Building Tomorrow, Leading the Way

AQUEDUCT PRIMARY SCHOOL SCIENCE PROGRESSION GRID

Substantive and Disciplinary Knowledge

Substantive Knowledge- The products of Science - Knowing more and remembering more about the products of science such as concepts, laws, and theories.
The National Curriculum for science aims to ensure that all pupils develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry, and physics.

Disciplinary Knowledge- The knowledge of practices of Science - Knowing how scientific knowledge is gained through scientific enquiry.
The National Curriculum for science aims to ensure that all pupils develop understanding of the nature, processes, and methods of science through different types of scientific enquiries that help them to answer scientific questions about the world and around them.

Substantive and Disciplinary Knowledge - The children being equipped with the knowledge to be able to understand the uses and implications of science today, and in the future.

Science Coverage Across the School

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
EYFS	All about me/features	Seasonal changes Changes in state Materials	Animals/habitats	Plants Seasonal changes Life cycles	How things work Space Changes in state	Living things and their habitats
Year 1	Seasonal changes	Animals including humans	Everyday materials		Animals including humans	Plants
Year 2	Living things and their habitats		Uses of everyday materials		Animals including humans	Plants
Science - Cycle 1						
Year 3/4	Animals including humans		Forces and Magnets	Plants	Electricity	Sound
Year 5/6	Earth and Space		Living things and their habitats		Evolution & inheritance	
Science - Cycle 2						
Year 3/4	Light	Rocks	Living things and their habitats		States of matter	
Year 5/6	Properties and changes in materials		Animals including humans	Light	Forces	Electricity

By the end of EYFS

ELG: The Natural World
Children at the expected level of development will:
- 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 and changing states of matter.

Working Scientifically
- Talk about what they see, using a wide vocabulary.
- Explore the natural world around them.
- Describe what they see, hear and feel whilst outside.
- To feel confident to answer simple questions about observable properties of objects and people, animals, and plants around them
- To compare objects in their environment and talk about similarities and differences
- To ask questions about the world around them, and seek to find their own answers

By the end of KS1	**Working Scientifically** • ask their own questions about what they notice • use different types of scientific enquiry to gather and record data, using simple equipment where appropriate, to answer questions: - observing changes over time - noticing patterns - grouping and classifying things - carrying out simple comparative tests - finding things out using secondary sources of information • communicate their ideas, what they do and what they find out in a variety of ways **Science Content** • name and locate parts of the human body, including those related to the senses (year 1), and describe the importance of exercise, a balanced diet and hygiene for humans (year 2) • describe the basic needs of animals for survival and the main changes as young animals, including humans, grow into adults (year 2) • describe the basic needs of plants for survival and the impact of changing these and the main changes as seeds and bulbs grow into mature plants (year 2) • identify whether things are alive, dead or have never lived (year 2) • describe and compare the observable features of animals from a range of groups (year 1) • group animals according to what they eat (year 1), describe how animals get their food from other animals and/or from plants, and use simple food chains to describe these relationships (year 2) • describe seasonal changes (year 1) • name different plants and animals and describe how they are suited to different habitats (year 2) • distinguish objects from materials, describe their properties, identify and group everyday materials (year 1) and compare their suitability for different uses (year 2)
By the end of KS2	**Working Scientifically** • describe and evaluate their own and others' scientific ideas related to topics in the national curriculum (including ideas that have changed over time), using evidence from a range of sources • ask their own questions about the scientific phenomena that they are studying, and select the most appropriate ways to answer these questions, recognising and controlling variables where necessary (i.e. observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests, and finding things out using a wide range of secondary sources) • use a range of scientific equipment to take accurate and precise measurements or readings, with repeat readings where appropriate • record data and results using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • draw conclusions, explain, and evaluate their methods and findings, communicating these in a variety of ways • raise further questions that could be investigated, based on their data and observations. **Science Content** • name and describe the functions of the main parts of the digestive (year 4), musculoskeletal (year 3) and circulatory systems (year 6); and describe and compare different reproductive processes and life cycles in animals (year 5) • describe the effects of diet, exercise, drugs, and lifestyle on how the body functions (year 6) • name, locate and describe the functions of the main parts of plants, including those involved in reproduction (year 5) and transporting water and nutrients (year3) • use the observable features of plants, animals, and microorganisms to group, classify and identify them into broad groups, using keys or other methods (year 6) • construct and interpret food chains (year 4) • describe the requirements of plants for life and growth (year 3); and explain how environmental changes may have an impact on living things (year 4) • use the basic ideas of inheritance, variation, and adaptation to describe how living things have changed over time and evolved (year 6); and describe how fossils are formed (year 3) and provide evidence for evolution (year 6) • group and identify materials (year 5), including rocks (year 3), in different ways according to their properties, based on first-hand observation; and justify the use of different everyday materials for different uses, based on their properties (year 5) • describe the characteristics of different states of matter and group materials on this basis; and describe how materials change state at different temperatures, using this to explain everyday phenomena, including the water cycle (year 4) • identify and describe what happens when dissolving occurs in everyday situations; and describe how to separate mixtures and solutions into their components (year 5)

