

# Pensans CP School



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## Science Policy

Reviewed on: September 2019  
Next Review Date: September 2021

# Pensans Science Policy 2019

Science is delivered across the school in a cross-curricular approach. The Science objectives for each year group are covered thoroughly, with class teachers choosing the most appropriate time throughout the year to cover the objectives. As Science is linked into the class' projects, the children create links between their learning and this ensures that maximum progress is made.

The variety of Science lessons excites pupils, stimulating their curiosity about the world around them. The practical experiences lead to a development in the Science skills of observation, interpretation, hypothesising, questioning, investigating and communicating.

Teachers encourage children to develop their enquiring minds, providing regular opportunities to investigate both given questions and their own questions.

We aim to do this by:

- Delivering high quality, interesting and engaging science lessons in a cross-curricular approach;
- Using scientific contexts to develop and consolidate cross curricular skills in literacy, Maths and ICT;
- Teaching science in a global and historical context; including the contributions significant scientists from a range of cultures;
- Developing and extending pupils' scientific knowledge and understanding;
- Developing pupils' ability to work scientifically and involve pupils in planning, carrying out and evaluating investigations;
- Developing pupils' scientific vocabulary and ability to articulate scientific concepts clearly and precisely;
- Ensuring that all pupils are appropriately challenged to make good progress in science.

## **Assessment**

Science will be assessed half-termly against age-expected outcomes for each key stage. These will be recorded both in individual target books and on scholar pack. Assessment will take place at every half term and children will be assessed against half-termly checkpoints for their year group- ranging from 1:1 to 6:6 and so on. For example a child in the third term of Year 1 would be assessed as 1:3 to be considered as on track to meet the end of year expectations.

## **Reporting and Monitoring**

Children will be categorised as either **emerging**, **expected** and **exceeding** according to age related expectations.

**Pupils working at national standard at the end of Key Stage 1 will able to demonstrate sufficient evidence of the following:**

### **Working scientifically**

While studying the content of biology, chemistry and physics a pupil at the national standard

is able to work scientifically by using first-hand practical experiences and a wide range of sources of information to develop an understanding of a range of scientific ideas.

This means they are able to:

- look closely at the natural and humanly-constructed world around them

- observe phenomena in the natural and humanly-constructed world
- ask questions about what they notice
- use different types of scientific enquiry to answer questions, including
  - o observing changes over time
  - o noticing patterns
  - o grouping and classifying things
  - o carrying out simple comparative tests
  - o finding things out using secondary sources of information.
- use simple and appropriate scientific language and terminology to talk about what has been found out.
- communicate ideas in a variety of ways.
- recall and use appropriate terminology when working scientifically (at least: method, observe, pattern, results, measure, compare, record, group, equipment, fair) as well as the scientific language and terminology found in the different areas of science
- read and spell scientific vocabulary at a level consistent with their word reading and spelling knowledge at key stage 1.

### **Biology - Structure and function**

- name and locate external parts of the human body, including those related to the senses.
- describe the basic needs of animals for survival.
- describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.
- describe the main changes as young animal offspring grow into adults (at least: between egg and adult bird; between egg and adult insect; between baby and adult mammal).
- name and locate parts of flowering plants and trees (at least: flower, leaf, root, stem, trunk, seed, branch, and petal).
- describe the basic needs of plants for survival and describe how changing these affects the plant.
- describe the main changes as seeds and bulbs grow into mature plants.
- identify
  - o whether things are alive, dead or have never lived
  - o a variety of common plants and animals in their habitats
  - o different groups of animals using differences in the features of groups (at least: fish, amphibians, reptiles, birds, mammals); and different animals using differences in the features within groups.
- group animals according to what they eat, describe how animals get their food from other animals or from plants, and use simple food chains to describe these relationships.
- describe seasonal changes (at least: living things, weather, day length, temperature).
- describe how different plants and animals are suited to different habitats and microhabitats.

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### **Chemistry - Properties of materials**

- distinguish between an object and the materials from which it is made, such that they can identify a variety of everyday materials.
- sort materials into groups on the basis of their simple physical properties.
- identify and compare different materials' suitability for different uses (at least: wood, plastic, glass, metal, water, rock, brick, paper, cardboard).

### **Chemistry - Changes in materials**

- describe how the shapes of some solid materials can be changed by applying a

force.

**Pupils working at national standard at the end of Key Stage 2 will be able to demonstrate sufficient evidence of the following:**

### **Working scientifically**

While studying the content of biology, chemistry and physics, a pupil at the national standard

is able to work scientifically by using first-hand practical experiences and a wide range of sources of information to develop a deeper understanding of a wide range of scientific ideas.

