1 Long Term Plan

Substantive knowledge:

- Organised around key scientific concepts for example, evolution, forces, or materials

Disciplinary knowledge (Scientific Enquiry):

- **DK1: Knowledge of methods that scientists use to answer questions** (grouping and classifying, observe changes over time, Fair and Comparative Tests)
- **DK2: Knowledge of apparatus and techniques, including measurements** (accurate measurement and recording of data)
- **DK3: Knowledge of data analysis** (notice patterns)
- **DK4: Knowledge of how Science uses evidence to develop explanations** (Research using secondary sources)

Science	AU1	AU2	SP1	SP2	SU1	SU2
Nursery		**Exploring Materials** **Talk about the differences between materials and changes they notice** (cooking porridge) Vocabulary: porridge, cooking, heating, change, cold, hot Key Knowledge: *(Using key words) Can describe the porridge before cooking *Can say what is happening to the porridge during the cooking process *(Using key words) Can describe the porridge after cooking	**Explore how things work** **Links to mechanisms** Vocabulary: vehicles, wheels, wings, move, roll Key Knowledge: *Knows the names of different vehicles *Knows that vehicles move *Knows that vehicles move in different ways **Explore and talk about different forces they can feel (pushes and pulls)** **Links to mechanisms** Vocabulary: push, pull, move, moves away, comes to Key Knowledge: *Knows that pushes and pulls makes things move *Knows that pushes move away *Knows that a pull comes towards	**Respecting and Caring for Our Environment** **Begin to understand the need to respect & care for the natural environment** Vocabulary: care, hurt, animals, plants, trees, tidy Key Knowledge: *Knows that the classroom & playground must be kept tidy *Knows that we should care for and never hurt animals *Knows we should care for and never hurt plants and trees * Knows that animals live and die - take part in first-hand scientific explorations of animal life cycles, such as caterpillars or chick eggs (look to order chick eggs) - Encourage children to refer to books, wall	**Exploring Natural Materials** **Use all their senses in hands-on exploration of natural materials.** **Explore collections of materials with similar and/or different properties.** Vocabulary: materials, hard, soft, bumpy, shiny, rough, same, different Key Knowledge: *Knows the 5 senses *Knows that materials can be similar or different Suggested activity: - Provide interesting natural environments for children to explore freely outdoors – spinney – Create a treasure box with the children from findings at the spinney children to collect and contrast pieces of bark,	**Living Things: Animals** **Understand the key features of the life cycle of an animal (butterfly)** Vocabulary: life cycle, butterfly, egg, caterpillar, Key Knowledge: *Knows that the life of a butterfly starts with an egg *Knows that a caterpillar comes out of the egg *Knows that a caterpillar turns into a butterfly *Knows that butterflies lay eggs Order a butterfly farm and observe its life cycle **Begin to understand the need to respect and care for all living things** Vocabulary: care, hurt, teachers, friends, animals, plants, trees

			Toy suggestions to explore: wind-up toys, pulleys, sets of cogs with pegs and boards.	displays and online resources. This will support their investigations and extend their knowledge and ways of thinking. **<u>Living Things: Seeds and Plants</u>** **Plant seeds and care for growing plants.** Vocabulary: plant, seeds, stem, flower, roots, leaf, sunlight, water, grow Key Knowledge: *Can name the parts of a plant-stem, flower, roots, leaf -Dissect a plant and look at the basic parts (stem, flower head, roots, leaf). Notice the visual differences. Label. *Knows that a plant needs sunlight and water to grow -Planting seeds – explore what happens if a plant is provided with sunlight and water, compared to one which is not. **<u>Plan Life Cycles</u>** **Understand the key features of the life cycle of a plant** Vocabulary: plant, life cycle, seed, die Key Knowledge:	different types of leaves and seeds, different types of rocks, different shells and pebbles – explore the properties. - Provide equipment to support these investigations. (magnifying glasses, tweezers – linking to find motor skills, magnifying jars – incorporate the use of IT through using the magnifying app) -Model observational and investigational skills. Ask out loud: “I wonder if…?” **<u>Reversable Changes</u>** **Talk about the differences between materials and changes they notice (melting ice-cream)** Vocabulary: melt, melting, dripping, cold, change Key Knowledge: *Can describe the ice-cream before melting *Can say what is happening to the ice-cream during the melting process *Can describe the ice-cream after melting	Key Knowledge: *Knows that we should care for and never hurt our teachers and friends *Knows that we should care for and never hurt animals *Knows we should care for and never hurt plants and trees