	• identify, with reasons, whether changes in materials are reversible or not (year 5) • use the idea that light from light sources, or reflected light, travels in straight lines and enters our eyes to explain how we see objects (year 6), and the formation (year 3), shape (year6) and size of shadows (year 3) • use the idea that sounds are associated with vibrations, and that they require a medium to travel through, to explain how sounds are made and heard (year 4) • describe the relationship between the pitch of a sound and the features of its source; and between the volume of a sound, the strength of the vibrations and the distance from its source (year 4) • describe the effects of simple forces that involve contact (air and water resistance, friction) (year 5), that act at a distance (magnetic forces, including those between like and unlike magnetic poles) (year 3), and gravity (year 5) • identify simple mechanisms, including levers, gears and pulleys, that increase the effect of a force (year 5) • use simple apparatus to construct and control a series circuit, and describe how the circuit may be affected when changes are made to it; and use recognised symbols to represent simple series circuit diagrams (year 6) • describe the shapes and relative movements of the Sun, Moon, Earth and other planets in the solar system; and explain the apparent movement of the sun across the sky in terms of the Earth's rotation and that this results in day and night (year 5).

Year Group	Areas of learning	Plants (Biology) National curriculum statements in red are from other linked topics
Nursery		**KNOWLEDGE:** • Use all their senses in hands-on exploration of natural materials. • Explore collections of materials with similar and/or different properties. • Plant seeds and care for growing plants. • Understand the key features of the life cycle of a plant and an animal. • Begin to understand the need to respect and care for the natural environment and all living things. **VOCABULARY:** plant, leaf, stem, branch, root, bark, flower, petal, seed, berry, fruit, vegetable, bulb, plant, hole, dig, water, weed, grow, shoot, die, dead, soil, names of plants they grow
RECEPTION Threaded throughout the year.		**KNOWLEDGE:** • Plants seeds and cares for growing plants with support • Understand the key features of the life cycle of a plant. • Begin to understand the need to respect and care for the natural environment and all living things. • Can say how to look after plants so that they will grow • To know what a plant is • To know what a flower is • To know where you see plants • To describe different plants and flowers **VOCABULARY:** tree, bush, herb, names of plants they see, root, shoot, stem, leaves, flower, growth, soil, water, sunshine, light, vegetable, weed
Year 1 Summer 2		**KNOWLEDGE:** • 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. **VOCABULARY:** leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud, names of trees in the local area, names of garden and wild flowering plants in the local area
Year 2 Summer 2		**KNOWLEDGE:** • Observe and describe how seeds and bulbs grow into mature plants. • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. • Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 - Living things and their habitats) **VOCABULARY:** light, shade, Sun, warm, cool, water, space, grow, healthy, bulb, germinate, shoot, seedling names of plants in local habitats and micro-habitats (Y2 - Living things and their habitats)

