

## Sequence of knowledge and skills across the curriculum in Science

### Common themes across the science curriculum sequenced from EYFS and into KS3

#### **Technical, scientific vocabulary**

**EYFS:** plants, teeth, mouth, toothbrush, plants, living, non- living, leaves, flowers, stalk, pollen, insects, animals, materials, hard, soft, shiny, bricks, wood, straw, magnets, weather, rain, sun, wind, rainbows, snow, Autumn, Winter, Spring, Summer. Life cycle, butterfly, chrysalis, pupa, frog, tadpole, chicks. Earth, Sun, Moon, space, stars, astronauts, rockets, Neil Armstrong.

**Key Stage 1:** leaves, flowers, blossom, petals, fruit, roots, bulb, seed, trunk, branches, stem, head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth, toothbrush. Habitats, living, dead, micro-habitats, food chain. Materials, wood, plastic, glass, water, rock. Hard/soft, stretchy/stiff, shiny/dull, rough/smooth, waterproof/not waterproof, absorbent/not absorbent, opaque/transparent, brick, paper, fabric, elastic, foil, metal, cardboard. Weather, seasons, Autumn, Winter, Spring, Summer

**Lower Key Stage 2:** vertebrate animals fish, amphibians, reptiles, birds, mammals, invertebrates, snails, slugs, worms, spiders, insects. Prey, predator, producer, food chain. Digestive system, mouth, tongue, teeth, oesophagus, stomach, large and small intestine. Habitats. Rocks, organic. Opaque, transparent, light, shadow. Forces, magnetic, attract, repel, poles. Evaporation, condensation, water cycle, temperature. Vibration, sound. Cells, wires, bulbs, switches, buzzers, circuit, switch

**Upper Key Stage 2:** mammal, amphibian, reproduction, life cycle, puberty, gestation. Micro—organisms, vertebrates, invertebrates, circulatory system and functions of the heart, blood vessels and blood. Nutrients, evolution, inheritance. Fossils, offspring, environment, adaptation. Solution, filtering, sieving, evaporating, solution, solids, liquids and gasses, reversible, dissolving, mixing, changes of state. Sun, Moon, Earth, spherical, orbit, solar system, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto, Moon. Gravity, forces, air resistance, water resistance, friction, Isaac Newton. Periscope, physics, chemistry, biology. Systematically, circuits, symbols, voltage.

#### **Mathematics**

**EYFS:** sorting and grouping a variety of objects for a variety of reasons using sorting circles. Collect rainwater and measure using standard and non-standard measures. Measure sunflower heights.

**Key Stage 1:** use simple measurements and equipment to gather data, record simple data, sort and group objects and materials.

**Lower Key Stage 2:** Observe changes over time, notice patterns, group and classify things, carry out simple comparative and fair tests. Record findings using, drawings, labelled diagrams, keys, bar charts, and tables. Talk about criteria for grouping, sorting and classifying; and use simple keys. Collect data from observations and measurements. Use simple tables and standard units.

