Brookhurst Primary School
Science Curriculum Overview

Year 1						
Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Unit of Work	Everyday Materials	Using Our Senses	Looking at Animals	Everyday Materials	Plant Detectives	Looking At Animals
	Our Changing World					
Area of Science	Chemistry	Biology	Biology	Chemistry	Biology	Biology
	Biology & Physics					
Significant Scientists	**Charles Mackintosh** (Waterproof coat)	**William Addis** (Toothbrush Inventor)	**Chris Packham** (Animal Conservationist)	**John MacAdam** (roads) **Chester Greenwood** (Earmuffs)	**Beatrix Potter** (Author & Botanist)	**Dr Steve Lyons** (Extreme Weather) **Holly Green** (Meteorologist)
Equipment	Wooden offcuts / different everyday objects made of a variety of materials / range of different paper / range of different fabrics / different spoons / different elastics / waterproof materials	Digital cameras / magnifier glasses / mirrors / lining paper roll / blindfolds / food to taste / sound recorders / feely bags / different fabrics	Information books / animal posters / match sticks / real dead fish / ice / magnifier glasses / feathers from different birds / animal food bowls / soft toy animals	Wooden offcuts / different everyday objects made of a variety of materials / range of different paper / range of different fabrics / different spoons / different elastics / waterproof materials	Garden plant catalogues / potted plants / wildflower seeds / containers / collector trays / digital camera / magnifiers / microscopes /	Information books / animal posters / match sticks / real dead fish / ice / magnifier glasses / feathers from different birds / animal food bowls / soft toy animals
	Our Changing World PE hoops / magnifiers / digital cameras / pebbles / flowering plants / books / edible plants / basket of vegetables with roots / dried fruit and seeds / gardening equipment / kitchen equipment / bird identification books / bird feeders / pet care equipment / fabric / sound recorders/ weather maps					

Brookhurst Primary School
Science Curriculum Overview

National Curriculum Links	• distinguish between an object and the material from which it is made • identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock • 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 simple physical properties.	• identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	• identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals • identify and name a variety of common animals that are carnivores, herbivores and omnivores • describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)	• distinguish between an object and the material from which it is made • identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock • 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 simple physical properties.	• identify and name a variety of common wild and garden plants, including deciduous and evergreen trees • identify and describe the basic structure of a variety of common flowering plants, including trees. •	• identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals • identify and name a variety of common animals that are carnivores, herbivores and omnivores • describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)
	<u>Our Changing World</u> • observe changes across the four seasons • observe and describe weather associated with the seasons and how day length varies.					
Scientific Enquiry Type	• Grouping and classifying • Carrying out comparative and fair tests	• Grouping and classifying • Carrying out comparative and fair tests • Noticing Patterns	• Grouping and classifying • Finding things out using a wide range of secondary sources of information	• Grouping and classifying • Carrying out comparative and fair tests •	• Grouping and classifying • Noticing Patterns	• Grouping and classifying • Finding things out using a wide range of secondary sources of information
	<u>Our Changing World:</u> • Observing changes over different periods of time • Grouping and classifying • Noticing Patterns • Finding things out using a wide range of secondary sources of information					

Brookhurst Primary School
Science Curriculum Overview

Working Scientifically Skills	• identifying and classifying • observing closely, using simple equipment • performing simple tests • using their observations and ideas to suggest answers to questions • gathering and recording data to help in answering questions. • asking simple questions and recognising that they can be answered in different ways	• asking simple questions and recognising that they can be answered in different ways • identifying and classifying • using their observations and ideas to suggest answers to questions • gathering and recording data to help in answering questions. • performing simple tests	• identifying and classifying • observing closely, using simple equipment • gathering and recording data to help in answering questions. • using their observations and ideas to suggest answers to questions	• identifying and classifying • observing closely, using simple equipment • performing simple tests • using their observations and ideas to suggest answers to questions • gathering and recording data to help in answering questions. • asking simple questions and recognising that they can be answered in different ways	• observing closely, using simple equipment • identifying and classifying • gathering and recording data to help in answering questions. • using their observations and ideas to suggest answers to questions	• identifying and classifying • observing closely, using simple equipment • gathering and recording data to help in answering questions. • using their observations and ideas to suggest answers to questions
	<u>Our Changing World:</u> • observing closely, using simple equipment • identifying and classifying • gathering and recording data to help in answering questions. • using their observations and ideas to suggest answers to questions • asking simple questions and recognising that they can be answered in different ways • gathering and recording data to help in answering questions.					
Key Facts	• Everything around us and that we use is made of some form of material. • All materials come from animals or plants, are dissolved in the sea or are mined from the ground. • Today some materials are artificially made in commercial chemical plants. Some of these materials are used as	• Humans have five senses – taste, hearing, smell, sight and touch – that they use to help them to find out about the world around them. • The tongue and the roof of the mouth are covered with around 10,000 tiny taste buds, which	• Most **amphibians and reptiles** have a similar basic structure – four legs (apart from snakes), large bulbous eyes and gaping mouths. • Amphibians, such as frogs, toads and newts, have a delicate soft skin, while reptiles, such as iguanas, crocodiles and alligators, have	• Everything around us and that we use is made of some form of material. • All materials come from animals or plants, are dissolved in the sea or are mined from the ground. • Today some materials are artificially made in commercial chemical plants. Some of these materials are used as they are and others are altered to make new,	• They begin to recognise a simple structure that is common to many different types of plants. Parts of a plant that children learn about in Year 1 include leaves, flowers, petals, fruit, roots, bulb, seed, trunk, branches and stem. • A simple flower has petals and contains a	• Most **amphibians and reptiles** have a similar basic structure – four legs (apart from snakes), large bulbous eyes and gaping mouths. • Amphibians, such as frogs, toads and newts, have a delicate soft skin, while reptiles, such as iguanas, crocodiles and alligators, have scaly

Brookhurst Primary School
Science Curriculum Overview

	they are and others are altered to make new, manufactured materials. • Natural materials can be identified in the physical environment – soil, rocks and water – or the biological environment – wood. • Manufactured materials have been processed in some way from raw materials, for example, metals are processed from the refining of metal ores, paper is produced from wood pulp and fabrics are produced from plant and animal fibres. • Other materials are produced from the chemicals extracted from natural materials, for example, plastics.	allow us to taste food • This causes the receptor cells located in the taste buds to send messages through sensory nerves to the brain. Taste buds recognise four basic kinds of taste: sweet, salty, sour and bitter. • The salty/sweet taste buds are located near the front of the tongue, the sour taste buds line the sides of the tongue and the bitter taste buds are found at the very back of the tongue. • Inside the nose is the 'olfactory epithelium', which is made up of around 10 million scent receptors. These receptors can distinguish up to 10,000 different smells.	scaly skin that gives their bodies a protective external 'armour plating'. • Most reptiles live on land. • Most fish are 'torpedo' shaped with eyes at either side of their heads. They feed while swimming through the water. • Birds are unique in the animal kingdom in having feathers that not only cover the bird's body to provide warmth, but also are light and create the appropriate wing shape that enables the birds to fly. • Animals that eat only plants are called herbivores. Most herbivores, including cows, squirrels, and elephants, eat a wide variety of plants and plant parts, fruits, nuts and seeds.	manufactured materials. • Natural materials can be identified in the physical environment – soil, rocks and water – or the biological environment – wood. • Manufactured materials have been processed in some way from raw materials, for example, metals are processed from the refining of metal ores, paper is produced from wood pulp and fabrics are produced from plant and animal fibres. • Other materials are produced from the chemicals extracted from natural materials, for example, plastics.	single set of reproductive organs at the centre, such as a buttercup or lily. • Many common flowers that children are familiar with are compound. • Compound flowers appear to be single flowers, but the 'flower' itself is actually made up of numerous small flowers or 'florets' arranged within a flower head. • The two main functions of roots are to absorb water and dissolved nutrients, and to secure the plant in the ground.	skin that gives their bodies a protective external 'armour plating'. • Most reptiles live on land. • Most fish are 'torpedo' shaped with eyes at either side of their heads. They feed while swimming through the water. • Birds are unique in the animal kingdom in having feathers that not only cover the bird's body to provide warmth, but also are light and create the appropriate wing shape that enables the birds to fly. • Animals that eat only plants are called herbivores. Most herbivores, including cows, squirrels, and elephants, eat a wide variety of plants and plant parts, fruits, nuts and seeds. •
	<u>Our Changing World</u> • Children should be able to link the seasons of the year to the different months and describe the most likely weather and temperatures that are frequently experienced in the UK. • Some children may refer to 'changing the clocks' from winter time to summertime. This is also known as daylight saving time and is a convention adopted in most countries of the world in order to help us to get maximum use out of the daylight time available at different times of the year. • Weather forecasting is a prediction of what the weather will be like in the near future. Weather forecasting involves a combination of computer models, observations, and knowledge of trends and patterns. • The main function of leaves is to make food for the plant by the process of photosynthesis					

Brookhurst Primary School
Science Curriculum Overview

	• Deciduous trees and plants rest, and live off the food that they stored during the summer. • A '**minibeast**' is simply a small animal. Spiders, snails, slugs, beetles, centipedes, worms, earwigs, caterpillars, are all examples of the thousands of different types of minibeasts that might be found within the school grounds. Most minibeasts are invertebrates – animals without a backbone. • In Britain alone there are over 25,000 species of invertebrates known.					
Common Misconception	• The major potential for confusion is the distinction between the properties of materials and the objects they are made into. It is important that, in this module especially, children are encouraged to focus on the material, not the object when describing properties. It is important that they explore off cuts or samples of different materials before they investigate objects they have been made into. • Adults as well as children may mis-use the word "material" to describe what should be called fabric. In science a material is something that is made from matter and this includes solids, liquids and gases. Non-materials are things not consisting of matter, for example energy. • Children often think that absorbent materials such as	• Children may have few misconceptions at this stage about the human body and the senses, but they commonly think that in order to see, 'rays' are sent out onto the object from their eyes.		• The major potential for confusion is the distinction between the properties of materials and the objects they are made into. It is important that, in this module especially, children are encouraged to focus on the material, not the object when describing properties. It is important that they explore off cuts or samples of different materials before they investigate objects they have been made into. • Adults as well as children may mis-use the word "material" to describe what should be called fabric. In science a material is something that is made from matter and this includes solids, liquids and gases. Non-materials are things not consisting of matter, for example energy. • Children often think that absorbent materials such as paper towels are waterproof – confusing absorbent (soaks water up) with waterproof (keeps water out).	• Many children have a concept of 'plant' that does not include trees. • They may perceive that plants are small scale and can be grown only in pots. • Trees are seen as a separate grouping. This can also sometimes be true of grass. • Children may not recognise that the school field is covered with plants.	

Brookhurst Primary School
Science Curriculum Overview

	paper towels are waterproof – confusing absorbent (soaks water up) with waterproof (keeps water out).					
	<u>Our Changing World</u> • Children may believe that leaves are always green. They may not recognise that there are many shades of green or that leaves are not always green but may naturally be other colours.					
Health and Safety	Check on CLEAPSS Website					
Career Opportunities	• Systems Engineer • Produce Development Scientist	• Nurse • Surgeon • Geneticist • Chemist	• Zoologist • Vet • Animal Technologist	• Materials Scientist • Materials Engineer • Polymer Scientist	• Environmental Scientist • Botanist • Soil Scientist • Plant Geneticist	• Marine Biologist • Ornithologist • Herpetologist
Key Vocabulary	materials, wood, wooden, plastic, metal, glass, water, rock, brick, paper, writing, wrapping, shiny, drawing, display, greaseproof, kitchen towel, handkerchief, wallpaper, sand paper, fabric, wool, nylon, silk, fleece fibre, properties, hard, soft, fluffy, rough, smooth, shiny, dull, light, heavy, transparent (see-through), opaque (can't see-through), translucent (see something through), harder, lighter, rougher, stretch, stretchy, elastic, stiff, bend, bendy, not	body, head, neck, arms, elbows, hands, fingers, legs, knees, feet, face, skin, ears, eyes, nose, nostrils, hair, mouth, teeth, tall, taller, short, shorter, big, bigger, small, smaller, louder, softer, loud, quiet, high, low, senses, taste, hearing, touch, smell, sight, bitter, sweet, sour, sharp, tingly, fizzy, milky, creamy, buzzer, doorbell, radio, tocker timer, bird song, wind blowing, car horn, traffic noise, loud/er, quiet/er, peaceful, silent, silence, noise, noisy, bang, crash, whistle, buzz, ring, squeak, creak, rattle, bang,	fish, amphibian, reptile, bird, mammal, goldfish, tropical fish, budgerigar, parrot, rabbit, gerbil, hamster, mouse, chinchilla, lizard, snake, dog, cat, tail, paws, legs, feet, nose, ears, eyes, feather, fur, scales, fins, fish, tail, gills, scales, eyes, mouth, bill, beak, head, eye, legs, claws, wings, feather, down quill, webbed feet, legs, smooth skin, big eyes and mouth, nose, scaly skin, claws on feet, long tongue, big teeth, mackerel, trout, hake, sea bass, whitebait, flat fish, plaice, robin, blackbird, blue tit, hawk, peacock, seagull, magpie, eagle, jump, hop, leap, climb,	materials, wood, wooden, plastic, metal, glass, water, rock, brick, paper, writing, wrapping, shiny, drawing, display, greaseproof, kitchen towel, handkerchief, wallpaper, sand paper, fabric, wool, nylon, silk, fleece fibre, properties, hard, soft, fluffy, rough, smooth, shiny, dull, light, heavy, transparent (see-through), opaque (can't see-through), translucent (see something through), harder, lighter, rougher, stretch, stretchy, elastic, stiff, bend, bendy, not bendy, press, squash, twist, shape, waterproof, absorb,	pansy, geranium, busy Lizzie, petunia, begonia, daisy, snapdragon, fuchsia, lily, daffodil, tulip, buddleia, weed, buttercup, thistle, nettle, foxglove, poppy, dandelion, daisy, cornflower, periwinkle, bluebell, leaf, stem, flower, bud, root, root system, tap root, fibrous roots, tree, trunk, branch, twig, tall, short, taller, shorter, tallest, shortest, similar, different, compare, group, measure	fish, amphibian, reptile, bird, mammal, goldfish, tropical fish, budgerigar, parrot, rabbit, gerbil, hamster, mouse, chinchilla, lizard, snake, dog, cat, tail, paws, legs, feet, nose, ears, eyes, feather, fur, scales, fins, fish, tail, gills, scales, eyes, mouth, bill, beak, head, eye, legs, claws, wings, feather, down quill, webbed feet, legs, smooth skin, big eyes and mouth, nose, scaly skin, claws on feet, long tongue, big teeth, mackerel, trout, hake, sea bass, whitebait, flat fish, plaice, robin, blackbird, blue tit, hawk, peacock, seagull, magpie, eagle, jump, hop, leap, climb,

