



Science

Overview

At Bessemer Primary School, our children are engaged, curious and excited about science. Science is defined as knowledge about the natural world that is based on facts learned through experiments and observation.

At the core of teaching and learning is the focus to ensure that children are ultimately given the tools to take ownership of their own learning and that they are given the opportunity to develop the knowledge and skills which will best serve them when undertaking the next stage of their learning journeys. In a reflection of our schools' visions and values, the aim of science at our federation is to commit to academic achievement as well as promoting creative and practical learning.

	Early Years
	Early Learning Goals
Objectives	<ul style="list-style-type: none"> • I can explore the natural world around me, making observations and drawing pictures of animals and plants • I know some similarities and differences between the natural world around me and contrasting environments, drawing on my experiences and what has been read in class. • I understand some important processes and changes in the natural world around me, including the seasons and changing states of matter.

Science at The Gem Federation begins with understanding things close to home.

In Early Years, science is incorporated throughout the year to enable children to achieve their Early Learning Goals. Children are encouraged to comment and ask questions about the world around them including how to best look after living things and the environment. As they progress through school, children are taught to recognise similarities, differences, changes and patterns in nature, and how environments might vary from one another.

5 Types of Enquiry

Comparative and Fair Testing

Pattern Seeking

Observing Over Time

Identifying and Classifying

Researching

	Year 1					
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topic	Animals including Humans (2 weeks)	Everyday Materials	Everyday Materials (1 week)	Seasonal Changes (2 weeks)	Plants (2 weeks)	Seasonal Change (3 weeks)
Knowledge Objectives	I can identify, name draw and label the basic parts of the human body and say which parts of the body is associated with each sense.	<ul style="list-style-type: none"> I can distinguish between and object and the material from which it is made. I can identify and name a variety of everyday materials, including wood, plastic, glass, water and rock. I can describe the simple physical properties of a variety of everyday materials. 	I can describe the simple physical properties of a variety of everyday materials. Compare and group together a variety of everyday materials on the basis of their physical properties.	I can observe changes across the four seasons	<ul style="list-style-type: none"> I can identify and describe the basic structure of a variety of common plants including roots, stem/trunk, leaves and flowers. 	I can observe changes across the four seasons
	Seasonal Changes		Seasonal Changes (2 weeks)	Plants (4 weeks)	Animals including Humans	Plants (3 weeks)
			I can observe changes across the four seasons			I can identify and name a variety of common

	I can observe and describe weather associated with the seasons and how day length varies.	Compare and group together a variety of everyday materials on the basis of their physical properties.	Animals Including Humans (3 weeks) <ul style="list-style-type: none"> • I can identify and name a variety of common animals that are birds, fish, amphibians, reptiles and mammals • I can identify and name a variety of common animals that are carnivores, herbivores and omnivores. 	<ul style="list-style-type: none"> • I can identify and name a variety of common plants, including garden plants, wild plants and trees, and those classified as deciduous and evergreen • I can identify and describe the basic structure of a variety of common plants including roots, stem/trunk, leaves and flowers. 	<ul style="list-style-type: none"> • I can identify and name a variety of common animals that are carnivores, herbivores and omnivores. • I can describe and compare the structure of a variety of common animals (birds, fish, amphibians, reptiles and mammals, and including pets). 	plants, including garden plants, wild plants and trees, and those classified as deciduous and evergreen
Working Scientifically	<p>Observing Take weather measurements and make observations over time (photos of what children are wearing through the year). Record time it gets dark each day. (This gathers evidence, over time, that day length changes and so do activities.)</p> <p>Pattern seeking At the end of the year, look for patterns in evidence e.g. Does it rain more in spring? Do we have more sunny days in the summer? Which was the coldest month?</p>					

	Year 2					
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topics	Uses of Everyday Materials	Animals including Humans	Living Things and their Habitats	Plants		Consolidation
Knowledge Objectives	<ul style="list-style-type: none">• I can identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses• I can find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching	<ul style="list-style-type: none">• I can notice that animals, including humans, have offspring which grow into adults• I can find out about and describe the basic needs of animals, including humans, for survival (water, food and air)• I can describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	<ul style="list-style-type: none">• I can explore and compare the differences between things that are living, dead, and things that have never been alive• I can 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.• I can identify and name a variety of plants and animals in their habitats, including micro-habitats <p>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.</p>	<ul style="list-style-type: none">• I can observe and describe how seeds and bulbs grow into mature plants• I can find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.		

