Ditton Primary School Science

Curriculum INTENT

Areas of working scientifically: Fair & comparative testing | Research using secondary sources | Identifying, classifying & grouping | Pattern seeking | Observing over time

CORE VALUES: **CHILDREN FIRST** **RESILIENCE** **PIONEERING**

Ditton Primary School- SCIENCE progression through EYFS TheNatural UTW-

Active Learning - Motivation	Active Learning - Motivation	Creating & Thinking Critically - Thinking
• Being involved & concentrating • Keep on trying • Enjoying achieving what they set out to do	• Being involved & concentrating • Keep on trying • Enjoying achieving what they set out to do	• Having their own ideas (creative thinking) • Making links (building theories) • Working with ideas (critical thinking)

Understanding the World- The Natural World ELG -

- Explore the natural world around them, making observations and drawing pictures of animals and plants
- Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class - Understand some important processes and changes in the natural world around them, including the seasons

Focus	Seasonal changes	Everyday materials	Plants	Animals including Humans	Vocabulary- To be used daily.
Reception Skills	• Describe what they see, hear & feel whilst outside • Observational drawings of the natural world • Discuss how to care for the living things & their habitats • Examine change over time • Express opinions on natural & built environments & opportunities to hear different points of view on the quality of the environment. Use words such as busy, quiet, pollution • Understand the effect of changing seasons on the natural world around them	• Explore collections of materials with similar and/ or different properties. • Talk about the differences between materials and changes that they notice •Characteristics of liquids & solids e.g. cooking eggs, melting chocolate Observe & interact with natural processes, such as ice melting, a sound causing a vibration, light travelling through transparent material, an object casting a shadow, a magnet attracting an object & a boat floating on water	• Extend vocabulary: blossom, buds, bulb, evergreen, deciduous • Describe what they see, hear & feel whilst outside • Name & describe some plants • Draw pictures of plants	• Shows some understanding that good practices with regard to exercise, eating, drinking water, sleeping & hygiene can contribute to good health • Describe what they see, hear & feel • Identify different parts of their body & animals • Be able to show care and concern for living things • Know the effects exercise has on their bodies • Have some understanding of growth and change Talk about things they have observed including animals • Observational drawings of animals	Test, fair, why, senses, world, plants – leaf, stem, root, flower, animals, humans, materials – waterproof, natural, change, growth, decay, environment, heavy, light, float, sink, stretch, snap, magnetic, baby, toddler, child, teenager, adult, egg, caterpillar, chrysalis, bark, stick, branch, seasons, melt, liquid, solid, hard, soft, kitten, puppy, foal, calf etc

Reception Knowledge	**Autumn** Animals and Friendships / Stars and Space	**Spring** Superheroes / Traditional Tales	**Summer 1** **Growing / Seaside**
	• Can name own body parts using the text Funny Bones as a support. All above + shoulders, ribs, backbone, knees, elbow • Can piece back together the parts of the body and locate upon request. • Can describe key function of the skeletal system • Can describe what changes occur as they change from a baby to an adult • Can name the 4 seasons • Can talk about similarities and differences between each season • Can name the characteristics of each season	•Know the effects of heating and cooling on ingredients such as melting and freezing •Can classify a set of objects by their materials- Wood, plastic, fabric, and glass. •Can name the characteristics of materials •Can describe the most suitable materials for building and give explanations as to why.	• All plants need water, light and warmth to grow and survive • A seed produces roots to allow water to get into the plant and shoots to produce leaves to collects the sunlight • Use correct terms e.g. chrysalis, pupa when observing life cycle of butterfly & ladybirds •Can describe the life cycle of a chick using correct terminology eg embryo, incubation, hatching •Knows that meat is produced from animals

Guiding Principle: "To deliver a first class education through partnership, innovation, school improvement and accountability."