Brookhurst Primary School
Science Curriculum Overview

	bendy, press, squash, twist, shape, waterproof, absorb, absorbent, soak up, mop up; frozen, freeze, melt, salt, tissue paper, button, glass bead, marble, pebble, pasta	knock, tick, chime, feel, touching, sensitive, sense, sensory, rub, pinch, prod, rough, smooth, bumpy, wrinkled, grooved, shiny, smooth, soft, hard, crunchy, slippery, slimy, fragrance, scent, pong, flowery, fruity, sour, bitter, sharp, strong, gentle, smelly, delicate, sensitive, fabric, material, layers, thick, thin, thicker, thinner, soft, hard, clock, window, door, floorboards, kettle, fire, chicken, sheep, cow, cluck, baa, moo	clamber, swing, pad, pace, prowl, pounce, spring, flap, fly, flutter, flop, splash, splosh, dive, swim, slither, slide, hedgehog, fox, bat, badger, night, nocturnal, senses, sight, smell, sonar, food, feeding, roost, sett, burrow, tunnel, nest, hospital, surgery, nurse, vet, patient, care, look after, treat, accident, injury, injured, illness, sick, medicine, bandage, stethoscope, gloves, face mask, overalls, cow, sheep, pig, horse, pony, goat, duck, chicken, cockerel, goose, harvest mouse, barn owl, rabbit, cat, dog, moo, baa, oink, neigh, bleat, quack, cluck, cock-a-doodle-do, honk, squeak, purr, miaow, woof, eat, healthy, meat, insects, fish, vegetables, plants, trees, grass, seeds, nuts, carnivore, herbivore, omnivore, goat, beard, hoof, hooves, horns, troll, ugly, big eyes, big pointed ears, big nose, big mouth with sharp teeth, small, medium, big, smallest, biggest, dinner, meal, meat, lamb, beef, ham, chicken, vegetables, plants, trees, bushes, grass, menu, hamper, appetite	absorbent, soak up, mop up; frozen, freeze, melt, salt, tissue paper, button, glass bead, marble, pebble, pasta		clamber, swing, pad, pace, prowl, pounce, spring, flap, fly, flutter, flop, splash, splosh, dive, swim, slither, slide, hedgehog, fox, bat, badger, night, nocturnal, senses, sight, smell, sonar, food, feeding, roost, sett, burrow, tunnel, nest, hospital, surgery, nurse, vet, patient, care, look after, treat, accident, injury, injured, illness, sick, medicine, bandage, stethoscope, gloves, face mask, overalls, cow, sheep, pig, horse, pony, goat, duck, chicken, cockerel, goose, harvest mouse, barn owl, rabbit, cat, dog, moo, baa, oink, neigh, bleat, quack, cluck, cock-a-doodle-do, honk, squeak, purr, miaow, woof, eat, healthy, meat, insects, fish, vegetables, plants, trees, grass, seeds, nuts, carnivore, herbivore, omnivore, goat, beard, hoof, hooves, horns, troll, ugly, big eyes, big pointed ears, big nose, big mouth with sharp teeth, small, medium, big, smallest, biggest, dinner, meal, meat, lamb, beef, ham, chicken, vegetables, plants, trees, bushes, grass, menu, hamper, appetite
	<u>Our Changing World</u> plant (verb and noun), leaf, leaves, bud, twig, branch, tree, roots, stem, shoot, bud, flower, leaf, rough, smooth, shiny, glossy, wrinkled, crinkled, crunchy, crisp, soft, green, olive, brown, orange, red, yellow, rust, flower, blossom, petals, stem, stalk, small, little, big, large, single, lots, deciduous, evergreen, plug plant, soil, compost, manure, dig, prepare, water, watering, vegetable, fruit, names of vegetables and fruits, salad, wash, clean, peel, cut, chop, grate, mix, sprinkle, combine butterfly, fly, wasp, bee, frog, spider, woodlice, worm, ant, ladybird, fly, squirrel, fox, dog, puppy, cat, kitten, hedgehog, bird, blackbird, house sparrow, starling, pigeon, seagull, robin, thrush, wagtail, blue tit, chaffinch, great tit, collared dove, magpie, wood pigeon, bird table, feeder, nuts, seed, types of seed, fat ball, snail, shell, foot, slime, slimy, striped, stripy, ridged, spiral, terrarium, dandelion, feed, food, leaves, lettuce, paws, claws, fur, whiskers, tail, furry, fluffy, silky, smooth, rough, thick, thin, long, short, big, small, brush, comb, lead, collar, toys, biscuits, chews seasons, autumn, winter, spring, summer, evidence, similar, different, group, compare, change, names of the months of the year, temperature, hot, warm, cold, cool, freezing, frosty, wet, dry, sunny, cloudy, showery, stormy, windy, breeze, gale, rainy, sunny, snow, shower, drizzle, puddle, breeze, gale, thunder, lightning, sleet, fog, mist, hat, gloves, mittens, scarf, muffler, ear muffs, boots, coat, umbrella, wellies, kite, windmill, sunglasses, thick, thin, woolly, furry, warm, waterproof					

Brookhurst Primary School
Science Curriculum Overview

Year 2						
Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Unit of Work	What is in your habitat?	Materials: Good Choices	Materials: Shaping Up	The Apprentice Gardener	Growing Up	Take Care
	Our Changing World					
Area of Science	Biology	Chemistry	Chemistry	Biology	Biology	Biology
	Biology					
Significant Scientists	**Rachel Carson** (Marine Pollution) **Liz Bonnin** (Conservationist) **Eugenie Clark** (Marine biologist)	**John Dunlop** (Invented the pneumatic tire)	**Thomas Hancock** (Invented elastic)	**Captain Cook** (Botanists) **Agnes Arber** (Botanist) **Alan Titchmarsh** (Botanist & Gardener)	**Elizabeth Garrett Anderson** (First British female physician and surgeon) **Robert Winston** (Human Scientist)	**Florence Nightingale** (Pioneer of modern nursing) **Mary Seacole** (Pioneer of modern nursing)
Equipment	Rock / dead lead / invertebrates / plastic bags /	Feely bag / range of fabric / paperclips / different materials / different fabrics / beakers / kitchen materials / rubber bands / pipettes / teabags / variety of balls / balloons / tent materials	Modelling clay / digital camera / sponge / strips of metal / blocks of wood / different elastics / straws / dowelling / bamboo skewers / marshmallows / elastic bands / pipe cleaners	digital camera / sets of seeds / plastic bottles / paper towels / small containers / bulbs / seeds	Baby doll /PE hoops / digital camera / cardboard hats / tape measures / small coloured stickers / metre rulers	PE Hoops / digital cameras / video camera / felt tip pens
	Our Changing World Teaspoons / pots / magnifying glasses / microscopes / pond dipping equipment / straws / garden area / seeds and bulbs / bird identification books / gardening equipment					

Brookhurst Primary School
Science Curriculum Overview

Books Required	• The Gruffalo by Julia Donaldson • Pond Circle by Betsy Franco • This is the Sea that Feeds Us by Robert Baldwin • Butternut Hollow Pond by Brian J. Heinz • Trout are Made of Tress by April Pulley Sayre • Sparrow Girl by Sara Pennypacker					
National Curriculum Links	• 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 • identify and name a variety of plants and animals in their habitats, including micro- habitats • explore and compare the differences between things that are living, dead, and things that have never been alive • describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name	• identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses	• find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching	• observe and describe how seeds and bulbs grow into mature plants • find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.	• notice that animals, including humans, have offspring which grow into adults • find out about and describe the basic needs of animals, including humans, for survival (water, food and air)	• describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.

Brookhurst Primary School
Science Curriculum Overview

	different sources of food.					
Scientific Enquiry Type	• Grouping and classifying • Finding things out using a wide range of secondary sources of information	• Grouping and classifying • Carrying out comparative and fair tests	• Grouping and classifying • Carrying out comparative and fair tests	• Observing changes over different periods of time • Noticing Patterns • Finding things out using a wide range of secondary sources of information • Grouping and classifying • Carrying out comparative and fair tests	• Grouping and classifying • Finding things out using a wide range of secondary sources of information • Noticing Patterns	• Grouping and classifying • Finding things out using a wide range of secondary sources of information
	Our Changing World • Grouping and classifying • Finding things out using a wide range of secondary sources of information • Noticing Patterns • Observing changes over different periods of time					
Working Scientifically Skills	• gathering and recording data to help in answering questions. • using their observations and ideas to suggest answers to questions	• identifying and classifying • using their observations and ideas to suggest answers to questions • performing simple tests • observing closely, using simple equipment	• gathering and recording data to help in answering questions. • observing closely, using simple equipment • using their observations and ideas to suggest answers to questions • performing simple tests	• using their observations and ideas to suggest answers to questions • performing simple tests • observing closely, using simple equipment • asking simple questions and recognising that they can be answered in different ways	• gathering and recording data to help in answering questions. • using their observations and ideas to suggest answers to questions • identifying and classifying	• using their observations and ideas to suggest answers to questions • identifying and classifying
	Our Changing World • observing closely, using simple equipment • gathering and recording data to help in answering questions. • using their observations and ideas to suggest answers to questions • asking simple questions and recognising that they can be answered in different ways					

Brookhurst Primary School
Science Curriculum Overview

Key Facts	• A habitat is a natural environment or home of a variety of plants and animals. The animals and plants that live in a habitat depend on the never-lived things in the environment (water, oxygen, soil or sand and rocks) and each other for their basic survival needs. • The two main types of habitats are land habitats and water habitats. • Water habitats may contain freshwater or salt water. • Plants are producers and can make their own food using sunlight, carbon dioxide and water in the process of photosynthesis. Animals depend on the other living things in the habitat for their food – they are known as consumers.	• Materials have different properties that make them suitable for different purposes. When choosing a material for a purpose, it is important to identify what properties are important and then to select the material that is closest to the ideal for each of these properties for the particular use. • Some properties are easily observed, for example, waterproof or transparent. • To investigate properties it is important to actually handle the materials and to feel whether they are, for example, rough or smooth, flexible or stiff. • When children are carrying out the different tests in this module they may not necessarily plan the test very well in advance. However, it is better to let them	• Flexible: able to be bent or twisted into a different shape. • Rigid: the opposite of flexible. • Squashy: able to be squashed or pressed into a new shape that has the same volume. • Stretchy: able to be stretched into a longer, thinner shape that has the same volume. • Elastic: the property of material which, when stretched or squashed, allows it to spring back to its original shape. • Stiff: unable to be changed by squashing or stretching. The term 'stiff' can also be used as the opposite of flexible, but in this module 'rigid' and 'stiff' are used with separate meanings to avoid confusion. • Pushes and pulls can cause objects to move away from or towards whatever is applying the force.	• Seeds need water and a suitable temperature to germinate. The required temperature varies from plant to plant; some seeds only germinate after a period of low temperatures. • Most seeds do not need light to germinate. • Growing plants need water, light and a suitable temperature. • Children need to recognise some causes of changes seen in unhealthy plants. • Seeds are the result of sexual reproduction and grow into new, unique plants. • Seed germination happens in a predictable sequence. There are two main types of germination: epigeal and hypogeal. • Children will observe that seeds do not all germinate in exactly the same way, but at this stage in their learning focus only on the common features of	• All animals require food, water and air for survival. Humans also require shelter to keep them dry and warm (unlike many other animals, humans are vulnerable to exposure and hypothermia). • The stages of the human life cycle considered in this module are baby, toddler, child, teenager, adult and elderly person.	• These lessons are based on the Eatwell Plate. The Eatwell Plate highlights the different types of food that make up our diet and shows the proportions that we should eat them in to have a well- balanced and healthy diet. • It is important that children can name a range of foods from each food type and that they know we should eat a balance of these foods every day. • We should eat plenty of fruit and vegetables each day – at least five portions. • Children should engage in physical activity every day. This should be a mix of moderate-intensity aerobic activity, • On three days a week physical activity should involve muscle-strengthening activities and bone-strengthening activities, such as running • Hand washing is very important before eating and after a range of different activities throughout the day to