**Upper Key Stage 2:** Take 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

Science	Knowledge	Skills
EYFS	<ul style="list-style-type: none"> <li>• Know that changes can be reversed – melting ice</li> <li>• Know that some changes eg. bread making cannot be reversed</li> <li>• Know that plants grow and change over time</li> <li>• Know that brushing teeth helps to keep them clean and that eating less sweets and sugar can help</li> <li>• Know what living things need to grow and stay alive – water, food, light, warmth</li> <li>• Know that earth is a planet in space</li> </ul>	<ul style="list-style-type: none"> <li>• Observe changes over time – growing plants</li> <li>• Use scientific vocabulary eg. Chrysalis</li> <li>• Know how to care for living things eg plants, chicks, butterflies</li> <li>• Brush teeth effectively</li> <li>• Sort foods into healthy and unhealthy</li> <li>• Sort insects using different criteria</li> <li>• Name earth, Sun, Moon and some other planets</li> </ul>
<p><b>End Point : Children will use scientific vocabulary in context. They will know how to care for living things like plants and chicks/caterpillar/butterflies. Children will be able to discuss how things such as ice can change over time. EYFS pupils will know how to clean their teeth effectively and how to look after them by brushing twice a day and limiting sugar intake. They will know the difference between healthy and unhealthy amounts of foods. Know that they live on planet Earth in space and they can see the Moon and the Sun in the sky.</b></p>		
Science	Knowledge	Skills
Year 1/Year 2	<p><b>Biology – Plants (Y1/2/3/4)</b></p> <ul style="list-style-type: none"> <li>• <b>Know</b> common names of flowers, examples of deciduous and evergreen trees, and plant structures, including <b>leaves, flowers, blossom, petals, fruit, roots, bulb, seed, trunk, branches, stem</b></li> <li>• <b>Know</b> the names of common plants and the different parts of plants including trees</li> <li>• <b>Know</b> that plants change over time</li> <li>• <b>Know</b> how to observe, record and label plants</li> <li>• <b>Describe</b> how plants need water, light and a suitable temperature to grow and stay healthy</li> <li>• <b>Know</b> what plants need for germination, growth and survival</li> <li>• <b>Know and describe</b> the processes of reproduction and growth in plants</li> <li>• <b>Know</b> that seeds and bulbs need water to grow but most do not need light</li> </ul>	<p><b>Biology – Plants (Y1/2/3/4)</b></p> <ul style="list-style-type: none"> <li>• <b>Name</b> a variety of common wild and garden plants, including deciduous and evergreen trees</li> <li>• <b>Describe</b> the basic structure of a variety of common flowering plants, including trees</li> <li>• <b>Observe</b> the growth of flowers and vegetables that they have planted</li> <li>• <b>Explore</b> and answer questions about plants growing in their habitat</li> <li>• <b>Work scientifically</b> by: <b>observing</b> closely, using magnifying glasses, <b>comparing and contrasting</b> familiar plants; <b>identifying and grouping</b> plants</li> <li>• <b>Draw diagrams</b> showing the parts of different plants including trees.</li> <li>• <b>Keep records</b> of how plants have changed over time, for example the leaves falling off trees and buds opening</li> <li>• <b>Observe and describe</b> how seeds and bulbs grow into mature plants</li> </ul>

- **Know** that seeds and bulbs have a store of food inside them

### **Biology - Living things and their habitats** (Y1/2/3/4/5/6)

- **Know** the difference between things that living, dead and have never been alive
- **Understand** that living things live in habitats that are suited to them.
- **Know** that animals obtain food from plants and other animals.
- **Know** that a micro-habitat is a very small habitat for example wood lice living under stones or leaf litter.

### **Biology - Animals including humans** (Y1/2/3/4/5/6)

- **Know** that carnivores are meat eaters, herbivores eat vegetation and omnivores eat a combination of both.
- **Be able to** categorise animals including humans as carnivores, herbivores and omnivores
- **Know** which part of the body is associated with each sense
- **Understand** how to take care of animals taken from their local environment and the need to return them safely after study.
- **Know** the common names of some fish, amphibians, reptiles, birds and mammals, including those that are kept as pets.
- **Learn** the names of the main body parts (including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth) through games, actions, songs and rhymes.
- **Know** that animals, including humans, have offspring which grow into adults

- **Grow** plants from seeds and bulbs
- **Use** the local environment throughout the year to observe how different plants grow.

### **Biology - Living things and their habitats**

- **Describe** a variety of different habitats and the kinds of animals and plants that live in them.
- **Name** a variety of plants and animals including micro-habitats
- **Describe** a simple food chain
- **Identify** and name different sources of food

### **Biology - 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
- **Group** animals according to what they eat and their habitats.
- **Describe** the basic needs of animals, including humans, for survival (water, food and air)
- **Describe** the process of growth and change in humans and animals.
- **Use scientific vocabulary** such as; egg, chick, chicken; egg, caterpillar, pupa, butterfly; spawn, tadpole, frog; lamb, sheep. Baby, toddler, child, teenager, adult.

