SLS Primary Science Curriculum Overview

Explaining Science | Classification | Designing Experiments | Data, Tables & Graphs | Making Conclusions

Particle Model | Force Arrow Model | Energy Transfer Model | Big Picture Model

Key Stage 1	1	**Seasonal Changes** • Observe & describe changes across the four seasons. • Observe, describe, *measure & record* weather across the four seasons. • Observe the sun moving across the sky. Describe changes in day-length across the seasons **(see Light & Shadows).**	**Plants** • Identify & describe the basic structure of flowering plants. • Identify, name & *observe* a variety of common plants (garden/wild/veg plants, trees) *growing in their habitat.* • Identify deciduous & evergreen trees.	**Everyday Materials** • Describe the materials that a range of objects are made from. • Describe simple physical properties of a variety of everyday materials. • Compare & group a variety of everyday materials using their physical properties.	**Pushes & Pulls** • *Recognise & name a push and a pull force in action.* • *Know that a force is needed to move an object.* • *Explore & investigate that a bigger force is needed to move an object further.* • *A bigger force is needed to move a heavier object.* • *Force can be bigger / smaller & moves an object in a direction.*	**Animals Including Humans** • Identify, name, describe features of and compare common vertebrates. • Identify & name common carnivores, herbivores & omnivores. • Identify, name, draw & label basic human body part. • Know the five senses and link these to human body parts.	**Light & Shadows** • Identify a range of light sources (natural & man-made). • *Observe & describe light coming from a light source. Observe & describe brightness close to and further away from a light source.* • *Observe how materials behave with light.* • *Describe how a shadow forms.* • *Know how to stay safe in the bright sunlight and in the dark.*
	2	**Living Things & Habitats** • Know the differences between things that are living, dead and those that have never been alive. • Describe how habitats give a place for animals and plants to live, grow and feed. Living things are suited to their habitat (microhabitat). • Identify & name animals & plants. • Describe food chains. Identify and name sources of food.	**Animals Including Humans** • Animals (including humans) have offspring which grow into adults. *Compare to other animal life cycles*. • Animals need water, food and air (*oxygen*) to survive. • It is important to exercise, eat the right amounts of different types of food and to keep ourselves clean (hygiene).	**Uses of Everyday Materials** • *Can describe the properties of a range of everyday materials*. • The uses (application) of a variety of everyday materials. • *There are three states of matter. Know the properties of solids, liquids and gases.* • The shape of solid objects can be changed by squashing, bending, twisting and stretching.	**Building Circuits** • Know appliances that need electricity (power/energy source) to work (mains, battery, rechargeable, etc). • Can name (with their symbol) and use components correctly/safely in simple circuit. • Can build simple closed series circuits from instructions. • Can identify dangers & know how to use electricity safely in the home/classroom.	**Plants** • Know and describe the stages as seeds (& bulbs) grow into mature plants (*life cycle of a flowering plant*). • Know that plants need water, light and a suitable temperature to grow and stay healthy.
Lower Key Stage 2	3	**Animals Including Humans** • Animals (including humans) need the right types and amounts of food (nutrition). *Unlike plants, animals can't make their own food – they need to transfer energy in through food*. • Humans (and some other animals) have skeletons and muscles for support, protection and movement.	**Light** • We need light to see things. Dark is the absence of light. • Light from the sun can be dangerous. We protect our eyes. • Light can be reflected from surfaces. • Shadows are formed when light *energy* is blocked by an opaque object. • Know how to change the size of a shadow.	**Forces and Magnets** • Some forces need contact (contact forces) between two objects and some forces act at a distance (non-contact forces). • Magnets attract or repel each other. Magnets have two poles. • Materials can be grouped together based upon whether they are attracted to a magnet (magnetic) or not.	**Rocks** • Identify & describe different kinds of rocks using appearance and physical properties. *Rocks have lots of uses.* • Fossils are formed when things that have lived are trapped within rock over millions of years. • Soils are made from rocks and organic matter.	**Plants** • Identify/describe the functions of parts of flowering plants (flower in detail). • Plants need air, light, water, nutrients from soil, and room to grow. • Water is moved within plants from the roots to the leaves. • Flowers support reproduction through pollination, seed formation & seed dispersal.
	4	**Living Things & Habitats** • Living things can be grouped in a variety of ways. • Use classification keys to group, identify and name living things in local habitats. • *Know how to randomly sample a habitat for species diversity (biodiversity)*. Measure species richness & abundance. • Environments can change and this can pose dangers to living things. *Conservation acts to save species and restore habitats*. • *Learn how to change a habitat to encourage biodiversity*.	**Animals Including Humans** • Know the basic functions of parts of the digestive system in humans. • Identify different types of teeth and describe their functions. • Construct and interpret food chains. Identify producers (of energy), consumers (of energy), predators & prey.	**States of Matter** • Groups materials as solids, liquids or gases. Know the features (criteria) that make them different. • Can describe, *using the particle model*, how substances change from a gas, into a liquid, then into a solid (and back again) as they are heated or cooled. • Temperature (°C) affects the speed (rate) of evaporation. • Describe the water cycle (evaporation and condensation).	**Sound** • Identify how sounds are made (sound energy, vibrations) • Sound energy/vibrations travel from a source, through a medium (solid, liquid or gas), to your ear. • The volume of a sound is linked to the strength of vibrations (sound energy) that produces it. • The distance away from the source affects the volume of sound. • The pitch of a sound is linked to the frequency of vibrations (sound energy) that produces it.	**Electricity** • Recognise common appliances that run on electricity. • Construct a range of simple closed series circuits. Draw these circuits with correct component symbols (named). • *Recognise and solve 'errors' in circuits to make them work*. • A switch opens and closes a circuit. • Conductors allow electrical (*energy*) to pass through them. Insulators do not allow electrical (*energy*) to pass through.