Brookhurst Primary School
Science Curriculum Overview

	• Living is anything that is currently alive. • Once-lived is something that used to be alive but is no longer living. • Examples of things that have never lived may be naturally occurring, such as rocks, soil, air, water, or manufactured materials such as refined metal and plastic.	start testing, even if you know that they are not going to get sensible results, and then you can support them to realise that the test method is not appropriate.		a radicle emerging first and growing into root, followed by the shoot which grows the first leaves. • Roots and shoots are sensitive to gravity so, no matter what orientation the seed is planted in, the root always grows downwards and the shoot upwards.		prevent infection and the spread of disease.
	<u>Our Changing World</u> • Where an organism lives is called its habitat. The size of a habitat varies enormously from a tropical rainforest to a single leaf of an oak tree. • The boundaries as to what makes something a microhabitat are not clear-cut, so in this module the term 'habitat' is used throughout regardless of size. • A habitat is a natural environment or home to a variety of plants and animals. The conditions may vary across a habitat. • Most living things live in a habitat to which they are suited and depend on each other for survival. Animals depend on plants to give them shelter and food. Some animals depend on other animals for food.					
Common Misconceptions	• Children will not necessarily define seeds/berries as living as they do not think about the possibility of the object growing into a new plant. This will need explicit teaching. • Children may not realise that wooden objects, such as a wooden bench or fence, are once-lived as they do not recognise that the	• Children sometimes use the word 'material' to describe fabric and textiles. They need to be reminded that in science the word material is a generic word used to describe what something is made of.	• Children may need further practice at distinguishing between an object and the material it is made from. • In this module some properties are identified as fixed properties of a material, but others are seen to vary according to what the material has been made into, for	• Children may confuse the requirements of seeds for germination with those of mature plants for growth. • Children may not recognise that plants that grow tall when deprived of light are not healthy.	• Children often cannot distinguish between essentials for survival, needs for modern life and things that are desirable. Many of the things that children regard as essential, from televisions to more basic items such as clothes and beds, are	• Some children believe that sweets are bad for you and that you should never eat them. Help the children to understand that they can eat sweets, but only occasionally. • Children don't always recognise that there are different food types, just that

Brookhurst Primary School
Science Curriculum Overview

	wood came from a tree. • When constructing food chains, children do not necessarily have sufficient subject knowledge about what different animals eat or the habitat they live in, and therefore will incorrectly link animals that do not live in the same habitat. • Children often put the arrows the wrong way round in a food chain as they use the arrows to indicate what an animal eats. It is not necessary to introduce the idea of the passing of energy; instead use the phrase 'is eaten by'.	• Many scientific words are used differently in everyday language, so it is important to ensure that the children use these words correctly during science lessons. For example, some children may say that a material cannot be strong as it does not have muscles. Ensure that you listen to how the children use and discuss the vocabulary.	example, wood is never stretchy but it can be flexible, especially if it is shaped into a thin ruler or dowel, or it can be rigid if made into a thick table top or door. • Children need supporting to understand when they should refer to the material, for example, clay, rock, rubber, and when they also need to include information about the object, for example, metal spring, wooden block.		not needed for survival • Children who do not have younger siblings also may not distinguish between what is needed by a baby and what is appropriate for them, for example, foods and types of toys.	they eat different things. It is important that children can give examples of food items belonging to each of the food types. • They do not need to know what nutrition is gained from each type of food but they do need to know that they should eat a balance of the different types.
	<u>Our Changing World</u> • A food chain is a very simplified model of how energy is transferred. Most animals feed on a range of plants and other animals.					
Previous Science Unit Connections	Year 1 – Looking at Animals	Year 1 – Everyday Materials	Year 1 – Everyday Materials	Year 1 -Plant Detectives		

Brookhurst Primary School
Science Curriculum Overview

Healthy and Safety	Check on CLEAPSS Website					
Career Opportunities	• Wildlife Biologist • Wetland Biologist • Habitat Restoration Engineer	• Design Engineer • Patent Examiner	• Material Scientist • Materials Engineer	• Botanist • Environmental Scientist • Plant Geneticist	• Nurse • Surgeon • Chemist	• Operating Department Practitioner • Medical Physicist
Key Vocabulary	habitat, alive, living, once-lived, dead, never-lived, plants, animals, decay, rocks, soil, air, water, food chain, plants, animals, herbivores (eat plants and parts of plants), carnivores (eat other animals), omnivores (eat plants/parts of plants and other animals), direction, source of food, suited, habitat, features, names of habitats, living things and animal body parts	material, wood, property, metal, plastic, glass, rock, brick, paper, cardboard, fabric, smooth, rough, soft, hard, bendy, squashy, stiff, rigid, shiny, dull, see through, cold, warm, breaks, fold, crease, waterproof, absorb, absorbent, wet, sunglasses, lenses, light, block, transparent, opaque, translucent, strength, strong, weak, tear, teabag, tea leaves, chair, legs, arms, seat, backrest, cushion,	twist, squash, bend, stretch, squashing, bending, twisting, stretching, push, pull, pushing, pulling, roll, pinch, press, smooth, flexible, rigid, stretchy, squashy, elastic, stiff, properties, suitable, stretchiness, weight, catapult, frame, missile, strong, table, column, Venn diagram, set, sort, label, measure, record, bar chart	seeds, plant (verb and noun), apprentice, gardener, bulb, grow, observe, observations, describe, identify, expert, question, predict, prediction, water, compare, answer, investigate, bean, soil, surface, test, bury, light, dark, water, germinate, fair, same, plan, suitable, radicle, root, shoot, leaves, change, evidence, height, tallest, shortest, bar chart, scale, pattern, question, connection, measure, seedling, mature plant, wilting, healthy, unhealthy, warmth, care, die,	baby, need, want, living, alive, essential, food, milk, water, drink, eat, air, breathe, shelter, warmth, survival, depend, child, toddler, compare, change, differences, dependent, independent, move, care, learn, appearance, annotate, life cycle, life story, stages, order, pregnancy, birth, teenager, adult, parent, elderly person, grow, measure, compare, table, scatter graph, plot, pattern, evidence, observation, question, record	food, sort, classify, Venn diagram, Carroll diagram, healthy diet, dairy, fruits, vegetables, meat, fish, beans, fat, sugar, bread, potatoes, cereals, exercise, physical activity, hot, sweaty, heart beating, pulse, tired, aching, muscles, clean, hygiene, hygienic, wash, bath, shower, brush, comb, toothbrush, toothpaste, soap, water, shampoo

Brookhurst Primary School
Science Curriculum Overview

		tent, stretchy, tent cover, frame, flexible, measure, record		block, agree, disagree, alive, food store, first, next, later, after...days, order, conclusion, because		
	<u>Our Changing World</u> egg, offspring, baby, adult, grow, change, habitat, food chain, tally chart, pattern, chick, calf, cub, kid and other baby animal terms, seeds, bulbs, plant, root, stem, leaf, fruit, shoot(s), bud, flower, soil, compost, manure, dig, prepare, water, watering, vegetable, herbs, names of vegetables and herbs, wash, clean, peel, cut, chop, blend, smooth, puree, heat, boil, simmer, fry					

Brookhurst Primary School
Science Curriculum Overview

Year 3						
Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Unit of Work	Amazing Bodies	Can you see me?	The Power of Forces	How does your garden grow?	How does your garden grow?	Rock Detectives
	Our Changing World					
Area of Science	Biology	Physics	Physics	Biology	Biology	Chemistry
	Biology					
Significant Scientists	**Marie Curie** (Radiation) **Wilhelm Rontgen** (X rays) **Adelle Davis** (Nutritionist)	**Justus Von Liebig** (Mirrors) **James Clerk Maxwell** (Visible and Invisible Waves of Light)	**Andre Marie Ampere** (Electro-magnetism) **The Wright Brothers** (Airplanes) **Henry Ford** (Cars)	**Joseph Banks** (Botanist) **Ahmed Mumin Warfa** (Botanist)	**Marianne North** (Botanist)	**Mary Anning** (Fossil hunter) **Dr Anjana Khatwa** (Geologist) **Ursula Marvin** (Geologist) **Inge Lehrmasn** (Earth's Mantle) **William Smith** (Fossils strata)
Equipment	Local restaurant menus / tracing paper / chicken leg / mall weights / bottles of water/ bench / spreadsheets / stopwatches / tape measures / trundle wheel / bean bags / balls	A tent / torches / collection of objects / plastic mirrors / cut out card / shiny and non-shiny objects / plastic combs / tracing paper / sticks of wood / sunglasses	Tennis balls/ table tennis balls / cotton wool balls / rubber bands / clockwork toys / different windmills / stopwatches/ ramps / ramp covers / sand / sawdust / magnets / coins	Flowering plant in a pot (geranium) / different leaf / busy lizzie / primula / magnifiers / peas / carnations / celery /apple / sweet pea / lily / plastic bottles / Velcro dots / video camera / a range of seeds	Flowering plant in a pot (geranium) / different leaf / busy lizzie / primula / magnifiers / peas / carnations / celery /apple / sweet pea / lily / plastic bottles / Velcro dots / video camera / a range of seeds	Sandstone / sand / granite /chalk / limestone / marble / pumice / magnifiers / microscope / weighing scales / stop watches / pipettes / soil samples / fossil kits

Brookhurst Primary School
Science Curriculum Overview

	Our Changing World Digital cameras / paints / ball of string / lolly sticks / PE hoops / iPads / Sunflower seeds of different varieties / measuring equipment					
National Curriculum Links	• 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 • identify that humans and some other animals have skeletons and muscles for support, protection and movement.	• recognise that they need light in order to see things and that dark is the absence of light • notice that light is reflected from surfaces • recognise that light from the sun can be dangerous and that there are ways to protect their eyes • recognise that shadows are formed when the light from a light source is blocked by an opaque object • find patterns in the way that the size of shadows change.	• compare how things move on different surfaces • notice that some forces need contact between two objects, but magnetic forces can act at a distance • observe how magnets attract or repel each other and attract some materials and not others • compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials • describe magnets as having two poles • predict whether two magnets will attract or repel each other, depending on which poles are facing.	• identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers • 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 • investigate the way in which water is transported within plants • explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	• identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers • 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 • investigate the way in which water is transported within plants • explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	• compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • describe in simple terms how fossils are formed when things that have lived are trapped within rock • recognise that soils are made from rocks and organic matter.

Brookhurst Primary School
Science Curriculum Overview

Scientific Enquiry Type	• Grouping and classifying • Exploration • Finding things out using a wide range of secondary sources of information • Noticing Patterns	• Grouping and classifying • Noticing Patterns • Carrying out comparative and fair tests • Finding things out using a wide range of secondary sources of information	• Carrying out comparative and fair tests • Grouping and classifying • Exploration	• Grouping and classifying • Observing changes over different periods of time • Finding things out using a wide range of secondary sources of information • Exploration • Carrying out comparative and fair tests • Noticing Patterns	• Grouping and classifying • Observing changes over different periods of time • Finding things out using a wide range of secondary sources of information • Exploration • Carrying out comparative and fair tests • Noticing Patterns	• Grouping and classifying • Carrying out comparative and fair tests • Observing changes over different periods of time • Finding things out using a wide range of secondary sources of information
	<u>Our Changing World</u> • Observing changes over different periods of time • Noticing Patterns • Grouping and classifying					
Working Scientifically Skills	• reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • using straightforward scientific evidence	• gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • identifying differences, similarities or changes related to simple	• identifying differences, similarities or changes related to simple scientific ideas and processes • setting up simple practical enquiries, comparative and fair tests • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • recording findings using simple scientific language,	• recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • setting up simple practical enquiries, comparative and fair tests • identifying differences, similarities or changes related to simple scientific ideas and processes • using results to draw simple conclusions, make predictions for new values, suggest	• recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • setting up simple practical enquiries, comparative and fair tests • identifying differences, similarities or changes related to simple scientific ideas and processes • using results to draw simple conclusions, make predictions for new values, suggest	• recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • using straightforward scientific evidence to answer questions or to support their findings.

