	Substantive knowledge	Disciplinary knowledge
Year 3	Light Forces and Magnets Rocks Plants Animals – Nutrition; Skeletons and Muscles	Making observations Reporting findings Making observations Making observations Recording findings
Year 4	States of Matter Sound Electricity Living Things and their Habitats – Classification; Environmental Change Animals – Digestion; Teeth; Food Chains	Recording findings Drawing conclusions and asking questions Setting up enquiries Recording findings Carrying out a scientific investigation
Year 5	Properties and Changes of Materials Forces Earth and Space Living Things and their Habitats – Life Cycles; Reproduction Animals – Humans develop to old age	Carrying out a scientific investigation Setting up enquiries Identifying evidence Reporting and presenting findings Recording findings
Year 6	Light Electricity Evolution and Inheritance Living Things and their Habitats – Classification Animals – Human Circulatory System; Diet, Exercise, Drugs; How nutrients and water are transported within animals	Making observations Reporting and presenting findings Identifying evidence Recording findings Recording findings

Year 3

Light

- recognise that they need light in order to see things and that dark is the absence of light
- notice that light is reflected from surfaces
- recognise that light from the sun can be dangerous and that there are ways to protect their eyes
- recognise that shadows are formed when the light from a light source is blocked by an opaque object
- find patterns in the way that the size of shadows change

    - There must be light for us to see. Without light it is dark.
    - We need light to see things, even shiny things.
    - Shiny materials reflect beams better than non-shiny materials.
    - Beams of light bounce off some materials (reflection).
    - Transparent materials let light through them and opaque materials don't let light through.
    - Light comes from a source.

Forces and Magnets

- compare how things move on different surfaces
- notice that some forces need contact between 2 objects, but magnetic forces can act at a distance
- observe how magnets attract or repel each other and attract some materials and not others
- compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials
- describe magnets as having 2 poles
- predict whether 2 magnets will attract or repel each other, depending on which poles are facing

    - Magnets exert attractive and repulsive forces on each other.
    - Magnets exert non-contact forces, which work through some materials.
    - Magnets exert attractive forces on some materials.
    - Magnetic forces are affected by: magnetic strength, object mass, distance from object, object mass.

Rocks

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

Plants

- identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers
- explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant
- investigate the way in which water is transported within plants
- explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal

    - Seeds and bulbs need the right conditions to germinate. They contain a food store for the first stages of growth (ie until the plant is able to produce its own food.)
    - Plants make their own food in their leaves to provide them with energy, grow, repair and reproduction.
    - Leaves absorb sunlight and carbon dioxide through leaves.
    - Plants have roots to provide support and to draw moisture from the soil, through stems to take water to the rest of the plant.
    - The plant makes its food from water and carbon dioxide, using sunlight as energy, in the green parts of the plants.
    - Flowering plants have evolved specific parts to carry out pollination, fertilisation and seed growth.
    - Seed dispersal improves chances of enough seeds germinating and growing to mature plants.

Animals, including humans

- identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat
- identify that humans and some other animals have skeletons and muscles for support, protection and movement

    - Identify that animals, including humans, need the right types and amounts of nutrient, and they cannot make their own food; they get nutrient from what they eat.
    - Movable joints connect bones.
    - Muscles are connected to bones and move them when they contract.
    - Many animals have skeletons to support their bodies and protect vital organs.

Year 4

Sound

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

    - Sound travel can be blocked.
    - Sound travels from its source in all directions and we hear it when it travels to our ears.
    - Sound is produced when an object vibrates.

States of Matter

- compare and group materials together, according to whether they are solids, liquids or gases
- observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)
- identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature

    - Solids, liquids and gases are described by observable properties.
    - Heating causes solids to melt into liquids and liquids to evaporate to gases.
    - Cooling causes gases to condense to liquids and liquids to freeze to solids.

