

Overarching Principles

Subject Intent

- ❖ We want to stimulate the pupil's curiosity when finding out why things happens in the way that they do.
- ❖ The science curriculum has been strategically designed so that every year group across KS1 and KS2 will study aspects of chemistry, biology and physics to enable them to develop an understanding of the world around them.
- ❖ We want pupils to appreciate the way in which science affects their lives and the lives of others, and recognise how it impacts on the environment and society.
- ❖ We want pupils to know the key knowledge identified in each unit of the National Curriculum, so they have a firm knowledge base ready to deepen their learning as they progress through school.
- ❖ Scientific substantive knowledge and understanding is taught alongside disciplinary knowledge (working scientifically) as this enables pupils to develop a rich understanding of scientific concepts and processes and develop their thinking and make connections.

Substantive Knowledge	Disciplinary Knowledge	Connecting themes
<ul style="list-style-type: none">❖ Physics, Biology, Chemistry, Earth Sciences	<ul style="list-style-type: none">❖ Working Scientifically to develop an understanding of the nature, processes and methods of science through different types of enquiry.	<ul style="list-style-type: none">❖ Key knowledge is introduced, revisited and referenced in different year groups as the pupils move through school to enable them to make connections with prior learning, and to help them understand how their current learning relates to a specific scientific discipline.❖ Scientific enquiry within all substantive dimensions.

Key Subject Teaching Approach at All Saints

- ❖ Substantive knowledge is developed and repeated through school in line with the National Curriculum programmes of study.
- ❖ The teaching of a new concept will always begin with a baseline to ascertain what prior knowledge pupils can remember and help them to make links to previous learning.
- ❖ Vocabulary is high value and high priority in all science lessons and units
- ❖ All units of work will focus on a type of scientific enquiry, which are planned to ensure progression as pupil move through the school.

Assessment

- ❖ Assessment probes are used to adjust lessons so they are responsive to pupil's needs. They allow teachers to assess pupil's understanding quickly and reveal any common misconceptions such as:
 - Plants get their food from the soil.
 - Particles expand when they are heated.
 - Light travels from student' eyes to the object.
- ❖ **Teachers assess pupil's understanding using a range of strategies including:**
- ❖ Multiple choice questions: Pupils can select scientific answers from a series of options, one of which will contain the misconception.
- ❖ Open-ended questions: These are a great way to explore the learners' thinking processes e.g. are humans still evolving?
- ❖ Using statements: Provide pupils with some statements about scientific concepts. Pupils must comment whether the statement is correct, partially correct or incorrect, and justify their answer with reasons.
- ❖ Practical work: Can a pupil follow a line of enquiry? Can they analyse and interpret data? Can they take and record measurements with accuracy and precision?
- ❖ Concept cartoons: These are a visual representation of science ideas. The simple cartoon-style drawings present a range of possible viewpoints about an everyday scientific concept. Some of the viewpoints may be correct; some partially correct or may illustrate a misconception related to a scientific concept.

Supporting SEND pupils

At Waddington All Saints Academy we use a range of multisensory teaching approaches to provide the best possible opportunity for pupils to understand and retain information.

For example we use:

- Use a full range of media, for example, visual and hands-on materials such as artefacts, photos, symbol/vocabulary charts, written questions, concept maps, writing frames.
- Use a range of ICT (assistive technology and technology to enable learning).
- Visual prompts are used to support the pupil's learning
- Word mats to keep relevant vocabulary close at hand.
- Scaffolds are used to progressively give more responsibility and independence.
- Ensure that pupils are familiar with the range of resources they need to use (pre-teaching where necessary)
- Pupils with significant motor difficulties benefit from adapted apparatus.
- Check for understanding, involving other adults in the class.

Science Overview

Y1	Plants Seasonal changes	Materials Seasonal changes	Animals including humans Living things and their habitats Seasonal changes
Y2	Plants	Materials	Animals including humans Living things and their habitats
Y3	Animals, including humans	Plants Light	Forces & Magnets Rocks
Y4	Animals, including humans	Living things and their habitats States of matter	Sound Electricity
Y5	Earth & Space	Properties & changes of materials Forces	Animals, including humans Living things and their habitats
Y6	Electricity Light	Living things and their habitats	Evolution & Inheritance Animals, including humans

Progression in Key Science skills

Please see attached Progression documents (including working scientifically) for:

Science Progression Overview KS1

Science Progression Overview LKS2

Science Progression Overview UKS2

Key Learning to remember (end points)

Aims

The national curriculum, and our science curriculum at Waddington All Saints, aims to ensure that all pupils:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them
- are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future

End Points

Year 1 can:

- Identify and name a variety of common wild and garden plants, including deciduous and evergreen tree
- Identify and describe the basic structure of a variety of common flowering plants, including trees.
- 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.
- 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.
- observe changes across the four seasons and observe and describe weather associated with the seasons and how day length varies.

Year 2 can:

- 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 microhabitats
- 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. ☑ 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.
- 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.
- 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.

Year 3 can:

- 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.
- 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.
- 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.
- 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 an opaque object
- Find patterns in the way that the size of shadows change. ☐ 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.

Year 4 can:

- 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.
- 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.
- 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 (°C)
- Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.
- 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.
- 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.

Year 5 can:

- 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.
- Describe the changes as humans develop to old age.
- 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.
- 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.
- 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.

Year 6 can

- 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.
- 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.
- 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.
- 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.
- 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