				*Knows that plant life starts with a seed *Knows that a plant grows from a seed *Knows that the plant dies Suggested activity - plant seeds and bulbs so children observe growth and decay over time		
	On-going Natural world (Science) skills: - Explore materials with different properties. -Explore natural materials, indoors and outside. -Explore and respond to different natural phenomena in their setting and on trips. -Talk about what they see, using a wide vocabulary. Vocabulary: Explore, notice, look closely, feel/touch, smell, taste, materials, different, same Key Knowledge: *Using key words, can talk about different materials *Know what a plant is *Can identify/name trees, plants, bushes, grass *Can name a variety of animals *Can say what is happening					
Reception	**Seasons: Part 1** **Understand the effect of changing seasons on the natural world around them (Autumn)** Vocabulary: Autumn, Winter, Summer, Spring, season, red, yellow, orange, green, brown, grey, evergreen, deciduous, hibernate Key Knowledge: *Know the name of the four seasons - *Name the autumn colours *Know what the weather is like in Autumn *Knows how some trees change in Autumn *Understand why some animals/plants hibernate	**The Natural World: Part 1** **Understand some important processes in the natural world** **Freezing water/melting ice** Vocabulary: Freeze, freezing, melt, melting, cold, Ice, icy, water, watery, slippery, change, heat, method Predict, test, observe, record Key Knowledge: They are only looking at ice melting? *Understand the term prediction - Prediction process- ask simple questions about the world around them, followed by using their	**Understand some important processes in the natural world** **Volcanoes** Vocabulary: Volcano, extinct, dormant, active, ash, sunlight, lava, erupts, smoke, ash cloud, magma Key Knowledge: *What a volcano is *The difference between a dormant and active volcano *Know what happens to a volcano when it erupts *Know some key vocabulary e.g. magma etc. *Link volcanoes to the dinosaur extinction	**Understand some important processes in the natural world** **-Draw pictures of sea creatures (See EAD)** **Floating and Sinking** **Vocabulary:** **Float/floating, sink/sinking, buoyant, dropping, beneath, surface, air holes, lighter, dense, testing, predict** **Key Knowledge:** ***Know what the terms 'floating' and 'sinking' means** ***Be able to sort materials which float and sink** ***Know why some materials float and sink**	**-Recognise some environments that are different to the one in which they live in** **-Know some similarities and differences between the natural world around them and contrasting environments** **Vocabulary:** **Africa, continent, environments, desert, grassland, savanna, wet season, dry season, rainforest, tropical weather, temperature, Earth, cities, rivers, lakes, ocean, waterfall, mountain** **Key Knowledge:** ***Can locate Africa on Google earth/globe**	**Describe what they see, hear and feel whilst outside (The Farm)** **Vocabulary:** **Adult, young, pig, cow, donkey, goat, sheep, horse, chicken, duck, piglet, calf, foal, kid, lamb, chick, duckling, pastoral, arable** **Key Knowledge:** ***Know the names of farm animals and their young** ***Know the names of the farm animal homes** ***Know the purpose of farms** ***Know there are different types of farms** ***Can match the produce to the animal**

	*Know the effects autumn has on the natural world around them	observations and ideas to **suggest** answers to their questions (heavily supported and scaffolded) *Know that water can change with the freezing/melting process *Know that ice melts when it is heated *Know different methods of heating *Know how to observe and interact with natural processes (can extend learning by investigating sound causing a vibration, light travelling through transparent material, an object casting a shadow, a magnet attracting an object and a boat floating on water).	<u>Fossils</u> Vocabulary: Fossil, Palaeontologist, Extinct, identify, print, cast, excavate, bones, observe Key Knowledge: *Know what a fossil is *Know how fossils are formed *Know what a palaeontologist is/does <u>Herbivores/Carnivores</u> Vocabulary: Herbivore, carnivore, omnivore, meat eater, plant eater, tyrannosaurus Rex, Velociraptor, ankylosaurus, Brontosaurus, triceratops, stegosaurus, diplodocus Key Knowledge: *Know the names of common dinosaurs *Know that different dinosaurs ate different food *Understand the terms 'herbivore', 'carnivore' and 'omnivore' - Chn to simply observe and identify, compare and describe the differences in the terms using different dinosaurs for examples. *Know whether a dinosaur was a herbivore		***Can identify deserts, rainforests and grasslands on a map of Africa** ***Can name the 3 main environments** ***Know some differences between the 3 environments e.g. weather, physical features** **-Understand some important processes in the natural world** **<u>Life Cycle of a crocodile</u>** **Vocabulary:** **Crocodile, River Nile, reptile, cold-blooded, life-cycle, dangerous, lay eggs, hatch, hatched, hatching, hatchling** **Key Knowledge:** ***Knows what a crocodile looks like and where it lives** ***Knows that crocodiles lay eggs/where they lay their eggs** ***Knows a baby crocodile hatches from an egg** ***Knows what a life-cycle is** ***Knows that a life-cycle is in order**	**-Understand some important processes in the natural world** **-Draw pictures of plants** **<u>Planting seeds</u>** **Vocabulary:** **Arable farmers, plant, grow, bean, seed, roots, soil/compost, crop, sprinkle, water, sunlight** **Key Knowledge:** ***Know what an arable farm produces** ***Know how to plant seeds** ***What seeds need to grow** ***Knows what a bean plant looks like**

<table>
<tr><td></td><td></td><td></td><td>or carnivore based on certain physical features
- Chn to use simple features to compare, and, with help, decide how to sort and group them.</td><td></td><td></td><td></td></tr>
<tr><td></td><td colspan="6">On-going Natural world (Science) skills:
-Explore the natural world around them making observations
Vocabulary:
Observe, notice, look closely, record, draw
Key Knowledge: *Know what the natural world is *Know what a plant is *Name a variety of plants *Name a variety of animals

-Describe what they see, hear, and feel whilst outside</td></tr>
<tr><td>Year 1</td><td>Name of unit - Animals including humans

Vocabulary: Head, Neck, Arms, Elbow, Legs, Knees, Face, Ears, Eyes, Nose, Hair, Mouth, Teeth, Senses, Taste, Touch, Smell, Hear, See

Key knowledge:
*Identify, name, draw and label the basic parts of the human body (see vocab for expectations in parts to label)
*Know that we have 5 senses- smell, taste, touch, sight, hearing
*know the following body parts are linked to the senses:<table><tr><th>sense</th><th>Part of the body</th></tr><tr><td>Sight</td><td>Eyes</td></tr><tr><td>Smell</td><td>Nose</td></tr></table></td><td>Name of unit - Use of everyday materials

Vocabulary: Wood, Plastic, Glass, Paper, Water, Metal, Rock, hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent

Key knowledge:
*Know the difference between an object and the material from which it is made e.g. car- metal and rubber, bottle- plastic or glass
*Identify and name a variety of everyday materials natural materials- wood, rock, metal</td><td>Name of unit - Seasonal changes

Vocabulary: Summer Spring Autumn Winter Seasons Climate Day Night Weather Compare Record Observe Temperature, Dawn, Dusk, Months, Solstice, Sun, Day, Moon, Light, Dark

Key knowledge:
*Know the four seasons- Autumn, Spring, Summer, Winter
* Know what the weather is like in different seasons-
Autumn - Temperatures start to drop from Summer, overcast
Winter - Coldest time of year, snow, frosty in the morning, sleet, blizzard, hail
Spring - Temperatures start to warm up
Summer - Hottest time of the year, sunshine,</td><td>Name of unit - Animals including humans