Electricity

- identify common appliances that run on electricity
- construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
- identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery
- recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
- recognise some common conductors and insulators, and associate metals with being good conductors

    - More batteries will push the electricity round the circuit faster.
    - Electricity sources push electricity round a circuit.
    - A source of electricity (mains or battery) is needed for electrical devices to work.
    - Devices work harder when more electricity goes through them.
    - Some materials allow electricity to flow easily and these are called conductors. Materials that don’t allow electricity to flow easily are called insulators.
    - A complete circuit is needed for electricity to flow and devices to work.

Living things and their habitats

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

    - Environmental change affects different habitats differently.
    - Different organisms are affected differently by environmental change.
    - Different food chains occur in different habitats.
    - Living things can be divided into groups based upon their characteristics.
    - Human activity significantly affects the environment.

Animals, including humans

- describe the simple functions of the basic parts of the digestive system in humans
- identify the different types of teeth in humans and their simple functions
- construct and interpret a variety of food chains, identifying producers, predators and prey

    - Food is broken down by the teeth and further in the stomach and intestines where nutrients go into the blood. The blood takes nutrients around the body.
    - Nutrients produced by plants move to primary consumers then to secondary consumers through food chains.
    - Different animals are adapted to eat different foods.
    - Animals have teeth to help them eat.
    - Different types of teeth do different jobs.

Year 5

Properties and changes of materials

- compare and group together everyday materials on the basis of their properties
- know that some materials will dissolve in liquid to form a solution
- use knowledge of solids, liquids and gases to decide how mixtures might be separated
- give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials
- 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

Forces

- explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
- identify the effects of air resistance, water resistance and friction, that act between moving surfaces
- recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect

    - Air resistance and water resistance are forces against motion caused by objects having to move air and water out of the way.
    - Some objects require large forces to make them move; gears, pulley and levers can reduce the force needed to make things move.
    - Friction is a force against motion caused by two surfaces rubbing against each other.

Earth and Space

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

    - Objects like planets, moons and stars spin.
    - Smaller mass objects like planets orbit large mass objects like stars.
    - Objects with larger masses exert bigger gravitational forces.
    - Stars, planets and moons have so much mass they attract other things, including each other, due to a force called gravity. Gravity works over a distance.
    - Stars produce vast amounts of heat and light. All other objects are lumps of rock, metal or ice and can be seen because they reflect the light of stars.

Living things and their habitats

- describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird
- describe the life process of reproduction in some plants and animals

    - Environmental change can affect how well an organism is suited to its environment.
    - Organisms best suited to their environment are more likely to survive long enough to reproduce.

- Competition exists for resources and mates.
- Life cycles have evolved to help organisms survive to adulthood.
- Different types of organism have different life cycles.

Animals, including humans

- describe the changes as humans develop to old age

    - Different animals mature at different rates and live to different ages.

Year 6

Light

- recognise that light appears to travel in straight lines
- use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye
- explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes
- use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them

    - Animals see objects when light is reflected off that object and enters their eyes.
    - Animals see light sources when light travels from the source into their eyes.
    - Light reflects off all objects ~~(unless they are black)~~. Non-shiny surfaces scatter the light so we do not see a single beam.
    - Light travels in straight lines.

Electricity

- associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit
- compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches
- use recognised symbols when representing a simple circuit in a diagram

    - Batteries are a store of energy. This energy pushes electricity round the circuit. When the battery's energy is gone, it stops pushing. Voltage measures the push.
    - The greater the current flowing through a device the harder it works.
    - Current is how much electricity is flowing round a circuit.
    - When current flows through wires heat is released. The greater the current, the more heat is released.

Evolution and inheritance

- recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago
- recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents
- identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution

    - Some organisms reproduce sexually where offspring inherit information from both parents.
    - Some organisms reproduce asexually by making a copy of a single parent.
    - Organisms best adapted to reproduce are more likely to do so.
    - Organisms reproduce and offspring have similar characteristics to parents.
    - Variation exists within a population (between offspring and parents)
    - Over time the characteristics that are most suited to the environmental become increasingly common.

Living things and their habitats

- describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals
- give reasons for classifying plants and animals based on specific characteristics

Animals including humans

- identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood
- recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function
- describe the ways in which nutrients and water are transported within animals, including humans