Upper Key Stage 2	5	**All Living Things** • Describe similarity/differences in the life cycles of mammals, amphibians, birds and insects. Compare & contrast. • *Research life cycles of plants, invertebrates & vertebrates within local habitats. Be able identify & describe changes over time.* • Describe the life process of reproduction in plants & animals. Sexual & asexual.	**Animals Including Humans** • Order and compare the stages in the human life cycle. • Understand and describe the changes as humans develop to old age. • Describe the changes experienced in puberty. Understand why puberty happens. • Compare gestation time in animals.	**Properties & Changes of Materials** • Compare and Group materials based on their properties. Give reasons (from evidence) for uses of these materials. • A mixture is made up of 2 or more substances (particles mix). A solute (solid) dissolves in a solvent (liquid) to form a solution. • A solution and other mixtures can be separated through evaporating, filtering, sieving *and chromatography*. • Dissolving, mixing and changes in state are reversible changes. • Some changes form new materials (compounds) through chemical reactions. These are irreversible reactions.	**Forces** • *Opposing forces can be in balance or unbalanced.* • Unsupported objects fall towards earth because of gravity force acting between earth and the falling object. • Air resistance force (gas) water resistance force (liquid) and friction force (solid) act between moving surfaces. • Levers, pulleys and gears allow a smaller force to have a greater effect (force multipliers).	**Earth & Space** • The sun, planets and moon(s) are spherical bodies. *Can describe the development of a heliocentric model of the solar system.* • Know the order of planets in our solar system. Can describe how planets rotate and orbit the sun. • The Earth and other planets orbit the sun in the Solar System. Day and night are caused by the Earth's rotation (sun appears to move across the sky). • The moon orbits the Earth. *Know the phases of the moon.*
	6	**Living Things & Habitats** • Living things are classified into broad groups according to observable features (*binomial naming system*). Reasons for classifying. • *There are five Kingdoms of living things. Know the binomial naming System. Can use & construct classification Keys.* • *Know how to sample a habitat for species diversity (biodiversity). Measure species richness, abundance & evenness. Measure abiotic factors over time. Manage/plan change to encourage biodiversity.* • Micro-organisms include bacteria and fungi.	**Evolution and Inheritance** • Living things can produce identical offspring (*asexual*) *but sexual reproduction results in* offspring that, *although share inherited features*, may vary (not identical) from their parents. Know some inherited features. • *This variation means that some individuals will have features better suited to a changing environment. These better features will be selected for by nature, and so, individuals that have them are more likely to survive.* • *Natural selection* is the process *where* species adapt to their environment. It is the engine that drives evolution. Know how some species are adapted. • Fossil evidence shows how living things have changed over time.	**Animals Including Humans** • Name the main parts of the human circulatory system. Describe the functions of the heart (structure), blood vessels (artery, vein & capillaries) & blood (components) • *Understand & describe the double circulatory system of humans to* describe the way water, nutrients *& oxygen* are transported in animals. • Know the impact of diet, exercise, drugs & lifestyle on the way our bodies function.	**Light** • Light travels in straight lines from a light source *(Energy Transfer Model) directly, reflects, goes through a material or is absorbed.* • Light travels in straight lines from a light source directly into the eye (*represent this using a light ray diagram*) • Light travels in straight lines from a light source to an object and reflected into the eye (*represent using a light ray diagram*) • *Know the angle of incidence is equal to the angle of reflection.* • Explain the size and shape of a shadow knowing that light travels in straight lines (*represent using a light ray diagram*)	**Electricity** • Confidently draw a range of series circuits using symbols. • Link the brightness of a bulb / volume of a buzzer to the number & Voltage of cells used in the battery. *Measure Voltage*. • Explain changes in brightness / volume *using the Energy Transfer Model* (link to Voltage). Explain the action of a switch. • *Begin to explain component 'failure' by resistance to electrical flow (energy transfer out of the circuit as heat energy). Begin to describe electrical flow as Current.*

