Banks Lane Junior School

Communication, Collaboration, Curiosity, Resilience, Reflection

Science at Banks Lane Junior School

At Banks Lane Junior School we intend to give children a Science curriculum which enables them to confidently explore and discover the world around them so that they have a deeper understanding of the world we live in. We aim to create fun and stimulating science lessons centred around a practical, enquiry-based curriculum which promotes questioning, challenge, investigating, evaluating, and using scientific vocabulary.

Key Concepts are golden threads that run through our curriculum subjects and support us in revisiting and reviewing previously taught knowledge and content. They support in making connections in learning so that it becomes 'sticky' knowledge. In Science these concepts are:

KEY CONCEPTS

BIOLOGY CHEMISTRY PHYSICS

Substantive knowledge is the factual content for a subject which must be connected into a careful sequence. Substantive knowledge is understood better with repeated encounters in meaningful contexts.

Disciplinary knowledge is the action taken within a particular subject to gain the substantive knowledge through skills, critical thinking and enquiry.

Progression in Science skills and disciplinary knowledge.

Aims of Science National Curriculum

The National Curriculum for Science aims to ensure that all pupils:

- develop **scientific knowledge and conceptual understanding** through the specific disciplines of Biology, Chemistry and Physics.
- develop understanding of the **nature, processes and methods of science** through different types of science enquiries that help them to answer scientific questions about the world around them.

Aims of teaching children to work scientifically at BLJS:

- To equip children with the skills and knowledge to go on the scientific pursuit of answering the why, how and what if questions they pose.
- To nurture their natural curiosity and ensure it is not lost as they progress through school and grow older.
- To equip them with the scientific knowledge required to understand the uses and implications of science, today and for the future.

Where possible, our concepts are aligned with Banks Lane Infant School to ensure continuous development of knowledge. Our teachers understand the importance of referring back to prior learning in the previous key stages and linking key concepts wherever practical.

Reception - Year 2

Key concepts: Biology, Chemistry and Physics

Key questions: I wonder…' questions, what something is? How things are similar and different? The ways things work? Which alternative is better? How things change and how they happen?

- I can explore the natural world around me; describing what I can see, hear and feel
- I can recognise that some environments are different to the one in which I live
- I can manage my basic hygiene and personal needs; understanding the importance of healthy food choices.
- I can explore materials with different properties
- I can understand the effect of changing seasons on the natural world
- I can name a variety of animals and how to classify them
- I can sort by living and non-living things
- I can name of parts of the human body
- I can name body parts associated with each sense
- I can name the petals, stem, leaves and root of a plant
- I can name common wild and garden plants and trees
- I can classify things by living, dead or never lived
- I know how habitats provides basic needs of things living there (plants and animals
- I can name some different sources of food for animals using a food chain and what animals need to survive
- I know the basic stages in a life cycle for animals, including humans
- I know that animals have offspring which grow into adults
- I know why exercise, a balanced diet and good hygiene are important for humans
- I know and can explain how seeds and bulbs grow into plants
- I can share what plants need in order to grow and stay healthy
- I can the name the materials an object is made from
- I can share the properties of everyday materials; comparing and grouping them
- I can share how materials can be changed and used in specific jobs
- I can name the seasons and the weather associated with each season
- I can describe how day length varies

In science our concepts are aligned with Banks Lane Infant School - these are taken from the National Curriculum.

Lower KS2

Working Scientifically - taught throughout each unit

Ask Questions

- I can ask relevant questions and use different types of scientific enquiries to answer them.
- I can set up simple practical enquiries.
- I can set up comparative and fair tests.

Measuring and Recording

- I can make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.
- I can record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables.
- I can gather, record, classify and present data in a variety of ways to help in answering questions

Concluding

- I can identify differences, similarities or changes related to simple scientific ideas and processes
- I can report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- I can use straightforward scientific evidence to answer questions or to support their findings

Evaluating

- I can use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.

KEY VOCABULARY: I can read, spell and pronounce scientific vocabulary correctly and with confidence, using my growing word reading and spelling knowledge.

gradually, identify, observe, recognise, investigate, record, units, table, fair, similarities, differences, research and source scientists, discovery, process, cycle, measurements, conclude, evaluate, rank, plan, vary, constant, bar graph, table, tally.

Year 3

Key topics: Animals including humans/ Plants / Rocks / Light / Forces and Magnets

- I can identify that animals and humans need the right types of nutrition, that they cannot make their own food and they get nutrition from what they eat.
- I can identify that some animals and humans have skeletons and muscles for support, protection and movement.
- I can identify and describe the functions of different parts of flowering plants, roots, stem/trunk, leaves and flowers.
- I can explore the requirements of plants for life and growth (air, light, water, nutrients from soil and room) and how they vary from plant to plant.
- I can investigate water transportation in plants.
- I can explore the part that flowers play in the lifecycle of flowering plant including pollination, seed formation and seed dispersal.
- I can compare and group different kinds of rocks based on appearance and physical properties.
- I can describe in simple terms how fossils are formed when things that have lived are trapped within rock.
- I can recognise that soils are made from rock and organic matter.
- I can recognise that we need light to see things and that dark is the absence of light.
- I can notice that light is reflected off surfaces.
- I can recognise that light from the sun can be dangerous and that there are ways to protect our eyes.
- I can recognise that shadows are formed when light from a light source is blocked by an opaque object.
- I can find patterns in the way that the size of shadows change.
- I can compare how things move on different surfaces. I can notice that some forces need contact between two objects but magnetic forces can act at a distance.
- I can observe how magnets attract or repel each other and attract some materials but not others.
- I can compare and group a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials.
- I can describe magnets as having two poles. I can predict whether two magnets will attract or repel each other, depending on which poles are facing.