Working Scientifically	Classifying Based on the children's own criteria, classify materials e.g. samples of wood, metal, plastic, etc.	Classifying Based on the children's own criteria: classify food items classify animals.	Classifying Find things that are living/ dead /have never been alive and classify them. Classify minibeasts found in the environment based on physical structure.	Classifying – seeds and bulbs		
	Comparative Testing Test materials for different uses (e.g. Which material can you use to make an aeroplane? Which fabric would you use for curtains?	Observing over time Observe a life cycle (e.g. caterpillars, chicks, farm animals).	Observing Closely Explore plants and animals in micro-habitats (under a rock, in a pond, in a meadow throughout the year.	Observing over time Plant seeds and bulbs and observe how they grow	Pattern seeking Children generate questions for investigation such as: Do big seeds germinate more quickly? Does it matter which way round you plant a bulb or seed? Which comes first, the root or the shoot?	
	Year 3					
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	Rocks	Forces and Magnets	Light	Animals Including Humans	Plants	Consolidation
Knowledge Objectives	<ul style="list-style-type: none">• I can compare and group together different kinds of rocks on the basis of their appearance and simple 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 rocks and organic matter.	<ul style="list-style-type: none">• 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 and not others• I can compare and group together a variety of everyday materials on the basis	<ul style="list-style-type: none">• I recognise that they need light in order to see things and that dark is the absence of light• I can notice that light is reflected from surfaces• I recognise that light from the sun can be dangerous and that there are ways to protect their eyes• I recognise that shadows are formed when the light from a light source is blocked by a solid object	<ul style="list-style-type: none">• I can 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• I can identify that humans and some animals have skeletons and muscles for support, protection and movement.	<ul style="list-style-type: none">• I can identify and describe the functions of different parts of plants; roots, stem, leaves and flowers.• I can 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.• I can investigate the ways in which water is transported within plants.	

		<p>of whether they are attracted to a magnet, and identify some magnetic materials</p> <ul style="list-style-type: none"> • I can describe magnets as having two poles <p>Predict whether two magnets will attract or repel each other, depending on which poles are facing.</p>	<ul style="list-style-type: none"> • I can find patterns in the way that the sizes of shadows change. 		<ul style="list-style-type: none"> • I can explore the role of flowers in the life cycle of flowering plants, including pollination, seed formation and seed dispersal 	
Working scientifically	<p>Classifying - Based on the children's own criteria: classify rocks based on physical properties. Look at different soils and discuss how they are similar/different.</p> <p>Comparative/ fair testing Test what happens when rocks are put in water. Test how quickly water runs through different types of soil.</p> <p>Researching How were fossils formed?</p>	<p>Classifying - Based on the children's own criteria: sort materials (metal/non-metal and magnetic/not magnetic)</p> <p>Comparative/fair testing Test the strength of different magnets. Recording data - table Recording findings using simple scientific language and labelled diagrams</p> <p>Researching Find out how magnets are used in everyday life</p>	<p>Comparative/fair testing Test materials for reflectiveness and transparency Investigate shadows (size and shape)</p> <p>Classifying - Based on children's own criteria: Classify light sources (man-made/natural) Classify materials (reflective/non-reflective or transparent, translucent or opaque)</p>	<p>Pattern Seeking Do 'healthy' drinks have less sugar? Do people with long arms throw further? Can people with short legs jump higher?</p> <p>Classifying animals Classify and sorting based on whether they are vertebrates or invertebrates</p> <p>Researching Look at food packaging to identify the amount of nutrients in different food items.</p> <p>Asking questions: what would happen if humans did not have skeletons?</p>	<p>Observing over time Observing celery in coloured water. Gathering photographic evidence of blossoms/flowers on a trail throughout the year</p> <p>Pattern seeking Investigate what happens when conditions are changed e.g. more/less light/water, change in temperature.</p> <p>Researching functions of parts of flowering plants and different methods of seed dispersal/pollination.</p>	
Year 4						
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	Living Things and their Habitats	States of Matter	Sound	Animals Including Humans	Electricity	Consolidation
Knowledge Objectives	<ul style="list-style-type: none"> • I can recognise that living things can be grouped in a variety of ways 	<ul style="list-style-type: none"> • I can compare and group materials together, according to 	<ul style="list-style-type: none"> • I can identify how sounds are made, associating some of 	<ul style="list-style-type: none"> • I can describe the simple functions of the basic parts of the 	<ul style="list-style-type: none"> • I can identify common appliances that run on electricity 	

