Cambridge Park Academy

Character - Preparation - Achievement

Science

Functional Curriculum – Key Stage 3

Stages 4-10

Curriculum Intent:

"Our vision is to inspire the next generation of Scientists through an exciting and stimulating Science curriculum!

Our aim is to ensure that all children build a core body of scientific knowledge, vocabulary and skills so that they may understand and apply science in everyday life.

We provide meaningful hands-on experiences, rooted in inquiry-based learning so that our pupils develop a sense of excitement and curiosity about science within the world in which we live."

At Cambridge Park we ensure that we

- develop pupils' sense of excitement of world we live in
- develop pupils' curiosity about natural phenomena
- encourage pupils to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

Developmental Stages and Ages				
Stage 4 **5 years** **(The bridge from the foundation curriculum to the functional curriculum)**	**Stage 5** **5-6 years**	**Stage 6** **6-7years**	**Stage 7 & 8** **7-9 years**	**Stage 9 &10** **9-11 years**

Long Term Plan (Year 1)					
Autumn 1	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Humans - Hygiene	Everyday Materials	Electricity	Seasonal Change/ Earth and Space	Animals – Australia and the Arctic	Living things and Habitats – Australia and the Arctic

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	Substantive Knowledge				
Term	**Autumn 1**				
Key Topic	***Humans- Ourselves*** Pupils will identify body parts and those associated with girls/boys. Looking at changes over time, pupils will look at how they have changed or those familiar to them using photos. They will learn about how to take care of their own body with a focus on personal hygiene. *Working Scientifically:* *Observe and measure how different humans grow, e.g. through pattern seeking- are older people always taller? Can people with larger feet hold more sweets in their hand/throw the furthest? Ask questions about what is needed for humans survive and stay healthy, explore ideas about what would happen is humans did not happen* *Possible trips/experiences: Dental nurse visit*				
	Stage 4	**Stage 5**	**Stage 6**	**Stage 7&8**	**Stage 9&10**
The Body	• Explores natural objects using their senses (e.g., "It's rough," "It smells sweet").	• Name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	• Start to name simple organs in the body: heart, lungs, brain	• Know that human and some other animals have skeletons and muscles for support, protection and movement. • Know the simple functions of the basic parts of the digestive system in humans • Know the different types of teeth in humans and their simple functions	• Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood • Know the ways in which nutrients and water are transported within humans
Looking After our Body	• Knows that people need to keep clean to stay healthy. • Knows that we wash our hands to get rid of dirt and germs. • Knows that we brush our teeth to keep them clean and strong. • Knows that we need to have a wash or bath to clean our body. • Recognises some items used for keeping clean (e.g. soap, toothbrush, towel).	• Know what humans need to do to keep healthy through personal hygiene, including; brush our teeth, washing hands, deodorant, bathing/showering, cutting nails etc.	• Know that keeping a good hygiene routine is important and to know how to keep your body healthy e.g. how to brush teeth, how to cut nails safely, how to wash hair etc.	• State the effect of not keeping good hygiene e.g. what would happen to your teeth if you didn't brush them?	• Recognise and state the impact of drugs and lifestyle on the way their bodies function

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Our Changing Body	• Begins to notice and talk about changes *in the body e.g. young to old incl. puberty*	• Begin to name parts of the body that make boys and girls different; penis, vesicles, vagina	• Identify and name external reproductive organs- breasts, vagina, penis, testis *age appropriate • Know that animals, including humans, have offspring which grow into adult	• Name ovaries and testes and know that they create eggs and sperm which are needed to reproduce • Describe changes the human body experience as human develop into adolescence onwards	• Know that a foetus grows in a female's womb and develops into a baby • Describe the changes as humans develop to old age • Describe the life process of reproduction
Key Vocab	Leg, head, teeth, body, eyes, ears, mouth, parts of the body including those within the school's RSHE policy, senses, touch, see, smell, taste, hear, fingers, skin, eyes, nose, ear, tongue *Although we often use our fingers and hands to feel objects, the children should understand that we can feel with many parts of our body		Heart, lungs, brain, offspring, baby, adults, growth, baby, toddler, teenager, old person, hygiene, soap, toothpaste, water,	Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, joints, support, protect, move, skull, ribs, spine, Digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, large intestine, rectum, anus, teeth, incisor, canine, molar, premolars, plaque, tooth decay, cavities, gum disease,	Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, drugs, medication, alcohol, lifestyle

