



Shepherdswell CEP School

Science

Progression of Skills



The 10 big ideas

- 1** There is a relationship between how things are (structure) and the way things work (function)
- 2** Living and non-living things can be grouped in a variety of ways
- 3** Living things move through different stages of growth and development
- 4** Everything on Earth exists in one of three states: solid, liquid, gas and the state of matter can change
- 5** Living things have common life processes to survive; lifestyle choices impact survival and health
- 6** Changing the movement of an object requires a force (push or pull) to be acting on it
- 7** Living things depend on each other and on the environment; this can be positive or negative
- 8** Living things have changed over time
- 9** Energy makes things happen and can be seen by its effects; it can be transferred (but is not used up)
- 10** The movement of the Earth affects the times of day; the Sun is at the centre of our solar system

The 10 big ideas of primary science

Links to the National Curriculum Programmes of Study

Big idea 1:

There is a relationship between how things are (structure) and the way things work (function)

Underpinning concepts: Materials, structure, function, properties

Year 1:

- identify and describe the basic structure of a variety of common flowering plants, including trees
- describe and compare the structure of a variety of common animals
- identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense
- describe the simple physical properties of a variety of everyday materials

National curriculum links

Year 2:

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

Year 3:

- identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers
- identify that humans and some other animals have skeleton and muscles for support, protection and movement
- describe magnets as having two poles
- predict whether two magnets will attract or repel each other, depending on which poles are facing

Year 4:

- identify 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
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Year 5:

- give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
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Year 6:

- identify and name the main parts of the circulatory system, and describe the functions of the heart, blood vessels and blood.

Big idea 2:

Living and non-living things can be grouped in a variety of ways

Underpinning concepts: Structure, deciduous, evergreen, amphibians, reptiles, mammals, birds, fish, classification, organisms.

**National
curriculum
links****Year 1:**

- identify and name a variety of common wild and garden plants, including deciduous and evergreen 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
 - compare and group together a variety of everyday materials on the basis of their physical properties
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Year 2:

- explore and compare the differences between things that are living, dead and things that have never been alive
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Year 3:

- compare and group together different kinds of rocks on the basis of their appearance and simple physical properties
 - 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
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Year 4:

- 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
 - *explore ways of grouping a wide selection of living things that include animals, flowering plants and non-flowering plants**
 - compare and group materials together, according to whether they are solids, liquids or gases
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Year 5:

- compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity and response to magnets
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Year 6:

- 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.

Big idea 3:

Living things move through different stages of growth and development

Underpinning concepts: Change, life cycle, reproduction, offspring, genetics

Year 2:

- notice that animals, including humans, have offspring which grow into adults
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National curriculum links**Year 5:**

- 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.

Big idea 4:

Everything on Earth exists in one of three states: solid, liquid, gas and the state of matter can change

Underpinning concepts: Mass, matter, states of matter, changing states of matter, water cycle, temperature, reversible and irreversible changes.

Year 2:

- find out about the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching
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Year 4:**National curriculum links**

- 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
 - identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature
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Year 5:

- now 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
- 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.

Big idea 5:

Living things have common life processes to survive; lifestyle choices impact survival and health

Underpinning concepts: Senses, carnivore, herbivore, omnivore, environment, life processes, reproduction, nutrition, survival, skeleton, muscles, digestive system, circulatory system, organs.

Year 2:

National curriculum links

- find out and describe how plants need water, light and a suitable temperature to grow and stay healthy
- 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

Year 3:

- 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
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- 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 amounts 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 skeleton and muscles for support, protection and movement
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Year 4:

- describe the simple functions of the basic parts of the digestive system in humans
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Year 5:

- 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
-

Year 6:

- 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.

Big idea 6:

Changing the movement of an object requires a force (push or pull) to be acting on it

Underpinning concepts: Magnetism, air resistance, gravity, friction, water resistance, mechanisms.

**National
curriculum
links**

Year 3:

- 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
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Year 5:

- 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.
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Big idea 7:

Living things depend on each other and on the environment; this can be positive or negative

Underpinning concepts: Climate change, sustainability, energy conservation, habitat, microhabitats, food chains, population, development.

Year 2:

**National
curriculum
links**

- 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
 - 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
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Year 4:

- recognise that environments can change and that this can sometimes pose dangers to living things
- construct and interpret a variety of food chains, identifying producers, predators and prey.

Big idea 8:

Living things have changed over time

Underpinning concepts: Theory of evolution, organic matter, adaptation, variation, offspring, fossils.

National curriculum links**Year 3:**

- describe in simple terms how fossils are formed when things that have lived are trapped within rock
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Year 6:

- 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.
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Big idea 9:

Energy makes things happen and can be seen by its effects; it can be transferred (but is not used up)

Underpinning concepts: Light, sound, electricity, waves, conductors and insulators.

Year 3:

- recognise that they need light in order to see things and that dark is the absence of light
- recognise that shadows are formed when the light from a light source is blocked by an opaque subject
- find patterns in the way that the size of shadows change

National curriculum links

Year 4:

- 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 vibrations that produced it
- 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

Year 6:

- 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

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- 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.
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Big idea 10:

The movement of the Earth affects the times of day; the Sun is at the centre of our solar system

Underpinning concepts: Seasons, weather, solar system, Earth.

Year 1:

- observe changes across the 4 seasons

National curriculum links

Year 5:

- 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.

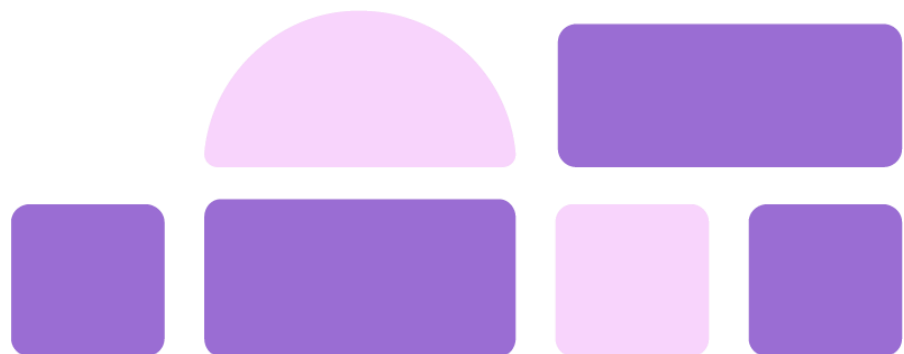
Components to composites – from the little ideas to the big ideas

Imagine the primary science curriculum as a puzzle. Each piece, no matter how small, contributes to the overall image. These individual pieces are our components – the specific facts, concepts, and skills. When we connect these components, they form larger, more complex ideas known as composites. These are the overarching concepts that help children make sense of the world.

At the heart of our curriculum are **big ideas** – the broad, unifying concepts that guide our teaching. These provide the framework for selecting and sequencing curriculum components.

By carefully choosing and connecting curriculum components, we build a strong foundation of essential substantive knowledge. This means children not only learn facts but also understand how these facts relate to each other and the wider world. For instance, understanding that plants need water to grow (component) is essential, but knowing why this water is essential to life (composite) and how this relates to the broader composite concept of 'living things move through different stages of growth and development' (big idea) is where the real learning happens.

It's like building a house. Bricks (components) are important, but the architectural plan (big ideas) and the way they are assembled (composites) determine the overall structure and purpose of the building. In the same way, we have carefully constructed our primary science curriculum to ensure children develop a deep and enduring understanding.



1 There is a relationship between how things are (structure) and the way things work (function)

By the end of **Year 1**, pupils will know...

Everyday materials

- An **object** is something that you can touch. A **material** is what the object is made from.
- **Materials** which have the property of being **absorbent**, soak up liquids, for example water.
- **Waterproof** means that water cannot pass through an object or **material**. It is a material that **keeps water out**.

Animals, including humans

- There are many different parts of the **human body**, and each one has a different job to do.
- Humans have **five senses**. These are **touch, sight, smell, hearing** and **taste**.
- **Eyes** are associated with **sight**, **ears** with **hearing**, **nose** with **smell**, **skin** with **touch** and **tongue** with **taste**.

Plants

- **Roots** keep the plant in the ground and hold it up. They also take in **water** from the **soil**.
- **Flowers, petals, roots, stem** and **leaves** are all parts of flowering **plants**.
- **Trunks, branches, bark, blossom and fruit** are parts of a **tree**. **Trees** are **plants**.

By the end of **Year 3**, pupils will know...

Forces and magnets

- **Magnets** can vary in strength based on their **size, shape** (eg horseshoe, bar and ring), and the **type of material** from which they are made. Some magnets are stronger than others.

Light

- We need **light** to see. Light can come from many different **sources**, such as the Sun, stars, torches, lamps and candles.

Rocks

- Some rocks are more **durable** than others. These rocks are good for building as they last a long time without breaking or getting weaker.
- Some rocks, such as sandstone or chalk, let water soak through them. They are called **permeable** rocks. Other rocks, such as slate, do not let water soak through them. They are called **impermeable** rocks.