Vocabulary: Fish, Amphibian, Reptiles, Birds, Mammals, Herbivore, Carnivore, Omnivore,

Key knowledge:
*Know a variety of common animals
Mammals- fox, deer, badger, elephant, lion, gorilla
Fish- pike, carp, cod, tuna, salmon
Amphibians- common frog, toads, salamander
Reptiles- grass snake, lizard, crocodile, chameleon
Birds- blackbird, sparrow, robin, penguin, flamingo, emu
*Know a variety of common animals based on what they eat – herbivore- plants , omnivore- meat</td><td>Name of unit - Plants

Vocabulary: Plants, Leaf Flowers, Stem, Roots Deciduous, Evergreen Trunk, Branch Petal, Fruit, Bulb, Seed, Bramble, Dandelion, Daisy, Buttercup, Bluebells, Rose, Sunflower, Lavender, Fir, Chestnut, Oak, Pine, Cedar

Key knowledge:
*Know a variety of common wild and garden plants including deciduous and evergreen trees
*Know the basic structure of a variety of flowering plants:<table><tr><th>part</th><th>function</th></tr><tr><td>leaves</td><td>Make food for the plant</td></tr><tr><td>flowers</td><td>Creates seeds</td></tr></table></td><td></td></tr>
</table>

	<table><tr><td>Touch</td><td>Hands, feet, legs etc</td></tr><tr><td>hearing</td><td>Ears</td></tr><tr><td>Taste</td><td>tongue</td></tr></table> **Oracy outcome :** Demonstration of body parts, what they do and the senses (see separate Oracy in Science LTP for more detail)	Man made materials- plastic, glass(heated up sand), paper *Know about the properties of some everyday materials -use the simple properties to compare the materials. *Know a variety of everyday materials based on their properties e.g. glass is transparent, smooth and waterproof, wood is not bendy, opaque, dull *Compare and group together a variety of everyday materials on the basis of their simple physical properties. With help, decide how to sort and group the materials based on their properties e.g. hard, bendy, soft etc.	generally dry weather but may be thunderstorms *Know how day length varies- winter having the shortest day light hours and summer having the longest- *shortest day in the UK is 21st December with the longest day being 21st June* **Writing across the curriculum: Geography/science:** Poster (A3) – spring, summer, autumn, winter	and plants, carnivore- meat *Know the structure and compare a variety of common animals Fish have gills, scales and live in water Mammals have hair or fur, babies drink mother's milk live on land or water Amphibians- live on land or water when adults, soft skin, lay eggs in water, live in water when young Reptiles- dry scaly skin, lay eggs on land, have 4 legs or no legs Birds- wings, hatch from eggs, beak/bill, most can fly but some can't (Can all birds fly? Do all mammals have 2/4 legs?) **Writing across the curriculum:** Leaflet for a zoo (characteristics of animals) – A3 *This will be built up over several weeks:* *** front cover – Characteristics of…* *** reptiles* *** mammals* *** amphibians* *** birds* *** fish*	<table><tr><td>Stem</td><td>Holds plant upright</td></tr><tr><td>root</td><td>Collect nutrients, holds plant in place</td></tr><tr><td>petal</td><td>Attracts insects</td></tr></table> and trees- root, trunk branches leaves *Know examples of different trees (names in vocabulary list) and identify what makes them different (from their leaves, fruit, shape) *know that deciduous trees sheds its leaves annually. The leaves are often large and thin. *know that evergreen trees has green leaves all year. these leaves are usually waxy, think, narrow and small. Suggested activity: Planting of seeds: chn to keep an observational diary - Pupils might keep records of how plants have changed over time, for example the leaves falling off trees and buds opening; and compare and contrast what they have found out about different plants	

					Writing opportunity ** Diary – observation over time of cress seeds	
	Disciplinary knowledge DK1: Identify and classify different food based on the senses	**Disciplinary knowledge** DK1: Identify and classify materials based on their properties DK1: Perform simple test	**Disciplinary knowledge** DK1: Observe changes across the seasons DK2: Gather and record data to answer simple questions DK3: Notice patterns across the seasons	**Disciplinary knowledge** DK1: Identify and classify animals DK3: Notice patterns across a group of animals	**Disciplinary knowledge** DK1: Identify and classify plants and trees DK1: Observe changes over time DK2: Gathering data using apparatus	
Year 2	**Name of unit -** Use of everyday materials **Vocabulary:** Hard, Soft, Stretchy, Stiff, Shiny, Dull, Rough, Smooth, Bendy, Waterproof, Absorbent, Opaque, Transparent Brick, Paper, Fabrics, Squashing, Bending, Twisting, Stretching Elastic, Foil **Key knowledge:** *Know the suitability of materials, and compare the properties and uses, such as wood, metal, plastic, glass, brick, rock, paper and cardboard. Know how to select an appropriate material for a given job, e.g. a kitchen towel is used to wipe up liquids because it's absorbent/ fabric is a	**Name of unit –** Animals including humans **Vocabulary:** Survival, Water, Air, Food, Adult, Baby, Offspring, Kitten, Calf, Puppy, Exercise, Hygiene **Key knowledge:** *Know the following animals and their offspring: Dog/puppy, cow/ calf, cat/ kitten, goat/kid, sheep/lamb *Know how animals and humans change as they mature, life cycle of a frog- frogspawn, tadpole, frog/ life cycle of a chicken- egg, chick, chicken/ life cycle of a butterfly egg, caterpillar, pupa, butterfly	**Name of unit -** Plants **Vocabulary:** Seeds, Bulbs, Water, Light, Suitable temperature, Grow, Healthy, Germinate, Decompose **Key knowledge:** *Know how seeds and bulbs grow into mature plants - Plant life cycle- *understand why a circle diagram is used to understand the life cycle of a plant* *Know what plants need water, air, warmth, light and nutrients to grow and be healthy Experiment with planting seeds/flowers in different locations (dark room/light room), providing some flowers with water etc. - Seed A should have water and access to light -Seed B should have access to light but no water - Seed C should have water but no access to light - Seed D should have no water and no access to light			**Name of unit -** Living things and Habitats **Vocabulary:** Living, Dead, Habitat (a natural environment or home of a variety of plants and animals), Energy, Food chain, Predator, Prey, Woodland, Pond, Desert, microhabitat (a very small habitat, for example for woodlice under stones, logs or leaf litter) **Key knowledge:** *Know, explore and compare the differences between living and non living things - Know that living things move, grow consume nutrients and reproduce, dead things used to do these things but no longer do, and things that have never been alive