Seasonal changes	Everyday materials	Plants	Animals including humans
Children to be exposed to key vocabulary daily in provision. High quality text to be chosen for story times that allow for questioning opportunities relating to key events. The outdoor classroom will be used as a key feature in our science learning through the natural world. Trips to the farm and the zoo will be used to enhance children experiences of animals and class experiences of hatching our own chicks and caring for our own caterpillars/butterflies.			

CORE VALUES: **CHILDREN FIRST** **RESILIENCE** **PIONEERING**

Year 1: Science skills progression	
POS **Year 1 Seasonal changes** •observe changes across the 4 seasons •observe and describe weather associated with the seasons and how day length varies **Year 1 Everyday materials** •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 **Year 1 Plants** •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 **Year 1 Animals including humans** • 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 • Identify, name, draw and label the basic parts of the human and say which part of the body is associated with which sense	Working scientifically: • asking simple questions and recognising that they can be answered in different ways • observing closely, using simple equipment • performing simple tests • identifying and classifying • using their observations and ideas to suggest answers to questions • gathering and recording data to help in answering questions. • Use books from the library service linked to Science topics

Year 1– End points	
Seasonal changes	• To know in Autumn the leaves of many trees change colour, the temperature grows colder, plants stop making food and animals prepare for the months ahead. • To know in Winter it is usually the coldest time of the year and in some places, it brings freezing temperatures, snow and ice. • To know in Spring dormant plants begin to grow again, new seedlings sprout out of the ground, plants grow new leaves and hibernating animals awake. • To know in summer that it has long, usually sunny days and is the hottest season. • To know that the movement of Earth in space gives us day and night. • To know a day on Earth last 24 hours – how long it takes to orbit the sun • To know that in the UK, the day length is longest at mid-summer (about 16 hours) • To know that from the summer solstice the number of daylight hours decreases each day until mid-winter. • To know that at winter's solstice the day length is about 8 hours.
Everyday materials	• An object is something which can be seen or touched • Objects can be made from one or more materials • Know that a material is the matter from which a thing is or can be made from • Know that natural materials come from plants, animals or the ground • Name a variety of natural everyday materials – water, wood or rock • Know that man-made materials have been made by man • Name a variety of man-made materials – plastic, metal or glass • Can name and know the meanings of some physical properties of every materials – transparent – allows light through, rigid – not flexible, absorbent – able to soak up liquid easily

Plants	• To know flowering plants consist of leaves, flowers (blossom), petal, roots, bulb or seed, trunk or stem • To know wild plants grow without human intervention and garden plants are grown by human intervention • To name wildflowers – dandelion, forget-me-not, cornflower • To name garden flowers – rose, fuchsia, geranium • To name deciduous trees – ash, oak, beech, silver birch, alder • To know deciduous trees shed their leaves in winter to conserve energy • To know evergreen trees keep its leaves throughout the year

	• To name evergreen trees pine, spruce, cedar
Animals including humans Classification of animals	• To know the animal kingdom is classified into fish, amphibians, reptiles, birds and mammals • To know these animals have a different structure • To know a carnivore feeds on other animals, examples are: fox, shark, lion, polar bear • To know a herbivore feeds on plants, examples are: cows, camel, elephant. giraffe • To know an omnivore feeds on both animals and plants, examples are: bears, badgers, hedgehogs, humans • To know the body has five senses which are associated with the following: hands-touch; nose-smell; mouth-taste; eyes-see and ears-hear To name examples of fish: trout, salmon, cod, plaice • To name examples of amphibians: frog, newt, toad • To name examples of reptiles: lizard, snake, turtle, alligator • To name examples of birds: sparrow, blackbird, robin • To name examples of mammals: humans, dog, rat, bear • To know animals can be warm or cold blooded