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	Substantive Knowledge				
Term	**Autumn 2**				
Key Topic	**Everyday Materials** Exploring a range of everyday materials and investigating their properties pupils will be able to classify materials linked to homes and buildings by their properties. *Working Scientifically:* *They will plan investigations to test the most suitable materials for a given building project with set criteria e.g. weatherproof/strong. Pupils will classify their findings after recording their observations.* *Possible trips/experiences: Local builder*				
	Stage 4	**Stage 5**	**Stage 6**	**Stage 7&8**	**Stage 9&10**
What are Materials?	• Explore collections of materials with similar and/or different properties eg different types of rocks, shells •	• Identify and name a variety of everyday materials used for building, incl wood, brick, stone, glass wool, polystyrene, slate, clay, plastic • Distinguish between an object and the material from which it is made	• Identify and compare the suitability of a variety of everyday materials used for building, incl wood, metal, plastic, glass, glass wool, brick, stone and slate for particular uses	• Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties	• Compare and group together everyday building materials on the basis of their properties including their hardness, solubility, conductivity and transparency, durability • Give reason for the particular use of everyday building materials, including metals, wood and plastic, brick etc.
Properties of Materials	• Explores natural objects using their senses (e.g., rocks, shells, "It's rough," "It smells sweet").	• Describe the simple physical properties of the building materials named. • Know how to group together a variety of everyday building materials on the basis of their simple physical properties	• Know how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching	• Describe in simple terms how fossils are formed when things that have lived are trapped within rocks • Know that soils are made from rocks and organic matter	• Recognise that fossils provide information about living things that inhabited the earth millions of years ago.
Key Vocab	Object, material, wood, plastic, glass, metal, water, rock, brick, stone, slate, polystyrene, cement, glass wool, paper, fabric, elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, breaks/tears, rough, smooth, shiny, dull, see-through, not see-through		Names of materials – wood, metal, plastic, glass, brick, rock, paper, cardboard Properties of materials – opaque, transparent and translucent, reflective, non-reflective, flexible, rigid, absorbent Shape, push/pushing, pull/pulling, twist/twisting, squash/squashing, bend/bending, stretch/stretching	rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, fossil, bone, flesh, minerals, marble, chalk, granite, sandstone, slate, soil, types of soil (e.g. peaty, sandy, chalk, clay)	Thermal/electrical insulator/conductor, burning, rusting, new material, galvanising, rigid, malleable

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	Substantive Knowledge				
Term	**Spring 1**				
Key Topic	**Electricity** Pupils in stage 5 will explore safety around electricity identifying what appliances and devices use what type of electricity. In stage 5 + pupils will construct circuits to trying different components and use their circuits to create simple devices like a basic torch. *Pupils throughout all stages will only study series circuits and not parallel. *Working Scientifically: observe patterns e.g. bulbs become brighter when more cells are added. Comparative tests on materials that can be used as a switch to conduct electricity.* *Possible trips/experiences: Electrician visitor,*				
	Stage 4	**Stage 5**	**Stage 6**	**Stage 7&8**	**Stage 9&10**
How Things Work	• Repeat actions that have an effect e.g. turning a light switch off and on • Explore how things work	• Know some common appliances that run on mains electricity and battery powered • Know how to handle electrical appliances with care and is aware of dangers including not sticking fingers in mains, water kept away from it, and never touching switches with wet hands.	• 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	• Know that the brightness of a lamp or the volume of a buzzer is associated with the number and voltage used in the circuit. •
How Circuits Work	• Knows that some toys and objects need electricity to work. • Knows that a battery can make something turn on or light up.	• Knows that electricity can travel through wires to make something work. • Knows that turning something on or off changes whether it works (e.g. light switch, toy switch).	• Know that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit	• Know some common conductors and insulators, and associate metals with being good conductors.	• 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.
Key Vocab	Mains, battery, appliance, device, electricity, danger, electric shock, plug, socket		electrical circuit, complete circuit, component, cell, battery, positive,	loose connection, short circuit, conductor, insulator, metal, non-metal, symbol	Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage

			negative, connect/connections, crocodile clip, bulb, switch, buzzer, motor,		
	Substantive Knowledge				
Term	**Spring 2**				
Key Topic	**Seasons (Stages 4-6)** Discussing different weather that they have experienced, pupils will identify weathers associated with the four seasons. *Working Scientifically: Pupils will create tables and charts to record weather and day length over the year.* **Space (Stages 7-10)** After being introduced to the structure of the solar system, pupils will learn that the sun is a star. Pupils will find out about the ways the idea of the solar system have developed understand the geocentric and heliocentric models. *Working Scientifically: Using the internet to research time of day at different places on earth and use the information to compare. Create models of the solar system and sundials.* *Possible trips/experiences: Media term to support with a weather report*				
	Stage 4	**Stage 5**	**Stage 6**	**Stage 7&8**	**Stage 9&10**
Seasons	• Talks about what they see in the natural world, like trees, animals, weather, or changes in seasons. • Understands simple features of the weather and seasons.	• Name the four seasons • Describe weather associated with the seasons	• Identify the differing sessions and the time of year they occur across earth • Explain why other parts of the world will be in summer whilst we are in winter and vice versa.	• Knows that the Earth orbits the Sun and that this movement causes the seasons. • Understands that the tilt of the Earth's axis affects how much sunlight different parts of the world receive during the year.	• Knows that the Earth takes approximately 365.25 days to orbit the Sun, resulting in a calendar year and the need for leap years. • Understands that the combination of Earth's axial tilt and orbit creates varying daylight hours and temperatures across seasons globally.
Earth and Space	• Knows that some days are longer and some days are shorter. • Knows that it gets dark earlier in some parts of the year and stays light longer in others.	• Know that day length varies dependent on the season e.g. 'it is still light at 8pm in the summer'.	• Describe how day length varies dependent on the season	• Describe the Sun, Earth and Moon as approximately spherical bodies • Identify the positioning of the eight planets in relation to the sun.	• Describe the movement of the Moon relative to the Earth- *identifying the length of a month* • Describe the movement of the earth, and other planets, relative to the sun in the solar system – *identifying the length of a year*
Key Vocab	weather, sunny, rainy, raining, shower, windy, snowy, cloudy, hot, warm, cold, storm, thunder, lightning, hail, sleet, snow, icy, frost, puddles, rainbow, seasons, winter, summer, spring, autumn, Sun, sunrise, sunset, day length		weather, sunny, rainy, raining, shower, windy, snowy, cloudy, hot, warm, cold, storm, thunder, lightning, hail, sleet, snow, icy, frost, puddles, rainbow, seasons, winter, summer,	Sun, Moon, Earth, planets (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, Solar System	rotate, star, orbit, year, month, waning, waxing, first quarter, waxing cresent, new moon, waning cresent, last quarter, wanning gibbous, full moon, waxing gibbous,

