportunities for the moderation of work between colleagues.
- be responsible for disseminating relevant information re: local and national initiatives to the teaching/non-teaching staff.
- plan and deliver in-service training to staff as necessary.
- take an annual audit of resources and order what is required as soon as possible thereafter. (funding allowing)
- make an annual bid for finance from school allowance for resources.
- ensure that resources are accessible to staff.

Assessment and Record Keeping

Assessments are based on the learning objectives for science.

Teachers are expected to keep records of children's progress in relation to the learning outcomes. At the end of a unit of work teachers are expected to complete the science assessment grid that is passed through the school. These are located in the Foundation Subject Group Assessment Folder (Science).

Review

The Head teacher and staff will review this policy regularly. Any amendments will be presented to the Governing Body for approval.

G. Hartley January 2019