Plants

- Plants spread their seeds in lots of different ways. This is called seed **dispersal**. Some seeds are **transported** by the wind and are shaped to float, glide or spin through the air. This is important to prevent seeds from needing to **compete** for **space, light, water** and **nutrients**.
- **Roots**: keep the plant steady and **upright** in the soil. **Root hairs** absorb **water** and **nutrients** (food) from the soil.
- **Stem**: carries **water** and **nutrients** to different parts of the plant. The stem of a tree is called its **trunk**. This often divides into smaller **branches**.
- **Leaves**: Use light from the Sun, along with **carbon dioxide** from the air and water to make food for the plant.
- **Flowers**: are involved in plant **reproduction** and produce **seeds** from which new plants grow.
- Plants need **water** to make their own food. Water is **absorbed** and **transported** through the **stem, leaves** and **roots**.

Animals, including humans

- **Muscles** often work in pairs, pulling on your bones so that you can move. Your skeleton has **joints** which allow movement. When a muscle **contracts** it gets shorter and then **relaxes** to return to its normal length.

By the end of **Year 4**, pupils will know...

States of matter

- **Solids**: stay in one place and can be held, keep their shape, always take up the same amount of space and can be cut or shaped.
- **Liquids**: flow or can be poured easily (they are not easy to hold) and change their shape depending on the container they are in; they always take up the same amount of space (their volume stays the same).
- **Gases**: are often invisible, do not have a fixed shape (they spread out and change their shape and volume to fill up whatever container they are in); they can be squashed

Animals, including humans

- **Humans** have **three types of teeth**. These are:
- **Molars** - These are the teeth at the back of your mouth which are used for grinding up food.
- **Incisors** - The teeth at the very front of your mouth that are used for cutting food.
- **Canines** - The teeth at the sides of your mouth between the incisors and the molars. These are used for tearing up food.

By the end of **Year 5**, pupils will know...

Properties and changes of materials

- **Materials** that make the best **thermal insulators** are typically those that trap air well. These materials trap small pockets of air that act as barriers to slow down the **transference** (movement) of heat, helping to keep things warm or cool.
- **Air** is a good **insulator** because it is a poor **conductor** of heat.
- **Filtering** is a method to separate a solid from a liquid in a mixture. It involves passing the mixture through a **filter**, often made of paper or another porous material. The liquid passes through, leaving the solid behind.
- **Sieving** is a method to separate different-sized particles in a mixture. A **sieve**, which is a tool with holes of a specific size, is used. Smaller particles pass through the holes, while larger ones are retained.
- **Evaporation** is a method to separate a solute from a solvent in a mixture. It involves heating the mixture to allow the solvent to turn into vapor and leave the solute behind. The vapor can be condensed back into a liquid.

By the end of **Year 6**, pupils will know...

Animals, including humans

- The **circulatory system** has three main parts: the **heart** (a muscular organ that pumps blood), **blood vessels** (arteries, veins, and capillaries), and **blood** (which carries oxygen, nutrients, hormones, and waste products).
- The **circulatory system** transports **nutrients, water** and **oxygen** to the entire body.
- Blood is made from four parts: Red blood cells which **transport oxygen**. White blood cells which **protect against disease**. Blood platelets help the blood to clot and **form scabs to repair a cut**. Plasma is a yellowy liquid that **carries** these cells and **important nutrients around your body**.
- The **circulatory system** transports **water** and **nutrients** around the body.
- Not all animals have the same system – some have **double circulatory systems** and some have **single**, some have **closed circulatory systems** and some have **open**.

2

Living and non-living things can be grouped in a variety of ways

By the end of **Year 1**, pupils will know...

Everyday materials

- **Properties** is a word that helps us to describe the characteristics (the way they look, feel or act) of different **materials**. We can **group** different materials together based on their properties.

Animals, including humans

- All **birds** lay **eggs**. They all have **beaks, feathers, two legs** and **two wings** - most birds can **fly** but some cannot. Birds have lungs and **breathe air**. They are **warm blooded**.
- All **fish** live in **water** and have **scales**. They don't have legs. They have **gills** that allow them to breathe underwater. Most fish lay soft **eggs**. They are **cold blooded**.
- All **mammals** have **hair**. Mammals have lungs and **breathe air**, but **not all live on land**. Mammals are **warm blooded**. They give birth to **live young**.
- All **amphibians** can **live on land and in water**. Most have **slimy skin**. Most amphibians **lay eggs**. They are **cold blooded**.
- All **reptiles** have **dry, scaly skin**. They **breathe air**, they are **cold-blooded** and **lay eggs**. Reptiles can **live on land and in water**.
- **Carnivores** eat other animals and do not eat plants. **Herbivores** eat plants and do not eat other animals. **Omnivores** eat both plants and other animals.

Plants

- **Deciduous trees** change and drop their leaves with the seasons. **Evergreen trees** stay green and keep their leaves all year round.

By the end of **Year 2**, pupils will know...

Uses of everyday materials

- Everyday **objects** are made from **materials** that have different **properties**.
- Different **materials** have different **properties**, making them **suitable** for specific **purposes and uses**.

Animals, including humans

- All animals, including humans are born, get older and grow bigger and most will go on to have offspring of their own. All animals are at a stage in their lifecycle.

Living things and their habitats

- Living things can grow, change, move, reproduce and use their senses.
- Dead things were once alive (were once part of a living thing or a living thing that has died) but no longer show signs of life.
- Things that have never been alive are objects or materials that were never part of a living thing.

By the end of **Year 3**, pupils will know...

Forces and magnets

- **Magnets** are **metals** that attract other metals (eg **iron, steel** and **nickel**).
Every magnet is a metal, but not all metals are magnets.

Rocks

- **Rock**, or stone, is a hard **material**. Different groups of rock have their own unique **appearance** and set of **physical properties**:
- **Sedimentary rocks** are laid down in layers which are made from broken up bits of other rocks and remains of animals and plants that have been squashed together. They **can be soft and wear away easily**.
- **Igneous rocks** are made when molten rock (lava or magma from a volcano) cools down. They **are very hard and do not wear away easily**.
- **Metamorphic rocks** are rocks that have been changed over time by intense heat and pressure deep underground. They **are hard and can be polished**.

By the end of **Year 4**, pupils will know...

States of matter

- Solids, liquids and gases are called **the three states of matter**.
Each one has its own unique set of properties ([link to Big Idea 1](#)).

Electricity

- Some **appliances** require **mains electricity**, and some require **batteries** to operate. Appliances convert **electrical energy** into other types of **energy**.
- Some **materials** let electricity pass through them easily. These materials are known as **electrical conductors**.

- Some **materials** do not allow electricity to pass through them. These materials are known as **electrical insulators**.

Animals, including humans

- Different **animals** have different **teeth** based on their **diet**:
- **Herbivores** are animals that only eat **plants**. They need **flat molars** and **flat incisors**.
- **Carnivores** are animals that only eat **meat**. They need **canines** and **incisors**.
- **Humans** are **omnivores** eat **plants and meat**. They need all three types of teeth – **canines, incisors** and **molars**.

Living things and their habitats

- **Classification** is putting things into **groups**. Living things can be divided into these groups or 'classified' by looking at similarities and differences between the way they look and behave.
- Animals are divided into two main groups. Animals that have a **backbone** (spine) are called **vertebrates**. Animals that do not have a **backbone** are called **invertebrates**.
- A **classification key**, also known as an identification key or **dichotomous key**, is a tool used by scientists and naturalists to help identify and categorise living things.

By the end of **Year 5**, pupils will know...

Properties and changes of materials

- A thermal conductor is a material that lets heat pass through it easily. Thermal refers to anything related to heat. Conductor is something that allows the flow of a particular thing.
- A thermal insulator is a material that reduces or prevents the transfer of heat. Thermal refers to anything related to heat. Insulator is a material or substance that does not easily allow the transfer of electricity, heat, or sound.

By the end of **Year 6**, pupils will know...

Living things and their habitats

- The **classification** of animals involves organising them into groups based on shared **characteristics**. This is known as **taxonomy**. This helps scientists to study and understand the enormous variety of **living organisms**.
- Animals can be sorted in a variety of ways eg **vertebrates, invertebrates, warm-blooded, cold-blooded** or into groups such as **annelids, molluscs, arachnids**.
- **Classification** enables scientists to **identify** relationships among species, **predict** traits, and **communicate** biological information effectively. It is a crucial tool in simplifying the study of animals and contributing to our overall understanding of the natural world.

- **Plants** can be **classified** based on shared **characteristics**. This is known as **plant taxonomy**. This process helps scientists to organise plants into **systematic** and **meaningful groups**.
- Different **plant groups** have specific **adaptations** that suit particular **environmental conditions**.
- **Microorganisms**, including **bacteria**, **viruses**, **fungi**, and **protists**, play a crucial role in various aspects of life on Earth.

By the end of **Year 6**, pupils will know...

Electricity

- When drawing **circuit diagrams**, rather than drawing detailed **components**, we use simple **symbols** to represent the different components.

3 Living things move through different stages of growth and development

By the end of **Year 2**, pupils will know...

Animals, including humans

- All animals, including humans are born, get older and grow bigger and most will go on to have **offspring** of their own. All animals are at a **stage** in their **lifecycle**.
- Human body parts **change with age**. As people grow older, their body goes through various changes.