	good material for a jumper because it is flexible, soft and strong/ glass is good to make a window because it is transparent and rigid *Know what happens when materials are squashed, bent, twisted or stretched- record results to show which materials can be changed or not by each type of force.	Human stages- baby toddler, child, teenager, adult, elderly *Know that animals and humans need water, food and air to survive. *Know that humans need exercise to stay fit and healthy (running, swimming, playing sports etc) need to eat different types of food- **carbohydrates** (gives energy), **fruit and vegetables** (helps with digestion), **protein** (helps the body grow and repair), **dairy** (keep bones and teeth healthy), **fats and sugar** (gives energy but shouldn't be eaten often) *Know the following hygiene rules to prevent the spread of germs Wash hands Cover your mouth when coughing or sneezing Shower/ bath regularly Wear clean clothes Brush teeth twice day **Oracy outcome :** Group video guide about how to take care of an animal (see separate Oracy in Science LTP for more detail)			have never done these things. *Know what all living things have in common. Develop a basic understanding of the 7 life processes making sure to link it to humans, plants and animals. MRSGREN (movement, respiratory, sensitivity, growth, reproduction, excretion, nutrition). Identify living, dead and non-living things. *Know where plants and animals live in the local environment. Discuss habitat features and link the features with living requirements. Suggests ways animals/ plants are suited to their habitats. Introduce microhabitats. *Know that different plant and animals live in different places because of their needs. *Know about different habitats (rainforest, desert, ocean, woodland, polar ice) and microhabitats (under log, on stony path or rock, under bushes, pond) and animals and plants within them. *Know and describe how animals obtain their food from plants and other animals - Know about food chains. What did you eat for dinner? Start to link in a chain. Research to find who

						eats who. Construct a simple food chain that includes humans (eg, grass, cow, human)
	Disciplinary knowledge DK1: Identify and classify materials based on their properties DK1: Perform a simple test DK2: Gather and record data to answer simple questions	**Disciplinary knowledge** DK1: Identify and classify food groups DK1: Observe changes over time	**Disciplinary knowledge** DK1: Observe changes over time DK2: Gather and record data to answer simple questions			**Disciplinary knowledge** DK1: Identify and classify plants DK3: Ask simple questions about the world around them
Year 3	**Name of unit -** Animals, including humans **Vocabulary:** Movement, Muscles, Bones, Skull, Nutrition, Skeletons, carbohydrates, protein, dairy, fats and sugar, balanced diet **Key knowledge:** *Know animals and humans cannot make their own food *Know about different foods provide different nutrients, and the effect this has on the body **carbohydrates-** e.g potatoes, bread, rice, pasta (gives energy), **fruit and vegetables** (helps with digestion), **protein-** e.g meat, fish eggs (muscle development and maintenance), **dairy** e.g. milk, cheese, yogurt (keep	**Name of unit -** Light **Vocabulary:** Light, Shadows, Mirror, Reflective, Dark, Reflection, Light Source, Cast, opaque **Key knowledge:** *Know that we need light to see *Know that darkness is the absence of light *Know that shadows are formed when an opaque object blocks light from passing through *Know that light is reflected from surfaces – discuss that the moon is not a source of light, is simply reflect the light from the sun, and compare this to how the sun illuminated the Earth. (smooth, shiny surfaces	**Name of unit -** Forces and Magnets **Vocabulary:** Magnetic, Force, Contact, Attract, Repel, Friction, Poles, Push, Pull, north, south **Key knowledge:** *Know that the texture of a surface will affect how an object moves along that surface. *Know that the force between two surfaces rubbing together is called friction Investigate how different materials can cause more or less friction on a moving object (simple car and ramp investigation) *Know that we use Newtons to measure a force – use a force gauge to measure friction in the above investigation	**Name of unit -** Rocks **Vocabulary:** Fossils, Soils, Sandstone, Granite, basalt Marble, Pumice, Crystals, Sedimentary, Metamorphic, Igneous, Absorbent/Porous, Durable, Permeable, Impermeable **Key knowledge:** *Know the three types of rocks igneous (formed from the heat of lava or magma e.g. granite/ basalt), sedimentary (formed from sediment being compressed by the weight of the liquid above and cementing over time e.g. limestone/sandstone) and metaphoric (igneous or sedimentary rocks that have changed due to intense heat from magma e.g. marble/ slate)	**Name of unit -** Plants **Vocabulary:** Air, Light, Water, Nutrients, Soil, Reproduction, Transportation, Seed Dispersal (seeds scatter from parent plant), Pollination, Flower, **Key knowledge:** *Know the functions of different parts of flowering plants (Year 1 summer 2 recap- roots, stem/trunk, leaves and flowers) *Know the things that plants need to grow (Year 2 spring) (comparison of variation between a cactus, tulip and Venus fly trap- *Cactuses have thicker stems as they live in arid (dry) conditions whereas tulip's grow in*	