Building Tomorrow, Leading the Way

Year 3/4 Cycle 1 – Spring 2		**KNOWLEDGE:** • 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. • Recognise that living things can be grouped in a variety of ways. (Y4 – Living things and their habitats) • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 – Living things and their habitats) • Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 – Living things and their habitats) **VOCABULARY:** photosynthesis, pollen, insect/wind pollination, male, female, seed formation, seed dispersal (wind dispersal, animal dispersal, water dispersal), air, nutrients, minerals, soil, absorb, transport classification, classification keys (Y4 – Living things and their habitats)
Year 5/6		**KNOWLEDGE:** • Describe the life process of reproduction in some plants and animals. (Y5 – 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. (Y6 – Living things and their habitats) • Give reasons for classifying plants and animals based on specific characteristics. (Y6 – Living things and their habitats) **VOCABULARY:** life cycle, reproduce, sexual, fertilises, asexual, plantlets, runners, tubers, cuttings (Y5 – Living things and their habitats) flowering, non-flowering, mosses, ferns, conifers (Y6 – Living things and their habitats)
KS3		**KNOWLEDGE:** • Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.
Year Group	Areas of learning	**Living Things and Their Habitats (Biology)** National curriculum statements in red are from other linked topics
Nursery		**KNOWLEDGE:** • Use all their senses in hands-on exploration of natural materials. • Explore collections of materials with similar and/or different properties. • Begin to understand the need to respect and care for the natural environment and all living things. **VOCABULARY:** natural, plant, animal, leaves, seeds, conkers, acorns, twigs, bark, shells, feathers, pebbles, stones, same, different, pattern plant, leaf, stem, branch, root, bark, flower, petal, seed, berry, fruit, vegetable, bulb, plant, hole, dig, water, weed, grow, shoot, die, dead, soil (Nursery – Plants)
RECEPTION Threaded throughout the year.		**KNOWLEDGE:** • Understand the key features of the life cycle of an animal. • Begin to understand the need to respect and care for the natural environment and all living things. • Can explain the life cycle of a frog and a butterfly • Describe what they see, hear, and feel whilst outside. • Recognise some environments that are different to the one in which they live. • To know what an animal is • To recognise and name a variety of different animals • To know the names of different body parts of humans and animals they have experience of **VOCABULARY:** plant, tree, bush, flower, vegetable, herb, weed, animal, names of plants and animals they see, name of a contrasting environment (e.g., beach, forest) habitat
Year 1		**KNOWLEDGE:** • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 – Plants) • Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 – Plants) • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 – Animals including humans)

	• Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals including humans) • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 -Animals, including humans) • Observe changes across the four seasons. (Y1 - Seasonal change) **VOCABULARY:** names of garden and wild flowering plants in the local area (Y1 - Plants) head, body, eyes, ears, mouth, teeth, leg, tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves, names of animals experienced first-hand from each vertebrate group (Y1 - Animals, including humans) weather, sunny, rainy, raining, shower, windy, snowy, cloudy, hot, warm, cold, storm, thunder, lightning, hail, sleet, snow, icy, frost, puddles, rainbow, seasons, winter, summer, spring, autumn, Sun, sunrise, sunset, day length (Y1 - Seasonal changes)
Year 2 All of Autumn	**KNOWLEDGE:** • Explore and compare the differences between things that are living, dead, and things that have never been alive. • Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. • Identify and name a variety of plants and animals in their habitats, including microhabitats. • Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. • Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals including humans) **VOCABULARY:** living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed, water, air, survive, survival, names of local habitats (e.g. pond, woodland etc.), names of micro-habitats (e.g. under logs, in bushes etc.), conditions, light, dark, shady, sunny, wet, damp, dry, hot, cold, names of living things in the habitats and micro-habitats studied light, shade, Sun, warm, cool, water, space, grow, healthy, bulb, germinate, shoot, seedling (Y2 - Plants) offspring, reproduction, growth, baby, toddler, child, teenager, adult, old person, names of animals and their babies (e.g. chick/chicken, cat/kitten, caterpillar/butterfly) (Y2 - Animals, including humans)
Year 3/4 Cycle 2 - All of Spring	**KNOWLEDGE:** • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants) • 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. • Construct and interpret a variety of food chains, identifying producers, predators and prey. (Y4 - Animals, including humans) **VOCABULARY:** photosynthesis, pollen, insect/wind pollination, male, female, seed formation, seed dispersal (e.g. wind dispersal, animal dispersal, water dispersal), air, nutrients, minerals, soil, absorb, transport classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate herbivore, carnivore, omnivore, producer, predator, prey (Y4 - Animals, including humans)
Year 5/6 Cycle 1 - All of Spring	**KNOWLEDGE:** • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. • Describe the life process of reproduction in some plants and animals. • Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals. • Give reasons for classifying plants and animals based on specific characteristics. • Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. (Y6 - Evolution and inheritance) • Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. (Y6 - Evolution and inheritance) **VOCABULARY:** life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, cuttings vertebrates, fish, amphibians, reptiles, birds, mammals, warm-blooded, cold-blooded, invertebrates, insects, spiders, snails, worms, flowering, non-flowering, mosses, ferns, conifers
KS3	**KNOWLEDGE:**

	• Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta. • Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. • Differences between species.	
Year Group	Areas of learning	**Animals Including Humans (Biology)** National curriculum statements in red are from other linked topics
Nursery		**KNOWLEDGE:** • Use all their senses in hands-on exploration of natural materials. • Begin to make sense of their own life-story and family's history. • Understand the key features of the life cycle of a plant and an animal. • Begin to understand the need to respect and care for the natural environment and all living things. **VOCABULARY:** egg, chick, bird, caterpillar, cocoon, chrysalis, butterfly, frog spawn, tadpole, froglet, frog, grow, change, die, names of animals and their young, fur, feathers, scales, tail, wings, beak, claws, paws, hooves, swim, walk, run, jump, fly, patterns, spots, stripes, grow, change, baby, toddler, child, adult, old person, smell, taste, touch, feel, hear, see, blind, deaf
RECEPTION Threaded throughout the year.		**KNOWLEDGE:** • Talk about members of their immediate family and community. • Name and describe people who are familiar to them. • Recognise some environments that are different to the one in which they live. **VOCABULARY:** names of animals, live, on land, in water, jungle, desert, North Pole, South Pole, sea, hot, cold, wet, dry, snow, ice, hair (e.g. black, brown, dark, light, blonde, ginger, grey, white, long, short, straight, curly), eyes (e.g. blue, brown, green, grey), skin (e.g. black, brown, white), big/tall, small/short, bigger/smaller, baby, toddler, child, adult, old person, old, young, brother, sister, mother, father, aunt, uncle, grandmother, grandfather, cousin, friend, family, boy, girl, man, woman
Year 1 Autumn 2 and Summer 1		**KNOWLEDGE:** • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. **VOCABULARY:** head, body, eyes, ears, mouth, teeth, leg, tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves, names of animals experienced first-hand from each vertebrate group, parts of the human body including those within the school's RSE policy, senses, touch, see, smell, taste, hear, fingers, skin, eyes, nose, ears, tongue
Year 2 Summer 1		**KNOWLEDGE:** • Notice that animals, including humans, have offspring which grow into adults. • Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. • Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. (Y2 - Living things and their habitats) **VOCABULARY:** offspring, reproduction, growth, baby, toddler, child, teenager, adult, old person, names of animals and their babies (e.g. chick/chicken, kitten/cat, caterpillar/butterfly), survive, survival, water, food, air, exercise, heartbeat, breathing, hygiene, germs, disease, food types (e.g. meat, fish, vegetables, bread, rice, pasta, dairy) living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed, water, air, survive, survival (Y2 - Living things and their habitats)
Year 3/4 Cycle 1 - All of Autumn		**KNOWLEDGE:** • 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. • 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. **VOCABULARY:** nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, joints, support, protect, move, skull, ribs, spine, digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, large intestine, rectum, anus, incisor, canine, molar, premolar, herbivore, carnivore, omnivore, producer, predator, prey
Year 5/6 Cycle 2 – Summer 1	**KNOWLEDGE:** • Describe the changes as humans develop to old age. • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 – Living things and their habitats) • Describe the life process of reproduction in some plants and animals. (Y5 – Living things and their habitats) • Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. • 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. • 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. (Y6 – Living things and their habitats) • Give reasons for classifying plants and animals based on specific characteristics. (Y6 – Living things and their habitats) **VOCABULARY:** puberty, the vocabulary to describe sexual characteristics in line with RSE policy life cycle, foetus, baby, child, adolescent, adult, reproduce, sexual, sperm, fertilises, egg, live young (Y5 – Living things and their habitats) heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, cycle, circulatory system, diet, drugs, lifestyle
KS3	**KNOWLEDGE:** • Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta. • The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases. • The effects of recreational drugs (including substance misuse) on behaviour, health and life processes. • The structure and functions of the gas exchange system in humans, including adaptations to function. • The mechanism of breathing to move air in and out of the lungs. • The impact of exercise, asthma and smoking on the human gas exchange system.
Year Group	Areas of learning: **Evolution and Inheritance (Biology)** **National curriculum statements in red are from other linked topics**
Nursery	**KNOWLEDGE:** • Begin to understand the need to respect and care for the natural environment and all living things. (Nursery – Living things and their habitats) **VOCABULARY:** natural, plant, animal, leaves, seeds, conkers, acorns, twigs, bark, shells, feathers, pebbles, stones, same, different, pattern (Nursery –Living things and their habitats)
RECEPTION Threaded throughout the year.	**KNOWLEDGE:** • Recognise some environments that are different to the one in which they live. (Reception – Living things and their habitats) **VOCABULARY:** plant, tree, bush, flower, vegetable, herb, weed, animal, names of plants and animals they see, name of a contrasting environment (e.g. beach, forest) (Reception – Living things and their habitats)
Year 1	**KNOWLEDGE:** N/A **VOCABULARY:** leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud (Y1 – Plants)
Year 2	**KNOWLEDGE:** • Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. (Y2 – Living things and their habitats) • Notice that animals, including humans, have offspring which grow into adults. (Y2 – Animals, including humans) **VOCABULARY:** light, shade, Sun, warm, cool, water, space, grow, healthy, bulb, germinate, shoot, seedling (Y2 – Plants)