Plants

- **Germination** is the process by which **seeds** begin to **grow into plants**.
- The **cycle** from **seed** to **plant** to **flower** to **seed** is called a **lifecycle**.
- The **lifecycle** of a plant involves five main stages: **seed** > **sprout** > **plant** (**leaf**, **stem**, **root**) > **flower** > **fruit**. This cycle repeats.

By the end of **Year 5**, pupils will know...

Living things and their habitats

- A **lifecycle** is the **different stages** of life for all living things, including humans. There are normally four major events in the **lifecycle** of animals: **birth - growth - reproduction - death**.
- There are some significant differences in the specific **developmental processes** for the **lifecycles** of **mammals**, **amphibians**, **insects**, and **birds**.

Animals, including humans

- There are six stages in the **human lifecycle**:
 1. **Foetus** - a baby is growing inside the womb.
 2. **Baby** - A baby is born after spending nine months inside the womb.
 3. **Childhood** - you learn to walk and talk.
 4. **Adolescence** - stage between childhood and adulthood when children become teenagers and bodies develop during puberty.
 5. **Adulthood** - body is fully developed and this is the stage where some women may have babies.
 6. **Old age** - the last stage in the lifecycle of a human
- **Puberty** is a natural process during which an individual undergoes **physical** and **hormonal** changes, marking the transition from **childhood to adulthood**. These changes include the development of characteristics, such as the growth of body hair, changes in voice pitch, and the onset of reproductive capabilities.
- Generally, the larger the animal, the longer the **gestation period**. Humans have a gestation period of around nine months.

4 Everything on Earth exists in one of three states: solid, liquid, gas and the state of matter can change

By the end of **Year 2**, pupils will know...

Uses of everyday materials

- The shapes of **solid objects** made from some **materials** can be changed by **squashing, bending, twisting** and **stretching**.

By the end of **Year 4**, pupils will know...

States of matter

- Solids, liquids and gases are called **the three states of matter**. Each one has its own **unique set of properties**
- When some solids are heated, they **melt** and turn into a liquid. The temperature this happens at is called the **melting point**, and it is measured in degrees Celsius (°C).
- When a liquid is cooled, it **freezes** and turns into a solid. Freezing happens at the same temperature as the melting point.
- Higher temperatures speed up evaporation and lower humidity (dry air) helps things dry faster.

By the end of **Year 5**, pupils will know...

Properties and changes of materials

- A **reversible change** in science is a change that can be undone or reversed, and the original **substance** or **materials** can be **recovered**. *Some examples of reversible changes include **melting, freezing, mixing, dissolving, evaporating** and **condensing**.*
- An **irreversible change** is a permanent change that creates something new or different. It cannot be undone. *Some examples of irreversible changes include **heating, mixing** and **burning**.*

5 Living things have common life processes to survive; lifestyle choices impact survival and health

By the end of **Year 2**, pupils will know...

Animals, including humans

- Animals, including humans all need water, air, shelter and food to survive.
- Exercise is a way of moving our bodies to stay healthy. It makes our muscles and bones strong, keeps our lungs and heart healthy, and helps us feel good.
- Animals, including humans need to eat a balanced diet to stay healthy. This includes eating the right amount of fruit, vegetables, cereal, meat, dairy, fat and sugar.

Plants

- Plants need **water, light, the right temperature** and **air** to grow and keep healthy.

By the end of **Year 3**, pupils will know...

Plants

- All plants are alive. They need **air** (carbon dioxide), **light, water, nutrients**, and the right **temperature** to grow and stay healthy. *Some plants need more or less of these than others.*
- Many plants rely on animals and **insects** (like bees*) to **reproduce**.
- To make a seed, a flower* needs to be **pollinated**. This means that pollen from one flower needs to travel to another. Bees and other animals move pollen from plant to plant. This is called **pollination**.

Animals, including humans

- **Animals, including humans, cannot produce their own food.** Animals get the energy they need to survive from a balanced and varied diet with specific types and amounts of nutrients.
- Humans need a balanced diet of fruit and vegetables, carbohydrates, protein, dairy and fat to stay healthy.
- It is important to eat a healthy diet with enough protein to help your muscles grow properly. We find protein in meat, fish, eggs and beans.
- To keep pets healthy, provide balanced nutrition, regular exercise, routine veterinary care, proper hygiene, and a loving environment.
- Animals, including humans need a skeleton for support, protection of organs, and to enable movement.
- It is important to eat a healthy diet with enough **calcium** to help your bones grow. We find calcium in dairy products like milk and cheese.
- People who engage in more physical activity often develop stronger muscles because exercise promotes muscle growth and strength.

By the end of **Year 4**, pupils will know...

Animals, including humans

- **Digestion** happens in the **digestive system**. This is made up of different **organs** that break down the food so it can be absorbed into our **blood** to give our body the **nutrients** and **energy** it needs to function.

By the end of **Year 5**, pupils will know...

Living things and their habitats

- **Sexual reproduction** in **plants** is where **pollen** (from the male part of the flower) and **ovule** (from the female part of the flower) come together to make **seeds**, and these seeds grow into new plants.
- **Asexual reproduction** allows plants to reproduce without seeds and produce offspring that are **genetically identical** to the parent plant.
- **Reproduction** means to have babies or **offspring**. To reproduce, animals need a **male** and a **female**. Together they can create offspring when they **mate**. This is called **sexual reproduction**.
- **Internal reproduction** involves the fertilisation of eggs inside the body of the female.
- **External reproduction** involves the release of eggs and sperm into the external environment, where fertilisation takes place.

By the end of **Year 6**, pupils will know...

Animals, including humans

- When you engage in physical activity, especially aerobic exercises like running or cycling, your heart rate typically increases. This is because your muscles require more oxygen and nutrients to meet the increased demand for energy during exercise. The heart responds by pumping more blood, leading to a higher heart rate.
- It is important to eat a healthy diet so that we have energy, our brains can concentrate, we can fight off infections and so that we do not become overweight which can cause long-term poor health.
- We need sleep to help us recover and recharge. This is good for our mental and physical health.
- Some drugs are helpful, like medicines. These should be taken according to the instructions.
- Taking drugs, drinking alcohol and smoking can have very harmful effects on our bodies. They are highly addictive which means it can be difficult to stop and this has damaging, long-term effects on our bodies.

6 Changing the movement of an object requires a force (push or pull) to be acting on it

By the end of **Year 3**, pupils will know...

Forces and magnets

- We need **forces** to make things move. A contact force can be a **push** or a **pull**. We can make things move faster, slower or even stop if the size of the force changes.
- A **contact force** can work against the **movement** of an object and act in the opposite direction (link to push/pull). Some **surfaces** affect the movement of an object more than others.
- Not all forces need **contact**. A **magnetic force** can act at a **distance**.
- **Magnets** have two ends. These are called **north pole** and **south pole**. When two of the same poles are placed close together, they **repel** (push apart) each other. When two different poles are close, they **attract** (pull together) each other.

By the end of **Year 5**, pupils will know...

Forces

- **Friction** is a force **between two surfaces** that are in contact and sliding, or trying to slide, across each other.
- Friction always works in the direction **opposite** to the direction in which the object is moving or trying to move. Friction always **slows** a **moving** object down
- The greater the amount of **friction**, the greater the **force** required to move an object.
- **Air resistance** is a type of friction between air and another material. It is a **force** that opposes the movement of an object as it moves through the air.
- Objects with a large **surface area** create more air resistance so they move more slowly through air.
- **Water resistance** is friction between water and an object that is moving through the water.
- This force acts upwards against gravity when an object is falling through **water**. If the **upthrust** is less than the weight of the object, the object will **sink**. If the upthrust is equal to the weight of the object, the object will **float**.
- Some **mechanisms**, including **levers**, **pulleys** and **gears**, allow a smaller force to have a greater effect.

7

Living things depend on each other and on the environment; this can be positive or negative

By the end of **Year 2**, pupils will know...

Living things and their habitats

- A **simple food chain** shows the flow of food (**energy**) from one living thing to another. For example, a plant (**producer**) is eaten by a rabbit (**prey**), which is then eaten by a fox (**predator**).
- A **habitat** is a place where an animal or plant lives. It is an **environment** that has everything **animals** and **plants** in it, need to live.
- A **microhabitat** is a very **small habitat** that also has everything **animals** and **plants** in it, need to live.
- Just like animals, different **plants** are suited to different **habitats** and **microhabitats**.
- **Habitats** and **microhabitats** provide **plants** with what they need to **survive**.
- Each **habitat** has **specific features** like **temperature**, **water** availability, and types of **food** that meet the individual needs of the plants and animals living there.

By the end of **Year 4**, pupils will know...

Animals, including humans

- All living things need **energy** from food to **grow**, **repair** themselves and **reproduce**. Animals need to eat plants or other animals to get their energy. The flow of energy from one living thing to another is shown in the arrows in a **food chain**.

Living things and their habitats

- An **environment** refers to the **surroundings** or **conditions** in which living things exist and interact. This can be made up of **natural** and **human-made** features.
- **Humans** affect the **environment** in many ways for many different reasons. Changes to environments can damage **habitats** and cause danger to animals and plants that live in them, including us.
- **Conservation** is the careful **protection** and **management** of our natural environment to keep it healthy and balanced for the benefit of all living things (plants, animals, including humans), now and in the future.

8 Living things have changed over time

By the end of **Year 3**, pupils will know...