	bones and teeth healthy), **fats and sugar** e.g butter, sweets (gives energy but shouldn't be eaten often) *Know that a skeleton keep bodies the correct shape, help movement (joints- e.g knee, elbow) and protect organs. *Name bones within the body skull, rib cage, spine, pelvis, femur, ulna, patella *Know that muscles are attached to bones and are responsible for movement. Muscles **contract** and **relax** to cause movement.	reflect light more efficiently) *Know that the size of shadows can change (when the distance between the light source and object changes) *Know that looking directly at the sun is dangerous and that eyes should be protected by covering them. (wear brimmed hat/ cap/ sunglasses)	*Know that a contact force happens when objects touch each other. *Know that a non-contact force happens when an object is able to push or pull another object without touching it. *Know some magnetic materials (iron/ steel/nickle) *Know magnets have two poles (north and south) and these attract (one object pulling another object towards it) or repel (one object pushing another object away from it) each other *Know that opposite poles of a magnet attract each other and same poles of a magnet repel each other. (children to predict and investigate this for themselves using magnets)	*Know how to identify, group and classify different kinds of rocks based *Know how fossils are formed - Know that a fossil is the hard remains of a prehistoric animal or plant that are found inside a rock and are formed when living things have been trapped inside them (fossils are only found in sedimentary rocks) 1. animal dies and is buried by sediment 2. soft parts of the animal decay or decompose 3. more sediment builds up around the animal and is compressed to form rock 4. bones start to be dissolved by water underground 5.minerals in the water then turn to rock *Know that soils (e.g sand, clay, silt) are made from organic matter (air, water, broken down rock, dead or living animal tissue)	*damp conditions where access to water is much easier. Cactus plants do not rely on insects for reproduction, whereas tulips have bright leaves to attract insects. Compare with a venus fly trap, which gets most of its nutrition from insects above the ground, instead of nutrients in the soil like the cactus and tulip*.) Trip consideration – Botanical Gardens *Know how water is transported within plants (use celery and coloured water to demonstrate the early stages of transpiration) *Know the life cycle of flowering plants, including pollination Germination > Growth > Pollination > Seed Formation > Seed Dispersal > Germination **Oracy outcome :** 'How to' video guide about parts of a plant and how to look after them (see separate Oracy in Science LTP for more detail)	
	Disciplinary knowledge DK1: To group and classify different food groups	**Disciplinary knowledge** DK1: Observe changes over time	**Disciplinary knowledge** DK1: To group and classify based on properties	**Disciplinary knowledge** DK1: To group and classify different types of rocks	**Disciplinary knowledge** DK1: To observe changes over time	

	DK2: Gather and record data to answer simple questions DK4: Recognise the different secondary sources may be beneficial to their research	DK1: To recognise when a simple fair test is necessary and help to decide how to set it up DK2: Gather and record data to answer simple questions	DK3: Ask simple questions about the world around them	DK1: To begin to compare based on test results DK2: Gather and record data to answer simple questions DK4: Recognise the different secondary sources may be beneficial to their research	DK1: To recognise when a simple fair test is necessary and help to decide how to set it up DK2: Gather and record data to answer simple questions	
Year 4	**Name of unit -** Living things and habitats **Vocabulary:** classification key (a set of questions about the characteristics of living things) Vertebrates, invertebrates Fish, Amphibians, Reptiles, Birds, Mammals, Insects, Environment, Habitats, warm blooded(animals that can make their own body heat)/ cold blooded(animals that need the sun's warmth to heat up their bodies) **Key knowledge:** *Know that living things can be grouped in a variety of ways. vertebrate animals into groups, for example: fish, amphibians, reptiles, birds, and mammals; and invertebrates into snails and slugs, worms, spiders, and insects.	**Name of unit -** Animals, including humans **Vocabulary:** Mouth, Tongue, Teeth, Oesophagus, Stomach, Small Intestine, Large Intestine, Herbivore, Carnivore, Canine, Incisor, Molar, producer (create their own food) predator (animals that consume other animals), prey (animals that are consumed by other animals) **Key knowledge:** *Know that digestion is the breaking down of food *Know the different parts of the digestive system (mouth, tongue, teeth, oesophagus, stomach, and small and large intestine) 1. mouth- where food enters the digestive system 2. tongue- moves food around to be broken down	**Name of unit -** States of Matter **Vocabulary:** Solid, Liquid, Gas, Evaporation, Condensation, Particles, Temperature, Freezing, Heating, Precipitation **Key knowledge:** *Know that most materials exist as solid (hold their shape), liquid (can be poured) and gas (move around freely). *Know what 'matter' is . Use examples of jelly and sand to address misconceptions. Introduce particle model. Pupils can role play as particles. *Know that some materials change state when they are heated or cooled and understand that temperature is measured in Celsius. Demo- melting chocolate/ ice-cream. Fair test- do	**Name of unit -** Sound **Vocabulary:** Volume, Vibration, Wave, Pitch, Tone, Speaker **Key knowledge:** *Know that sounds are made when something vibrates - explore this by placing a small bowl (in a plastic container) near a loud sound, and see how the water vibrates. *Know that vibrations travel through a medium (e.g. air) to the ear *Know that pitch is how high or low a sound is *Know and explore patterns between the volume of a sound and the strength of the vibrations that produced it(the weaker the vibration the quieter the sound, the stronger the vibration the louder the sound) *Know and find patterns between the pitch of a	**Name of unit –** Electricity **Vocabulary:** Cells, Wires, Bulbs, Switches, Buzzers, Battery, Circuit, Series, Conductors, Insulators, Brightness **Key knowledge:** *Know which appliances use electricity *Know and use components to construct a circuit identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers *Know how to create a simple circuit using a battery, a bulb and a switch. *Know that an open switch will not complete the circuit and that a closed switch will complete the circuit Children to investigate if the following circuits will work or not: 1. a complete circuit without switches 2. a circuit with wires not connected to the cell on one side 3. a complete circuit with a open switch 4. a complete circuit with a closed switch 5. a circuit where the wire is not connected to the bulb *Know that conductors allow electricity to pass through them and that insulators prevent the passage of electricity Predict and test the following materials: **Material** | **Conductor** | **Insulator** Copper | |