Brookhurst Primary School
Science Curriculum Overview

	to answer questions or to support • setting up simple practical enquiries, comparative and fair tests • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions	scientific ideas and processes • setting up simple practical enquiries, comparative and fair tests • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using straightforward scientific evidence to answer questions or to support	drawings, labelled diagrams, keys, bar charts, and tables • making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers	improvements and raise further questions • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions	improvements and raise further questions • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions	• identifying differences, similarities or changes related to simple scientific ideas and processes • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
	<u>Our Changing World</u> • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • setting up simple practical enquiries, comparative and fair tests • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions					
Key Facts	• Humans, like other animals, cannot make their own food. They gain the **nutrition** they need from the **food** they eat. It is important to eat the right type of food in the correct proportions in order to stay healthy. • Different types of food give us different **nutrients**. • People taking significant amounts of exercise will need to eat more	• The idea that we need light to see things is stressed in the National Curriculum, and the role of the eyes in seeing is equally critical although it is not explicitly mentioned. • The word 'dark' in everyday terms is generally used to mean not much light, and children will be familiar with it in this context. However, in a scientific context it means no light at all (or the absence of light).	• A **force** is a **push**, **pull** or **twist** that can make an object start moving, speed up, slow down, stop or change direction. • It takes a larger force to pull an object across a surface such as carpet than across ice. This is because the surface material is resisting the movement. This is a force known as **friction.** • **Magnets** are mostly made from iron or alloys of iron (mixtures of iron and other materials). Magnets provide a force which can push or pull over a	• The two main functions of roots covered in this module are to absorb water and dissolved nutrients and to secure the plant in the ground. Branching of roots and the presence of root hairs increases the surface area for absorption. Branching, the spreading of fibrous roots and deep taproots provide greater anchorage in the soil. • The **root** is the first part of the plant to grow when a seed germinates. • The **stem**, also known as the **trunk** in trees, supports the parts of the plant which are above ground and enables water and nutrients and other substances to be transported throughout the plant. • The function of the flower is sexual reproduction. Flowers may have only male parts, only female parts, or both. • he main stages of the life cycle of a flowering plant are: • **Germination:** • the seed first grows a root and then a shoot to become a seedling • **Growth:**		• **Limestone** is a grey/white rock that was formed from the bones of tiny sea creatures that dropped down to the bottom of the sea when they died. It is used as a building stone, and to make concrete. • **Chalk** is a softer, white rock and is a type of limestone. • **Granite** is harder and tough, usually grey to pink in colour and often used for buildings. Granites are made up of crystals, which can

Brookhurst Primary School
Science Curriculum Overview

	carbohydrates to give them increased energy. People in extreme weather conditions such as the Arctic will need to take in more fats to keep their bodies warm. • Humans and some other animals have an internal **skeleton** made of **bone**. These animals all have a **backbone** (also known as the **spine**) made up of bones called **vertebrae**. These animals are therefore called **vertebrates**. Mammals, fish, birds and reptiles are all vertebrates. • Insects have an external skeleton (a hard outer covering) which is known as an **exoskeleton**.	• The absence of light means that we cannot see, so there is a possibility for some confusion here unless the word 'dark' is used precisely. • All objects will reflect some light, although in some cases the ability of the eye to register this is limited and so we may not see them. • The pupil can control the amount of light entering the eye, but responds slowly to changing light intensity, and so does not provide effective protection against very bright lights. • Sunglasses serve two main functions. The first is to reduce the intensity of light, which makes it easier to see things and not to be overwhelmed by glare. The second is to provide a filter to reduce the potentially damaging amount of UV light that enters the eye.	distance. The stronger the magnet the greater the distance this force can be felt. • Magnets attract magnetic materials. Iron and materials containing iron (including steel) are the most common magnetic materials, but nickel and cobalt are also magnetic. • All magnets have two **poles**, the **north pole** and the **south pole**. These poles are in different places depending on the shape of the magnet. • If two like poles are brought near each other they **repel**. If two unlike poles are brought near each other they **attract**	• the plant increases in size, number of leaves and so on until it is a mature plant and flowering occurs **Pollination** is followed by **seed formation** (see above) • **Seed dispersal:** • the seeds are distributed away from the parent plant to avoid competition for light, space and water. The main methods of seed dispersal are: • **Wind:** seeds are light and blow away from the parent plant or have wing-like structures to allow them to drift as they fall from the plant • **Animal:** fruits are eaten and seeds dispersed in animal droppings; fruits and nuts are carried away and may be dropped or stored; seeds are adapted to cling to animal fur and be carried away • **Water:** method of dispersal for water plants; land plants may produce seeds which float and can be carried away by water • **Self-dispersal:** this may simply be by gravity with the fruit falling from the plant; it may then be further dispersed by animals, wind or water. More elaborate examples include seed heads adapted to sprinkle seeds around the plant ('pepperpots') and fruits such as pods exploding, catapulting the seeds away from the parent plant	often be seen clearly on the surface. • **Slate** is fine-grained and when expertly cut it will form smooth flat sheets of stone, which have long been used for roofing, floor tiles and other purposes. Slate is frequently grey in colour, especially when seen covering roofs, but can be found in other colours. • **Marble** is made of limestone that has experienced extreme heat and changed to form a hard rock that is used in buildings and to create sculptures. It can be white but varies in colour, depending on where it comes from. • Most **sandstone** is composed of quartz and feldspar because these are the most common minerals found in the Earth's crust. Like sand, sandstone may be any colour, but the most commonly occurring are tan, brown, yellow, red, grey, pink, white and black. • There are six main soil types: clay, sandy, silty, peaty, chalky, loamy.

Brookhurst Primary School
Science Curriculum Overview

	Our Changing World • **Leaves** are important to a plant as it is here that the plant produces the food it requires to grow. • In winter it is difficult for **deciduous trees** to maintain their leaves properly so they therefore become dormant during this period and do not grow. In preparation for this the trees shed their leaves during autumn. The green chlorophyll is no longer produced and the other pigments in the leaves give rise to the reds and yellows, which start to become more visible. The leaves begin to die due to lack of nourishment and fall to the ground where they rot, often leaving leaf skeletons. • The leaves of **evergreen trees** do not change so dramatically through the year.				
Common Misconceptions	• Fats and sugary foods are bad for us. In fact, they are not bad for us, we just need to eat them in moderation. • • Only vertebrates have a skeleton. Insects also have a skeleton but it is external, known as an exoskeleton. Shells are not skeletons. • All vertebrates have an internal skeleton made of bones. In fact some vertebrates (the cartilaginous fish which include sharks and rays) have a skeleton made of cartilage to give their bodies some rigidity but great flexibility.	• Light is only found in bright areas • We see things because light travels from our eyes towards an object • Objects that we see, 'give out' their own light • The moon is a source of light • We can see objects because light shines on them (the light still needs to get to our eyes!) • You can see more of your image in a mirror as you move backwards from it • Surfaces that are not shiny do not reflect light • A mirror reverses everything (think left/right and up/down) • Cats and other animals that see in the dark do so because their eyes give out light • Shadows are real 'things' rather than the absence of light (or less light than the surrounding area) • Shiny/reflective/white objects make light and	• All metals are magnetic. Ensure that you provide enough examples of materials that are clearly metals but are not magnetic. • The larger the magnet, the stronger it will be. • Some children may also find it difficult to distinguish between an object that is made of metal and those that appear metallic because they have a reflective coating.	• All structures that grow below the ground are roots. Actually, structures growing below the ground may be rhizomes (underground stems), bulbs or stem tubers, etc. • All roots grow below ground. Some plants have aerial roots • Plants 'suck up' or 'drink' water. The water is absorbed. • Plants 'eat' soil. The dissolved nutrients are needed by the plant but the source of food is photosynthesis. • All leaves are green. Leaves which do not appear green in colour because they contain other pigments also contain chlorophyll. The white parts of variegated leaves do not contain chlorophyll; in conditions where there is not enough light the plant may grow leaves without variegation to maximise photosynthesis. • Children may not recognise that the word fruit is used differently in botany and in the kitchen. Scientifically, pods, nuts and savoury seed-containing vegetables such as tomatoes and cucumbers are all fruits. • Seeds need light to germinate. Most seeds do not need light. The seed contains a store of food to sustain the plant until the leaves grow and it can photosynthesise.	• Children are not required to learn the terms sedimentary, igneous and metamorphic in the context of how rocks are formed. Children may not recognise: • That 'stones' and 'pebbles' are small pieces of rock • that the word 'stone' is sometimes used instead of 'rock' • That rock sits below everything on the Earth and is always there below the observable surface – even though it cannot be seen. • Encourage children to use the term 'absorb' rather than 'soak up' or 'take in' in the context of permeability activity.

Brookhurst Primary School
Science Curriculum Overview

		• can be seen in the dark • Some children may think that the object 'gives out' the light and others may not include both the light sources and the object in descriptions of shiny objects.				
	Our Changing World • Deciduous trees die in the winter and then come alive again in the spring. They do not die; they are simply dormant. • In order to reproduce all plants must produce flowers and seeds. (There are vegetative means of reproduction that do not involve flower and/or seed production). • Seeds need light to germinate because plants need light in order to grow well. In most cases, seeds do not require light in order to germinate: they do need water, the right temperature conditions and oxygen. Exceptions to this would be plants in forests or woods. Seeds there are stimulated to grow when the right amount of light comes through the canopy. • Children often do not realise that seeds, berries and fruits can be found on different plants throughout the year as their life cycles are at different stages. For example, blackberries are seen on plants from June to November whereas holly bears its fruit through winter. Conkers, the seeds of chestnut trees, fall in October and November, whereas dandelions disperse their seeds in spring.					
Previous Science Unit Connections	KS1 – Animals Including Humans			Year 1 – Plant Detectives	Year 2 – The Apprentice Gardener	
Health and Safety	Check on CLEAPSS Website					
Career Opportunities	• Chemist • Zoologist • Geneticist • Operating Department Practitioner	• Laser Engineer • Electrical Engineer • Optometrist • Ophthalmologist • Physicist	• Electrical Power Technician • Robotics Engineer • Magnet Engineer • Civil Engineer • Sports Scientist	• Soil Scientist • Plant Geneticist • Environmental Scientist • Botanist	• Conservation Scientist • Irrigation Engineer • Bioprocessing Engineer	• Geologist • Mining Geologist • Mineralogist • Petroleum Geologist
Key Vocabulary	stay alive, survive, food, balanced diet, nutrition, nutrients, fruit and vegetables, carbohydrates, protein, roughage, fibre, sugar, fat, dairy,	light, dark, shadow, mirror, bright, dim, reflect, eye, opaque, transparent, translucent, ultraviolet, ray, beam, absorb, luminous, non-	push, pull, twist, force, air, turns, fast, slow, slows down, material, surface, magnet, attracts, magnetic material, magnetism, acts at a distance, non-magnetic material, metal, non-metal,	plant, roots, stem, trunk, leaf/leaves, flower, leaflet, stalk, veins, surface, edge, lobes, tip, food, root hair, nutrients, anchor, support, seed, germination, seedling, growth, mature plant, flowering, pollination, seed formation, bud, petal, sepal, carpel, stamen, pollen, reproduce, nectar, seed, fruit, dispersal, animal, wind, water, self-dispersal, explosion, sprinkling,		sandstone, granite, chalk, limestone, marble, pumice, rough, smooth, hard, soft, rock, stone, pebble, texture, particle, crystal,

Brookhurst Primary School
Science Curriculum Overview

	skeleton, bones, protect, support, move, muscles, joints, ribs, heart, skull, brain, backbone, spine, spinal column, vertebrate, footprint, trail, vitamins, minerals, question, classify, investigation, survey, measure, pattern, evidence, draw conclusions	luminous, infrared, question, investigation, fair test, change, measure, predict, prediction, explain, explanation, observations, draw conclusions	strength, north pole, south pole, repel, question, investigation, fair test, change, measure, predict, prediction, explanation, observations, draw conclusions	competition, air, light, stigma, style, ovary, anther, filament, observe, question, investigation, fair test, change, measure, predict, prediction, explanation, observations, draw conclusions	granule, properties, soil, clay, sandy, loam, peat, organic material, weather, weathering, frost, beach, cliff, trilobite, starfish, sea urchin, ammonite, fossil, fossilise, remains
	<u>Our Changing World</u> leaf, deciduous, evergreen, seed, berry, fruit, flower, seedling, seed head, grow, growth, habitat, soil type, variation, season, seasonal change, pollen, pollinate, nectar, honey bee, bumblebee, butterfly – Large White, Tortoiseshell, Peacock, observe, record, present				

Brookhurst Primary School
Science Curriculum Overview

Year 4						
Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Unit of Work	Where does all that food go?	Good vibrations	In a state	Switched on	Who am I? & Where does all that food go?	Human Impact & In a state
	Our Changing World					
Area of Science	Biology	Physics	Chemistry	Physics	Biology	Biology & Chemistry
	Biology					
Significant Scientists	**Ivan Pavlov** (Digestive System Mechanisms) **Washington & Lucius Sheffield** (Toothpaste in a tube)	**Alexander Graham Bell** (Invented the telephone) **Aristotle** (Sound Waves) **Galileo Galilei** (Frequency and Pitch of Sound Waves)	**Joseph Priestly** (Discovered oxygen) **Lord Kelvin** (Absolute zero temperature) **Anders Celsius** (Temperature Scale) **Daniel Fahrenheit** (Temperature Scale / Invention of the Thermometer)	**Michael Faraday** (Discovered relationship between magnets and electricity) **Thomas Edison** (Lightbulb) **Joseph Swan** (Incandescent Light Bulb)	**Joseph Lister** (Antiseptic) **Jacques Cousteau** (Marine Biology)	**George Washington Carver** (Chemist) **Cindy Looy** (Environmental Change and Extinction) **Joean Beauchamp** (Procter Zoologist)
Equipment	Modelling clay / mirrors / fork / potato masher / apples / straws / strings / blender / porridge / crackers / spoons / beakers / eggs / bicarbonate of soda / stopwatches	Tambourine / datalogger / iPad to record sound/ musical instruments / sting / hangers / cutlery / paper cups / PE hoops / straws / pan pipes / materials for testing	Variety of materials / ice / thermometers / foil cases / plastic containers / ping pong balls / balloons/ syringe / cotton fabric / antiseptic wipes / kettle / datalogger	Batteries / sticky notes / solar powered calculator / bulbs/ motors/ wires/ buzzers / magnifiers / switches / crocodile clips	Pond / seashore life identification keys / equipment for collecting / magnifiers / nets / trays	Items made of a variety of materials / litter pickers / gardening gloves / sturdy plastic bags /items of litter

Brookhurst Primary School
Science Curriculum Overview

	Our Changing World Digital cameras / Woodland Trust Identification guides					
National Curriculum Links	• describe the simple functions of the basic parts of the digestive system in humans • identify the different types of teeth in humans and their simple functions • construct and interpret a variety of food chains, identifying producers, predators and prey.	• identify how sounds are made, associating some of them with something vibrating • recognise that vibrations from sounds travel through a medium to the ear • find patterns between the pitch of a sound and features of the object that produced it • find patterns between the volume of a sound and the strength of the vibrations that produced it • recognise that sounds get fainter as the distance from the sound source increases.	• compare and group materials together, according to whether they are solids, liquids or gases • 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) • identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	• identify common appliances that run on electricity • 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 • recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit • recognise some common conductors and insulators, and associate metals with being good conductors.	• recognise that living things can be grouped in a variety of ways • explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment	• recognise that environments can change and that this can sometimes pose dangers to living things. • explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment • recognise that living things can be grouped in a variety of ways