Year 2: Scie nce skills progression

POS

Year 2 Anima

- notice
- find o
- descri

Year 2 Use of ••identify and cardboard for •find out how t

Year 2 Plants

observe and d •find out and

Year 2 Living

- explor
- identif needs
- identif describe how different sourc

ls including humans

that animals, including humans, have offspring which grow into adults
ut about and describe the basic needs of animals, including humans, for survival (water, food and air)
be the importance for humans of exercise, eating the right amounts of different types of food, and hygiene

everyday materials

compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and particular uses
he shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching

escribe how seeds and bulbs grow into mature plants
describe how plants need water, light and a suitable temperature to grow and stay healthy

things and their habitats

e and compare the differences between things that are living, dead, and things that have never been alive
y that most living things live in habitats to which they are suited and describe how different habitats provide for the basic of different kinds of animals and plants, and how they depend on each other
y and name a variety of plants and animals in their habitats, including microhabitats
animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name es of food

Working scientifically:

- asking simple questions and recognis that they can be answe in different ways • observing closely, using simple equipment
- performing simple tests
- identifying and classifying • using their observations and ideas suggest answers to questions • gathering a recording data to help i answering questions.
- Use books from the libra service linked to Scienc topics

Year 2– End points	
Animals including humans Animals basic needs	• To know animals and plants are made up of cells. • To know all animals need food, water, air and shelter • To know animals need to stay fit by eating sensibly and taking regular exercise • To know all animals need to eat a balanced diet • To know the food groups are: carbohydrates, proteins, fats, fruits and vegetables and dairy • To know all animals have offspring which then grow into adults • To know some offspring are different from their adults e.g. caterpillar-butterfly, tadpole-frog

	• To know the four stages in a life are: birth, growth, reproduce and death • To know animals also need exercise and sleep to keep a body healthy • To know humans are hygienic to stop the spread of germs
Use of everyday materials	• Can name the uses for a variety of materials – wood (fuel, making tools, weapons furniture and paper), metal (screws, pots for cooking), paper (books, newspapers, money), rock (household tiles, statues) • Can name the ways solid objects can be changed by – squashing, bending, twisting and stretching
Plants	• To know seeds and bulbs have a store of food inside them. • To know plants need light, water, air, nutrients and space • To know that seeds and bulbs do not need light to germinate but need warmth. • To know the process to grow into mature plants includes growing roots, shoot appears through soil, plant takes nutrients from the soil and continues to grow To know types of seed: sunflower apple, tomato, pea • To know types of bulb: daffodil, tulip, bluebells, onions, garlic • To know that plants need water, light, warmth and space to stay healthy
Living things and their habitats	• Explain the difference between living (grow), dead (no longer alive) and never been alive (doesn't grow) • Name the 5 things all living things need – food, water, shelter, warmth and space • Can name different habitats for plants and give an example – grassland (ryegrass, wild oats), forest (ferns, foxgloves), pots (tomatoes, peas), desert (prickly pear, aloe vera, cactus), river (pondweed, waterweed), and tundra (artic moss, artic poppy) • Name habitats for animals and give examples – grassland (elephant, zebra, lion), desert (camel, scorpion), river (turtle, fish, crab), tundra (polar bear, snowy owl), and forest (squirrel, deer, bird) • Explain what a microhabitat is - a small specialized habitat within a larger habitat – decomposing log (earthworm, centipede, beetle), temporary pool of water (water mites), and under rocks (worm, ant, cricket) • Animals obtain food from other animals and plants • Explain a simple food chain and name different sources of food (grass, snail, bird)

Year 3: Science skills progression

POS	Working scientifically:
Year 3 animals including humans	asking relevant questions & using different types of scientific enquiries to answer them ● setting up simple practical enquiries, comparative & fair tests ● making systematic and careful observations &, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers & data loggers ● 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
•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	
Year 3 Light	
•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	
Year 3 Rocks	
•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	charts, & tables **CORE VALUES:**	**CHILDREN FIRST**
RESILIENCE	**PIONEERING**	

Year 3 Plants •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 **Year 3 Forces and magnets** •compare how things move on different surfaces •notice that some forces need contact between 2 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 2 poles •predict whether 2 magnets will attract or repel each other, depending on which poles are facing	● reporting on findings from enquiries, including oral & written explanations, displays or presentations of results & conclusions ● using results to draw simple conclusions, make predictions for new values, suggest improvements & raise further questions ● identifying differences, similarities or changes related to simple scientific ideas and processes ● using straightforward scientific evidence to answer questions or to support their findings. Use books from the library service linked to Science topics