	Warm blooded- humans, birds, mammals Cold blooded- reptiles, amphibians, fish flowering plants (have a flower head or fruit e.g buttercup, daisy, bluebell) and non-flowering plants (don't produce flowers or fruit- fern and moss) *Know how to use classification keys to help group, identify and name a variety of living things. Use a classification key to classify a variety of amphibians. You can first practise this by classifying the properties of sweets. *Know that environments can change and that this can sometimes pose dangers to living things. Explore examples of human impact (both positive and negative) on environments, for example, the positive effects of nature reserves, ecologically planned parks, or garden ponds, and the negative effects of population and development, litter or deforestation.	3.teeth- breaks down food so it can travel through the oesophagus 4.oesophagus- moves food from mouth to stomach 5. stomach- uses chemicals to break the food into smaller parts 6.small intestine- digested food passed into the blood stream so it can be taken to different parts of the body 7. large intestine-where, unwanted/ left over food is passed along *Know the different types of teeth in humans and their simple functions **incisors-** front teeth to bite off chunks of food to be broken down **Canines-** pointed teeth design to rip and tear meat and fish **(premolars and) molars-** flatter thicker teeth at the back of the mouth designed to crush and grind food *Know how to construct and interpret a variety of food chains, identifying producers, predators and prey. E.g Grass (producer)-> Cow (prey) -> Human (predator) **Oracy outcome :** A commentary on how the	different liquids freeze/ melt at different speeds? *Know that temperature is measure in degrees Celsius (°C) water turns to a solid when cooled to 0°C. Water turns to a gas when heated to 100°C *Know processes involved in the water cycle such as evaporation and condensation. (Recap from Geography Y4 Autumn) Demo- condensation in a bag, ice on Clingfilm over hot water.	sound and the object that made it * Recognise that sounds get fainter as the distance from the sound source increases.	<table><tr><td>Wood</td><td></td><td></td></tr><tr><td>Rubber</td><td></td><td></td></tr><tr><td>Iron</td><td></td><td></td></tr><tr><td>Steel</td><td></td><td></td></tr><tr><td>Plastic</td><td></td><td></td></tr><tr><td>paper</td><td></td><td></td></tr></table>

		digestive system works (see separate Oracy in Science LTP for more detail)			
	Disciplinary knowledge DK1: To group and classify living thing DK1: Explore the effects of deforestation DK2: Gather, record, classify and present data in a variety of ways to help in answering questions.	**Disciplinary knowledge** DK1: Conduct comparative and fair tests DK3: Construct and interpret a variety of food chains DK4: Recognise the different secondary sources may be beneficial to their research	**Disciplinary knowledge** DK1: Observe the changes within the water cycle DK1: To group, classify and compare solids, liquids, and gases DK1: Take accurate measurements using standard units, using a range of equipment Use tables, bar charts to record data. DK2: Analyse the data	**Disciplinary knowledge** DK1: Conduct comparative and fair tests DK3: Investigate patterns between the volume of a sound and the strength of vibrations DK4: Recognise the different secondary sources may be beneficial to their research	**Disciplinary knowledge** DK1: Conduct comparative and fair tests DK2: Gather and record data to answer simple questions DK3: Notice patterns between circuits

Year 5

Name of unit - Properties and Changes of Materials

Vocabulary: Hardness, Solubility, Transparent, Opaque, Translucent, Magnetic, Filter, Evaporation, Dissolving (solid material mixes into a liquid and no longer visible), Mixing, Thermal Conductor, Thermal Insulator, Electrical Conductor, Electrical Insulator

Key knowledge:

*Know how to compare and group together everyday materials based on their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. Work Scientifically by carrying out tests to answer questions.

*Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. Use particle model to develop understanding of dissolving. Fair tests. Investigate how type/ amount of sugar/ temperature/ volume of water effect how long it takes sugar to dissolve.

*Know that solids, liquids and gases can be separated by using filtering, sieving and evaporating

Filtering- separates an insoluble solid from a liquid

Sieving- separates solids of different sizes

Evaporating- separates dissolved substances from liquids

*Know about the uses of everyday materials, including metals, wood and plastic – give reasons for their uses, using evidence from an experiment using comparative and fair testing (keeping a hot drink hot and a cold drink cold in a particular cup – links to thermal conductors and insulators)

*Know that reversible changes (dissolving, mixing, and altering state) are changes that are not permanent.

*Know that some changes result in the formation of new materials is usually irreversible (e.g. paper that is burnt cannot be returned to its original state, cooking an egg)

Name of unit - Forces

Vocabulary: Air Resistance, Water Resistance, Friction, Gravity, Newton, Gears, Pulleys, Lever, Force, Pivot (Fulcrum)

Key knowledge:

*Know that gravity is a force which pull things to the ground on Earth, making unsupported objects fall towards the Earth.

*Know that air resistance is a type of friction between air and another material (parachute investigation)

*Know that water resistance is a type of friction between water and another material (use different shaped objects linking to streamlining to drop into a bottle of water. Time how fast it takes for that object to reach the bottom of the bottle. Is there a pattern in the results? E.g. the more streamline the object, the less water resistance)

*Know when friction is helpful and when it is not (investigate why we need non-slip materials for the

Name of unit – Earth and Space

Vocabulary: Earth, Sun, Moon, Axis, Rotation, Day, Night, Phases of the Moon, star, constellation, waxing, waning, full, new, year, month

Key knowledge:

*Know how the Earth and other planets move, relative to the Sun in the solar system the sun is a star at the centre of the solar system and that it has 8 planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006)

*Know that the Moon orbits the Earth every 28 days (lunar cycle)

*Know that the Sun, Earth, and Moon are approximately spherical bodies

*Know how Earth's rotation to explain day and night and the apparent movement of the sun across the sky. The Earth takes 24 hours to complete one spin on its axis, which creates day and night. The Earth, tilted at approximately 23°, which alters how we see the sun in different

Name of unit - Living things and Habitats

Vocabulary: Mammal, Reproduction, Insect, Amphibian, Bird, Offspring; Classification, Vertebrates, Invertebrates, Microorganisms, Amphibians, Reptiles, Mammals, Insects

Key knowledge:

*Know the differences in the life cycles of different types of animals.

e.g **Jaguar (mammal)**
Live young > kitten > adult
Poison dart frog (amphibian),
frog spawn > tadpole > froglet > adult frog
Leaf cutter ant (insect),
Egg > Larva > Pupa > Adult
Hummingbird (bird).
Egg > chick > Adult

*Know the life process of reproduction in some plants and animals. Review plant life cycle. Emphasise pollen and eggs are gametes. Look at sexual and asexual reproduction in plants, and sexual reproduction in animals.