Rocks

- **Fossils** are the **preserved remains** of a dead plant or animal. Fossils come in all shapes and sizes.
- Fossils are formed through a process of multiple stages called **fossilisation**, and this takes place over many, many years.
- **Soil** is made from **organic matter** - dead rotting plants, rock, air and water.
- **Soil** also contains lots of animals, for example, **earth worms** and **micro-organisms** too tiny to see with the naked eye.

By the end of **Year 6**, pupils will know...

Evolution and inheritance

- **Evolution** explains how the living things on our planet today have slowly developed from simpler life forms that lived millions of years ago.
- By comparing **fossils** from older and newer layers of rock, scientists can see how things have changed over time.

- When living things reproduce, they pass on **characteristics** to their **offspring**. This is known as **inheritance**.
- **Variation** explains the different **features** and **characteristics** of living things. Variation is a key factor in the **evolution** and **adaptation** of living things to their environments.
- **Natural selection** is the process by which living things with **traits** better suited to their environment are more likely to **survive** and **reproduce**, passing those beneficial traits on to their **offspring**.
- **Adaptation** is the process by which living things develop **traits** or **characteristics** that enhance their ability to **survive** and **reproduce** in their specific **environment**.

9 Energy makes things happen and can be seen by its effects; it can be transferred (but is not used up)

By the end of **Year 3**, pupils will know...

Light

- We need light to see. Light can come from many different sources, such as the Sun, stars, torches, lamps and candles.
- Reflection involves a source of light and a surface. The light travels towards the surface and bounces off. When light from an object is reflected by a surface, it changes direction.
- Smooth, shiny surfaces such as mirrors and polished metals reflect light well. Dull and dark surfaces, such as dark fabrics, absorb light so they do not reflect it well.
- A shadow is a dark shape that is formed when light is stopped or blocked by an object or a person.
- Shadows show the shape and size of the object that's blocking the light. They change in size and shape depending on the angle and position of the light source and the object.

By the end of **Year 4**, pupils will know...

States of matter

- **The water cycle**: When water (a **liquid**) is heated, it turns into water vapour (a **gas**) and evaporates. When water vapour (a **gas**) is cooled, it condenses and changes back into water (a **liquid**).

Sound

- Sounds are made when objects **vibrate**. This makes the air around the object vibrate and the air vibrations then travel to and enter your ear.
- **Sound waves** can travel through solids (such as metal, stone and wood), liquids (such as water) and gases (such as air).
- **Strong vibrations** (more energetic sound waves) make **sound** appear **louder**. **Weak vibrations** (less energetic sound waves) make **sound** appear **quieter**.
- **Sounds** decrease in **volume** as they get further from the sound **source**. This is because the sound **vibrations** decrease as they travel through the **medium**.
- **Soft** and **dense** materials are generally good at providing **insulation** against sound. This is because they **absorb** or **prevent sound waves** from travelling through.
- The **pitch** of a sound is how **high** or **low** the sound is. A high sound has **quick vibrations** and produces a **high pitch**, and a low sound has **slow vibrations** and produces a **low pitch**.

Electricity

- A **circuit** always needs a power source, such as a **battery**, with wires connected to both the positive (+) and negative (-) ends
- A circuit can also contain other **electrical components**, such as wires, bulbs, buzzers or motors, which allow electricity to pass through.
- **Electricity** will only travel around a **circuit** that is complete.
- When a **switch** is **open** (off), there is a gap in the **circuit**. **Electricity** cannot travel around the circuit. When a **switch** is **closed** (on), it makes the circuit complete. Electricity can travel around the circuit.

By the end of **Year 6**, pupils will know...

Electricity

- A circuit will always have a **battery** (cell) as well as other components. Components such as **bulbs**, **buzzers**, **switches** and **motors**, need a battery in order to work.
- Increasing the number of **batteries/cells** in a **circuit** can increase the **voltage** travelling to the **bulb**, usually making it brighter.
- Adding more bulbs in a **circuit** means more **energy** (voltage) is required to keep the brightness the same. If the **voltage** is not increased, this will affect the brightness of the bulbs.
- The more **cells/batteries**, the **larger** the **voltage** and the brighter the bulb/louder the buzzer.
- The more **components**, the more **energy** they use and so the bulb is not as bright and the buzzer not as loud.

- The **battery** provides the **power source**. **Electricity** will only travel around a **circuit** that is complete. When the circuit is complete, the electricity flows around the circuit. The electrical **energy** is converted to light energy in the bulb. The **switch** opens and closes the circuit. If the circuit is broken, the electricity cannot flow so the bulb won't light and/or the buzzer won't sound.

Light

- **Light** travels in **straight lines**. When a **beam** of light from the **light source** hits an object, it is **reflected** by that object and travels in **straight lines** to our **eyes**. Our eyes take in some of this light and information is sent to the **brain**. This is how we **see** the object.
- The shape of a **shadow** will be the same as the **object** that **cast** it. This is because the object only blocks the **rays** of light that hit it. The rest of the light can continue to travel in straight lines around the edges.
- Different **factors** can result in **distortions** in the shadow's shape compared to the actual shape of the object.
- When a **beam of light** hits a smooth and shiny surface, that ray is called the **incident ray**. This hits the mirror at an **angle**. The ray of light then bounces off the mirror (is reflected) and this is called the **reflected ray**.
- Refraction happens when light changes direction, or bends, when it moves from one transparent material to another. **This can also cause light to separate into its different colours. This band of colours is called the spectrum.**

10 The movement of the Earth affects the times of day; the Sun is at the centre of our solar system

By the end of **Year 1**, pupils will know...

Seasonal changes

- In the UK, there are four **seasons**: **spring**, **summer**, **autumn** and **winter**.
- The **weather** is often different during each season.
- During the **summer**, the **day** is **longer** than the **night**. During the **winter**, the **day** is **shorter** than the **night**.
- Different **seasons** lead to changes in **plant** and **animal** behaviour.

By the end of **Year 3**, pupils will know...

Light

- In the morning, **shadows are longer when the Sun is lower**. As the day goes on, **shadows get shorter when the Sun goes higher**. In the evening, shadows get longer again as the Sun starts to go down.

By the end of **Year 5**, pupils will know...

Earth and Space

- Life can **survive** on Earth because Earth's position in the **solar system** means we have **energy**, the right **temperature** and a stable **climate**.
- The Earth **rotates** around the sun whilst also spinning on its **axis**. At the same time, the Moon is **orbiting** the Earth. This is a constant repeating pattern.
- The Moon orbits the Earth and spins on its axis once each time it orbits the planet.
- The sun, Earth and moon are approximately **spherical bodies**.
- The **Earth** is one of eight **planets** that **orbit** around **the Sun**. The planets are called **Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune**.
- Earth **rotates** constantly on its **axis**. It takes **24 hours** or one day for a full **rotation**. When parts of the Earth face the Sun, it is **daytime**. When Earth is facing away from the Sun, this is **night-time**.
- **Shadows** change **direction** because the **Earth** is **rotating**. The Earth rotates from west to east. Shadows point in different directions as the Earth spins. **Noon** is when shadows are shortest because the sun is right above you.

Forces

- **Gravity** is a **force** that acts at a distance. Gravity attracts all objects towards each other.
- Larger objects have a **stronger gravitational pull** so heavy and light objects fall at the same speed.
- Everything is pulled to the **Earth** by gravity. This causes **unsupported** objects to **fall**.

Building components for disciplinary knowledge - Year 1

| | | Knowledge of scientific methods Models Classification Pattern-seeking Fair tests Observation over time | Knowledge of apparatus and techniques, including measurement Apparatus Safety Procedures Taking measurement | Knowledge of data analysis and presentation Graphs Tables Drawings | Knowledge of how science uses evidence to develop explanations Evidence Validity Conclusions Peer review | Learning from scientists |
|----------|---------------------|--|---|---|--|--|
| | Year R | Add the disciplinary elements which will form the foundation (from your own school curriculum) of these pillars. For example: close observation, counting minibeasts and grouping, drawing plants in the environment over time. | | | | |
| YEAR ONE | Unit 1 Materials | <p>Know how to sort objects (classify) according to the material they are made from.</p> <p>Using observation of the different materials, suggest answers.</p> <p>Use observation to suggest which material is best at absorbing water.</p> <p>Guided simple test to answer the question, Which material is best at absorbing water?</p> | Use a sand timer to time one minute. | | Ask and suggest answers to one key question : What properties does the material have? | Explore the invention of the modern waterproof raincoat by Charles Macintosh. Consider its significance. |

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| | Guided Simple Test to answer the question, Which material is best at absorbing water? | | | | |
| Unit 2 Animals | Use observation to suggest what things are the same and what things are different . Using knowledge of animals and their diets, classify (group) accurately into herbivores, carnivores and omnivores. Use a simple test to find out which body part is used to see, hear, smell, taste and touch. | | | | Explore what a naturalist is, for example Steve Backshall. Know that scientists are still discovering new species. |
| Unit 3 Plants | Identify and classify plants as garden plants, wild plants, trees or weeds. Identify and classify common trees according to their leaves. Know that by observing living things over time, we can monitor changes. | Identify and describe parts of plant by observing closely using simple equipment – magnifying glasses/hand lenses. Use string to measure trunks and then order them according to size. | | | Scientists who work with plants are called horticulturalists, for example Alan Titchmarsh. They are experts at gardening. |
| Ongoing Unit 4 Seasons | Make close observations about living things in the local area in each season. Observe changes and link to seasons. | | Together, make class tables and charts to record sunset, sunrise and the weather over a period of time. | | Know that the Met Office makes accurate weather predictions. We see these as a weather forecast. |