Year 3– End points	
Animals including humans	• To know the right food is important for a healthy body • To know animals get their nutrients from what they eat • To know all animals need the right amount of nutrients from the food they eat • To know carbohydrates and fats provide energy, proteins help with growth and repair, vitamins and minerals keep cells healthy, fibre helps food move through the gut and 70% of the body is water • To know the skeleton does three jobs: protecting the body parts, supporting the body and letting the body move. • To know bones have joints so the skeleton can bend. To know muscles and joints allow movement • To know muscles are soft tissues that are joined to bones and always work in pairs.
Light	• Explain light is needed in order to see things and dark is the absence of light • Can explain and name different types of light natural (suns, stars, fire) and artificial (light bulbs, LED lights, fluorescent lighting) Light is reflecting from surfaces • Give a reason as to why the sun is dangerous for eyes and explain how they can be protected • Explain how a shadow is formed – when a light sources is blocked by a solid object • Explain that the size of a shadow depends how close (bigger) or far away (smaller)it is from the light source
Rocks	• Name the main three types of rocks and give an example – sedimentary (chalk, limestone, shale, sandstone), metamorphic (slate, marble, quartzite, anthracite) and igneous (basalt, granite, pumice, obsidian) • Explain rocks can be group based on physical properties and can give examples – hard/soft, permeable/impermeable or durability • Explain fossil formation - A plant or animal dies in a watery environment, the plant or animal is buried in mud and silt, soft tissues quickly decompose leaving the hard bones or shells behind, over time sediment builds over the top and hardens into rock. • Name a type of soil and explain it is made from rocks and organic matter – clay, sandy, loamy, peaty, chalky, silty
Plants	• To know the flower is needed for reproduction • To know the leaves are needed for nutrition (leaves use sunlight to change carbon dioxide and water into food – photosynthesis)
CORE VALUES:	**CHILDREN FIRST** **RESILIENCE** **PIONEERING**

	• To know the stem hold the plant up towards the light and carries water and minerals from the roots to the rest of the plant • To know the roots anchor the plant and root hairs soak up water and minerals from the soil • To know water travels up a plant after being absorbed from the soil • To know that each flowering plant has a male (stamen) and female (carpel) part • To know stamen contains pollen grains • To know carpel contains the eggs • To know flowers are pollinated by insects or wind and pollen carried to stigma of another plant • To know when pollen and egg join – a seed is made • To know the ovary becomes a fruit which contains the seeds • To know seeds are dispersed by wind, water, animals or by explosion

Forces and magnets	• To know a force is a push or a pull. • To know a force can make things slow down or speed up. • To know when an object moves on a surface, the texture of the surface and the object affect how it moves. To know moving objects slow down quickly on rough surfaces. • To know moving objects don't slow down much on smooth surfaces. • To know for some forces to act, there must be contact e.g. a hand opening a door, the wind pushing the trees • To know that magnets don't need to touch objects for a force to occur • To know a magnet has a North pole (N) and a South pole (S) • To know a North and South pole attract and like poles repel • To know only some materials are attracted to magnets – steel and iron

Year 4: Science skills progression

POS

Year 4 animals including humans

•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

Year 4 Sound

•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

Year 4 Electricity

•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

Working scientifically:

asking relevant questions & using different types of scientific enquiries to answer them

- setting up simple practical enquiries, comparative & fair tests
- making systematic and careful observations &, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers & data loggers
- 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, & tables
- reporting on findings from enquiries, including oral & written explanations, displays or presentations of results & conclusions

•recognise some common conductors and insulators, and associate metals with being good conductors **Year 4 Living things and their habitats** •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 **Year 4 States of matter** •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	● using results to draw simple conclusions, make predictions for new values, suggest improvements & raise further questions ● identifying differences, similarities or changes related to simple scientific ideas and processes ● using straightforward scientific evidence to answer questions or to support their findings. Use books from the library service linked to Science topics