	<ul style="list-style-type: none"> <li>• <b>Know</b> the importance of exercise, eating the right amounts of different types of food, and hygiene for humans to stay healthy.</li> <li>• <b>Know</b> the basic needs of animals for survival</li> </ul> <p><b>Chemistry – Everyday materials (Y1/2/5/6)</b></p> <ul style="list-style-type: none"> <li>• <b>Know</b> the materials everyday objects around them are made from eg, brick, paper, fabric, elastic, foil, metal, cardboard and can be used for different purposes</li> <li>• <b>Know</b> that the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</li> </ul> <p><b>Physics – seasonal changes (Y1/2)</b></p> <ul style="list-style-type: none"> <li>• <b>Know</b> how the weather changes according to the season</li> <li>• <b>Know</b> how the length of the day changes over the year</li> </ul>	<p><b>Chemistry – Everyday materials</b></p> <ul style="list-style-type: none"> <li>• <b>Identify</b> an object and what it is made from eg, wood, plastic, glass, water, rock</li> <li>• <b>Group</b> everyday materials according to physical properties</li> <li>• <b>Describe</b> physical properties of everyday materials eg. Hard/soft, stretchy/stiff, shiny/dull, rough/smooth, waterproof/not waterproof, absorbent/not absorbent, opaque/transparent</li> </ul> <p><b>Physics – seasonal changes</b></p> <ul style="list-style-type: none"> <li>• <b>Observe and record</b> changes throughout the four seasons</li> <li>• <b>Make</b> tables and charts to record the weather throughout the year</li> </ul>
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**Key Stage 1 End Point**  
Pupils will have experienced and observed phenomena, looking more closely at the natural and humanly-constructed world around them. They will have had opportunities to be curious and ask questions about what they notice. Pupils will use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Pupils will have learned about science through lots of first-hand practical experiences. They will have observed changes over time noticed patterns and used mathematical skills to group and classify things. They will have used secondary sources of information such as books, photographs and videos. They will know the properties of some everyday materials and their uses. Children will be able to describe how the weather changes according to the season.

Science	Knowledge	Skills
Year 3/Year 4	<p><b>Biology - Plants</b></p> <ul style="list-style-type: none"> <li>• <b>Know</b> the functions of different parts of flowering plants</li> <li>• <b>Know</b> what plants need to survive and how this may vary between plants</li> <li>• <b>Know</b> and be able to describe the life cycle of flowering plants</li> </ul>	<p><b>Biology - Plants</b></p> <ul style="list-style-type: none"> <li>• <b>Identify and describe</b> the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers</li> <li>• <b>Explore</b> 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</li> </ul>

- **Know**, document and describe the function of the roots and stem in nutrition and support, leaves for nutrition and flowers for reproduction.
- **Know** that plants make their own food
- **Be able to** group plants into categories such as flowering plants (including grasses) and non-flowering plants, such as ferns and mosses.
- **Know about** the effects of human impact (both positive and negative) on environments, for example, the positive effects of nature reserves, garden ponds, and the negative effects of population, development and deforestation.

#### Biology – Animals including humans

- **Know** 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
- **Know** that humans and some other animals have skeletons and muscles for support, protection and movement.
- **Know** different food groups and how they keep us healthy
- **Know** that animals including humans need water, food and air to survive.
- **Understand that** healthy lifestyles include exercise, eating the right amounts of different foods and good hygiene
- **Know** the names and functions of parts of the human digestive system.
- **Know** the names and functions of human teeth.

- **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.
- **Compare** the effect of different factors on plant growth, the amount of light, the amount of fertilizer
- **Observe** the different stages of plant life cycles over a period of time; looking for patterns in the structure of fruits that relate to how the seeds are dispersed.
- **Observe** how water is transported in plants by putting cut, white carnations into coloured water and observing how water travels up the stem to the flowers.
- **Use and make** simple guides or keys to identify local plants

#### Biology – Animals including humans

- **Name some of the bones** in the human skeleton
- **Identify different parts of the body** and their special functions.
- **Group animals with and without skeletons;** observe and compare their movement
- **Compare and contrast** the diets of different animals (including their pets)
- **Group animals** according to what they eat
- **Research different food groups** and how they keep us healthy
- **Design healthy meals** based on food groups
- **Put vertebrate animals into groups** such as fish, amphibians, reptiles, birds, and mammals; **and invertebrates** into snails and slugs, worms, spiders, and insects.
- **Use and make simple guides** or keys to identify local plants and animals
- **Describe** the simple functions of the human digestive system.
- **Construct and interpret** food chains.