	living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed, water, air, survive, survival, conditions, light, dark, shady, sunny, wet, damp, dry, hot, cold (Y2 – Living things and their habitats)
Year 3/4	**KNOWLEDGE:** • Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 – Rocks) • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 – Plants) • Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 – Living things and their habitats) **VOCABULARY:** photosynthesis, pollen, insect/wind pollination, male, female, seed formation, seed dispersal (e.g. wind dispersal, animal dispersal, water dispersal), air, nutrients, minerals, soil (Y3 – Plants) soil, fossil, bone, flesh, minerals (Y3 – Rocks) environment, habitat, human impact, positive, negative, migrate, hibernate (Y4 – Living things and their habitats) herbivore, carnivore, omnivore, producer, predator, prey (Y4 – Animals, including humans)
Year 5/6 Cycle 1 – All of Summer	**KNOWLEDGE:** • Describe the life process of reproduction in some plants and animals. (Living things and their habitats – Y5) • 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. **VOCABULARY:** life cycle, reproduce, sexual, fertilises, asexual, plantlets, runners, tubers, cuttings (Y5 – Living things and their habitats) offspring, sexual reproduction, vary, characteristics, adapted, inherited, species, evolve, evolution
KS3	**KNOWLEDGE:** • Heredity as the process by which genetic information is transmitted from one generation to the next. • A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model. • The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection. • Changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction.
Year Group	Areas of learning — **Seasonal Changes (Physics)** National curriculum statements in red are from other linked topics
Nursery	**KNOWLEDGE:** • Understand the key features of the life cycle of a plant and an animal. (Nursery – Plants & Animals, excluding humans) **VOCABULARY:** grow, shoot, die, dead (Nursery – Plants) egg, chick, bird, caterpillar, cocoon, chrysalis, butterfly, frog spawn, tadpole, froglet, frog, grow, change, die, names of animals and their young (Nursery – Animals, excluding humans)
RECEPTION Threaded throughout the year.	**KNOWLEDGE:** • Explore the natural world around them. • Describe what they see, hear and feel whilst outside. • Understand the effect of changing seasons on the natural world around them. • Can identify what you need to wear for each season and why • Understand the effect of changing seasons on the natural world around them. • Names and orders seasons and can identify key features of each season. • To observe changes in trees and plants as the seasons progress • To know about different types of weather • Can talk about their observations of the trees in the school grounds during the different seasons. **VOCABULARY:** spring, summer, autumn, winter, seasons, sunny, cloudy, hot, warm, cold, shower, raining, storm, thunder, lightning, hail, sleet, snow, icy, frost, puddles, windy, rainbow, animals, young, plants, flowers
Year 1 Autumn 1	**KNOWLEDGE:** • Observe changes across the four seasons. • Observe and describe weather associated with the seasons and how day length varies.