Year 4– End points	
Animals including humans	• To know that the digestive system breaks down food. • To know the digestive system consists of: mouth, tongue, oesophagus, stomach, small intestine and large intestine To know teeth are used to chew the food and break it up into bits • To know helps to chew the food and swallow it • To know that the oesophagus transports food to the stomach • To know that in the stomach the food is churned up and broken down further • To know in the small intestine the nutrients from the food are absorbed into the blood which transports them around the body To know in the large intestine water is absorbed into the body • To know the four front teeth in both the upper and lower jaws are called incisors and are used to cut food. • To know there are four canines in the mouth which tear food and form the corners of the mouth. • To know the premolars are designed to crush and grind food. • To know the molars have broader and flatter surfaces and grind food. • To know energy passes along the food chain • To know all food chains start with a plant which is a producer as it makes its own food • To know that animals that eat plants are primary consumers • To know that primary consumers may be eaten by secondary consumers or predators
Sound	• Explain that sounds are made by continuous vibrations and the vibrations sends waves into the ear • Sound can travel through different materials and give examples – solid (metal, stone wood), liquid (water) An and gas (air) • Louder the sound (the stronger the vibrations), sounds become fainter as the distance increases High pitch (fast vibrations), low pitch (slower vibrations)
Electricity	• Give examples of common appliances that run on electricity - television, fridge/freezer, microwave, washing machine, lights Name the basic parts of a simple circuit – cells, wires, bulbs, switches, buzzers • Explain why a lamp in a simple circuit will (circuit is a complete loop) or won't light (break in the circuit) • Know that a switch open (will not light a bulb – circuit incomplete), switch closed (will light a bulb – circuit complete)

	• Conductors (easily allow electric to pass through) and insulators (does not let electricity pass through easily) • Give an example of a good conductor (metal - aluminium, copper, gold, water, people) and good insulators (rubber, plastics, wood , paper)
Living things and their habitats	• Can give examples of how living things can be grouped – invertebrates (no backbone) and vertebrates (have a back bone) • Can use a classification key to help group, identify and name a variety of living things – e.g. Can it fly, does it crawl, does it belong in… does it grow out of the… - can identify different types of invertebrates (warm blooded, breath through gills, hatch from eggs) and vertebrates • Give an example of how environments can change and how it can potential pose a danger to living things -global warming, litter, oil spill, chemical pollution, deforestation and land development
States of matter	• To know that materials can be solids, liquids or gases (the three states of matter) □ To know the shape and volume of a solid doesn't change unless a bit is broken off • To know the shape of a liquid can change, depending on the container it is in, but its volume doesn't change • To know that most gases are invisible • To know the gas in a container completely fills the container so has the same shape and volume of the container it is in • To know liquids change into gases when they are heated – this is evaporation • To know liquids change into solids when they are cooled – this is freezing • To know gases change into liquids when they are cooled – this is called condensation • To know solids change into liquids when they are heated – this is called melting • To know the rate of evaporation depends on the temperature • To know evaporation is slow when it is cold and fast when it is hot • To know the water on Earth is constantly recycling using evaporation and condensation • To know the heat from the sun makes the water from the sea, lakes and rivers evaporate into water vapour • To know as the water vapour rises, it cools and condenses to form clouds, then falls as rain

Year 5: Science skills progression

POS

Year 5 Animals including humans

•describe the changes as humans develop to old age **Year 5 Forces**

•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 levers, pulleys and gears allow a smaller force to have a greater effect

Year 5 Earth and Space

•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 movement of the sun across the sky

Year 5 Living things and their habitats

•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

Year 5 Properties and changes of materials

Working scientifically:

- 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
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written

•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 •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 •give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic •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	forms such as displays and other presentations ● identifying scientific evidence that has been used to support or refute ideas or arguments. Use books from the library service linked to Science topics