Name of unit - Animals including humans

Vocabulary: Foetus, Embryo, Womb, Gestation, Baby, Toddler, Teenager, Elderly, Growth, Development, Puberty.

Key knowledge:

*Know the changes as humans develop to old age (YR2 AU2).

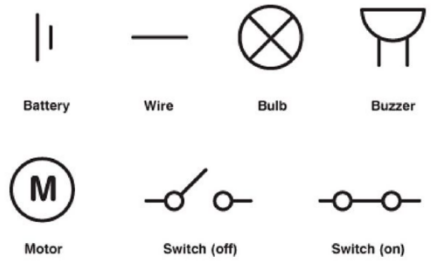
Baby: 0 - 1 year
Toddler: 1 - 3 years
Child: 3 - 12 years
Teenager/ adolescent: 12 - 18 years
Adult: 18+ years
Pensioner: 65+ years

*Know how the human and animal gestation compare

animal	Gestation period
Rat	21 days/ less than a month
Rabbit	31 days/ 1 month
Cat/dog	63 days/ 2 months
Human	275 days/ 9 months
Horse	336 days/ 11 months
Killer whale	465 days/ 15 months
Elephant	624 days/ 20 months

General rule- bigger the animal, the longer the gestation period

	*Know that adding acid (lemon juice) to bicarbonate of soda results in bicarbonate breaking down into salt water and gas and cannot be transformed back into its original form – an example of an irreversible change.	bottom of our shoes, why would this be helpful?) (Objective below covered in AUTUMN – to go alongside DT project) *Know that levers (mechanism used to lift or move objects), pulleys (device consisting of a wheel over which a rope or chain is pulled to lift heavy objects) and gears (toothed wheels that lock together and turn each other) are mechanisms that allow a small force to have a greater effect.	positions in the sky throughout the day, and this makes the sun look as if it is moving when it is in fact Earth.		**Oracy outcome :** A presentation of research findings from gestation period research (see separate Oracy in Science LTP for more detail)
	Disciplinary knowledge DK1: Observe the changes that take place over time DK1: Grouping and classifying a range of materials based on their properties DK1: Conduct comparative and fair tests DK2: Gather, record, classify and present data in a variety of ways to help in answering questions	**Disciplinary knowledge** DK2: Gather, record, classify and present data in a variety of ways to help in answering questions. DK3: Explore the effects of friction on movement and find out how it slows or stops moving objects	**Disciplinary knowledge** DK4: Recognise the different secondary sources may be beneficial to their research	**Disciplinary knowledge** DK1: Observe the life cycle of animals and plants DK1: Compare the life cycle of animals and plants DK4: Recognise the different secondary sources may be beneficial to their research	**Disciplinary knowledge** DK3: Notice patterns within the gestation periods DK4: Recognise the different secondary sources may be beneficial to their research
Year 6	**Name of unit -** Light and Electricity **Vocabulary:** electrons, cell, switch, series, circuit, voltage, current, wire, motor, conductor, components, amps, light bulb, buzzer, battery, insulator, symbols, resistance, reflection, translucent, transparent, opaque **Key knowledge:** Light *Know that light appears to travel in straight lines *Know that we see things because light travels in straight lines from light sources to our eyes or by reflecting off a surface into our eye	**Name of unit -** Animals, including humans **Vocabulary:** circulatory system, heart, blood vessels, oxygenated (enriched with oxygen) blood, deoxygenated (depleted of oxygen) blood, capillaries (microscopic blood vessels), veins (blood vessels that carry blood to the heart), arteries (blood	**Name of unit -** Living Things and Habitats **Vocabulary:** vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering, non-flowering **Key knowledge:** *Know how living things are classified into broad		**Name of unit -** Evolution and Inheritance **Vocabulary: offspring, inheritance, variations, characteristics, adaptation, habitat, environment, evolution, natural selection, fossil, adaptive traits, inherited traits** **Key knowledge:** *Know that living things have changed over time

	*Know that light travels in straight lines to explain why shadows have the same shape as the objects that cast them Suggested activities: deciding where to place rear-view mirrors on cars; designing and making a periscope and using the idea that light appears to travel in straight lines to explain how it works <u>Electricity</u> *Know the more volts there are in a circuit, the more power there is travelling through it. (the higher the volt the brighter the lamp/ louder the buzzer) *Know reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches *Know how to use recognised symbols when representing a simple circuit in a diagram Suggested activities: designing and making a set of traffic lights, a burglar alarm or some other useful circuit  	vessels that carry blood away from the heart) red blood cells, white blood cells, platelets, drug, alcohol, nutrients **Key knowledge:** *Know that human circulatory system consists of the heart, blood vessels, blood, veins, arteries, capillaries, oxygen, lungs and ribcage *Know the functions of the heart (organ that pumps blood around the body), blood vessels (narrow tubes through which your blood flows including arteries, capillaries and veins) and blood (red fluid that is pumped by the heart through blood vessels to supply tissues with nutrient and oxygen. *Know the ways in which nutrients and water are transported within animals, including humans *Know the impact of diet, exercise, drugs, and lifestyle on the way their body's function. Exercise can improve the health of a person by removing fatty deposits from the body. Some drugs and other substances can be harmful to the human body (link to PSHE Y6SU)	groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals. Look at classification keys in more detail (Y4 AU1). Introduced to the idea that broad groupings, such as micro-organisms, plants and animals can be subdivided. Classify animals into the subdivided groups. Look at bacteria, fungi, Protoctista and viruses. *Know how to classify plants and animals based on specific characteristics. Understand the work of Carl Linnaeus and use it to help identify, classify organisms		and that fossils provide information about living things that inhabited the Earth millions of years ago. *Know that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. *Know how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. They should appreciate that variation in offspring over time can make animals more or less able to survive in particular environments i.e., explore how giraffes' necks got longer or the development of insulating fur on the arctic fox. Explore how Charles Darwin developed their ideas on evolution-natural selection. Children could also explore the works of Mary Anning (female scientist)