Building components for disciplinary knowledge - Year 2

| | | Knowledge of scientific methods | Knowledge of apparatus and techniques, including measurement | Knowledge of data analysis and presentation | Knowledge of how science uses evidence to develop explanations | Learning from scientists |
|----------|-------------------------|--|---|---|--|--|
| | | Models Classification Pattern-seeking Fair tests Observation | Apparatus Safety Procedures Taking measurement | Graphs Tables Drawings | Evidence Validity Conclusions Peer review | |
| YEAR TWO | Unit 1 Habitats | <p>Identify and classify living and non-living things according to whether they are alive or dead or have never been alive.</p> <p>Observe the light, plants and dryness of the soil in different habitats.</p> <p>Sort animals and plants into food chains.</p> | Use simple equipment (magnifying glasses) to observe closely the animals we find in local microhabitats. | | <p>Observe the conditions in different microhabitats and together draw conclusions about what minibeasts need to survive.</p> <p>With support, draw conclusions about what different plants need to survive.</p> | <p>Use books and the internet to learn about different, unfamiliar habitats around the world and the animals that live there.</p> <p>Explore the impact and legacy of Jacques Cousteau's work.</p> |
| | Unit 2 Materials | <p>Identify and classify the variety of uses of different materials based on their properties.</p> <p>With support, make a prediction about which</p> | Gather data by measuring using informal methods . | Record in a table , present in a bar chart . | Use observations to suggest answers to questions – can solid objects change shape? | Know that engineers work with machines and other mechanical equipment. Understand Caroline Haslett's importance in leading the way for women |

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| | <p>fabric they think will be most stretchy.</p> <p>Know that when scientists plan experiments, they try to keep some things the same.</p> | | | | to work successfully in technical jobs. |
| <p>Unit 3</p> <p>Animals</p> | <p>Understand that scientists observe closely – they look for change and they look for growth to help them understand.</p> <p>Use knowledge of animal groups and observations of change to order life cycles correctly.</p> <p>Sort foods into healthy and unhealthy groups .</p> <p>With support, perform a simple test to identify which activity makes our bodies work harder.</p> | <p>With support, use measuring tape to measure accurately in metres and centimetres.</p> | <p>Gather and record data in a table.</p> | | <p>Understand the importance of Florence Nightingale in highlighting the importance of hospital cleanliness. Consider why this was significant and how this saved lives.</p> |
| <p>Unit 4</p> <p>Plants</p> | <p>Observe seed germination closely.</p> <p>With support, make predictions.</p> <p>Develop the idea that we should keep some things the same when planning an experiment.</p> | | | <p>Use observations and ideas (about seeds and bulbs) to suggest answers to questions.</p> | <p>Ask simple questions (and find answers from secondary sources such as books).</p> |

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| | With support, set up a simple test /investigation following a model to see how long this takes. | | | | |
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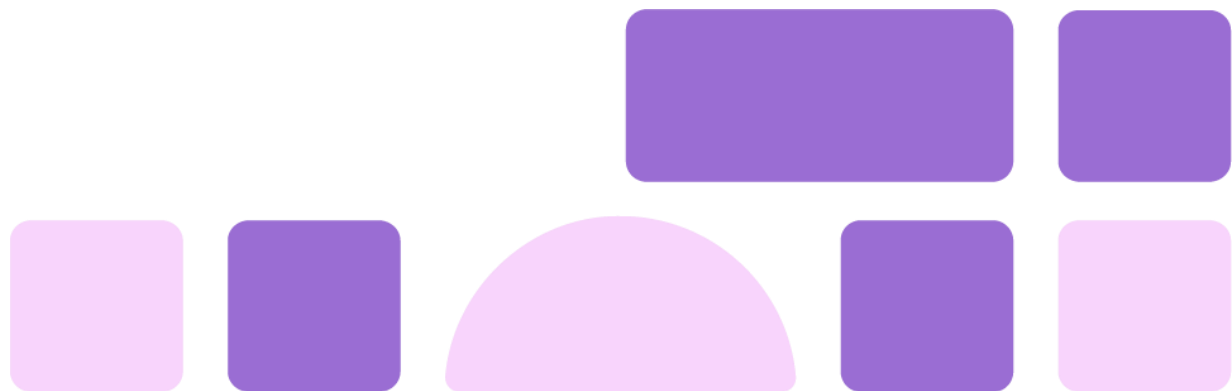
Building components for disciplinary knowledge - Year 3

| | | Knowledge of scientific methods | Knowledge of apparatus and techniques, including measurement | Knowledge of data analysis and presentation | Knowledge of how science uses evidence to develop explanations | Learning from scientists |
|-------------------|--|--|---|--|--|--|
| | | Models Classification Pattern-seeking Fair tests Observation | Apparatus Safety Procedures Taking measurement | Graphs Tables Drawings | Evidence Validity Conclusions Peer review | |
| YEAR THREE | Unit 1 Forces and magnets | Use observation to identify forces being used. Understand why tests should be fair and control all but one variable (the surface the car travels on). Sort into groups objects that are attracted to magnets and those that are not. | Use a measuring tape to measure the distance a car travels (in cm). Make systematic observations , testing the strength of magnetism from different distances. | Record results in a simple table and use these to draw conclusions about which surface slowed down the moving object the most. Carry out a simple investigation, record results in a table and use these to present data in a bar chart . | Identify and report on the effect of a push or pull force on an object. Predict whether two magnets will attract or repel each other, depending on which poles are facing. Compare results , identifying similarities and differences, from a simple investigation (bringing a range of materials near a magnet to test magnetism). | <i>Understand that science has been studied for a long time and many of these discoveries still help us to understand scientific ideas and process, such as the work of Leonardo Da Vinci.</i> <i>Understand that scientific ideas continue to be developed, for example like the invention of the world's strongest permanent magnet by Masato Sagawa.</i> |

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| | | | | Discuss (and report on) the factors that might influence magnet strength, such as the size, shape, and material of the magnet. | |
| Unit 2 Light | <p>Set up a simple comparative test to see which materials can be seen in low light.</p> <p>Make systematic and careful observations to identify which objects can be seen in different lighting conditions and record findings using simple scientific language and a table.</p> <p>Collectively set up a simple comparative and fair test to see how shadows change over the course of the day.</p> | <p>Take measurements of length with a standard ruler (cm) to measure how shadows change in size.</p> <p>Make careful observations when using mirrors, to learn how light behaves when it is reflected.</p> <p>Take accurate measurements of how position and size of shadows changes using equipment that records standard units of length (cm, m).</p> | <p>Record findings using simple scientific language and labelled diagrams of the learning about light and reflection.</p> <p>Use a bar chart to show how shadows change across a day.</p> | <p>Report on findings and draw a conclusion about which materials are more visible in low light.</p> <p>Use straightforward scientific evidence to answer questions or support findings about why distance and height changes the size of shadows.</p> <p>Use evidence – observation: how does the height of light change shadows/tables of data: how does distance affect shadow size/comparison: which objects create darker shadows – to answer questions.</p> <p>Report findings, using oral and written explanations, about how to keep our eyes safe in the Sun.</p> | <p><i>Understand how breakthrough inventions such as the lightbulb by Thomas Edison shape how we live today.</i></p> <p><i>Compare the development of scientific discoveries and inventions and see how ideas are refined and improved over time, for example, the evolution of the lightbulb by Isamu Akasaki.</i></p> |
| Unit 3 Rocks | <p>Classify rocks according to whether they have grains, crystals or layers.</p> <p>Use a physical model to represent the process of</p> | <p>Make careful observations to identify rocks using a hand lens or magnifying glass.</p> | <p>Record the process of fossilisation using a storyboard which includes simple scientific language and drawings.</p> | <p>Make careful observations on the properties of different rocks to draw conclusions about which is best suited for a given purpose.</p> | <p>Scientists, such as Sanjeev Gupta, use their knowledge of rocks to understand how landscapes are formed on Earth and other planets.</p> |