Year 5– End points	
Animals including humans	• To know prenatal development has a germinal phase, an embryonic phase and a foetal phase To know animals have different gestation periods • To know the stages in a human's life include infancy, childhood, adolescent, adulthood and old age To know cell decline is part of becoming old • To know animals have different lifespans • To know the changes that take place in boys and girls during puberty • To know in the girls hormonal changes cause the ovaries to release eggs and the monthly menstrual cycle is triggered To know the boys muscles become more developed and facial and body hair begins to grow
Forces	• To know that friction is the force between surfaces that are touching. To know rough surfaces create lots of friction. To know smooth surfaces don't create much friction. To know friction produces heat. • To know air resistance is the force that slows down moving objects as they move through air. • To know objects need to be streamlined to travel faster through the air and to travel slower through the air, you need a large surface area. • To know water resistance is the force that slows down moving objects as they move through water. • To know if you want to travel more quickly through water, the shape needs to be streamlined. • To know that the force of gravity pulls objects towards the centre of the Earth regardless of where you are on the planet. • To know that the size of the gravitational force is more or less the same all over the Earth. • To know that levers, gears and pulleys are simple mechanisms that enable a small force to have a greater effect • To know a lever is made from a long pole and pivot (fulcrum) examples are scissors, a wheelbarrow and a stapler • To know a pulley is a rope running through a wheel, examples are window blinds, a flag pole and a well • To know gears are wheels with teeth that fit together. When one wheel is turned, the other wheel turns too but in the opposite direction. • To know that a smaller gear will turn faster than a larger one
Earth and Space	• Earth is a sphere, spins on an axis as it travels round the sun, when one sides faces the sun the other faces space • The side facing the sun is bathed in light and heat (daytime) Side facing space, cooler and darker (night)

	• A day on Earth last 24 hours – how long it takes to orbit the sun • Earth's tilt on its axis is what causes the 4 seasons. Sometimes it points towards the sun and other times it points away from the sun. Moon - moves around the Earth in an approximately circular orbit, once around the Earth in approximately 27.3 days As it orbits the earth its position changes, relative to the stars.
Living things and their habitats	• To know that there are different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals. • To know that sexual reproduction in plants involves pollen from one flower fertilising the egg of another to produce a seeds. • To know asexual reproduction in plants happens without pollen or an egg. The new plant grows from cuttings from the parent plant. • To know the life cycle of a mammal - live young born and get milk from mothers, grow from babies to adults, reproduce then die • To know the life cycle of an amphibian - egg in jelly laid in water, develops tail and legs, grows lungs to breathe and leaves water, takes 2 years to grow to adult size To know the life cycle of an insect - eggs laid by the female insect; eggs hatch and larva is born; when the larva moults for the last time, a pupa is formed. • To know some insects only have 3 stages: born as an egg, hatches as a nymph and changes into an adult. • To know the life cycle of a bird – egg, hatches and is fed by the parents, juvenile– leaves the nest when flight feathers are grown, adult attracts mate to reproduce. To know the naturalist David Attenborough • To know the animal behaviourist Jane Goodall • To know amphibians and insects go through metamorphosis.
Properties and changes of materials	• To know that heat travels from warmer materials to colder ones • To know that some materials let heat pass through them easily; these are thermal conductors (metals) • To know some materials do not let heat pass through them; these are called thermal insulators (plastic, cork, wood and fabrics) To know that thermal insulators are good for keeping heat out as well as in • To know soluble materials dissolve in water • To know if a material doesn't dissolve, it is insoluble • To know dissolving a solid in water makes a solution • To know there are three ways to separate mixtures: sieving, filtering and evaporation • To know sieving is when you pass a mixture of solids of different sizes through mesh • To know filtering is when you pass a mixture of a solid and liquid through a mesh • To know evaporation separates soluble solids from water; the water evaporates and leaves the solid behind • To know in a reversible change a material turns into something that looks and feels different but isn't changed forever – it can be changed back To know all changes of state are reversible • To know mixing and dissolving are reversible changes • To know in an irreversible change a completely new material is formed and cannot be changed back • To know some things react when you mix them (vinegar and bicarbonate of soda) to make new materials