### Biology - Living things and their habitats

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

### Physics – Rocks – link to geography (Y3/4)

- **Know** that soil is made from rocks and organic matter
- **Understand** how fossils are formed

### Physics – Light (Y3/4/5/6)

- **Know** that light is reflected from surfaces
- **Understand** that light is needed to see
- **Know** that light travels in straight lines
- **Know** that shadows are formed when light is blocked by an opaque object
- **Understand** it is not safe to look directly at the sun

### Physics - Forces and magnets (Y3/4/5/6)

- **Know** that some forces need contact between two surfaces
- **Know** that magnetic forces act at a distance
- **Know** that magnets have two poles

### Chemistry – States of matter (Y3/4/5/6)

- **Know** and be able to explain the water cycle
- **Know** that heating water increases the rate of evaporation
- **Understand** how water changes as it is heated and cooled

### Biology - Living things and their habitats

- **Use classification keys** to help group, identify and name a variety of living things in their local and wider environment
- **Group living things** in a variety of ways

### Physics – Rocks – link to geography

- **Group** rocks according to appearance and properties

### Physics – Light

- **Describe** how the size of shadows can change and measure them
- **Use** mirrors to investigate how light behaves
- **Describe** how to protect eyesight from the sun

### Physics - Forces and magnets

- **Compare** how things move on different surfaces
- **Group** everyday objects to show if they are attracted to a magnet or not
- **Predict** whether two magnets will attract or repel
- **Use** different magnets, bar, ring, button, horseshoe
- **Conduct** tests to find out about the strengths of magnets, how far objects travel on different surfaces

### Chemistry – States of matter

- **Group materials** together according to state solid, liquid or gas
- **Heat and cool** materials until they change state and measure the temperature

	<ul style="list-style-type: none"> <li>• <b>Know</b> that solids hold their shape, liquids form a pool, gasses escape from unsealed containers</li> </ul> <p><b>Physics - sound (Y3/4)</b></p> <ul style="list-style-type: none"> <li>• <b>Know</b> that vibrations form sounds travel through a medium (usually the air) to the ear</li> <li>• <b>Understand</b> how sounds get fainter as the distance from the sound increases</li> </ul> <p><b>Physics – electricity (Y3/4/5/6)</b></p> <ul style="list-style-type: none"> <li>• <b>Know</b> that metals are good conductors of electricity</li> <li>• <b>Know</b> that a switch opens and closes a circuit</li> <li>• <b>Know</b> that bulbs get brighter the more cells are added into a circuit</li> <li>• <b>Understand</b> the dangers of electricity and how to keep themselves safe.</li> </ul>	<p><b>Physics - sound</b></p> <ul style="list-style-type: none"> <li>• <b>Investigate</b> patterns in the pitch of a sound and the object producing the sound</li> <li>• <b>Find</b> patterns between the volume of a sound and the strength of the vibrations that produced it</li> <li>• <b>Explore</b> vibration and sound in a range of musical instruments from around the world</li> </ul> <p><b>Physics – electricity</b></p> <ul style="list-style-type: none"> <li>• <b>Identify</b> appliances that run on electricity</li> <li>• <b>Construct</b> a simple series circuit using cells, wires, bulbs, switches, buzzers</li> <li>• <b>Investigate</b> if a bulb will light depending on the bulb being part of a complete loop with the battery</li> <li>• <b>Draw</b> circuits in their own pictorial representation – conventional circuit symbols are taught in Y6</li> </ul>
<p><b>Lower Key stage 2 end point</b>  Pupils will have broadened their scientific view of the world around them. They will use scientific vocabulary to talk and write about what they have found out. Pupils will know about the positive and negative impact of humans on the environment. They will know how to live a healthy lifestyle and about food groups. Children will be able to group and classify living things. They will know about bones and skeletons and humans and animals move. They will be able to group rocks according to their properties and know what fossils are. Children will understand how shadows are formed and that light travels in straight lines. They will know key facts about magnets. They will understand the water cycle and the different states of water. Children will have carried out investigations into sound and vibration and know that sound travels through a medium usually air. They will remember that metals are good conductors of electricity and know how to construct a simple circuit.</p>		
<p><b>Science</b></p>	<p><b>Knowledge</b></p>	<p><b>Skills</b></p>
<p><b>Year 5/Year 6</b></p>	<p><b>Biology – Living things and their habitats</b></p> <ul style="list-style-type: none"> <li>• <b>Describe</b> the life process of reproduction in some plants</li> <li>• <b>Know about</b> different types of reproduction in plants</li> </ul>	<p><b>Biology – Living things and their habitats</b></p> <ul style="list-style-type: none"> <li>• <b>Grow</b> new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs.</li> </ul>

- **Know** the changes experienced in puberty
- **Know that** gestation periods are different across species