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| | <p>rock formation for the three different rock types.</p> <p>With support, carry out a comparative test to find out which rocks are durable and/or permeable (absorb water) or impermeable (do not absorb water).</p> <p>Create a model of a fossil to help understand the process of fossilisation.</p> <p>Set up a simple, comparative test and use a simple yes/no classification key to identify soil samples.</p> | <p>Use a stopwatch to time the length the rocks are in the water.</p> <p>Make detailed observations to compare soil types using hand lenses or magnifying glasses.</p> | <p>Record findings from 'The chocolate rock cycle' using simple scientific language and labelled diagrams.</p> | | <p>Palaeontologists study fossils. <i>Scientists continue to build on the work by early fossil hunters, such as Mary Anning.</i></p> |
| <p>Unit 4</p> <p>Plants</p> | <p>Make systematic and careful observations of seeds to look for properties that will help us to sort into groups according to dispersal method.</p> <p>Set up a simple fair test to find out how quickly the roots of a seed grow.</p> <p>Set up a simple practical enquiry to show water transport through a stem, marking the changes on a jar.</p> <p>Set up a comparative test to see how plants in different situations grow.</p> | <p>With support, use equipment to make systematic and careful observations of flowering plants (eg magnifiers, digital microscope).</p> <p>Take accurate measurements using standard units (eg a ruler measuring in cm).</p> | <p>Make systematic and careful observations of the plants each week for changes in condition, measuring different changes (eg height and number of leaves over time) and record this in a table.</p> <p>Make systematic and careful observations of flowers, gathering, recording and presenting data in a graph that shows the frequency of different colours in the plants.</p> | <p>Report findings from the enquiry, calculating the growth rate, and answer questions about it.</p> <p>Report on their findings, making comparisons over time, and draw simple conclusions.</p> <p>Use results to draw simple conclusions and make predictions eg which colours are most common and why might that be?</p> | <p><i>Know that simple scientific ideas, such as the principles of crop rotation by George Washington Carver, can have a big impact on the lives of ordinary people.</i></p> <p><i>Learn more about the important role of scientific research, such as the work of Luciano Scandian in finding ways to keep honeybees healthy.</i></p> |

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| <p>Animals, including humans</p> | <p>Unit 5</p> | <p>Identify differences and similarities of different food groups and categorise them by type to demonstrate a balanced and healthy diet.</p> <p>Make systematic and careful observations of the movement of animals with and without skeletons to identify similarities and differences.</p> <p>With support, set up a simple, comparative practical enquiry which is a fair test.</p> | | <p>Create a model of muscles to develop scientific understanding of how muscles contract and relax.</p> | <p>Use straightforward scientific evidence (including known websites or other secondary sources) to research and answer questions about the diets of pets.</p> <p>Make predictions and test whether these are true by collecting and analysing data.</p> | <p><i>Find out about the scientific idea of pasteurisation and how this discovery by Louis Pasteur changed medicine and food hygiene.</i></p> <p><i>Understand the simple scientific ideas and process are continuously developed by scientists such as Charlotte Armah who tests different foods to see how they can be used to help prevent disease.</i></p> |
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Building components for disciplinary knowledge - Year 4

| | | Knowledge of scientific methods Models Classification Pattern-seeking Fair tests Observation | Knowledge of apparatus and techniques, including measurement Apparatus Safety Procedures Taking measurement | Knowledge of data analysis and presentation Graphs Tables Drawings | Knowledge of how science uses evidence to develop explanations Evidence Validity Conclusions Peer review | Learning from scientists |
|-----------|---------------------|---|--|--|---|---|
| YEAR FOUR | Unit 1 Sound | <p>Make careful observations about how we see, hear and feel sound (vibrations) and use these to draw simple conclusions.</p> <p>Set up a comparative test to identify how the strength of vibrations affect the volume of a sound.</p> <p>Conduct a fair test with control variables to test what happens to sound as the distance from the sound increases.</p> <p>Create models of headphones to identify materials which act as the best insulators for sound. Scientists may create prototypes like these</p> | <p>Use data loggers with teacher support to measure sound.</p> <p>Make systematic and careful measurements of sound at different distances using a data logger.</p> | <p>Independently plan the method and create a results table for a comparative test to find out what material is the best insulator.</p> <p>Record findings using scientific language about pitch and sound waves to explain how to change the pitch of a sound.</p> | <p>Use results to draw simple conclusions, make links and identify patterns.</p> <p>Conduct a fair test and repeat three times to increase the reliability of results.</p> <p>Draw conclusions about what affects the pitch of a sound.</p> | <p><i>Understand that some scientific ideas and processes start from humble beginnings, for example, Alexander Graham Bell and his invention of the telephone.</i></p> <p><i>Understand the simple scientific ideas and processes are continuously developed by scientists and inventors, such as Jaap Haartsen and his invention of Bluetooth.</i></p> |

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| | <p>before creating a final product.</p> <p>Set up simple practical enquiries to find patterns between the pitch of a sound and features of the object that produced it.</p> | | | | |
| <p>Unit 2</p> <p>States of matter</p> | <p>Make systematic and careful observations to group and classify a variety of different materials according to whether they are a solid, liquid or gas.</p> <p>Set up simple comparative tests to explore the effect of temperature on some substances by investigating the temperature at which a range of solids change state and become liquids.</p> <p>Set up a simple practical enquiry, ensuring it is a fair test, to find out the answer to whether all liquids can change state to become a solid.</p> <p>Set up comparative and fair tests to determine the effect of temperature on rates of evaporation.</p> | <p>Take accurate measurements using standard units and a range of equipment: thermometers or data loggers to measure the temperature of melting points.</p> <p>Make systematic and careful observations to take accurate measurements using standard units by measuring the amount of water in ml or the space taken up by the water in cm.</p> | <p>Gather and record data in a table, using the correct unit of measure.</p> <p>Choose an appropriate way to gather and record data to help in answering questions and draw simple conclusions.</p> <p>Create a model of the water cycle to understand how condensation forms.</p> <p>Gather and record data in a table and line graph (with support) to show changes over time.</p> | <p>Report on findings about the properties of gas using simple scientific definitions.</p> <p>Report on findings in the form of a written conclusion; use this to raise further questions eg What further experiments could be done to explore the changing state of these items?</p> <p>Use results to draw simple conclusions about the rates of evaporation and present their findings to the class.</p> | <p><i>Know that astronomer Anders Celsius created a temperature scale divided into small parts called degrees.</i></p> <p><i>Understand how scientific ideas and processes are used across different industries, such as cookery (Heston Blumenthal).</i></p> |
| Unit 3 | <p>Sort and classify devices according to whether they</p> | <p>Use a range of equipment (bulb/lamp, bulb/lamp)</p> | | <p>Ask relevant questions, using scientific enquiry to</p> | <p><i>Identify changes related to simple scientific ideas</i></p> |

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| | <p>Electricity</p> <p>use mains or battery electricity.</p> <p>With increased independence, set up a simple, practical investigation – using all components to light a bulb and verbally report on findings.</p> <p>Set up a comparative test to identify which materials make good electrical conductors and which make good electrical insulators.</p> <p>Use scientific language and knowledge of circuits to produce diagrams and create functional objects.</p> | holder, buzzer, cell, battery, wire, crocodile clip) to make a working circuit. | | <p>answer them, about how appliances convert electrical energy.</p> <p>Know that scientists use their knowledge to form hypotheses and then test them out - investigate questions eg does the order of the components matter?</p> <p>Use straightforward scientific evidence to answer questions and support findings eg how do switches work?</p> <p>Use knowledge of how scientists work to make a prediction, investigate, and use results to draw simple conclusions, make links and identify patterns.</p> <p>Review the effectiveness (results) of made products to draw simple conclusions, suggest improvements and raise further questions.</p> | <p>and processes (Erik Bystrup – electricity pylon).</p> <p><i>Learn how scientists have explored, sought proof and used electricity (Benjamin Franklin) and how this has helped people (attracting lightning).</i></p> |
| | <p>Unit 4</p> <p>Set up simple practical enquiries, comparatives and fair tests (eggshells in different liquids but kept in same place).</p> | | <p>Create a model to show and explain a process (the digestive system) in oral and written form.</p> | <p>Know that scientists make careful observations over time to monitor changes and draw conclusions.</p> <p>Collectively set up and monitor an experiment to see how different liquids</p> | <p><i>Learn about how the work and innovation of Pierre Fauchard shaped modern day dentistry.</i></p> <p><i>Recognise scientific ideas and processes are</i></p> |

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| | <p>Animals, including humans</p> | <p>Create a model (of the stomach) to see the properties a stomach must have if the capacity needs to increase.</p> <p>Set up a simple practical enquiry that supports systematic and careful observations.</p> <p>Know how to construct and interpret a food chain, identifying producers, predators and prey; know that arrows show the movement of energy (food) through the food chain.</p> <p>Sort living things according to their role in a food chain and then according to their habitat.</p> | | | <p>affect our teeth, observe this over time and draw conclusions.</p> <p>Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations.</p> <p>Draw conclusions about an animal 's diet by looking at its teeth.</p> | <p><i>constantly evolving; look at the 'groundbreaking' research on tooth enamel by Dr Zhaoming Liu.</i></p> |
| | <p>Unit 5</p> <p>Living things and their habitats</p> | <p>Use classification diagrams and careful observation to group living things according to their characteristics.</p> <p>Use dichotomous keys to identify living things and draw conclusions about what they are.</p> | <p>Use observation and a range of equipment, such as magnifying glasses/ specimen magnifying pots, to identify living things in the local area.</p> | <p>Produce a guide book to inform people about the local area and threats it faces.</p> <p>Use data collection techniques to explore the local area, using knowledge of pollution and urbanisation, to identify issues that need resolving.</p> <p>Devise a plan of action to protect living things in the local area.</p> | <p>Reflect on why this (classification) is a process followed in the world of science.</p> <p>Identify and conclude, from observation and wider reading, how environments change over time.</p> <p>Use research and findings from the scientific community to understand how humans are negatively impacting the planet.</p> | <p><i>Know that Carl Linnaeus devised the modern method of classifying living things by grouping similar things together.</i></p> <p><i>Understand that scientists inspire others (such as climate activist, Vanessa Nakate) to protect the planet from the danger posed by human behaviour.</i></p> |