		Oracy outcome : Persuasive speech on benefits of exercise (see separate Oracy in Science LTP for more detail)			
	Disciplinary knowledge DK1: Conduct comparative and fair tests DK2: Gather, record, classify and present data in a variety of ways to help in answering questions DK3: Draw conclusions based on data analysis DK4: Recognise the different secondary sources may be beneficial to their research	**Disciplinary knowledge** DK1: Grouping different living things	**Disciplinary knowledge** DK1: Observe the changes that take place over time DK1: Conduct comparative and fair tests DK2: Gather, record, classify and present data in a variety of ways to help in answering questions DK3: Draw conclusions based on data analysis DK4: Recognise the different secondary sources may be beneficial to their research		**Disciplinary knowledge** DK1: Conduct comparative and fair tests DK2: Gather, record, classify and present data in a variety of ways to help in answering questions DK3: Draw conclusions based on data analysis DK4: Recognise the different secondary sources may be beneficial to their research
SEND - Adaptive Teaching	➢ Adjust the level of challenge- **e.g., provide sentence stems and question prompts to support thinking, allow children to present their work in different ways (mind maps, collaborative work)**. ➢ Targeted support from a TA – **provide a list of key questions/vocabulary/visual images for the TA to support with delivery of content. TA has a clear view of the curriculum intent and the lesson objectives prior to the lesson.** ➢ Clarify/simplify a task or provide numbered steps with visual representations (objects, pictures, signs, photos) ➢ Provide worked (completed) and partially completed examples. ➢ Highlight essential content- **Prioritise key knowledge that children need to learn to secure progression onto next stage.** ➢ Re-explain a concept or explain it in a different way- **use concrete items and models to aid with explanation.** ➢ Give additional (or revisit) examples. ➢ Use peer tutoring/collaborative learning (everyone must participate – give them roles) - ***Working in groups when conducting practical activities.*** ➢ Provide additional scaffolds – **e.g., – pre-teach vocabulary, 'I do, we do, you', chunk learning into smaller chunks and break learning down into key knowledge, provide worked examples, provide sentence starters for writing, use media (photographs, film) and hands on resources, where possible** ➢ Set clear targets/expectations. ➢ Provide prompts/sentence stems- **e.g., provide children with question prompts to support with thinking and reduce cognitive overload and provide/develop with children steps to success for children to work from.** ➢ Improve accessibility (e.g., proximity to speaker, visibility of whiteboard, read a text to the pupil)- **e.g., – child-friendly texts/media, where possible. When researching, use child appropriate websites.** ➢ Consider pace - (extra time for responses to questions, contributing to class discussions and to complete activities)				

	➢ Provide vocabulary with visual images- **e.g., - explicitly teach vocabulary at the beginning of a unit alongside a picture or diagram of the key word, use photographs to represent the word when using it during the unit. Practice where pupils say aloud the words.** ➢ Check understanding and reinforcing as needed through repetition, rephrasing, explaining and demonstration- **e.g., use of mini-plenaries to check understanding (quick quizzes), questioning and partner talk.** ➢ Have alternative ways to record learning, e.g. oral, photographic, video, highlighting text, mind maps, etc. **e.g., give children a variety of ways to record their work (recording themselves, use of technology, mind maps), allow children to be creative in the ways that they present their work – they do not all have to be the same.** ➢ Pre-teach vocabulary, key content etc- **Pre-teach key vocabulary using picture or diagrams.**
Strategies to stretch and challenge	➢ **Identify and account for prior knowledge** – a child who has extensive prior knowledge could be asked to present some of the knowledge they have to the class; explain something they understand easily to a child who doesn't 'get it' so quickly- **e.g., peer modelling, a more able child could present interesting facts that they already know to the children, more able children given more challenging enquiry based questions to extend their learning.** ➢ **Build on interests to extend** - read widely around a subject outside of lesson time by providing them with information about suitable material, e.g. give them suitable higher-level texts to read- **e.g., questions to research for home learning, projects to complete for home learning.** ➢ **Depth of content** - consider what you can add to create depth, **e.g. digging into an area more deeply, going laterally with a concept, asking pupils to use more complex terminology to describe abstract ideas, comparing scientific concepts and asking children to apply their scientific knowledge into other real world contexts.** ➢ **Use questioning techniques to boost thinking** – ask open-ended questions which require higher-order thinking- **e.g., – How……..Why……..Evaluate….., Compare……** ➢ **Consider learner roles** – ensure they are appropriately challenged through the role they are given so they can make an effective contribution; argue in favour of a viewpoint that is different to their own, e.g. argue the opposite position to that which they actually hold, during a class debate ➢ **Mastery** - more intensive teaching, tutoring, peer-assisted learning, small group discussions, or additional homework. . **e.g – evaluating the method used) How could this be improved? What are the limitations of this method? What would you change next time?)** ➢ **Differentiated success criteria/choice of task** – offer a choice of tasks with a different level of challenge ➢ **Feedback** – framing feedback so pupils must take responsibility for improving their own learning **e.g extend more able learners through open-ended questions when providing feedback**