	VOCABULARY: weather, sunny, rainy, raining, shower, windy, snowy, cloudy, hot, warm, cold, storm, thunder, lightning, hail, sleet, snow, icy, frost, puddles, rainbow, seasons, winter, summer, spring, autumn, Sun, sunrise, sunset, day length
Year 2	**KNOWLEDGE:** N/A **VOCABULARY:** N/A
Year 3/4	**KNOWLEDGE:** • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light) **VOCABULARY:** N/A
Year 5/6	**KNOWLEDGE:** • Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky. (Y5 - Earth and space) **VOCABULARY:** N/A
KS3	**KNOWLEDGE:** • The seasons and the Earth's tilt, day length at different times of year, in different hemispheres.
Year Group	Areas of learning — **Materials & States of Matter (Chemistry)** National curriculum statements in red are from other linked topics
Nursery	**KNOWLEDGE:** • Use all their senses in hands-on exploration of natural materials. • Explore collections of materials with similar and/or different properties. • Talk about the differences between materials and changes they notice. **VOCABULARY:** mix, stir, cook, hot, oven, microwave, change, burn, melt, hard, runny, set, freeze, freezer, cold, blended, hard, soft, bendy, stiff, wobbly, wood, plastic, paper, card, fabric
RECEPTION Threaded throughout the year.	**KNOWLEDGE:** • Explore the natural world around them. • Describe what they see, hear and feel whilst outside. • Uses all their senses in hands-on exploration of natural materials. • Explore collections of materials, identifying similar and different properties. • Explore and talk about different forces they can feel. • Talks about differences between materials and changes they notice. • To describe how different objects look and feel • To recognise that different everyday objects are made from different materials. **VOCABULARY:** ice, water, frozen, icicle, snow, melt, wet, cold, slippery, smooth, big, bigger, biggest, smaller, smaller, smallest, hard, soft, bendy, rigid, wood, plastic, paper, card, metal, strong, weak, hot, apply heat, waterproof, soggy, not waterproof, best, change, change back
Year 1 All of Spring	**KNOWLEDGE:** • 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. **VOCABULARY:** object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull, see-through, not see-through
Year 2	**KNOWLEDGE:**

All of Spring	• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. **VOCABULARY:** opaque, transparent, translucent, reflective, non-reflective, flexible, rigid, shape, push/pushing, pull/pulling, twist/twisting, squash/squashing, bend/bending, stretch/stretching
Year 3/4 Cycle 2 – All of Summer	**KNOWLEDGE:** • Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. (Y3 - Rocks) • Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 - Rocks) • 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. (Y3 - Forces and magnets) • 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. • Recognise some common conductors and insulators, and associate metals with being good conductors. (Y4 - Electricity) **VOCABULARY:** rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorbs water, fossil, bone, flesh, minerals, marble, chalk, granite, sandstone, slate, types of soil (e.g. peaty, sandy, chalky, clay) (Y3 - Rocks) magnetic force, magnet, attract, magnetic material, metal, iron, steel (Y3 - Forces and magnets) solid, liquid, gas, heating, cooling, state change, melting, freezing, melting point, boiling, boiling point, evaporation, condensation, temperature, water cycle electrical conductor, electrical insulator, metal, non-metal (Y4 - Electricity)
Year 5/6 Cycle 2 – All of Autumn	**KNOWLEDGE:** • 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. **VOCABULARY:** thermal insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material
KS3	**KNOWLEDGE:** • Chemical reactions as the rearrangement of atoms. • Representing chemical reactions using formulae and using equations. • Combustion, thermal decomposition, oxidation and displacement reactions. • Defining acids and alkalis in terms of neutralisation reactions. • The pH scale for measuring acidity/alkalinity; and indicators.
Year Group	Areas of learning: **Rocks (Chemistry)** National curriculum statements in red are from other linked topics
Nursery	**KNOWLEDGE:** • Use all their senses in hands-on exploration of natural materials. (Nursery - Living things and their habitats) • Explore collections of materials with similar and/or different properties. (Nursery - Living things and their habitats) **VOCABULARY:** natural, shells, pebbles, stones
RECEPTION Threaded throughout the year.	**KNOWLEDGE:** • Explore the natural world around them. (Reception - Living things and their habitats) • Describe what they see, hear and feel whilst outside. (Reception - Living things and their habitats) **VOCABULARY:** N/A
Year 1	**KNOWLEDGE:**