		spring, autumn, Sun, sunrise, sun-set, day length,		

	Substantive Knowledge				
Term	**Summer 1**				
Key Topic	**Animals – Australia and the Arctic** Becoming familiar with animals that can be found in the Arctic and Australia, pupils will identify which animal categories each animal belongs to. Pupils will learn about the structure of animals in different groups including those without a backbone (invertebrates) in stages 7+. *Working Scientifically: Classifying animals according to their features and structures. Observe, through photos, videos and experiences on trips, how different animals grow.* *Possible trips/experiences: Woodside Wildlife Park (penguins)*				
	Stage 4	**Stage 5**	**Stage 6**	**Stage 7&8**	**Stage 9&10**
Identifying animals	• Can name and describe some common animals, such as cats, dogs, birds, and fish. • Can identify simple features of animals (e.g. fur, feathers, scales, number of legs).	• Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals • Know that some animals live in water, some on land, and some in both. • Recognise that animals move in different ways (e.g. swim, fly, crawl, walk	• Know that different groups of animals (fish, amphibians, reptiles, birds, and mammals) have different body structures. • Can describe features such as skin covering (scales, feathers, fur), number of legs, and type of limbs (fins, wings, paws). • Can compare animals by how they move (e.g. swim, fly, walk) and breathe (e.g. lungs or gills). • Understand that pets are usually mammals or birds and have specific care needs linked to their body structure.	• Know that animals can be classified into groups such as vertebrates (with backbones) and invertebrates (without backbones). • Can group animals based on shared features (e.g. number of legs, presence of wings, body covering, or type of skeleton). • Know that vertebrates include mammals, birds, fish, reptiles, and amphibians, while invertebrates include insects, spiders, and worms. • Understand that skeletons give animals shape and support, protect vital organs, and help them move. • Know that muscles work with bones to create movement in animals.	• Know that animals are classified into major groups based on specific characteristics such as body structure, method of reproduction, and habitat. • Understand that vertebrates are classified into mammals, birds, fish, reptiles, and amphibians, each with distinct features (e.g. warm or cold-blooded, live birth or egg-laying, type of body covering). • Know that invertebrates include groups such as insects, arachnids, molluscs, annelids, and crustaceans, each with identifiable traits (e.g. segmented bodies, number of legs, hard exoskeletons). • Can give examples of how scientists use observable characteristics to classify

				• Can identify and describe simple differences between animals with internal skeletons, external skeletons, and no skeleton at all.	animals (e.g. presence of feathers, jointed legs, or gills). • Understand that classification helps scientists to identify, study, and understand relationships between species and ecosystems.
Lifecycles	• Begins to notice and talk about changes	• Notice that animals, including humans, have offspring which grow into adults	• Identify the young of different animals and describe how they change as they grow.	• Identify the lifecycles of animals from different groups including mammals, amphibians, insects and birds	• Describe the lifecycles of animals from different groups including mammals, amphibians, insects and birds • Know that animals produce offspring of the same kind but normally offspring vary and are not identical to their parents. • Describe the life process of reproduction in some animals
Key Vocab	tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves, names of animals experienced first-hand/from topic studied from each vertebrate group, offspring, growth, names of animals and their babies (e.g. arctic fox, arctic hare, arctic wolf, reindeer, polar bear, bald eagle, puffin, snowy owl, Greenland shark, Siberian newt, common lizard, common frog, narwhal whale, orca, common European adder (arctic snake), kangaroo, wallaby, emu, koala, dingo, wombat, kookaburra, crocodile, frilled lizard, platypus, green tree frog, clown fish, central bearded dragon, * The children need to be able to name and identify a range of animals in each group e.g. name specific birds and fish ** They do not need to use the terms mammal, reptiles etc. or recall all of the key characteristics of each, although they will probably be able to identify birds and fish, based on their characteristics.		Amphibian, reptile, fish, bird, mammal, lemming, moose, arctic skua, arctic tern, brunnich's guillemots, gabada goose, echidna, galah, cane toad, tusked frog, black headed monitor lizard, central netted dragon,	Invertebrate, insects, mollusks, arthopods, worms, cnidarians, echinoderms, sponges, skeleton, bones, muscles, offspring, young, adult, Artic wooly bear moth, sea slugs, jelly fish, corals, sponges, octopus, Christmas beetle, bogong moth	life cycle, reproduce, sexual, asexual