#### **Biology – Animals including humans**

- **Understand** the impact of diet, exercise, drugs and lifestyle on their bodies
- **Know** how nutrients and water are transported in animals

#### **Biology – Evolution and inheritance (Y5/6)**

- **Know** that living things have changed over time
- **Know** that living things produce offspring that are not identical to parents
- **Understand** that animals and plants adapt according to their environment **Know** about the findings of Charles Darwin and his influence on scientific thinking

#### **Chemistry - Properties and changes of materials**

- **Know** that some materials dissolve in liquid to form a solution and how to recover a substance from a solution
- **Understand** the difference between solids, liquids and gasses
- **Understand** and be able to demonstrate that dissolving, mixing and changes of state are reversible

#### **Physics – Earth and Space (Y5/6)**

- **Know** that the Moon orbits the Earth
- **Know** that the Sun, Earth and Moon are spherical
- **Understand** that day and night are caused by the Earth's rotation

- **Describe the life cycles** of a mammal, an amphibian, and insect and a bird
- **Classify living things building on knowledge from Y4**, including plants, animals and micro-organisms into broad groups and give reasons

#### **Biology – Animals including humans**

- **Identify** the main parts of the circulatory system and functions of the heart, blood vessels and blood

#### **Biology – Evolution and inheritance**

- **Examine** fossils for information about how animals have changed over time – building from knowledge gained about rocks in Y3.
- **Describe** how animals and plants adapt to suit their environment eg, penguins and camels
- **Describe** how adaptation leads to evolution

#### **Chemistry - Properties and changes of materials**

- **Compare and group** materials according to properties of hardness, solubility, transparency, conductivity and response to magnets.
- **Separate**, mixtures by filtering, sieving and evaporating
- **Give reasons** for the uses of everyday materials using evidence from testing
- **Explain** that some changes form new materials and are not reversible including burning

#### **Physics – Earth and Space**

- **Describe** the movement of the Earth, planets and the Sun in the solar system
- **Explain** day and night in context of the Earth's rotation
- **Remember** the names of the 8 planets in the solar system
- **Create** simple models of the solar system

- **Know** that the Sun is a star and at the centre of our solar system
- **Understand** it is not safe to look directly at the sun

### Physics – Forces

- **Know** that gravity is a force that **pulls** objects towards the Earth
- **Know** that air resistance, water resistance and friction act between moving surfaces
- **Understand** how some mechanisms – levers, pulleys and gears allow a small force to have a greater effect
- **Know** about Isaac Newton and his impact on scientific thinking and theory

### Physics – light

- **Know** that light travels in straight lines
- **Understand** that objects can be seen because they reflect light into the eye
- **Know** that we see things because light travels from light sources to objects and then to our eyes
- **Understand** that shadows have the same shape as the object blocking the light source because light only travels in straight lines

### Physics – electricity

- **Know** that the brightness of a bulb or volume of a buzzer increases with the number and voltage of cells used in a circuit
- **Understand** what the conventional symbols represent in a simple circuit
- **Know strategies for working** systematically and record findings eg change one thing at a time and observe changes

### Physics – Forces

- **Investigate** why objects fall towards the earth
- **Find out** how air resistance can change the speed at which objects fall to the earth eg parachutes, sycamore seeds, flat and scrunched paper
- **Investigate** how friction effects movement, speeds up, slows down or stops moving objects eg. Bicycle brakes

### Physics – light

- **Carry out** investigations to find out how light behaves (reflection and shadows) building on knowledge from Y3
- **Make predictions** using existing knowledge about light investigations
- **Make** periscopes and explain how it works

### Physics – electricity

- **Investigate** changes to the brightness of bulbs and the volume of buzzers in a circuit.
- **Build on work from Y4 to construct and draw** circuits using conventional symbols
- **Give reasons** for variations in how components function eg brightness of bulbs, loudness of buzzers
- **Work systematically** identifying changes by changing one component at a time

<p><b>Key Stage 2 End Point and progression to Key Stage 3</b></p> <p><b>Pupils will be familiar with, and use, scientific technical terminology accurately and precisely. They will have acquired an extended specialist vocabulary. They will be able to apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data. Pupils will be equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future. They will have developed scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics. Pupils will be well prepared to access the Key Stage 3 curriculum and develop a deeper understanding of a range of scientific ideas in the subject disciplines of biology, chemistry and physics.</b></p>		