Brookhurst Primary School
Science Curriculum Overview

Scientific Enquiry Type	• Finding things out using a wide range of secondary sources of information • Grouping and classifying • Carrying out comparative and fair tests	• Exploration • Carrying out comparative and fair tests • Noticing Patterns • Finding things out using a wide range of secondary sources of information	• Grouping and classifying • Observing changes over different periods of time • Carrying out comparative and fair tests • Exploration	• Grouping and classifying • Exploration	• Grouping and classifying	• Grouping and classifying • Carrying out comparative and fair tests • Noticing Patterns
	<u>Our Changing World</u> • Grouping and classifying • Finding things out using a wide range of secondary sources of information • Noticing Patterns					
Working Scientifically Skills	• asking relevant questions and using different types of scientific enquiries to answer them • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers	• identifying differences, similarities or changes related to simple scientific ideas and processes • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • using straightforward scientific evidence to answer questions or to support their findings. • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions	• identifying differences, similarities or changes related to simple scientific ideas and processes • setting up simple practical enquiries, comparative and fair tests • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including	• identifying differences, similarities or changes related to simple scientific ideas and processes • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • setting up simple practical enquiries, comparative and fair tests • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions	• making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • identifying differences, similarities or changes related to simple scientific ideas and processes	• identifying differences, similarities or changes related to simple scientific ideas and processes • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • identifying differences, similarities or changes related to simple scientific ideas and processes

Brookhurst Primary School
Science Curriculum Overview

	• using 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 • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions	• making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • setting up simple practical enquiries, comparative and fair tests	thermometers and data loggers • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using straightforward scientific evidence to answer questions or to support their findings.	• using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions		
	<u>Our Changing World</u> • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables					
Key Facts	• Animals, including humans, cannot make their own food; they get nutrition from what they eat. • We need to eat different types of food so that our bodies get sufficient nutrients	• Sounds are caused by a material vibrating. For sounds to travel they require a medium to pass through, which can be a solid, liquid or gas. We hear/detect sounds because the vibrations produced by the source pass through the air. • When they reach our ears they cause our eardrums to vibrate,	• Substances occur in three states, **solid**, **liquid** and **gas**. • **Solids** retain their shape unless a force is applied to them, for example to cut or shape them. They have **constant volume** (small amounts of expansion when heated are not considered in this module). This is because the **particles**	• A **cell** is the correct term for what is commonly called a **battery**. A cell is a single unit of electrical supply providing a voltage of 1.5V. • Technically a battery is a collection of cells and will have a voltage which is a multiple of 1.5.	• A **key** is a common way to structure **identification charts**. It uses sequences of questions with yes/ no answers that split the group into subgroups until individual types of organisms can be identified.	• Humans can have a negative impact on the local environment through different types of **pollution** (e.g. litter, chemical, air, noise) and through destruction of habitats through building housing, roads etc. • Humans can also have a positive impact when developments are designed to be

Brookhurst Primary School
Science Curriculum Overview

	for growth and repair and • as a source of energy. These nutrients are absorbed by the body as it passes through the digestive system. • The digestive system consists of the mouth, oesophagus, stomach, small intestine, large intestine, rectum, anus. • In the mouth food is broken down both mechanically by the teeth and chemically by the saliva. • Humans have two sets of teeth – milk teeth and permanent teeth. The role of the teeth is to break the food into smaller pieces so that it can be swallowed.	stimulating the nerve endings in the ear so we hear the sound. In space no one would be able to hear you scream because there is no air. It is a vacuum. • Unlike light, sounds travel in all directions from a source, including above and below. Sounds travel round corners and through materials, therefore we can hear sounds that are not in view. • Sounds can be **high** or **low**. This is known as the **pitch** of the sound. • The speed of the vibrations is known as their **frequency**. The higher the frequency, i.e. the faster the vibrations, the higher the pitch. This is measured in **Hertz** (Hz). • The loudness of a sound is dependent on how strong the vibrations are. The size of these vibrations is known as the **amplitude**. • This is measured in **decibels** (dB).	making up the solid are held in a tight structure where they can vibrate but cannot move in relation to each other. Powders can be poured but will form a pile rather than a pool (flat surface). Each grain of a powder maintains its **shape** and **volume**. • **Liquids** when transferred from place to place take the shape of the container they are in but do not change in volume (although children will learn later in the module that **heating** causes **expansion**). The surface of a liquid will remain horizontal when the container is tipped. The particles in a liquid remain in contact with each other so the liquid cannot be compressed, but they are more loosely bound and so can move in relation to each other, allowing changes of shape. • **Gases** change in shape and volume to fill the space they are in. The particles in a gas are wide apart and move freely so, under pressure, the gas will take up less space. • **Changes of state** occur as a result of **heating** or **cooling**. They affect the **properties** of the substance but not its **chemical composition**.	• he **voltage** of a battery is a measure of how much **energy** (or '**push**') it can provide. • **Electricity** (or electrical current) is a **flow of electrons** (negatively charged particles) which transfers energy. • **Electrons** are present throughout the circuit so the flow in all parts of the circuit is instantaneous when it is connected. A cell has a **positive terminal** and a **negative terminal**. • A **short circuit** occurs when electricity flows from the negative to the positive terminal of the cell without passing through a component • A **switch** is a means of controlling the flow of electricity in the circuit.	• **Classification** is assigning an item to a group based on **common characteristics**. Animals are classified into a hierarchy of related subgroups. • **Vertebrates** are animals with **backbones** as part of an **internal skeleton**. • There are five main groups of vertebrates: fish, amphibians, reptiles, birds and mammals. • **Invertebrates** are animals that do not have an internal skeleton. • There are six main groups of invertebrates: insects, arachnids, crustaceans, myriapods, molluscs and worms.	**environmentally friendly**, when they improve **brownfield sites** and where **parks**, **nature reserves** and other green spaces are deliberately created or actively maintained to increase **biodiversity**. • A **food chain** is used to describe feeding relationships. These relationships are complex and, for the whole ecosystem, are shown as an interconnected food web, with any one organism being food for or a feeder on one or more other species. A food chain isolates one linear relationship from within the web. • The food chain starts with a species that eats no other species (known as a producer, and usually a green plant). All other species in the chain are known as **consumers** and the food chain ends with a species that is eaten by no other species in the web (**top consumer**).

Brookhurst Primary School
Science Curriculum Overview

	Our Changing World • **deciduous plants** lose their leaves during autumn. In winter it is difficult for the trees to maintain their leaves properly so they become **dormant** during this period and do not grow. • In winter other clues should be used to classify deciduous trees. These include looking at the **shape** of the tree, **bark**, **buds** and the **vein pattern** on **leaf skeletons**.					
Common Misconceptions	• Children may use the word stomach, meaning their abdominal region (tummy) and not the organ inside. • Children may have heard of food 'going down the wrong way'. This may lead them to think that there are two tubes (correct) but they may assume that the second tube is for drinks (not the air we breathe). This concept of food and drinks taking different paths through the body is often strengthened in children's minds because we remove solids and liquids from different parts of our bodies. • Children often have little concept of how long the digestive tract is. • Children often have difficulty with the scientific convention for recording food	• Children sometimes find it hard to grasp the way sound travels, because they confuse it with light which travels in straight lines, is blocked by opaque materials and does not go round corners. Make sure that they notice that sounds can be heard in all directions from a sound source, including above and below, and that they can hear objects that they cannot see making a sound. • Children often wrongly conclude that sounds do not travel well through solids. This is because they experience sounds becoming quieter when muffled e.g. closing a door or window and wearing ear defenders. • Sounds actually travel more easily through a solid than through a liquid or a gas. This is because the particles in a solid are packed more closely together	• hollow may be seen as opposite in meaning to solid, leading to difficulties in classifying hollow solid objects. • Children may be confused by solids such as sponge which can apparently be compressed. They need to understand that the actual solid material does not change in volume but that it contains spaces filled with air which is pushed out when the sponge (object) is squashed. • They may also have difficulty with malleable solids such as clay which can be shaped. They need to recognise that a force has been applied to change the shape of the material. • Granular solids and powders, which seem to behave like liquids in some respects, can be difficult to classify. Children need to focus on the properties of the individual grains.	• Mains electricity and batteries are entirely different things – battery powered devices are not electrical. • Electricity goes to rather than through a component so only one wire is needed. In this model electricity is seen as a fuel used by the component rather than a flow through it. This misunderstanding can be seen in the way some children try to connect circuits and in their drawings. • Mains electricity only requires one wire (because the different wires within the single cable are not visible). • Electricity is something which is made by the battery and has to travel to the component rather than flowing in all parts of the circuit at once. • A switch will only control a component if it is 'before' the component in the circuit. • Water conducts electricity. Although it is a rule of electrical safety not to mix	• Animals are all furry and four legged. • Insects and other invertebrates are not animals. Children need to understand the hierarchical nature of classification and recognise that there are groups within groups. • Aquatic mammals such as whales and dolphins are fish. • Bats, which are actually flying mammals, are birds. • Insect is a general term for all 'mini-beasts' or 'creepy crawlies'. • Children may fail to classify humans as mammals, or even as animals.	• Children may not recognise that natural-looking environments can be highly managed and may have been entirely created by humans – not all development is malign. Even the wildest places have been affected by human activity of some kind in the past and to varying degrees now. • Children may not connect housing developments that look like pleasant places to live with the destruction of habitats that may have been involved in their creation, and they may also not realise that apparently derelict sites can harbour great biodiversity. • It is also important for children to understand that natural events can destroy habitats and that food chains can be disrupted by naturally occurring events affecting either the whole habitat or

Brookhurst Primary School
Science Curriculum Overview

	chains, using the arrow to represent 'eats' rather than 'is eaten by'. This may be because they associate the arrow with an action so they believe it points from the animal acting (eating) to the one being acted upon. • Children may misunderstand the consequences of the removal of one species from a habitat, because they consider only an individual food chain rather than the more complex relationships of the food web.	so it is easier for the vibration to be passed on. The reason why closing the door causes the sound to decrease is that the vibrations get weaker as they move from one medium to another (air, to solid door and to air again).	• Gases are less familiar to children than liquids and solids. They do not always realise that an 'empty' container has air in it or that gases have substance and weight. They may also believe that all gases are dangerous and poisonous. • Evaporation and boiling are often confused as both involve a change from liquid to gas. • The word condensation has the everyday meaning of 'mist' or 'fog' on mirrors, windows and so on. Condensation is the process which causes that to happen; what they can actually see is water, not a substance called condensation.	electricity and water, pure water does not conduct; it is the impurities in tap water which allow it to conduct electricity.		an individual species (for example disease). • Children often have difficulty with the scientific convention for recording food chains, using the arrow to represent 'eats' rather than 'is eaten by'. This may be because they associate the arrow with an action so they believe it points from the animal acting (eating) to the one being acted upon. • Children may also misunderstand the consequences of the removal of one species from a habitat, because they consider only an individual food chain rather than the more complex relationships of the food web.
	<u>Our Changing World</u> • Children may think that deciduous trees die in the winter and then come alive again in the spring. They do not die; they are simply dormant. • Children often do not realise that seeds, berries and fruits can be found on different plants throughout the year as their lifecycles are at different stages. For example, blackberries are seen on plants from June to November, whereas holly bears its fruit through winter. Conkers, the seeds of chestnut trees, fall in October and November, but dandelions disperse their seeds in spring.					
Previous Science Unit Connections		Year 1 – Using Our Senses			Year 3 – Rock Detectives	Year 2 – What is in your habitat?

Brookhurst Primary School
Science Curriculum Overview

Health and Safety	Check on CLEAPSS website			Zinc-carbon and zinc-chloride batteries are the most suitable for this type of activity. Alkaline and rechargeable batteries may become hot enough to cause burns if there is a short circuit.	Check on CLEAPSS website	
Career Opportunities	• General Practitioner • Surgeon • Nurse	• Music Producer • Sound engineer • Acoustics engineer • Audiologist	• Crystallographer • Nanotechnologist • Particle Physicist • Diagnostic molecular scientist	• Solar energy engineer • Systems engineer • Electrical technician • Broadcast engineer • Nuclear engineer	• Wildlife biologist • Palaeontologist • Naturalist • Entomologist • Animal Behaviourist	• Environmental restoration planner • Habitat Restoration Engineer • Biostatistican
Key Vocabulary	mouth, oesophagus, stomach, small intestine, large intestine, rectum, anus, digestive system, digestion, carbohydrate, fat, sugar, protein, roughage, dairy, fruit, vegetables, vitamins, minerals, balanced diet, healthy, mechanical process, chemical process, absorb, nutrients, water, saliva, chemicals, enzyme, teeth, canine, incisor, premolar, molar, jaw, cutting, tearing, grinding , dental hygiene, decay, dentist, brushing, toothpaste, floss, mouthwash, food, plants, animals, food chain, food web, producer, consumer, predator, prey, herbivore, omnivore, carnivore	sound, loud, quiet, high, low, repeating, continuous, strike, blow, shake, pluck, vibration, vibrate, solid, gas, volume, strength of vibrations, sound source, fainter, distance, pitch, particles, question, investigation, fair test, change, measure, predict, prediction, explanation, observations, draw conclusions	solid, liquid, hard, soft, pour, flow, pile, pool, surface, horizontal, runny, viscous, sticky, grain, powder, ice, water, temperature, cool, cooling, warm, warming, hot, degree Celsius, melt, melting, freeze, freezing, solidify, solidifying, heating, states of matter, change of state, melting point, freezing point, process, gas, air, carbon dioxide, helium, oxygen, bubbles, empty, particle, weight, compress, squash, shape, volume, dry, evaporate, evaporation, water vapour, boil, boiling, boiling point, steam, thermometer, data logger, sensor, droplets, condense, condensation, water, droplets, cycle, model, snow, expand, scale, calibrate, heat sensitive, sensor, observe, measure, fair test, variable, collect, present, interpret, data, axis, scale, interval, control, keep the same, evidence, annotate, accuracy, describe,	electricity, electrical, mains, plugged in, battery, power, rechargeable, solar, wind up, sound, light, heat, movement, cell, wire, bulb, bulb holder, buzzer, motor, component, circuit, complete circuit, short circuit, flow, break, make, metal, connect, disconnect, terminal, positive, negative, switch, press switch, toggle switch, tilt switch, pendulum switch, property, electrical conductor, electrical insulator, electron, filament, sets, Venn diagram, Carroll diagram, table, conclusion, evidence, annotate	features, sequence, key, distinguish, similarities, differences, vertebrate, fish, amphibian, reptile, bird, mammal, backbone, hair, scales, feathers, eggs, wings, beak, lungs, gills, cold blooded, warm blooded, suckle, head, thorax, abdomen, wing, segment, antennae, insects, arachnids (spiders), crustaceans, myriapods, molluscs, worms, observations, sort, group, classify, identify	environment, impact, positive, negative, litter, pollution, waste, biodiversity, habitat, derelict, graffiti, traffic, destroy, create, location, food chain, producer, consumer, human impact, global issue, destruction, deforestation, rainforest, climate, climate change, zoo, endangered, breed, wild, natural, predator, prey, conservation, categories, tally chart, pictogram, bar chart, axes, scale, opinion, point of view, argument, viewpoint, debate