	Substantive Knowledge

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Term	Summer 2				
Key Topic	**Living things and their Habitats- Australia and the Arctic** Pupils will be introduced to the idea that all living things have certain characteristics that are essential for keeping them alive and healthy. There are many types of environments from cities to forests and habitat is the word to describe a natural environment where a variety of living things can be found. Discovering how living things depend on each other- plants serving as food sources and shelter for animals e.g. Emus eat seeds and fruits from plants and also require shrubs for shelter and nesting. Pupils will use the animals suited in summer 1 to learn about their habitats. *Working Scientifically: Pupils will be supported to ask their own questions about life processes and research to find their answers. In stage 6 pupils will compare teeth of carnivores and herbivores and suggest reasons for the differences.* *Possible trips/experiences: Woodside Wildlife Park (penguins)*				
	Stage 4	**Stage 5**	**Stage 6**	**Stage 7&8**	**Stage 9&10**
Where living things are found	• Knows that some things are living and some are not	• Explore and compare the differences between things that are living, dead, and things that have never been alive • Identify that most living things live in habitats to which they are suited	• Identify and name a variety of plants and animals in their habitats, incl microhabitats • Describe how different habitats provide the basic needs for different kinds of animals and plants, and how they depend on each other	• Begin to understand changes to plants and animal's habitats can impact on how it provides their basic needs	• Describe how changes to an environment could endanger living things • Know that adaptation due to changes in their environment, may lead to evolution.
Food chains	• Knows that animals and humans need food and water to stay alive. • Knows that different animals eat different things (e.g. some eat meat, some eat plants).	• Identify and name different food sources for animals • Find out about and describe the basic needs of animals, incl humans, for survival (water, food and air)	• Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, • Identify and name a variety of common animals that are carnivores, herbivores and omnivores	• Construct and interpret a variety of food chains identifying producers, predators and prey. • Identify that animals, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat	• Describe the way in which nutrition and water is transported in animals.
Key Vocab	living, dead, never been alive, habitat, environment, natural environment, suited, suitable, plants, animals, arctic ocean, Australian desert, Australian wetlands, arctic desert		basic needs, food, food chain, herbivore, omnivore, carnivore, shelter, move, feed, water, air, survive, survival, names of local habitats (e.g. pond, woodland etc.), names of micro-habitats (e.g. under logs, in bushes etc.), conditions, light, dark, shady, sunny, wet,damp, dry, hot, cold, names of living things in the habitats and micro-habitats, Australian temperate forests, Australian mangroves,	Seasonal change, human impact, migrate, hibernate, food chain, producer, predator, prey, energy, nutrition, *arrows in a food chain represent the transfer of energy.	human impact, positive, negative, nutrient, water, transported,

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Disciplinary Knowledge

Being a Scientist!

Pupils are explicitly taught the working scientifically skills across all substantive knowledge units. They learn how to plan and carry out (do) investigations, record and review their findings. Finally, in later stages they begin to evaluate what they have found out.

Stage 4	Strands	Stage 5 & 6	Stage 7&8	Stage 9&10
• Talks about what they see in the natural world, like trees, animals, weather, or changes in seasons. • Can name and describe some common animals and plants. • Explores natural objects using their senses (e.g., "It's rough," "It smells sweet"). • Begins to notice and talk about changes (e.g., melting ice, growing seeds, rain turning to puddles). • Understands simple features of the weather and seasons. • Knows that some things are living and some are not	**Plan**	Ask simple questions and recognise that they can be answered in different ways Plan how to reach a goal. Choose the resources they need for their investigation	Ask relevant questions and use different types of scientific enquiries to answer them. Set up simple practical enquiries. Conduct comparative and fair tests.	Plan different types of scientific enquiry to answer questions, including recognising and controlling variables when necessary.
	Do	Observe closely using simple equipment (e.g. stop watches, magnifying glasses, Perform simple tests	Make systematic and careful observation. Take accurate measurements using standard units, using a range of equipment (e.g. thermometers, stop watches and data loggers).	Take measurements using a range of scientific equipment with increasing accuracy and precision, taking repeat readings when appropriate.
	Record	Gather and record data to help in answering questions Use a variety of methods including drawings (stage 5 - pictograms, tallys and block diagrams)	Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and time graphs	Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs.

		(stage 6- bar charts, pictograms and tables)	Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions	
	review 	Identify and classify Use observations and ideas to suggest answers to questions	Use results to draw simple conclusions Make predictions for new values Suggest improvements and raise further questions Identifying differences, similarities or changes related to simple scientific ideas and processes	Using test results to make predictions to set up further comparative and fair tests. Reporting and presenting findings from enquiries including conclusions, casual relationships and explanations of and degree in trust of results, in oral and written forms such as displays and other presentations.
	Evaluate 		Use straightforward scientific evidence to answer questions or to support their findings.	Identifying scientific evidence that has been used to support or refute ideas or arguments.