	<ul style="list-style-type: none"> • I can explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment • I can recognise that environments can change and that this can sometimes pose dangers to living things 	<p>whether they are solids, liquids or gases</p> <ul style="list-style-type: none"> • I can 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) • I can identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature 	<p>them with something vibrating</p> <ul style="list-style-type: none"> • 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 a sound and the strength of the vibrations that produced it • I can recognise that sounds get fainter as the distance from the sound source increases 	<p>digestive system in humans</p> <ul style="list-style-type: none"> • I can identify the different types of teeth in humans and their simple functions • I can construct and interpret a variety of food chains, identifying producers, predators and prey 	<ul style="list-style-type: none"> • I can construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers • I can 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 • 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 	
Working scientifically	<p>Classifying living things in our environment. Using drawings, charts and diagrams to record our work. Learning how to use and make a classification key.</p> <p>Observing - Making systematic and careful observations of living things in local environments</p> <p>Researching: How different habitats are under threat from humans</p>	<p>Classifying different materials as solid, liquid or gas.</p> <p>Comparative/fair testing What affects melting rate of chocolate/ice? What affects the rate of evaporation?</p> <p>Observing - water as a solid, liquid and gas. Watch it being heated and cooled.</p> <p>Researching: Stages of the Water Cycle</p>	<p>Comparative/fair testing Compare volume and pitch from different instruments. Compare how volume changes away from a source. Use data loggers to record findings.</p> <p>Observing – What sounds can be heard in different areas of the school?</p> <p>Pattern seeking – How do the features of an instrument affect the pitch? How do the</p>	<p>Classifying - Compare and contrast different types of teeth. Recording findings using drawing and labelled diagrams. Comparing the teeth of carnivores and herbivores</p> <p>Pattern seeking – Which drinks are the worst for teeth?</p> <p>Researching: The different parts of the Digestive System</p>	<p>Classifying - Household appliances as using batteries/ mains</p> <p>Comparative/fair testing Using results to draw simple conclusions and make predictions – would this bulb light in this circuit? Which materials are the best conductors?</p> <p>Asking relevant questions – will this circuit work?</p>	

strength of vibrations
affect the volume?

Asking relevant questions –
why are teeth different?

Year 5

	Autumn 1 Properties and Changes of Materials	Autumn 2 Properties and Changes of Materials	Spring 1 Forces	Spring 2 Living Things and Their Habitats	Summer 1 Earth and Space	Summer 2 Consolidation
Knowledge Objectives	<ul style="list-style-type: none">• I can compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets• I know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution• I can use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through	<ul style="list-style-type: none">• 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 that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda <div>Animals Including Humans</div>	<ul style="list-style-type: none">• 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, pulleys and gears allow a smaller force to have a greater effect	<ul style="list-style-type: none">• I can describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird• I can describe the life process of reproduction in some plants and animals	<ul style="list-style-type: none">• I can describe the movement of the 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	

	filtering, sieving and evaporating • I can give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic	• I can describe the changes as humans develop to old age				
Working scientifically	Classifying different materials (e.g. magnetic/electrical conductors) Comparative/ fair testing Take measurements with a range of scientific instruments - What cup makes the best insulator? Was the change reversible or irreversible e.g. melting vs burning? How long does it take different types of sugar to dissolve?	Researching characteristics of humans at different points in development. Pattern seeking – Do male and female babies grow at the same rate?	Comparative/fair testing Carrying out a scientific enquiry into air resistance (effective paper helicopter shapes) and water resistance. Compare friction by using a forcemeter	Classifying animals according to their life cycle Observing over time - grow from cuttings and observe whether they grow roots/stem/ leaf/flower. Observing the changes of trees in the playground across the seasons. Pattern seeking - Do larger mammals have longer gestation periods? Do larger animals live longer? Researching different methods of seed dispersal	Observing shadows throughout the day Research to compare the time of day at different places on Earth. How would life be different on Earth and Mars? Comparative/fair testing Compare orbits of planets, phases of the moon.	
	Year 6					
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2

	Light	Living Things and Their Habitat	Electricity	Animals Including Humans	Evolution and Inheritance	
Knowledge Objectives	<ul style="list-style-type: none"> • I can recognise that light appears to travel in straight lines • 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 eyes or from light sources to objects and then to our eyes • I can use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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/off position of switches • I can use recognised symbols when representing a simple circuit in a diagram 	<ul style="list-style-type: none"> • I can identify and name the main parts of the 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 their bodies function • I can describe the ways in which nutrients and water are transported within animals, including humans 	<ul style="list-style-type: none"> • 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 • I can identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution 	
Working scientifically	<p>Comparative/ fair testing Investigate the shape of shadows and link this to light travelling in straight lines.</p> <p>Observing what happens when light shines through a prism</p>	<p>Classifying (to show variation within a species) Classify a species of plant e.g. daffodils, tulips, lilies.</p> <p>Observing and raising questions about the abundance of microorganisms in our environment</p> <p>Researching - Identifying scientific evidence that has been used to support or refute ideas or</p>	<p>Comparative/ fair testing Experimenting with voltage – brightness and volume (adding more bulbs/cells to a circuit) Systematically identifying the effect of changing one component at a time in a circuit</p>	<p>Classifying living things in our local environment Classify animals according to Carl Linnaeus' system. Classify plants into flowering, mosses, ferns and conifers, based on specific characteristics.</p> <p>Researching the difference between bacteria, virus and fungi to give reasons why these are not plants or animals.</p>	<p>Comparative/ fair testing Exercise and pulse experiment</p> <p>Observing pulse rate before, during and after exercise</p> <p>Pattern seeking Do older people have lower pulse rates?</p> <p>Researching the role of the heart and blood</p>	

		<p>arguments – evidence for evolution</p> <p>Researching how some living things are adapted to survive in their habitats including extreme conditions, for example, cactuses, penguins and camels.</p>		<p>Research how microorganisms can be helpful or harmful.</p>		
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