	• Distinguish between an object and the material from which it is made. (Y1 - Everyday materials) • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials) • Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials) **VOCABULARY:** object, material, rock, brick, clay, hard, soft, waterproof, absorbent, rough, smooth, shiny, dull, see-through, not see-through (Y1 - Everyday materials)
Year 2	**KNOWLEDGE:** • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials) **VOCABULARY:** opaque, transparent, translucent, reflective, non-reflective (Y2 - Uses of everyday materials)
Year 3/4 Cycle 2 - Autumn 2	**KNOWLEDGE:** • 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. **VOCABULARY:** rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorbs water, fossil, bone, flesh, minerals, marble, chalk, granite, sandstone, slate, types of soil (e.g. peaty, sandy, chalky, clay)
Year 5/6	**KNOWLEDGE:** • Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. (Y6 - Evolution and inheritance) **VOCABULARY:** evolution
KS3	**KNOWLEDGE:** • The composition of the Earth. • The structure of the Earth. • The rock cycle and the formation of igneous, sedimentary and metamorphic rocks
Year Group	Areas of learning: **Light (Chemistry)** National curriculum statements in red are from other linked topics
Nursery	**KNOWLEDGE:** • Explore how things work. • Talk about the differences in materials and changes they notice. **VOCABULARY:** light, torch, bulb, lamp, spotlight, shiny, bright, brighter, brightest, Sun, shine, glow, mirror
RECEPTION Threaded throughout the year.	**KNOWLEDGE:** • Describe what they see, hear and feel whilst outside **VOCABULARY:** Sun, sunny, light, shadow, shady, clouds, torch, see-through, not see-through, source, light source
Year 1	**KNOWLEDGE:** • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Materials) **VOCABULARY:** senses, see, eyes (Y1 - Animals, including humans) shiny, dull, see-through, not see-through (Y1 - Materials)
Year 2	**KNOWLEDGE:** N/A **VOCABULARY:** opaque, transparent, translucent, reflective, non-reflective (Y2 - Uses of everyday materials)

Building Tomorrow, Leading the Way

Year 3/4 Cycle 2 – Autumn 1	**KNOWLEDGE:** • 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. **VOCABULARY:** light, light source, dark, absence of light, surface, shadow, reflect, mirror, Sun, sunlight, dangerous
Year 5/6 Cycle 2 – Spring 2	**KNOWLEDGE:** • 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. (Y5 - Properties and changes of materials) • 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. **VOCABULARY:** travel, reflect, reflection, light source, shadow, opaque, translucent, transparent, light rays, straight lines
KS3	**KNOWLEDGE:** • The similarities and differences between light waves and waves in matter. • Light waves travelling through a vacuum; speed of light. • The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface. • Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye. • Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras. • Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.

Year Group	Areas of learning	Forces (Physics) National curriculum statements in red are from other linked topics
Nursery		**KNOWLEDGE:** • Explore how things work. • Explore and talk about different forces they can feel. • Talk about the differences between materials and changes they notice. **VOCABULARY:** object, float, sink, water, up, down, top, bottom, push, pull, magnet, spring, squash, bend, twist, stretch, turn, spin, smooth, rough, fast, slow
RECEPTION Threaded throughout the year.		**KNOWLEDGE:** • Explore the natural world around them. • Describe what they see, hear and feel whilst outside **VOCABULARY:** float, sink, up, down, top, bottom, surface, move, roll, drop, fly, turn, spin, fall, fast, slow, faster, slower, fastest, slowest, further, furthest, wind, air, water, blow, bounce
Year 1		**KNOWLEDGE:** N/A **VOCABULARY:**
Year 2		**KNOWLEDGE:** • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials) **VOCABULARY:** flexible, rigid, shape, push/pushing, pull/pulling, twist/twisting, squash/squashing, bend/bending, stretch/stretching (Y2 - Uses of everyday materials)
Year 3/4		**KNOWLEDGE:** • Compare how things move on different surfaces.