Building components for disciplinary knowledge - Year 5

| | | Knowledge of scientific methods Models Classification Pattern-seeking Fair tests Observation | Knowledge of apparatus and techniques, including measurement Apparatus Safety Procedures Taking measurement | Knowledge of data analysis and presentation Graphs Tables Drawings | Knowledge of how science uses evidence to develop explanations Evidence Validity Conclusions Peer review | Learning from scientists |
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| YEAR FIVE | Enquiry 1 Living things and their Habitats | <p>Ask questions about the local area and, with support, plan an observation over time enquiry (observing changes in plant or animal life over the year).</p> <p>With support, make decisions about sensible intervals between observations.</p> <p>Carry out the same whole-class investigation so that the process is clear.</p> <p>Towards the end of the unit, plan a more</p> | <p>Choose, with support, how to record findings and equipment.</p> | <p>Present findings from observations through diagrams and photographs with annotations.</p> <p>Monitor and record results over time.</p> | <p>Make predictions using evidence.</p> | <p>Understand considerations when working as a naturalist eg taking care of the area, returning things to where they were found.</p> |

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| | <p>independent observational enquiry – can plants reproduce without seeds.</p> <p>Make supported decisions about the variables to change.</p> <p>Sort and group living things in a more complex way by designing classification systems.</p> | | | | |
| <p>Enquiry 2</p> <p>Earth and Space</p> | <p>Plan an observation over time investigation to identify how shadows change throughout the day. Write this independently, compare to a model and amend.</p> <p>With guidance, identify the variables that will stay the same, make decisions about intervals for observations.</p> | <p>Use a metre rule to take and record accurate measurements of length.</p> | <p>Create models to understand the movement of the Earth.</p> <p>Present findings through audio and recordings.</p> <p>Present results in a line graph and use this to prove a known fact (about the rotation of the Earth and its orbit around the Sun).</p> | <p>Make predictions using knowledge of night and day.</p> <p>Devise a way to ensure that results are valid (more than one person reading measurements).</p> <p>Draw conclusions from the line graph, using the shape of the line and relating this to the movement of the Earth.</p> | <p>Identify scientific evidence that has been used to refute ideas – Copernicus’ discovery of a heliocentric universe.</p> |

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| | <p>Enquiry 3</p> <p>Animals Including Humans</p> | <p>Learn the difference between pattern-seeking, comparative and observation over time investigations. Identify which category an investigation falls into.</p> <p>Know that pattern-seeking investigations help us to find relationships.</p> <p>Pupils to devise pattern-seeking questions. Method to be written independently and followed by a class discussion so that changes can be made.</p> <p>Categorise changes according to whether they happen to males or females, using a venn diagram. Use sources of information to conduct research and make decisions.</p> | <p>Make shared decisions about the equipment that may be required.</p> <p>Make shared decisions about the units of measure and measuring apparatus.</p> <p>Take accurate measurements using tape measures.</p> | <p>Record results in a table and line graph.</p> <p>Use secondary sources to research data and record this in a table.</p> <p>Use a range of sources.</p> <p>Interpret a scatter graph and compare results to own findings.</p> | <p>Make predictions using knowledge from experience beyond school (evidence that older people have larger heads).</p> <p>Take repeat readings and carry out peer review to check validity.</p> <p>Draw a conclusion to explain the causal relationship between size and stage in the life cycle.</p> <p>Understand that secondary sources may not always be reliable and we might need to cross check with other sources.</p> <p>Use data found to answer questions about causal relationships.</p> <p>Explore patterns to find out if there is a relationship between the mass of animals and the</p> | <p>Know that scientists may have to use interviews to find out information. Design and ask questions to find out information and use these answers to draw conclusions.</p> <p>Know that scientists often look for patterns in data to come up with rules that help them to understand unknowns.</p> |
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| | | | | | length of the gestation period. | |
| Enquiry 4 Forces | <p>Identify the difference between comparative and fair tests. Know that fair tests look for causal relationships.</p> <p>Independently plan a comparative scientific enquiry, with reminders about the stages to include.</p> <p>Devise fair test questions.</p> <p>Independently plan a fair test enquiry, making choices about the variables to be changed to test the impact of air resistance.</p> <p>Identify further investigations that could be carried out to test relationships.</p> | <p>Take accurate measurements of time using a stopwatch.</p> <p>Take accurate measurements of force using a forcemeter.</p> <p>Identify variables that are difficult to control.</p> | <p>Use scientific diagrams to show the direction of forces.</p> <p>Choose an efficient way to report and present findings.</p> <p>Understand the purpose of different types of graph. Present findings in a bar graph.</p> | <p>Compare findings to those of others and consider what this tells us.</p> <p>Take repeat readings to ensure reliability.</p> <p>Design further questions that could be investigated.</p> <p>Use knowledge of water resistance to make predictions.</p> <p>Identify relationships between water resistance and shape.</p> <p>Use diagrams to prove conclusions and to show causal relationships (the impact of levers, pulleys and gears on force required).</p> | <p>Identify the scientific evidence that has been used to support or refute ideas about gravity (<i>Galileo Galilei and Isaac Newton</i>).</p> | |
| | Enquiry 5 | <p>Independently plan a comparative investigation to explore</p> | <p>Take accurate measurements of</p> | <p>Use the information from line graphs to draw conclusions.</p> | <p>Interpret data from a line graph, making predictions</p> | |

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| | <p>Properties and changes of materials</p> | <p>which material is the best thermal insulator.</p> <p>Understand the role of independent, dependent and controlled variables in an investigation.</p> <p>Independently plan a fair test, recognising and controlling the variables.</p> <p>Carry out a scientific problem-solving investigation – How can we separate a mixture?</p> | <p>temperature using a thermometer.</p> <p>Pupils to consider the risks of using hot water and plan the safety considerations into their investigation planning.</p> | <p>Create own tables to record results.</p> <p>Make informed decisions about the type of graph that should be used.</p> <p>Make decisions about how to record, report and present findings.</p> <p>When presenting findings, explain how they know results are accurate and reliable.</p> <p>Present findings from enquiries in oral and written forms.</p> <p>Report using first-hand observations and findings from demonstrations in written forms.</p> | <p>about what it could be telling us.</p> <p>Use own results to make statements about the findings.</p> <p>Use previous test results to make predictions about new enquiries.</p> <p>Explain why scientists take repeat readings.</p> <p>Interpret a given table of results. Identify any anomalies and draw conclusions about the causes.</p> <p>Evaluate their investigation: FAR (Fairness, Accuracy, Reliability)</p> | |
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Building components for disciplinary knowledge - Year 6

| | | Knowledge of scientific methods | Knowledge of apparatus and techniques, including measurement | Knowledge of data analysis and presentation | Knowledge of how science uses evidence to develop explanations | Learning from scientists |
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| | | Models Classification Pattern-seeking Fair tests Observation | Apparatus Safety Procedures Taking measurement | Graphs Tables Drawings | Evidence Validity Conclusions Peer review | |
| YEAR SIX | Enquiry 1 Living things and their Habitats | <p>Use classification keys to sort a range of animals.</p> <p>Use and apply classification processes to animals in the local area, using classification keys and tables.</p> <p>Devise own questions linked to classification keys.</p> <p>Make suggestions for linked pattern-seeking investigations.</p> <p>Use a plant taxonomy to classify plants.</p> | <p>Know that scientists do not disturb living things when conducting research and we must leave the sites we visit as we left them.</p> | <p>Know that all living things can be broken down into smaller groups using classification.</p> | <p>Analyse the information from classification tables to work out what it could be telling us about the local area. Record any patterns.</p> <p>Seek data using a dichotomous key.</p> <p>Explain why classification might be useful for us.</p> <p>Identify patterns between living things and where they are found in the local area.</p> | <p>Know that scientists classify living things to help explain their relationships to each other and to help us learn things about newly discovered organisms by noting their similarities to known organisms.</p> <p>Know that Carl Linnaeus' taxonomy was significant and has an impact today.</p> <p>Know the significance of the work of Joseph Lister on medicine.</p> |

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| <p>Enquiry 2</p> <p>Evolution and Inheritance</p> | <p>Use a range of fossils and/or images of fossils over time and both identify changes and observe changes identified by scientists.</p> <p>Compare the adaptations of animals in different habitats.</p> <p>Observe and raise questions about how local plants adapt to their environment.</p> | <p>Use microscopes to study roots for signs of adaptation.</p> <p>Use magnifying glasses to explore plants.</p> <p>If digging up any plants, this should be done with care.</p> | <p>Use a range of secondary sources, considering validity and reliability of information and using this to compare and contrast.</p> <p>Use notes and diagrams to record how plants in the local area have adapted for the environment to ensure they get light and water.</p> | <p>Know how the Fossil Record can be interpreted.</p> <p>Use knowledge of natural selection to suggest how different circumstances may lead to natural selection and evolution.</p> <p>Use and apply knowledge of climate change to consider what this means for the adaptation of living things.</p> <p>Use findings to make predictions about the future eg could climate change lead to the extinction of further species?</p> <p>Explain how the local environment supports the scientific knowledge learnt during the unit.</p> | <p>Understand how scientists examine fossils to find out about the evolution of different species.</p> <p>Understand how scientists keep records and why these are useful.</p> <p>Know how Charles Darwin conducted scientific studies to inform his theory of evolution. This changed the way people understood human history.</p> |
| | <p>Enquiry 3</p> <p>Electricity</p> | <p>Recognise which variable to control in a fair test and carry out a fair test to see how the number of cells in a</p> | <p>Use a data logger to measure the brightness of a bulb. Create a scale to compare according to brightness.</p> | <p>Create circuits of increasing complexity and represent them using diagrams, annotated</p> | <p>Consider the reliability of results given that there is less precision with the measurements in this investigation (lesson 2). Comment on the degree</p> |