Brookhurst Primary School
Science Curriculum Overview

			explain, evaluate, reliable, repeatable			
	<u>Our Changing World</u> stalk, simple and compound leaves, leaf edge, leaf shape, leaf arrangement, deciduous, evergreen, bud, twig, tree shape, leaf skeleton, vein pattern, seed, flower, blossom, petal, classification key, observe, record, classify, present					

Brookhurst Primary School
Science Curriculum Overview

Year 5						
Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Unit of Work	The Earth and Beyond	Get Sorted & Everyday Materials	Feel the Force	Circle of Life & Reproduction in plants and animals	Reproduction in plants and animals	Marvellous Mixtures & Materials: All Change!
	Our Changing World					
Area of Science	Physics	Chemistry	Physics	Biology	Biology	Chemistry
	Biology					
Significant Scientists	**Stephen Hawking** (Black Holes) **Claudius Ptolemy & Nicolaus Copernicus** (Heliocentric vs Geocentric Universe) **Neil Armstrong** (First man on the Moon) **Caroline Herschel** (First to find a comet) **Valentina Tereshkova** (Cosmonaut)	**Jamie Garcia** (Invention of a new plastic) **Sir Humphrey Davy** (Separating gases) **Ruth Benerito** (Wrinkle-Free Cotton)	**Archimedes of Syracuse** (Levers) **Isaac Newton** (Gravity) **Albert Einstein** (The Theory Of relativity) **Galileo Galilei** (Gravity and Acceleration)	**Eva Crane** (Reproduction in Bees) **Sir David Attenborough** (Animal Behaviourist) **Mangala Mani** (Antarctic scientist)	**Jane Goodall** (Naturalist) **Sylvia Earle** (Marine biologist)	**Alexander Fleming** (Penicillin) **Louis Pasteur** (Vaccination)

Brookhurst Primary School
Science Curriculum Overview

Equipment	Ball of string / globe / torches / compass / large map /watches / online maps/ atlas	Classroom objects / household objects / sweets / foods / variety of liquids / spoons / variety of metal objects / variety of plastic objects / variety of balls / stop watches / carrier bags / thermometers / dataloggers / ice / kettle / insta-snow / pipettes / measuring jugs	Newton meters / string / plastic bag liners / tennis balls / tissue paper / bubble bath / large tank / rubber bands / tape measures /	iPads / leaflets / non-fiction books	Variety of flowers/ daffodils / magnifiers / digital microscopes	Disposable plates / cupboard catastrophe mixture / salt / sand/ rice / sugar / vinegar / water / spoons /rock salt / table salt / beakers / scales / hand lenses / plastic bowels / cling film / food colouring / lemonade / shaving foam / bicarbonate of soda / iron nails /metal paint / candles
	Our Changing World Bulbs / compost / sees / salad crops / flowering plants / potato tubers					
National Curriculum Links	• describe the movement of the Earth, and other planets, relative to the Sun in the solar system • describe the movement of the Moon relative to the Earth • describe the Sun, Earth and Moon as approximately spherical bodies • use the idea of the Earth's rotation to explain day and night and the apparent	• 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 • give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic	• explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • identify the effects of air resistance, water resistance and friction, that act between moving surfaces • recognise that some mechanisms, including	• describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • describe the life process of reproduction in some plants and animals.	• describe the life process of reproduction in some plants and animals.	• know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution • use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • demonstrate that dissolving, mixing and changes of state are reversible changes • 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.

Brookhurst Primary School
Science Curriculum Overview

	movement of the sun across the sky.		levers, pulleys and gears, allow a smaller force to have a greater effect.			
Scientific Enquiry Type	• Finding things out using a wide range of secondary sources of information • Noticing Patterns • Observing changes over different periods of time	• Grouping and classifying • Carrying out comparative and fair tests • Observing changes over different periods of time	• Noticing Patterns • Carrying out comparative and fair tests	• Using a wide range of secondary sources of information • Grouping and classifying • Noticing patterns	• Using a wide range of secondary sources of information • Grouping and classifying • Noticing patterns	• Planning comparative and fair tests • Grouping and classifying • Observing changes over different periods of time •
	<u>Our Changing World</u> • Observing changes over different periods of time • Carrying out comparative and fair tests					
Working Scientifically Skills	• reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations	• reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments. • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs	• taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • identifying scientific evidence that has been used to support or	• reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments. • recording data and results of increasing complexity using scientific diagrams and labels, classification	• planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries,	

Brookhurst Primary School
Science Curriculum Overview

	• recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • identifying scientific evidence that has been used to support or refute ideas or arguments. • using test results to make predictions to set up further comparative and fair tests	• planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate •	refute ideas or arguments. • planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs	keys, tables, scatter graphs, bar and line graphs	including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations

Brookhurst Primary School
Science Curriculum Overview

	Our Changing World • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • identifying scientific evidence that has been used to support or refute ideas or arguments. • planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary							
Key Facts	• Stars are held together in a galaxy by gravity • ' Constellation' is not a scientific term but is commonly used for a pattern of stars in a clearly defined area of the sky. • These stars may be vast distances apart and in different galaxies. The stars are called fixed because they were long believed not to move • Galaxies rotate: the distances between them are so great that this can only be detected using modern scientific equipment. The sky today looks as it did thousands of years ago and many of the constellations were named in ancient times. • When viewed from above the	• **Solids** retain their shape when transferred from place to place unless a force is applied to them, for example, to cut or shape them. They have constant volume. This is because the particles making up the solid are held in a tight structure where they can vibrate but cannot move in relation to each other. Powders can be poured but will form a pile rather than a pool (flat surface). Each grain of a powder maintains its shape and volume. • **Liquids** when transferred from place to place take the shape of the container they are in but do	• Materials that children encounter in the world around them show signs of wear and tear over time. This may be due to weathering or regular use (or abuse). • A thermal insulator is a material that provides high resistance to heat flow, for example, types of foamed plastics like polystyrene, wood, some fabrics and cork.	• Forces are at work on everyday things all the time. Everything that changes speed, stops, starts and changes direction has forces acting on it. These forces are invisible and only their effects are noticed • The simple definition of a force is that it is as a result of a push or a pull, so gravitational attraction is a pulling force – a force that works between bodies at a distance • There are two types of forces – those that work at distance and those that are in contact. Gravity and magnetism work at a distance, whereas friction, air resistance and water	• An animal is any living thing that can move from place to place independently and has senses that help it to recognise and react to the world around it. Animals are unable to make their own food and so have to feed on other living things. • A life cycle is made up of a series of developmental changes that an organism goes through, as they are born, grow, develop to adulthood, reproduce, reach old age and die. • The stages of the life cycle and length of that cycle vary, depending on the type of animal. • Mammal life cycles vary significantly in length. They give birth to live young which look like smaller versions of the adult animal. • Amphibians spend part of their life cycle in water and part of their life cycle on land. • The life cycles of insects vary, but most insects hatch from eggs. The immature stages can be very different from adults	• The reproductive organ of flowering plants is the flower. • The broad term 'flower' can be used to describe both **simple** and **compound** flowers. A simple flower has petals and contains a single set of reproductive parts at the centre, such as a buttercup or lily. Compound flowers appear to be single flowers, but the flower itself is actually made up of numerous small flowers arranged within a flower head. • Some plants have separate male flowers and female flowers on the same plant,	• Many breakfast **cereals** are fortified with iron particles as a mineral supplement. Iron is found in a very important component of blood called haemoglobin. Haemoglobin is the compound in red blood cells that carries oxygen from the lungs around the body. • **Salt** (chemical name – sodium chloride) gives us chlorine for the chlor-alkali chemical industry – the biggest user of salt. • **Dissolving** takes place when two materials, a solid and liquid, share a similar chemical property. **Salt** and **water** molecules carry positive and negative charges. As salt is mixed into water, the charged water molecules break	• **Reversible changes** are those in which the fundamental composition of the materials involved remains unchanged, and that by altering the conditions it is possible to return the materials to their original state. • **Dissolving** is another example of a reversible change. The material that is dissolved, such as salt (called the solute), in another material, such as water (called the solvent), can be recovered by separating the two materials. • **Non-reversible changes** occur when

Brookhurst Primary School
Science Curriculum Overview

	North Poles of the Sun and the Earth, the Earth and other planets orbit the Sun anticlockwise, causing an apparent shift in the positions of the stars over the year. • An international congress met in Washington DC in 1884 where the world was divided into 24 time zones (one for each hour of the day), each covering 15° of longitude. • Day and night are the same lengths on the equinoxes: September 22nd/23rd and March 20th.	not change in volume. The surface of a liquid will remain horizontal when the container is tipped. The particles in a liquid remain in contact with each other so the liquid cannot be compressed, but they are more loosely bound and so can move in relation to each other, allowing changes of shape. • **Gases** change in shape and volume to fill the space they are in. The particles in a gas move freely so, under pressure, the gas will take up less space.		resistance work in contact. • Newton's first law says that an object will stay still or, if moving, will continue to move at the same speed and in the same direction unless it is acted on by a force. • Unbalanced forces cause changes to movement (start, stop, speed up, slow down and changes of direction). • Scientifically, mass is used to describe the amount of matter in a body and is measured in grams and kilograms.	in structure, habit and habitat. • Birds lay eggs that have hard shells. These eggs hatch out after a period of incubation. Young chicks are largely helpless and are fed by the adult birds until they have grown and developed sufficiently to leave the nest • At any one time there are many species of animals that are considered to be threatened or endangered	such as corn, courgette, marrow, squash and cucumber. • Many plants can also reproduce without forming seeds. This is called asexual or vegetative reproduction, which results in new plants that are genetically identical to the parent. • All mammals, insects, birds and amphibians reproduce by sexual reproduction.	apart the charged salt molecules. • There is a limit to how much of a solid can be dissolved in a given amount of water. When no more of the **solute** (salt, sugar) can be dissolved in the **solvent** (water) the solution is said to be saturated.	materials react to produce new products which cannot be easily turned back into the original materials. • Rusting is another example of a non-reversable change. Almost all metals rust or oxidise to an extent. • When materials **burn**, a chemical change takes place. For burning to happen, three things must be present: **fuel**, **oxygen** and **heat**. Heat and light are given out during the change.
	<u>Our Changing World</u> • The reproductive organ of flowering plants is the flower. • The broad term 'flower' can be used to describe both **simple** and **compound** flowers. A simple flower has petals and contains a single set of reproductive parts at the centre, such as a buttercup or lily. Compound flowers appear to be single flowers, but the flower itself is actually made up of numerous small flowers arranged within a flower head. • Some plants have separate male flowers and female flowers on the same plant, such as corn, courgette, marrow, squash and cucumber.							

