

Year 3/4
Science:
Autumn 1
Physics - Forces and Magnets

Previous learning

In Year 2, the children learnt that objects can move. They learnt that objects that float are typically light or hollow and objects that sink are typically heavy or dense.

This project teaches children about contact and non-contact forces, including friction and magnetism. They investigate frictional and magnetic forces, and identify parts of a magnet and magnetic materials.

Substantive Knowledge in Science

Forces cause objects to move, change speed or change shape.

Forces need contact between two objects, but magnetic forces can act at a distance.

Magnets have two poles (north and south).

Magnets have invisible magnetic fields that can be seen using iron filings.

Disciplinary knowledge in Science

Ask relevant questions and use different types of scientific enquiries to answer them.

Set up simple practical enquiries, comparative and fair tests.

Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.

Gather, record, classify and present data in a variety of ways to help in answering questions.

Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.

Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.

Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.

Identify differences, similarities or changes related to simple scientific ideas and processes.

Use straightforward scientific evidence to answer questions or to support their findings.

Lesson 1

What is a force?

- To identify magnetic materials and the pushing and pulling forces.

Lesson 2

Points of contact (contact force)

- To understand that two 'bodies' need to touch each other for the force to occur (including predictions depending on which poles are facing).

Lesson 3

Frictional forces

- To observe the pushing force and the opposing frictional force on smooth and rough surfaces.

Lesson 4	Exploring force metres
	To measure the forces needed to carry out everyday tasks.
Lesson 5	Magnetic forces (non-contact force)
	To investigate and compare a range of magnets (bar, horseshoe and floating).
Lesson 6	Magnetic fields – Breadth and depth
	To make increasingly careful observations, identifying similarities, differences and changes and making simple connections.
Vocabulary	
pushing force, poles, pulling force, magnetic force, attract	

Year 3/4
Science:
Autumn 2
Physics - Electrical Circuits and Conductors (1)

Previous learning

In Year 3, the children learnt that materials have different properties. Some materials have magnetic properties and magnetic materials are attracted to magnets.

This project teaches children about further properties of materials. They learn about electrical appliances and safety. They construct simple series circuits and name their parts and functions, including switches, wires and cells. They investigate electrical conductors and insulators and identify common features of conductors. It also teaches children about programmable devices. They combine their learning to design and make a nightlight.

Substantive Knowledge in Science	Disciplinary knowledge in Science
A series circuit has a single path for an electric current to flow through. A series circuit must be a complete loop to work and have a source of power from a battery or cell. Electrical components include cells, wires, lamps, motors, switches and buzzers. Switches open and close a circuit and provide control.	Ask relevant questions and using different types of scientific enquiries to answer them. Set up simple practical enquiries, comparative and fair tests. Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. Gather, record, classify and present data in a variety of ways to help in answering questions. Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables. Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.

		Identify differences, similarities or changes related to simple scientific ideas and processes. Use straightforward scientific evidence to answer questions or to support their findings.
Lesson 1	Exploring electricity	
	To identify common appliances that run on electricity.	
Lesson 2	Components	
	To construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.	
Lesson 3	Making series circuits	
	To recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.	
Lesson 4	Fixing circuits	
	To 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.	
Lesson 5	Programmable technologies	
	To identify programmable technologies and their locations.	
Lesson 6	Programming traffic lights	
	To apply their understanding of computing to program, monitor and control their products.	
Vocabulary		
electricity, power, battery, buzzer, cell, circuit, complete circuit, component, crocodile clip, electric current, lamp, LED, light-emitting diode, motor, series circuit, switch, wire		

Year 3/4
Science:
Spring 1
Physics - Electrical Circuits and Conductors (2)

Previous learning

In Year 3, the children learnt that materials have different properties. Some materials have magnetic properties and magnetic materials are attracted to magnets.

This project teaches children about further properties of materials. They learn about electrical appliances and safety. They construct simple series circuits and name their parts and functions, including switches, wires and cells. They investigate electrical conductors and insulators and identify common features of conductors. It also teaches children about programmable devices. They combine their learning to design and make a nightlight.

Substantive Knowledge in Science

Disciplinary knowledge in Science

Design features of nightlights include a switch, light source and an attractive casing. Components can be added to circuits to achieve a particular goal. These include bulbs for lighthouses and torches, buzzers for burglar alarms. Electrical conductors allow electricity to flow through them, whereas insulators do not.	Ask relevant questions and using different types of scientific enquiries to answer them. Set up simple practical enquiries, comparative and fair tests. Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. Gather, record, classify and present data in a variety of ways to help in answering questions. Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables. Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. Identify differences, similarities or changes related to simple scientific ideas and processes. Use straightforward scientific evidence to answer questions or to support their findings.
Lesson 1	Conductors and insulators
	To recognise some common conductors and insulators, and associate metals with being good conductors.
Lesson 2	Recapping electrical knowledge
	To apply our knowledge of electricity, programming and design and technology.
Lesson 3	Research and develop ideas
	To use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups.
Lesson 4	Communicating my design
	To generate, develop, model and annotate and communicate their ideas.
Lesson 5	Constructing simple circuits
	To construct operational simple series circuits using a range of components and switches for control.
Lesson 6	Evaluate and improve
	To evaluate ideas and products against a design criteria and consider the views of others to improve their work.
Vocabulary	

electricity, power, battery, buzzer, cell, circuit, complete circuit, component, crocodile clip, electric current, lamp, LED, light-emitting diode, motor, series circuit, switch, wire

Year 3/4
Science
Spring 2
Biology - Plant Nutrition and Reproduction

Previous learning

In Year 2, the children learnt that plants grow from seeds and bulbs. They learnt that plants need water, light and a suitable temperature to grow and stay healthy.