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| | <p>circuit affects the brightness.</p> <p>Raise a question based on their experience.</p> <p>Plan a fair test to answer a question about how the number of cells affects the brightness of a bulb, recognising the variables and controlling these.</p> <p>Recognise with more accuracy whether an investigation is comparative or a fair test.</p> <p>Come up with their own linked questions.</p> <p>Plan a problem-solving scientific enquiry, which recognises and controls variables, to make a working device.</p> | <p>Reflect on accuracy of measuring methods.</p> | <p>with scientific diagrams and labels.</p> <p>Record and represent findings, including drawing conclusions independently.</p> <p>Plan and design own table for recording results.</p> <p>Record with increasing complexity using scientific diagrams and labels the different ways to affect the function of a component in a circuit.</p> <p>Report findings and provide clear explanations.</p> | <p>of trust given human error or discrepancy.</p> <p>Ensure results are accurate and reliable.</p> <p>Use evidence from previous lessons to make predictions about what will happen in a range of circuit set-ups and test the accuracy of these.</p> <p>Using the patterns found, pupils to make statements based on predictions about other patterns that they think they would find.</p> | <p>Understand why scientists use symbols ie international understanding, efficiency.</p> <p>Understand in more depth why scientists often repeat readings to increase the accuracy and precision of their results.</p> <p>Identify how scientists build on the work of other scientists (M. Stanley Whittingham designing lithium-ion batteries).</p> |
| <p>Enquiry 4</p> <p>Light</p> | <p>Make decisions about how to problem-solve, using knowledge of how the sun travels.</p> <p>Investigate the relationship between</p> | | <p>Create models to show how light travels in straight lines and is reflected.</p> <p>Use accurate drawings and annotations.</p> | <p>Use knowledge of how light travels to solve a problem.</p> <p>Report and present findings about the refraction of light (as per</p> | <p>Identify scientific evidence that has been used to support or refute ideas or arguments – Isaac Newton’s discovery about the colours of light.</p> |

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| | | light sources, objects and shadows. | | | pencil and glass demonstration) being an example of scientific phenomenon. Explain how the demonstrations provide evidence . | |
| | Enquiry 5 | Devise pattern-seeking, comparative and fair test questions. | Independently select apparatus and measuring equipment and methods. | Present findings in a graph that pupils consider appropriate. | Use diagrams to provide evidence of scientific knowledge. | Learn about scientific evidence that has been used to support or refute ideas or arguments (William Harvey). |
| | Animals including humans | Independently plan a pattern-seeking experiment to explore the relationship between the types of exercise we can do and heart rate. Identify the variables that need to be controlled. Write a hypothesis . Plan a method independently for how they will keep this a fair test, how they will measure and record . Include justification for the method. Carry out observations over time to monitor sleep over the course of a week and draw conclusions. | Use a heart monitor/pulse meter to take measurements and read them with accuracy . | Select an appropriate way to record sleep over time. | Draw conclusions and suggest further investigations . Explore nutritional guidance and draw conclusions . | Learn some ways in which technological advancements have changed our exploration of the human body. Understand how scientists may make breakthroughs in finding drugs that can help us. |

Year 1

| Everyday materials | | Animals, including humans | | Plants | | Seasonal changes | |
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| Charles Macintosh | Charlotte McCurdy | David Attenborough | Steve Backshall | David Douglas | Alan Titchmarsh | Robert Fitzroy | Carol Kirkwood |
| Scottish inventor of the modern waterproof raincoat. | American designer and researcher who blends science and design to reframe existential threats. | British biologist and naturalist famous for his educational broadcasts about the natural world. | British naturalist, explorer, presenter and writer, best known for BBC TV's <i>Deadly 60</i> . | Scottish botanist who changed the British landscape and timber industry by introducing non-native conifers. | English gardener who was awarded an MBE for services to horticulture and broadcasting. | British founder of the Met Office and creator of the first public weather forecast. | Scottish weather presenter, trained by the Met Office, and employed by the BBC. |

Year 2

| Living things and their habitats | | Uses of everyday materials | | Animals, including humans | | Plants | |
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| Jacques Cousteau | David Attenborough | Caroline Haslett | Stella McCartney | Florence Nightingale | Edward 'Bear' Grylls | Jane Colden | David Hickmott |
| French ocean explorer and ecologist who introduced millions of people to the underwater world. | British biologist and naturalist famous for his educational broadcasts about the natural world. | English electrical engineer, safety expert and advocate for science education for girls. | English fashion designer known for using sustainable initiatives and ethically sourced materials. | Italian nurse who raised the importance of hygiene to prevent the spread of disease and infections. | British adventurer and explorer famous for his ability to survive in challenging conditions and environments. | First known American female botanist who was regarded by many prominent botanists of the time. | British seed collections assistant at the world's largest seed bank (Millenium Seed Bank). |

Year 3

| Forces and magnets | | Light | | Rocks | | Plants | | Animals, including humans | |
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| Leonardi Da Vinci | Masato Sagawa | Thomas Edison | Isamu Akasaki | Mary Anning | Sanjeev Gupta | George W. Carver | Luciano Scandian | Louis Pasteur | Charlotte Armah |
| Italian inventor and first known person to plan and carry out tests on friction. | Japanese creator of the strongest permanent magnet in wide scale use today. | American inventor who created the first working electric light bulb. | Japanese engineer and joint inventor of LEDs used in energy-saving lighting. | English fossil hunter who discovered several dinosaur specimens. | Indian-born geologist who explores different landscapes on Earth and beyond. | American scientist who promoted ways to prevent soil depletion. | Italian research technician at the Laboratory of Apiculture and Social Insects. | French microbiologist who is renowned for his discovery of pasteurisation. | British-Ghanaian scientist who tests how food can help protect us from diseases. |

Year 4

| Sound | | States of matter | | Electricity | | Animals, including humans | | Living things and their habitats | |
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| Alexander G. Bell | Jaap Haartsen | Anders Celsius | Heston Blumenthal | Benjamin Franklin | Erik Bystrup | Pierre Fauchard | Zhaoming Liu | Carl Linnaeus | Vanessa Nakate |
| Scottish-American inventor who patented the first telephone. | Dutch inventor who contributed to the specification of Bluetooth. | Swedish astronomer who created the temperature scale, 'degrees'. | British chef and pioneer of multi-sensory cooking and experimental techniques. | American scientist who proved lightening was a form of electricity. | Danish designer of a new T-shape pylon being installed by the UK National Grid. | French physician, credited as being a pioneer and the 'father of modern dentistry'. | Chinese doctor and researcher into the reproduction of tooth enamel. | Swedish botanist who came up with a method for classifying all living things. | Ugandan climate justice activist who campaigned to save the Congo rainforest. |

Year 5

| Animals, including humans | | Earth and Space | | Forces | | Properties and changes of materials | | Living things and their habitats | |
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| Alexander Fleming | Rosalind Franklin | Nicolaus Copernicus | Tim Peake | Isaac Newton | Elon Musk | Albert Einstein | Hugh Bradner | Gregor Mendel | Jane Goodall |
| Scottish scientist who discovered the first anti-biotic drug, penicillin. | British chemist whose work led to discovery of DNA structure. | Polish astronomer who developed idea of a 'heliocentric universe'. | First British astronaut to walk in space in over 20 years. | English physicist who established three laws of motion and law of gravity. | South-African born physicist and entrepreneur - founder of Space X and Tesla. | German physicist who showed matter can be turned into energy and back. | American physicist who invented the first modern neoprene wetsuit. | Austrian botanist who discovered how features are passed down in different plants. | English primatologist famous for her work with chimpanzees. |

Year 6

| Living things and their habitats | | Evolution and inheritance | | Electricity | | Light | | Animals including humans | |
|---|--|---|---|--|--|---|--|--|--|
| Carl Linnaeus | Tanesha Williams | Charles Darwin | Sylvia Earle | Nikola Tesla | M. Stanley Whittingham | Ibn al-Haytham | Jo Shien Ng | William Harvey | Donald Palmer |
| Swedish botanist who came up with a method for classifying all living things. | Native American botanist who studies how plants respond to climate change. | English naturalist who showed how animals changed over generations (aka evolution). | American marine biologist, activist and world record holder for deepest sea walk. | Serbian inventor famous for contributions to the AC electricity supply system. | British chemist & Nobel Prize winner for the evolution of the lithium-ion battery. | Arabian physicist & mathematician who proved light travels in straight lines. | Malaysian professor whose research helps to develop electro light detection. | English physician known for describing the circulation of blood in the body. | British-Jamaican scientist who researches the human immune system. |