This means they are able to:

- explore and talk about their and other people's ideas
- analyse functions, relationships and interactions systematically
- begin to recognise how abstract ideas help them to understand and predict how the world operates
- begin to recognise that scientific ideas change and develop over time
- ask their own questions about scientific phenomenon and select and plan the most appropriate ways to answer science questions using different types of scientific enquiry, including:
  - o observing changes over different periods of time
  - o noticing patterns
  - o grouping and classifying things
  - o carrying out comparative and fair tests
  - o finding things out using a wide range of secondary sources of information.
- select the most appropriate equipment for a task and take accurate measurements or readings using the appropriate units as required.
- identify when to repeat measurements, if necessary, to ensure given results are reliable.
- draw conclusions based on their data and observations.
- use evidence from a range of sources to justify their ideas.
- use their scientific knowledge and understanding to explain their findings through talk, in written forms or in other ways.
- recall and use appropriate terminology when working scientifically (at least: accurate, conclusion, evidence, fair test, prediction, reliable, supports (evidence), variable, unit) as well as the scientific language and terminology found in the different areas of science.
- read, spell and pronounce scientific vocabulary correctly at a level consistent with their word reading and spelling knowledge at key stage 2.

### **Biology - Structure and function**

- name, locate and describe the functions of the main parts of the digestive, musculoskeletal, and circulatory systems in animals.
- describe the effects of diet, exercise, drugs and lifestyle on how their bodies function in the long and short term.
- describe the reproductive process in some animals and differences in their life cycles (at least: mammals, amphibians, insects, birds).
- name, locate and describe the functions of the main parts of plants, including those in the reproductive system and how water and nutrients are transported.
- describe how plants are affected by their environment and changes to growing conditions.

### **Biology - Evolution and inheritance**

- describe how fossils are formed, and how they provide some evidence for evolution
- use the ideas of inherited characteristics, variation between offspring and adaptation to their environment to describe how living things may have changed over time and evolved.
- use keys to group, classify and identify living things in different ways based on first hand observation or secondary information sources
- describe the main characteristics used to group plants, animals and micro-organisms according to the main groups in the classification system.
- construct and interpret food chains.
- explain how wider environmental changes may have an impact on living things.

### **Chemistry - States of matter**

- compare the characteristics of different states of matter (solids, liquids and gases).
- describe how materials can change state (with reference to temperature), using this to explain everyday phenomena, including the water cycle, based on first-hand observation of changes of state.

### **Chemistry - Properties of materials**

- group, classify and identify materials, including rocks, in different ways according to their properties (at least: appearance, hardness, solubility, transparency, conductivity (electrical and thermal) and response to magnets), based on first-hand observation.
- describe the advantages and disadvantages of everyday materials for different uses, based on an understanding of their properties and from evidence from scientific enquiries.
- describe the composition of soil.

### **Chemistry - Changes in materials**

- identify and recognise everyday phenomena where dissolving occurs.
- describe how to appropriately separate different mixtures of materials, including solutions.
- identify when changes of materials are reversible or non-reversible and explain how they know.

### **Physics - Light and sound**

- use the idea that light from the sun and other light sources or reflections, enters our eyes to explain how we see and represent this in simple diagrammatic form.
- use the idea that light travels in straight lines to explain the path of light when it is reflected, and the formation, shape and size of shadows.
- use the idea that sounds are associated with objects vibrating, and that they require a medium to travel through, to explain how sounds are made and heard.
- describe the patterns in sounds, relate how they are produced, and the distance from the source, to their pitch and volume.

### **Physics - Forces and magnets**

- use the idea that different forces have different effects on objects, and recognise that some forces (air resistance, water resistance, friction) involve contact between objects and others (gravitational and magnetic) do not.
- identify common materials which are magnetic.
- use the idea of like and unlike magnetic poles to predict the behaviour of magnets.
- describe how simple mechanisms (at least: pulleys, levers, gears) increase the effects of a force.

### **Physics - Electricity**

- use simple apparatus to construct and control, first-hand, a series circuit (involving at least: cells, wires, switches, bulbs and buzzers), and describe how the circuit may be affected when changes are made.

- use recognised symbols (at least: cells, wires, switches, bulbs, buzzers and motors) to draw and interpret simple series circuit diagrams.
- recognise common conductors and insulators.

### Physics - Earth and space

- describe the shape of bodies in the solar system and their movement relative to each other.
- use the Earth's movement in space to explain day and night and the apparent movement of the sun across the sky.

# Science Year 1

## Working scientifically

- asking simple questions and recognising that they can be answered in different ways
- observing closely, using simple equipment
- performing simple tests
- identifying and classifying
- using their observations and ideas to suggest answers to questions
- gathering and recording data to help in answering questions.