Cycle 1 – Spring 1	• Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Observe how magnets attract or repel each other and attract some materials and not others. • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. • Describe magnets as having two poles. • Predict whether two magnets will attract or repel each other, depending on which poles are facing **VOCABULARY:** force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole
Year 5/6 Cycle 2 – Spring 1	**KNOWLEDGE:** • 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. **VOCABULARY:** force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears
KS3	**KNOWLEDGE:** • Magnetic fields by plotting with compass, representation by field lines. • Earth's magnetism, compass and navigation. • Forces as pushes or pulls, arising from the interaction between two objects. • Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces. • Moment as the turning effect of a force. • Forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water. • Forces measured in Newtons, measurements of stretch or compression as force is changed.
Year Group	Areas of learning: **Sound (Physics)** National curriculum statements in red are from other linked topics
Nursery	**KNOWLEDGE:** • Explore how things work. **VOCABULARY:** sound, noise, loud, quiet, high, low, music, bang, blow, pluck, soft, hard, fast, slow, names of instruments
RECEPTION Threaded throughout the year.	**KNOWLEDGE:** • Describe what they see, hear and feel whilst outside **VOCABULARY:** sound, noise, listen, hear, music, voices, bird song, traffic, sirens, thunder, high, low, loud, quiet, soft, volume, crackle, thunder, hum, buzz, roar
Year 1	**KNOWLEDGE:** • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 – Animals, including humans) **VOCABULARY:** senses, hear, ear (Y1 – Animals, including humans)
Year 2	**KNOWLEDGE:** N/A **VOCABULARY:** N/A
Year 3/4 Cycle 1 – Summer 2	**KNOWLEDGE:** • 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. **VOCABULARY:** sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, quiet, loud, insulation
Year 5/6	**KNOWLEDGE:** N/A **VOCABULARY:** N/A
KS3	**KNOWLEDGE:** • Waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel superposition. • Frequencies of sound waves, measured in Hertz (Hz); echoes, reflection and absorption of sound. • Sound needs a medium to travel, the speed of sound in air, in water, in solids. • Sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal. • Auditory range of humans and animals. • Pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound. • Waves transferring information for conversion to electrical signals by microphone.
Year Group	Areas of learning — **Electricity (Physics)** National curriculum statements in red are from other linked topics
Nursery	**KNOWLEDGE:** • Explore how things work. **VOCABULARY:** battery, plug, socket, electricity, wire, sound, light, move
RECEPTION	**KNOWLEDGE:** N/A **VOCABULARY:** N/A
Year 1	**KNOWLEDGE:** N/A **VOCABULARY:** N/A
Year 2	**KNOWLEDGE:** N/A **VOCABULARY:** N/A
Year 3/4 Cycle 1 – Summer 1	**KNOWLEDGE:** • Identify common appliances that run on electricity. • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. • Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. • Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. • Recognise some common conductors and insulators, and associate metals with being good conductors. **VOCABULARY:** electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol
Year 5/6 Cycle 2 – Summer 2	**KNOWLEDGE:** • Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. • Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. • Use recognised symbols when representing a simple circuit in a diagram. **VOCABULARY:**

	circuit diagram, circuit symbol, voltage	
KS3	**KNOWLEDGE:** • Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge. • Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current. • Differences in resistance between conducting and insulating components (quantitative). • Static electricity.	
Year Group	Areas of learning	**Earth and Space (Physics)** National curriculum statements in red are from other linked topics
Nursery	**KNOWLEDGE:** N/A **VOCABULARY:** N/A	
RECEPTION Threaded throughout the year.	**KNOWLEDGE:** • Explore the natural world around them. • Describe what they see, hear and feel whilst outside. **VOCABULARY:** Sun, Moon, Earth, star, planet, sky, day, night, space, round, bounce, float	
Year 1	**KNOWLEDGE:** • Observe changes across the four seasons. (Y1 – Seasonal changes) • Observe and describe weather associated with the seasons and how day length varies. (Y1 – Seasonal changes) **VOCABULARY:** N/A	
Year 2	**KNOWLEDGE:** N/A **VOCABULARY:** N/A	
Year 3/4	**KNOWLEDGE:** N/A **VOCABULARY:** light, light source, Sun, sunlight, dangerous (Y3 – Light)	
Year 5/6 Cycle 1 – All of Autumn	**KNOWLEDGE:** • 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. **VOCABULARY:** Sun, Moon, Earth, planets (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, Solar System, rotate, star, orbit	
KS3	**KNOWLEDGE:** • Gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only). • Our Sun as a star, other stars in our galaxy, other galaxies. • The seasons and the Earth's tilt, day length at different times of year, in different hemispheres. • The light year as a unit of astronomical distance.	