KEY VOCABULARY: Animals: nutrients, muscles, vertebrate, invertebrate. **Plants**: evaporation, nutrients, pollination, seed dispersal, fertilisation. **Rocks**: fossilisation, sedimentary, igneous, metamorphic, permeable, impermeable. **Light**: light source, shadow, reflection, translucent, opaque, transparent. **Forces**: surface, friction, magnetic field, poles, attract, repel.

Year 4

Key topics: Animals including humans/ Living things and habitats/ States of matter / Sound / Electricity

- I can describe human digestive system functions.
- I can identify types of teeth in humans and their functions.
- I can interpret a variety of food chains and identify producers, predators and prey.
- I can use classification keys to group, identify and name living things in their local and wider environment.
- I can recognise that environments can change and that this can pose dangers to living things
- I can compare and group materials according to whether they are solids, liquids or gases.
- I can observe that some materials change temperature when heated or cooled and measure or research the temperature at which this happens in degrees Celsius.
- I can identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.
- I can identify how sounds are made associating some of them with something vibrating.
- I can recognise that vibrations from sounds travel through a medium to the ear.
- I can find patterns between the pitch of a sound and features of the object that produced it.
- I can find patterns between the volume of sound and the strength of the vibrations that produced it.
- I can recognise that sounds get fainter as the distance from the sound increases.
- I can identify common appliances that run on electricity.
- I can construct a simple series electrical circuit, identifying and naming basic parts including cells, wires, bulbs, switches and buzzers.
- I can recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.
- I can recognise some common conductors and insulators and associate metals with being good conductors.

KEY VOCABULARY: Animals: digest, oesophagus, small intestine, large intestine, molar, premolar, incisor, canine, food chain. **Living things:** organisms, specimen, classification, characteristics, environment, extinct. **Matter**: solids, liquids, gases, evaporate, condense, water vapour, precipitation. **Sound**: eardrum, vibration, particles, amplitude, soundwave, pitch. **Electricity:** mains, appliances, circuit, battery, electrical conductor, electrical insulator.

Upper KS2

Working Scientifically - taught throughout each unit

Ask Questions

- I can plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.

Measuring and Recording

- I can take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate; record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.

Concluding

- I can identify scientific evidence that has been used to support or refute ideas or arguments.
- I can report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results.
- I can use oral and written forms such as displays and other presentations.

Evaluating

- I can use test results to make predictions to set up further comparative and fair tests.

KEY VOCABULARY: I can read, spell and pronounce scientific vocabulary correctly.

classify, interpret, pattern, relationship prediction, analyse, conclude, evaluate, rank, variable, constants, control, repeat, key relationship, line graph, hypothesis, variable, constants, evaluate, plan, conclude, interpret, classify, categorise, database enquiry, control, repeat, support, refute, degree of trust, scatter graph.

Year 5

Key topics: Animals including humans/ Living things and habitats/ Forces / Materials /Earth and Space

- I can describe changes as humans age.
- I can describe differences in lifecycles of a mammal, an amphibian, an insect and a bird.
- I can describe the life process of reproduction in some plants and animals.
- I can explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.
- I can identify the effects of air resistance, water resistance and friction that act between moving surfaces.
- I can recognise that some mechanisms, including levers, pulley and gears, allow a smaller force to have a greater effect.
- I can compare and group everyday materials based on properties including hardness, solubility, transparency, conductivity (electrical and thermal) and response to magnets.
- I can separate mixtures by filtering, sieving and evaporating.
- I can give reason based on evidence from comparative and fair tests for particular uses of everyday materials including metals, wood and plastic.
- I can demonstrate that dissolving, mixing and changes of state are reversible changes.
- I can explain that some changes result in the formation of new materials, and this kind of change is usually not reversible.
- I can describe the movement of Earth and other planets, relative to the Sun in the solar system.
- I can describe the movement of the Moon relative to the Earth.
- I can describe the Sun, Earth and Moon as approximately spherical bodies.
- I can use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.

KEY VOCABULARY: Animals: gestation, reproduction, puberty, menstruation, life expectancy. **Living Things:** asexual reproduction, sexual reproduction, metamorphosis. **Forces**: air resistance, water resistance, buoyancy, up thrust, gravitational pull. **Materials**: conductor, insulator. **Earth and Space**: planet, spherical bodies, rotate, axis, orbit, satellite, geocentric model, heliocentric model, astronomer.

Year 6

Key topics: Animals including humans/ Living things and habitats/ Electricity / Light / Evolution and inheritance

- I can Identify main parts of human circulatory system and describe the functions of the heart, blood vessels and blood.
- I can recognise the impact of diet, exercise, drugs and lifestyle on the way our bodies function.
- I can describe the way in which nutrients and water are transported within animals, including humans.
- I can 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.
- I can give reasons for classifying plants and animals based on specific characteristics.
- I can associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.
- I can compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on and off position of switches.
- I can use recognised symbols when representing a simple circuit in a diagram.
- I can 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.
- I can explain that we see things because light travels from light sources to our eye or from light sources to objects and then to our eyes. I can use the ideas that light travels in straight lines to explain why shadows have the same shape as the object that cast them.
- I can recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.
- I can 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.

KEY VOCABULARY: Animals: circulatory system, oxygenated blood, deoxygenated blood, drug, alcohol. **Living things:** microorganisms, bacteria, microscope. **Electricity**: voltage, amps, resistance, electrons, current. **Light:** refract, spectrum, absorption, dispersion. **Evolution**: adaptation, natural selection, adaptive traits, inherited traits.