## Plants:

- identify and name a variety of common wild and garden plants, including deciduous and evergreen trees
- identify and describe the basic structure of a variety of common flowering plants, including trees.

## Animals: including humans

- identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals
- identify and name a variety of common animals that are carnivores, herbivores and omnivores
- describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)
- 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:

- distinguish between an object and the material from which it is made

- identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock

- describe the simple physical properties of a variety of everyday materials

- compare and group together a variety of everyday materials on the basis of their simple physical properties.

## **Seasonal changes:**

- observe changes across the four seasons

- observe and describe weather associated with the seasons and how day length varies.

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# Science - Year 2

## Working scientifically

- asking simple questions and recognising that they can be answered in different ways
- observing closely, using simple equipment
- performing simple tests
- identifying and classifying
- using their observations and ideas to suggest answers to questions
- gathering and recording data to help in answering questions.

## Living things and their habitats:

- explore and compare the differences between things that are living, dead, and things that have never been alive
- 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
- identify and name a variety of plants and animals in their habitats, including micro-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.

## Plants:

- observe and describe how seeds and bulbs grow into mature plants
- find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.

## Animals, including humans

- notice that animals, including humans, have offspring which grow into adults
- find out about and describe the basic needs of animals, including humans, for survival (water, food and air)
- describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.

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

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## Science

# Experimental and investigative science - SC1 - Year 3

### Working scientifically

During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings.

## Plants

### Plants

- identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers
- 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
- investigate the way in which water is transported within plants
- explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

#### Animals including humans

##### **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 nutrition from what they eat
- identify that humans and some other animals have skeletons and muscles for support, protection and movement.

#### Rocks

##### **Rocks**

- compare and group together different kinds of rocks on the basis of their appearance and simple physical properties
- describe in simple terms how fossils are formed when things that have lived are trapped within rock
- recognise that soils are made from rocks and organic matter.

#### Light

## Light

- recognise that they need light in order to see things and that dark is the absence of light

- notice that light is reflected from surfaces

- recognise that light from the sun can be dangerous and that there are ways to protect their eyes

- recognise that shadows are formed when the light from a light source is blocked by a solid object

- find patterns in the way that the size of shadows change.

## Forces and magnets

### Forces and magnets

- compare how things move on different surfaces

- notice that some forces need contact between two objects, but magnetic forces can act at a distance

- observe how magnets attract or repel each other and attract some materials and not others

- 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

- describe magnets as having two poles

- predict whether two magnets will attract or repel each other, depending on which poles are facing.

## Experimental and investigative science - Year 4

### **Working scientifically**

During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings.

### **Living things and their habitats**

#### **Living things and their habitats**

- recognise that living things can be grouped in a variety of ways
- explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment
- recognise that environments can change and that this can sometimes pose dangers to living things.

### **Animals, including humans**

#### **Animals, including humans**

- describe the simple functions of the basic parts of the digestive system in humans,
- identify the different types of teeth in humans and their simple functions

- construct and interpret a variety of food chains, identifying producers, predators and prey.

## States of matter

### States of matter

- compare and group materials together, according to whether they are solids, liquids or gases
- 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 ( $^{\circ}\text{C}$ )
- identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

## Sounds

### Sound

- identify how sounds are made, associating some of them with something vibrating
- recognise that vibrations from sounds travel through a medium to the ear
- find patterns between the pitch of a sound and features of the object that produced it
- find patterns between the volume of a sound and the strength of the vibrations that produced it
- recognise that sounds get fainter as the distance from the sound source increases.

## Electricity

### Electricity

- identify common appliances that run on electricity
- construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers

- 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

- recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit

- recognise some common conductors and insulators, and associate metals with being good conductors.

## Experimental and Investigative Science - Year 5

### 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:

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- identifying scientific evidence that has been used to support or refute ideas or arguments.

## Year 5

### Living things and their habitats

- describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird

- describe the life process of reproduction in some plants and animals.

## Animals, including humans

- describe the changes as humans develop to old age.

## Properties and changes of 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
- know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution
- use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
- give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
- demonstrate that dissolving, mixing and changes of state are reversible changes
- 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

- describe the movement of the Earth, and other planets, relative to the Sun in the solar system
- describe the movement of the Moon relative to the Earth
- describe the Sun, Earth and Moon as approximately spherical bodies
- use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.

## Forces

- 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 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 have a greater effect.

## **Experimental and Investigative Science -**

# Year 6

### **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:

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- identifying scientific evidence that has been used to support or refute ideas or arguments.

### **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

- give reasons for classifying plants and animals based on specific characteristics.

### **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

- 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

- 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

- 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

- 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.