Brookhurst Primary School
Science Curriculum Overview

Common Misconceptions	• Children might think seasons occur because the Earth is nearer to the Sun in the summer and farther away in winter. • Children often think that day and night are caused by the Earth orbiting the Sun (or even the Sun orbiting the Earth, rather than the Earth's rotation on its axis). • Children may think that stars are 'star-shaped' with five points. • Children may think that the Moon gives out light – actually it reflects light from the Sun. • Children may consider the Universe to be the same thing as the solar system, with no other suns or planets; a solar system is a star with planets orbiting round it; a galaxy consists of hundreds of billions of stars, all of which are	• Children sometimes use the word 'material' to describe fabric and textiles. They need to be reminded that in science the word 'material' is a generic adjective used to describe what something is made of. • Many children believe that all metals are magnetic. Only metals containing iron (including steel), nickel and cobalt are magnetic (i.e. can be attracted to a magnet).	• Children sometimes use the word 'material' to describe fabric and textiles. They need to be reminded that in science the word 'material' is a generic adjective used to describe what something is made of. • Many children believe that all metals are magnetic. Only metals containing iron (including steel), nickel and cobalt are magnetic (that is, can be attracted to a magnet).	• Children use the everyday understanding of the term 'force' – that is, when someone makes you do something you do not want to do. • Children identify motion as moving or not moving. • Children also think that movement stops when things 'run out of push' rather than because there are other forces acting on them. They may think that to keep an object moving you need to keep giving the object the force (push). This common misconception is because of the invisibility of the other forces at work. To help overcome this idea the use of arrows to define size and direction of the forces is written	• Children may think that humans are not animals. • Children tend only to recognise common mammals as animals and do not include birds, insects, fish and amphibians. • Children may not appreciate that different types of animals have different life cycles, for example, they may think that all young animals start life as miniatures of their adult parents.	• Children may think that humans are not animals and substitute 'animal' for types of mammal. • Children tend only to recognise common mammals as animals and do not include birds, insects, fish and amphibians. • Children may not appreciate that different types of animals have different life cycles; for example, they may think that all young animals start life as miniatures of their adult parents. • Children may not recognise that reproduction is a characteristic of living things. • Some children think that plants do not	• Children will often use the word 'disappear' interchangeably with dissolve, because they cannot see the solid once it has dissolved. • Using a coloured sugar and showing them what happens to the water's colour, as the sugar dissolves, may help. Evaporating the liquid and retrieving the solid will demonstrate that the solid is still present and has not 'disappeared'. • Some children may use the word 'melt' instead of dissolve. The confusion here may result from placing ice cubes in water. Point out that if the solid has 'melted', evaporating the	• Children may think that certain solids dissolve in liquids, not recognising that a chemical change has taken place, producing carbon dioxide gas as a result, such as sodium bicarbonate or a vitamin C tablet in water. • They may think that carbon dioxide bubbles released from a bottle of lemonade when the lid is unscrewed indicate a chemical reaction. • They may struggle to understand that the gas released

Brookhurst Primary School
Science Curriculum Overview

	potential solar systems.			into the module. This is particularly important because force is a vector and therefore should have both its size and its direction identified. • Children believe that a stationary object has no forces acting on it whereas the reason the object is stationary is because the forces acting on it are balanced. • Children and many adults believe that heavy things fall faster than light objects, when it is the surface area and air resistance that affect the way objects fall.		reproduce sexually at all. • Children may think that bees and other insects visit flowers to pollinate them. They visit flowers to collect nectar; their role in pollination is accidental as far as the insect is concerned. • Children may think that bees fertilise flowers; they pollinate them. Fertilisation happens when male and female genetic material fuses. • Young children may not link the idea of mating and fertilisation to the birth of animals.	liquid to retrieve the solid will not work. Try it!	has been dissolved in the liquid and is released because of the reduction of pressure. • They may think that only the wick of a candle burns, not recognising that the wax melts and vaporises and the gas burns, ignited by the candle flame.
	<u>Our Changing World</u> • Children may not recognise that reproduction is a characteristic of living things. • Some children think that plants do not reproduce sexually at all. • Children may think that bees and other insects visit flowers to pollinate them. They visit flowers to collect nectar; their role in pollination is accidental as far as the insect is concerned. • Children may think that bees fertilise flowers; they pollinate them. Fertilisation happens when male and female genetic material fuses.							

Brookhurst Primary School
Science Curriculum Overview

Previous Science Unit Connections		Year 4 – In a state		Year 3 – Power of Forces	Year 3 – Amazing Bodies KS1 Animals including Humans		Year 3 – Amazing Bodies KS1 Animals including Humans		Year 4 – In a state	
Health and Safety	Check on CLEAPSS Website									
Career Opportunities	• Astronomer • Satellite Engineer • Aerospace Engineer • Astrophysicist • Astronaut	• Material Scientist • Metallurgist • Design Engineer		• Spirts Scientist • Robotic Technician • Civil Engineer • Structural Engineer	• Vet • Zoologist • Nurse • Surgeon • Ornithologist • Herpetologist				• Polymer Scientists • Materials Scientist	
Key Vocabulary	Aldebaran, Arctic, Antarctic, British Summer Time, Earth, Greenwich Meridian, International Date Line, Jupiter, Mars, Mercury, Milky Way, Moon, North Pole, Saturn, South Pole, Sun, Neptune, Universe, Uranus, Venus, asteroid, autumn, axis, compass, crescent, dawn, degrees, dusk, equator, equinox, fixed stars, Full Moon, galaxy, gibbous, hemisphere, horizon, illuminate, leap year, longitude, lunar month, meridian, nebula, New Moon, northern, orbit, planet, reflect, rotate, rotation, solar system, solstice, southern, spin, spring, star, summer, sunrise, sunset, telescope, temperature, tilt, time zone, waning, waxing, winter, year, change,	properties, material, solid, liquid, gas, compare, contrast, group, organise, criteria, hardness, soluble, insoluble, transparent, transparency, opaque, hardness, strength, rigidity, flexibility, elastic, elasticity, ductile, electrical conductor/insulator, thermal conductor/insulator, magnetic, non-magnetic, attract, repel, viscosity, viscous, thick, thicker, types of plastic – polyester, nylon, polythene, PVC, polystyrene acrylic – recycle, reuse, biodegradable,	properties, material, building, construction, structure, organic, natural, manufactured, man-made, weathering, decay, decompose, break down, brittle, fragile, metal, plastic, wood, ceramic, concrete, compare, contrast, group, organise, criteria, strong, strength, weakness, durability, wear, tear, stretch, flexible, flexibility, hardness, light, heavy, durable, durability, waterproof, washable, stain resistant, reusable, bicycle,	Air resistance, Aristotle, balanced , balanced forces, bevel gears, clockwork, cogs, compress, extend, effort, force arm, forces, force, friction, force arrow, fulcrum, gravity, Galileo, gear ratio, gears, gear trains, lever, lift, machine, mechanisms, movement, Newton, Newton meter, pinion, pivot, pulley, pull, push, rack, resistance, rotary motion, simple machines, speed, time, unbalanced force, upthrust, water resistance, weight arm, wheel	life cycle, birth, growth, reproduction, metamorphosis, aging, death, animal, mammal, amphibian, insect, bird, elephant, toad, bumblebee, blue tit, hedgehog, bat, polar bear, mountain gorilla, cubs, pups, hibernate, nocturnal, marsupial, toad, newt, salamander, tree frog, metamorphosis, tadpole, larva, frog, toad, gills, cold blooded,	reproduction, reproduce, flower, organ, carpel, stamen, pollen, seeds, seed head, berry, fruit, pollinator, pollination, fertilisation, reproduction, reproduce, propagate, stem, leaf and root cuttings, runners, tubers, bulbs, rhizomes, gender, male, female, sex, sexual, asexual, metamorphosis, mate, sperm, pregnant, give birth, young, pup, calf, foal,	reproduction, reproduce, flower, organ, carpel, stamen, pollen, seeds, seed head, berry, fruit, pollinator, pollination, fertilisation, reproduction, reproduce, propagate, stem, leaf and root cuttings, runners, tubers, bulbs, rhizomes, gender, male, female, sex, sexual, asexual, metamorphosis, mate, sperm, pregnant, give birth, young, pup, calf, foal, chick, hatch, fledge, fledgling	material, compare, contrast, separate, mixture, sieve, filter, evaporate, solid, liquid, gas, powder, particle, dissolve, soluble, solution, contamination, contaminate, contaminated, impurity, pure, purity, suspension, saturated, saturation, reversible, non-reversible, microbes, bacteria, types of oil, liquid, solid, detergent, sticky, filter, mechanical, boom, residue,	material, change, compare, contrast, solid, liquid, gas, change of state, dissolve, melt, reversible, non-reversible, mixture, powder, particle, tablet, bubbles, carbon dioxide, change, reaction, inflate, rust, oxidise, oxygen, corrode, tarnish; types of metal: iron, steel, chromium, tin, zinc; boil, vapour, fuel, heat, burn, burning, flammable, flame, melts, solidifies, candle, wick, wax

Brookhurst Primary School
Science Curriculum Overview

	compare, draw conclusions, explain, explanation, investigation, line graph, measure, model, observations, plan, predict, prediction, presentation, question, record, review, scientific diagram, table	environmentally friendly	suspension, brakes, tyre tread, saddle, weight, mass, criteria, ovenproof, heat, temperature, room temperature, thermal conductor, thermal insulator, insulate, insulation, viscosity, viscous, sticky, stickiness, tackiness, adhesive, glue, saturated, powder, particle, polymer, volume, quantity		ladybird, butterfly, dragonfly, head, thorax, abdomen, antennae, egg, pupa, cocoon, adult, thrush, peregrine falcon, ostrich, emperor penguin, breeding cycle, clutch, brood, hatch, fledge, prey, predator, reproduce, habitat, environment, humpback whale, blue whale, swift, osprey, wildebeest, caribou, monarch butterfly, migrate, migration, navigate, genetic, endangered, threatened, extinct, extinction, evolution, giant panda, black rhino, peregrine falcon, bumblebee, salamander, osprey, koala bear	chick, hatch, fledge, fledgling		environment, biological, marine life, purify, drinkable, sterilise	
	<u>Our Changing World</u> flower, carpel, stamen, pollen, seed, seed head, berry, hip, fruit, pollinator, pollination, fertilise, fertilisation, seed dispersal, male, female, organs, sex, propagate, propagation, stem/leaf/root cutting, runner, tuber, rhizome, bulb, crop, cropping, produce, yield, glut, names of fruit and vegetables being grown								

Brookhurst Primary School
Science Curriculum Overview

Year 6						
Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Unit of Work	Everything Changes	Light up your world	Body Pump	Danger! Low Voltage	Nature Library	Body Health
	Our Changing World					
Area of Science	Biology	Physics	Biology	Physics	Biology	Biology
	Biology					
Significant Scientists	**Charles Darwin** (Evolution) **Alfred Russell Wallace** (Naturalist) **Rosalind Franklin** (DNA) **Nettie Stevens** (Geneticist) **Professor Alice Roberts** (Evolutionary biologist)	**Thomas Young** (Wave Theory of Light) **Ibn al-Haytham** (Light and our Eyes) **Percy Shaw** (The Cats Eye) **Maria Telkes** (Solar energy)	**Hippocrates** (The Father of Medicine) **Leonardo Da Vinci** (Anatomy) **Santorio Santorio** (Anatomist) **Dr. Katherine Dibb** (Expert in Cardiovascular Sciences)	**Nikola Telsa** (Alternative currents) **Alessandro Volta** (Electrical Battery) **Edith Clarke** (Electrical engineer)	**Carl Linneus** (Classification) **Libby Hyman** (Classification Invertebrates)	**Sir Richard Doll** (Linking Smoking and Health Problems) **Justus von Liebig** (Theories of Nutrition and Metabolism) **James Lind** (Cured Scurvy)
Equipment	Rulers / meter sticks / tape measures / wild plants /petri dishes / cotton wool / cress and mustard seeds / fossils / plastic cups / rice / tweezers / tongs/ plastic fork /plastic knife / large marbles	Torches/ sunglasses /mirror / datalogger / metal spoons / tracing paper/ tape measure / meter rulers / graph paper / bike light / red torch / fairy lights/ CD	Chalk / masking tape / sports bibs / bike pump /stethoscopes / large bucket	Energy stick / human circuit ball / 1.5v cells / lamps / lamp holders / tinfoil / magnifiers / wires / crocodile clips / push switch / paperclips	Large selection of sweets / moss / fern / conifer / flowering plant / internet / collection pots / microscope / mushrooms / petri dishes / variety of breads / variety of seeds / knives	Flip chart paper / food packaging / stopwatches / large PE hoops

Brookhurst Primary School
Science Curriculum Overview

	Our Changing World Hand lenses / Animal Identification guides / binoculars / cameras / butterfly kit / internet / bug catchers / nets / sieves / large white sheets /magnifying glasses / microscopes					
National Curriculum Links	• recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago • 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.	• recognise that light appears to travel in straight lines • 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 • 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 • use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.	• identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood	• associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit • 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.	• 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 • give reasons for classifying plants and animals based on specific characteristics.	• recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function • describe the ways in which nutrients and water are transported within animals, including humans.
Scientific Enquiry Type	• Finding out things using secondary sources of information • Grouping and classifying	• Noticing Patterns • Carrying out comparative and fair tests • Exploration	• Finding out things using secondary sources of information	• Finding out things using secondary sources of information • Carrying out comparative and fair tests	• Grouping and classifying • Observing changes over different periods of time • Finding out things using secondary	• Finding out things using secondary sources of information • Grouping and classifying

Brookhurst Primary School
Science Curriculum Overview

	• Carrying out comparative and fair tests				sources of information	• Carrying out comparative and fair tests
	<u>Our Changing World</u> • Grouping and classifying • Pattern Seeking • Observing changes over different periods of time					
Working Scientifically Skills	• Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, and bar and line graphs • Identifying scientific evidence that has been used to support or refute ideas or arguments • Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations	• Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • Identifying scientific evidence that has been used to support or refute ideas or arguments • Using test results to make predictions to set up further comparative and fair tests • Recording data and results of increasing complexity using scientific diagrams	• Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, and bar and line graphs • Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • Identifying scientific evidence that has been used to support or refute ideas or arguments	• Identifying scientific evidence that has been used to support or refute ideas or arguments • Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, and bar and line graphs	• Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, and bar and line graphs • Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • Identifying scientific evidence that has been used to support or refute ideas or arguments • Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary	• Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • Identifying scientific evidence that has been used to support or refute ideas or arguments • Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, and bar and line graphs • Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings where appropriate;