This project teaches children about the requirements of plants for growth and survival. They describe the parts of flowering plants and relate structure to function, including the roots and stem for transporting water, leaves for making food and the flower for reproduction.

Substantive Knowledge in Science		Disciplinary knowledge in Science	
Plants require air, light, water and nutrients for life and grow. Water is transported in plants from the roots, through the stem and to the leaves, through tiny tubes called xylem. The processes of a plant's life cycle include germination, flower production, pollination, seed formation and seed dispersal. The parts of a flower include the sepal, petal, stamen and carpel.		Ask relevant questions and use different types of scientific enquiries to answer them.	
		Set up simple practical enquiries, comparative and fair tests.	
		Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.	
		Gather, record, classify and present data in a variety of ways to help in answering questions.	
		Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.	
		Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.	
		Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.	
		Identify differences, similarities or changes related to simple scientific ideas and processes.	
		Use straightforward scientific evidence to answer questions or to support their findings.	
Lesson 1	Function of plant parts - including plant requirements		
	To identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.		
Lesson 2	Focus on roots		
	To investigate the way in which water is transported within plants.		
Lesson 3	Focus on stems		
	To make increasingly careful observations, identifying similarities, differences and changes and making simple connections.		
Lesson 4	Flower anatomy		
	To name the parts of a flower and describe their functions.		

Lesson 5	Flowering plant life cycle
	To explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.
Lesson 6	Pollination and seed dispersal
	To know how pollen grains are transferred and how seeds are transported.
Vocabulary	
flower production, pollination, seed formation, seed dispersal, pollen, roots, stem/trunk, leaves and flowers	

Year 3/4
Science:
Summer 1
Biology - Grouping and Classifying

Previous learning

In EYFS, the children learnt that plants and animals can be identified according to their features. In Year 2, the children were aware that animals can be divided into six distinct groups: mammals, fish, birds, reptiles, invertebrates and amphibians. In Year 3, the children learnt that animals have further features that help scientists define the animal groups.

This project teaches children about grouping living things, known as classification. They study the animal and plant kingdoms and use and create classification keys to identify living things.

Substantive Knowledge in Science

Scientists classify living things according to shared characteristics.

There are five main groups of vertebrates: mammals, fish, reptiles, birds and amphibians.

There are six main groups of invertebrates: annelids, molluscs, arachnids, crustaceans, insects and myriapods.

The plant kingdom is divided into vascular and non-vascular plants.

Disciplinary knowledge in Science

Ask relevant questions and using different types of scientific enquiries to answer them.

Set up simple practical enquiries, comparative and fair tests.

Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.

Gather, record, classify and present data in a variety of ways to help in answering questions.

Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.

Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.

Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.

	Identify differences, similarities or changes related to simple scientific ideas and processes. Use straightforward scientific evidence to answer questions or to support their findings.
Lesson 1	Guess who? To recognise that living things can be grouped in a variety of ways.
Lesson 2	Understanding classification keys To explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.
Lesson 3	Animal kingdom To recall and describe each step of fossil formation.
Lesson 4	Sorting vertebrates and invertebrates To sort, compare and contrast vertebrates and invertebrates.
Lesson 5	Plant kingdom To explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.
Lesson 6	Our changing environment To recognise that environments can change and that this can sometimes pose dangers to living things.
Vocabulary	
classification, natural influences, human influences, habitat destruction, risk	

Year 3/4 Science Summer 2 Physics - Light and Shadows	
Previous learning	
In Year 2, the children learnt that daylight varies through the year. This project teaches children about light and dark. They investigate the phenomena of reflections and shadows, looking for patterns in collected data. The risks associated with the Sun are also explored.	
Substantive Knowledge in Science	Disciplinary knowledge in Science
A light source produces light. A reflector reflects	Ask relevant questions and use different types of scientific enquiries to answer them.

light. Light sources and reflectors can be natural, such as the Sun and Moon, or artificial, such as a light bulb or bike reflector. Protection from the Sun includes sun cream, sun hats, sunglasses and staying indoors or in the shade. A shadow is made when an object blocks the passage of light from a light source.	Set up simple practical enquiries, comparative and fair tests. Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. Gather, record, classify and present data in a variety of ways to help in answering questions. Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables. Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. Identify differences, similarities or changes related to simple scientific ideas and processes. Use straightforward scientific evidence to answer questions or to support their findings.
Lesson 1	Exploring light To recognise that they need light in order to see things and that dark is the absence of light.
Lesson 2	Identify and classify To identify and classify light sources and reflectors.
Lesson 3	Sun safety To recognise that light from the sun can be dangerous and that there are ways to protect their eyes.
Lesson 4	Exploring shadows To recognise that shadows are formed when the light from a light source is blocked by a solid object.
Lesson 5	Observing changes in shadows To compare the suitability of a range of everyday materials for particular uses, including wood, metal, plastic, glass, brick, rock, paper and cardboard.
Lesson 6	Investigate To investigate what will happen to shadows during the day.
Vocabulary	
dark, dull, light, non-reflective, reflective, rough, shiny, smooth, translucent, transparent, opaque, SPF, Sun, sunburn, sun cream, sunglasses, sun hat, sun protection factor, ultraviolet light, UV	