Year 6: Science skills progression

POS	Working scientifically:
Year 6 Animals including humans •identify and name the main parts of the human circulatory system, and describe the functions the heart, blood vessels and blood variables where necessary •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 **Year 6 Electricity** •associate the brightness of a lamp or the volume of a buzzer with the number and voltage of used in the circuit scatter graphs, bar and line graphs	planning different types of scientific enquiries to answer questions, including recognising and controlling of ● taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate ● recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, cells ● using test results to make predictions to set up further comparative and fair tests

•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 **Year 6 Living things and their habitats** •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 **Year 6 Evolution and inheritance** •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 **Year 6 Light** •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	● 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. Use books from the library service linked to Science topics

Year 6– End points	
Animals including humans	• To know the circulatory system is made up of blood, blood vessels and the heart • To know blood moves food, waste oxygen and waste products around the body • To know there are three kinds of blood vessels: capillaries, veins and arteries • To know arteries carry oxygenated blood away from the heart to the body • To know veins carry de-oxygenated blood back to the heart • To know exercise strengthens the muscles, develops the lungs, helps body coordination, uses up food for energy and can prevent the body getting fat and helps the body to sleep at night time • To know that taking health risks can damage the body • To know that smoking causes heart attacks, blocked arteries, lung cancer and breathing problems • To know sniffing solvents is extremely dangerous as damages the brain • To know that drinking alcohol slows down the reactions • To know heavy drinking damages the liver, heart and stomach • To know drugs can be dangerous if misused and can cause damage to the brain • To know tobacco, sniffing solvent and some drugs are addictive

Electricity	To know when a switch is open, the circuit is incomplete To know that by adding more batteries the bulb gets brighter or the buzzer becomes louder as there is a greater current To know current is the amount of electricity flowing through the circuit To know that the higher the voltage of a battery, the more powerful it is – the more current flowing through a circuit To know that using higher voltage batteries causes a brighter bulb or a louder buzzer To know if you add more bulbs, the bulbs get dimmer To know if you add more buzzers, they buzz more quietly To know several motors would each turn more slowly than just one To know using longer wires between the components provides more resistance so bulbs dimmer and buzzers quieten To know the symbols of a simple circuit
Living things and their habitats	To know Carl Linneaus as a pioneer of classification To classify flowering plants into grasses, shrubs, cereals and deciduous trees To classify non-flowering plants into algae, mosses, ferns and coniferous trees To classify animals which are vertebrates – have backbones - (birds, fish, reptiles, mammals, amphibians) To classify animals which are invertebrates – no backbones- into snails and slugs, worms, spiders, and insects To know micro-organisms can be classified into bacteria, viruses, fungi, algae and protozoa
Evolution and inheritance	To know humans can live all over the world because they can wear clothes and build houses suited to different conditions To know most plants and animals can only live in certain environments To know animals and plants are adapted to their habitat To know living things can develop adaptations to suit the place they live To know that the living things that are best adapted to their habitat are more likely to survive. To know that over time, more and more of the animals and plants will end up with features that make them well-adapted to their habitat To know that animals and plants produce offspring that are similar to them To know that offspring look like their parents To know parent plants or animals pass on characteristics To know when living things change over time – this is evolution. To know Charles Darwin's (an English naturalist) scientific theory of evolution by natural selection became the foundation of modern evolutionary studies. To know an example of evolution is Darwin's finches – beaks adapted over time based on food source To know that fossils show how living things have changed – how they have evolved
Light	Light appears to travel in straight lines until it hits something else Light travels directly from a light source to the eye and it travels from a light source to an object and then to the eye Shadows are formed when light is blocked by an object - Because light travels in straight lines, the resulting shadow will mimic the shape of the object. Refraction – objects look bent in water

CORE VALUES: **CHILDREN FIRST** **RESILIENCE** **PIONEERING**