Science is a **core curriculum subject** that is crucial to our pupil's understanding of the world, next steps and future career aspirations. Through the National Curriculum for Science as a starting point, our enhanced SLS Science curriculum aims to ensure that all pupils:

- Build **depth** through recalled, connected substantive knowledge, explicit vocabulary expectations, a conceptual understanding of science (through a progressive use of science models) and a hands-on, investigatory approach to teaching. Activity will be varied, targeted to build conceptual knowledge/WS skills, support connection and with a gradual release of responsibility (GRR) to the pupils.
- Will be appropriately **challenged** through a sequential, coherent and ambitious curriculum, dual objective teaching (ensures clear focus, pitch and differentiation by expectation), effective questioning & activity (higher order), formative assessment approach and addressing misconceptions quickly. Independent thinking and investigation will be scaffolded and encouraged with a growth mindset.
- Build **connected** substantive knowledge through ensuring secure prior knowledge, conceptual understanding to link knowledge across the curriculum, blended learning across topics/wider curriculum and scientific theory development using key scientists within the learning. Factual knowledge is grounded into conceptual knowledge that then expands into connected knowledge.
- Build key **disciplinary knowledge & skills** through focussed/progressive Working Scientifically (WS) skill development (by dual objectives) through a range of Enquiry Types that help pupils to become increasingly independent and successful investigators. Explicit year group specific WS Skills are mapped across the curriculum to ensure coverage, sequencing and the tracking (assessment) of progress.
- Support **next steps** through high attainment (tracked), conceptual component knowledge & WS Skills to support secondary readiness and where pupils are equipped with the scientific knowledge required to understand the uses and implications of science, engage with current/future debates (Science Literacy) and develop high Science Capital (STEM/Cultural Capital).

To support a fully progressive curriculum, the foundations for learning science begin in Early Years Foundation Stage through planned substantive / disciplinary knowledge and key vocabulary development that dove-tails into National Curriculum expectations. Pupils are taught to use appropriate science equipment when investigating the world around them. This builds stronger foundations for success as pupils move into year 1.

STEM Learning Solutions Ltd