Brookhurst Primary School
Science Curriculum Overview

		and labels, classification keys, tables, scatter graphs, and bar and line graphs				
	Our Changing World • Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, and bar and line graphs • Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations					
Key Facts	• Through sexual reproduction living things produce offspring that are similar to but not exactly the same as the parents. • The offspring are also not identical to each other; even 'identical twins' show slight differences. • Each individual has some characteristics of its father, some of its mother and some which appear to be from neither parent. • Genes, which are composed of DNA, carry the information that leads to the different characteristics. • Each individual gets half of its genes from its male parent and half from its female parent. • The variation between individuals occurs because of the different combinations of genes each individual acquires at fertilisation. It is important to note that this variation occurs regardless of the	• The shape of a shadow is defined by the shape of the object causing it. • A pinhole camera can work without a lens because the aperture (the hole to let the light in) is small enough to restrict the amount of light let in. • A ray diagram is a model of looking at the behaviour of light that can help predict phenomena such as the size and shape of shadows. The rays are straight lines that travel from the object to the image or the eye, with arrows showing the direction of the light. • When light travels from one medium to another its speed changes. Unless the light travels into the object at right angles to the surface there is also a change in	• The heart is a very strong muscle that pumps blood around the body. It is made up of four chambers – two upper and two lower. Blood enters the upper chambers which squeeze and push the blood into the lower chambers. Here it is squeezed and pushed out of the heart. **Blood components** • Plasma: A relatively clear, yellow-tinted water containing sugar, fat, protein and salt solution, which carries the red cells, white cells, and platelets. Normally, 55% of the blood's volume is made up of plasma. It is likely that children will be surprised by the colour of plasma, and it should be pointed out that it is the red	• Electricity is a flow of electrons and this flow produces an electric current. • A single battery is called a cell. • Batteries are formed when a number of cells are grouped together. • Once all the chemicals in a cell have reacted together, then no more extra electrons can be produced and the cell is 'dead'. • As electrons are negatively charged they are attracted to the positive terminal when the two terminals of a cell are connected in some way. • The current in all parts of a circuit is instantaneous and equal. • Electrons keep flowing through the	• Classification is not the same as identification. During classification the emphasis is on the similarities of objects in order to demonstrate that they belong to the same group. • Identification focusses on the differences between objects in order to be able to give a specific name to that particular thing. The two processes are linked but not interchangeable. • Classification depends on developing groups and subgroups at different levels. • All the objects to be classified form the first set, for example, living things. These divided in sub-groups, for example the 5 kingdoms, each of which is subdivided into the next set of subgroups and so on until it is not possible	The health of humans can be adversely affected by the following: • A poor diet: A healthy diet is one that helps to maintain or improve general health, providing the body with essential nutrition, including water, protein, essential fatty acids, vitamins, minerals and adequate energy (expressed in calories). Where there are no pre-existing health problems, a properly balanced diet (in addition to exercise) is also thought to be important for lowering health risks such as obesity, heart disease, type 2 diabetes, hypertension and cancer. • Exposure to disease-causing micro-organisms: Micro-organisms can be transmitted to and between humans in several ways, including eating and drinking contaminated food and water, through coughs and sneezes, by direct contact and by disease-carrying organisms such as mosquitoes and fleas.

Brookhurst Primary School
Science Curriculum Overview

	environment in which the organism finds itself. • Humans have been able to use their knowledge of how natural variation occurs to carry out selective breeding in many different types of organism, including food crops such as wheat and apples, animals such as cattle and horses, and pets of different types. • Organisms are also affected by the environments in which they live. • To be able to live, grow and eventually reproduce, individuals in a population are in constant competition with other individuals of the same species as well as with individuals of other species.	direction. This is called refraction and is why an object half in water appears to be bent. • White light that comes from the sun and other sources, such as a torch, is made up of a number of colours (red, orange, yellow, green, blue, indigo, violet) but we cannot see these because they are mixed together. • The light can be split into the separate colours with a prism (dispersion). • White light can be split into its constituent colours in other ways, including using water, and this is how a rainbow is formed. The white light is split by the water drop (rain or mist) but bounces back in the direction it came from, so you can only see a rainbow if the sun is behind you and the rain/ mist is in front of you.	blood cells that turn it red. • Platelets: Cell fragments that work with blood clotting chemicals at the site of wounds by sticking to the walls of blood vessels, thereby plugging the gap. • Red Blood cells: Relatively large microscopic cells that normally make up 40-50% of the total blood volume. They transport oxygen from the lungs to the body's living tissues and carry away carbon dioxide. • White blood cells: There are different types of white blood cells that exist in variable numbers but that collectively make up a very small part of blood's volume – normally only about 1% in healthy people. •	circuit and they are not used up in the creating of light, movement or heat. • Cells, switches, lamps, buzzers, motors, etc., are called components of circuits. • Voltage is the driving force that causes current to flow around a circuit – 'the push' • As the voltage increases so does the work the current can do. • Voltage is measured in volts. • Resistance is the measure of the difficulty electrons have in flowing through a material. • The scientific convention for circuit diagrams always shows wires as straight lines with right angle turns.	to sub-divided things any further.	• Exposure to harmful substances: These include tobacco, which has been directly linked to breathing disorders, blocked arteries, heart disease, lung and other cancers and nerve damage, and alcohol drug and solvent abuse, which have been directly linked to impaired performance, personality change and major organ damage. • Lack of exercise, rest and sleep: Regular exercise makes humans stronger and more efficient, and a lack of regular exercise can lead to joint and muscle problems, clogged arteries, high blood pressure and heart disease. Humans need to rest and to sleep so that the body can repair and recharge itself. Insufficient sleep can lead to stress, anxiety and impaired performance. • Stress: Stress can be caused by a wide range of physical, emotional and environmental factors, and lead to a range of physical and physiological symptoms.
	<u>Our Changing World</u> • It is important to recognise that living things are suited to their environments This suitability is in part because of their physical adaptations, and also because of their behaviour patterns and life cycles. • The behaviours of living things are important because they help to reduce the level of competition with other organisms.					

Brookhurst Primary School
Science Curriculum Overview

	• The ways in which animals reduce the risk of being eaten by predators include both physical and behavioural adaptations (for example, camouflage, being nocturnal or moving very fast). • The interactions between organisms also contribute to their survival.					
Common Misconceptions	• Children may think that only animals adapt to their environment, whereas it is correct to say that all living things adapt. • Children may think that organisms adapt because they need/want to. Plants and animals do not make any decisions it is the individuals that happen to be well adapted that survive and it is these individuals that pass on to their offspring the characteristics that make them more suited to the environment. • Children may say that fossils are the remains of dead plants and animals. It is correct to say that fossils are an imprint of the space left behind when a dead plant or animal decomposes.	• Light is only found in bright areas. If you can see a lit candle from a dark corner of the room, light must be reaching the dark areas of the room for it to have entered your eyes. • We see things because light travels from our eyes towards an object; the reverse is true – we see because our eyes absorb light rays travelling from the object, reflected from a source. • Objects give out their own light (they actually reflect light from a light source). • The Moon is a light source (it reflects light from the Sun). • Shadows are real 'things' rather than the absence of light (or less light than the surrounding area).	• Children may think that heart is love-heart shaped and in the left-hand side of the chest. The heart is actually roughly the size and shape of a person's clenched fist. It is located in centre of the chest but 'leans' slightly to left. • Children may think that blood in our veins is blue. In fact, all human blood is red, ranging from bright red when oxygenated to dark red when not. It owes its colour to haemoglobin. Blood is never blue, but veins appear blue because light is diffused by the skin. Red and blue colours are typically used to show oxygenated and deoxygenated blood in scientific diagrams of the human circulatory system. • Children may think that air tubes connect the lungs to the heart. The process of the transfer of oxygen gas from the air into liquid blood is actually more complex. After a breath of air is inhaled it ends up in air sacs (alveoli) in the lungs where it dissolves into the blood across capillaries. At the same time carbon dioxide leaves the blood and enters the alveoli, ready	• Children think that there is only a flow of electrons in the wire in one direction to the lamp and that the return wire is unnecessary or 'empty' because the electrons have been 'used up' lighting the lamp. • Children often think that a switch has to be between, and close to, the cell and the lamp for it to light a lamp.	• The groups of living things are completely independent e.g. 'a fish is a fish, not animal' because they are not aware of how the groups relate to each other • Fungi are plants but they are not because fungi cannot make their own food by photosynthesis.	• Children generally attribute good health to what they eat and drink, and identify individual foods as healthy, rather than recognising the need for a balanced diet or eating in moderation. • Children often see exercise and rest as just adult pursuits. Alternative ideas that children may hold about diet include: • Overweight people are unhealthy and slim people are healthy. Children may not recognise that there is a range of healthy body weights for people of any height. • All fatty foods are bad for you. Children may not understand that the body needs some fat, and that it is a diet that is too high in fatty foods that can lead to people

Brookhurst Primary School
Science Curriculum Overview

			to be exhaled from the body			becoming overweight or obese.
	Our Changing World • Children may not realise that the behaviour of organisms is one of the ways in which they are adapted to the environment. • Children may not see the patterns in life cycles and the ways in which organisms are distributed in different environments. • Children may not recognise the interactions between organisms.					
Previous Science Unit Connections	Year 3 – Rock Detectives	Year 3 – Can you see me?	Year 3 – Amazing Bodies	Year 4 – Switched on	Years 1 to 6 - Living Things	Year 3 – Amazing Bodies Year 6 – Body Pump
Health and Safety	If possible, children should observe wild plants in different habitats. When outside, ensure children's safety and remind children that they should observe the plants, not touch them. Some plants may sting children or cause a rash.		CLEAPPS website to be find instructions and safety instructions.	Zinc-carbon and zinc-chloride batteries are the most suitable for this type of activity. Alkaline and rechargeable batteries may become hot enough to cause burns if there is a short circuit.	When using sweets and other foodstuffs in the classroom, remind children not to eat anything unless told they may do so and that they should wash their hands after handling sticky things.	
Career Opportunities	• Evolutionary Biologist • Biological Anthropologist • Geneticist • **Palaeoanthropologist** • Ecologist	• Optometrist • Lighting Technician	• Surgeon • Nurse	• Solar Energy Engineer • Electrical Technician • Nuclear Engineer	• Microbiologist • Cell biologist • Neurobiologist	• Surgeon • Nurse • General Practitioner
Key Vocabulary	population, variation, environment, inheritance, adaptation, selective breeding, generation, survival, natural selection, evolution, fossils, genes, genetics, DNA, extinct, extinction, speciation,	light, dark, shadow, mirror, bright, dim, reflect, eye, opaque, transparent, translucent, ultra violet, ray, beam, refraction, periscope, spectrum, dispersion, inverted, medium,	aorta, artery, atrium, blood, blood vessel, body temperature, capillaries, carbon dioxide, cells, chamber, chest cavity, circulation, circulatory system, deoxygenated blood,	cell, battery, lamp, wire, buzzer, motor, circuit, current, filament, electrical insulator, electrical conductor, mains electricity, terminal, switch, toggle switch, push switch,	**General terms:** identify, identification, classify, classification, division, family, genus, species, reason, common characteristics, distinguishing characteristics, leaves,	alcohol, asthma, athlete, balanced diet, beats per minute (bpm), benefits, breathing, caffeine, calories, cancer, carbohydrates (including sugars), cheating, cigarettes, clinical trial,

Brookhurst Primary School
Science Curriculum Overview

	question, investigation, fair test, change, measure, predict, prediction, explanation, observations, draw conclusions	question, investigation, fair test, change, measure, predict, prediction, explanation, observations, draw conclusions	digestive system, digestive tract, health, heart, heart valves, humans, hydration, lubricant, lungs, muscular system, nutrients, nutrition, oxygen, oxygenated blood, plasma, platelets, pump, red blood cell, skeletal, system, transport, valve, vein, vena cava, ventricle, vessel, waste, waste gases, white blood cells	slide switch, tilt switch, trembler switch, pressure switch, reed switch, series circuit, resistance, resistor, current, circuit diagram, recognised symbols, generate, generator, coal, gas, oil, fossil fuels, nuclear, biomass- fired power stations, wind turbine, wave hub, tidal flow, hydro-electric, grid, pylon, transmission, transformer, solar panels	shape, size, colour, backbone, wings, jointed legs, cased, transparent, antennae, shell, segments, explain, group, small, harmful, beneficial (helpful), colony, colonies, mould, multiply, historically, grouping, Aristotle, Carl Linnaeus, kingdom, Phillip Miller, John Ray, botany, conventions **Kingdoms of living things:** Animalia, Plantae, Fungi, Protista, and Monera **Plant kingdom:** flowering plants, conifers, ferns, mosses and algae **Animal kingdom:** vertebrates, fish, amphibians, mammals, birds, reptiles, invertebrates, molluscs, annelids, arachnids, insects, arthropods **Micro-organisms:** (3 kingdoms: Fungi, Monera, Protista), micro-organisms (microbes) bacteria	consequences, dairy, diet, doping, drugs, eatwell plate, energy, exercise, fat, fibre, heart, heart rate, intensity, illegal, impact, James Lind, legal, lifestyle, long-term effect, lungs, medicine, mental benefits, mineral, motivation, norm, nutrition, oxygen, passive smoking, peer pressure, performance enhancing, persuade, physical benefits, protein, pulse rate, RDA (recommended daily allowance), recovery rate, resting rate, rickets, roughage, saturated fat, scurvy, short-term effect, smoking, sodium, solvents, steroids, tobacco, training, unsaturated fat, vitamin

Brookhurst Primary School
Science Curriculum Overview

	<u>Our Changing World</u> mammal, amphibian, insect, bird, metamorphosis, tadpole, nymph, pupae, chrysalis, caterpillar, migrate, hibernate, courtship, plumage, habitat, adaptation, behaviour, young, chick, life cycle, egg, pupae, adult, butterfly, nectar, death rate, nest, brood, fledgling, juvenile, diet, migration, resident, invertebrate, mollusc, worm, snail, woodlouse, centipede, millipede, beetle, aphid, adaptation, predator, prey, survival, habitat, question, investigation, fair test, change, measure, predict, prediction, explanation, observations, draw conclusions, justify, analyse