LANGTOFT PRIMARY SCHOOL

SCIENCE

LEGAL FRAMEWORK

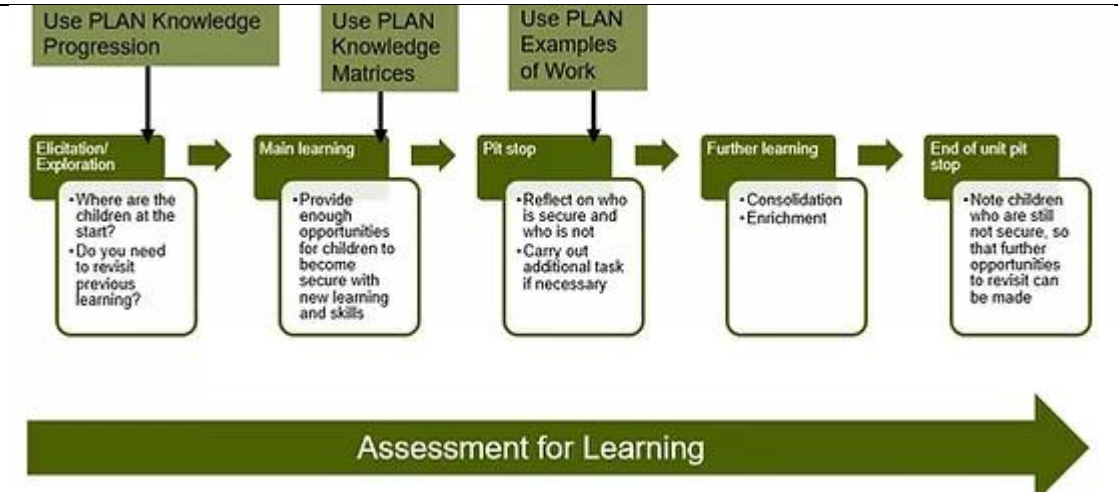
The science programmes of study from the national curriculum form the roots of Langtoft Primary School's science curriculum. From this national documentation, in conjunction with documentation from the Association for Science Education, our science curriculum has been devised, developed and personalised to our school community, having evolved from our values, vision and mission statement.

Our science curriculum is underpinned by the national curriculum aims for science, ensuring that all pupils:

- Develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics;
- Develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them;
- Are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

OUR INTENT FOR SCIENCE

Our science curriculum embraces curiosity and enthusiasm. It develops in pupils a strong understanding of the world around them: how to calculate, reason and solve problems; to understand relationships and identify patterns; whilst teaching specific skills and knowledge to think scientifically, to understand scientific processes and the uses and implications of science today and for the future. At Langtoft Primary School we adopt a working scientifically approach to the teaching of science, believing that this enables children to engage actively with their learning, allowing for deeper scientific thinking so that all pupils can be successful scientists. They immerse themselves in their enquiry, generating questions and seeing a topic as something to investigate, rather than just learn. Children establish a context for the ever-changing world in which they live and their role within it. Through their growing curiosity and fascination of the world around them, children develop an appreciation of the environment and the impact of science and scientists on our society and wider world. Our science curriculum is based on the National Curriculum objectives and influenced by the resources an schemes of learning from PLAN assessment, which breaks down progression, vocabulary and key concepts of learning and STEM projects focusing on the wider world and global issues. It employs a range of pedagogical strategies, allowing children to achieve the expected standard and beyond. All pupils within a year group work on the same objectives. Work is set at an appropriate level, with pupils given support and challenge relative to their own developmental needs. Children are supported with devising their own questions and developing key skills of research, investigation, analysis and problem-solving.



We aim for all Langtoft Primary School scientists to:

- Be fluent in the fundamentals of science;
- Be imaginative, creative and **ambitious** thinkers to design investigations to find solutions;
- Be **confident**, creative and curious in exploring and investigating their ideas;
- Use their prior learning to articulate their thoughts using the appropriate vocabulary;
- Know how to and be **confident** in selecting appropriate resources and techniques for carrying out an investigation, whilst following safe procedures;
- Apply their conceptual understanding to reason logically and articulate their thoughts and justifications;
- Have a developed knowledge, understanding and **consideration** of scientific processes and equipment;
- Approach science with positivity, showing joy, pride and satisfaction to explore scientific principles;
- See meaningful connection between science, other subjects and the wider world;
- Be **independently** creative, yet value and **respect** collaborative teamwork **(Cooperation)** within a safe, secure learning environment to reach a purpose;
- Have the skills to analyse problems; innovate new ideas and generate suitable solutions;
- Be **resilient** when solving problems and facing challenges, reflecting on prior knowledge and past successes and failures, adopting a systematic approach where possible;

Our curriculum is divided into concepts. These concepts are the 'big ideas' in each subject and travel through the curriculum, being built upon, progressively, year upon year as our children move through the school. Our science concepts are those defined by the national curriculum programmes of study:

- **Plants**
- **Animals including Humans**
- **Living Things and their Habitats**
- **Seasonal Changes**
- **Materials**
- **Rocks**
- **Light**
- **Forces and Magnets**
- **Sound**
- **Evolution and Inheritance**
- **Electricity**
- **Earth and Space**
- **Working scientifically is not taught as a separate strand, but instead woven into all other concepts.**

Examples of curriculum intent and implementation	Cultural experiences and enrichments • Science Week is carried out in March • Dentist visit to EYFS/Year 1 • Year 2 trip to Christmas tree farm. • Year 3 trip to Flag Fen. • Year 4 trip to Stibbington eco centre. • Year 5 trip to the Space Centre. • EYFS/KS1/KS2 STEM workshops.
	Life-long love of reading • Classrooms have non-fiction books on display that link to topic. • Knowledge organiser quizzes/assessment at the end of each subject • Concept Maps: Children have access to key knowledge, language and meanings to understand Science and to use these skills across the curriculum. • Working Walls: Science Working Walls throughout the school focus on key knowledge, vocabulary and questions and exemplify the terminology used throughout the teaching of Science. • Subject specific vocabulary: identified through knowledge organisers and working walls and highlighted to the children at the beginning of and during lessons.

	British Values • Listening to the children's opinions and sharing their ideas • Taking turns • Knowing there are consequences if safety rules are ignored • Using the fair testing rule as a way of following guidance • Making their own choices when planning an investigation • Others may have different views on where to start • Researching famous scientists and understanding their backgrounds, where they came from, their home life and early childhood • Understanding where different scientific elements come from in the world and comparing the two—for example electricity in the UK compared to other places in the world • Discussing safely and appropriately causes and protests across the world, based on animal rights or saving the environment. Debating these ideas in a calm manner and age appropriate. • Allowing children the chance to choose their resources and have a say in their experiments • Working as a team • Offering advice
Curriculum Impact Learning about science also enables learning from science.	• Develop increasingly independent enquirers • Develop increasingly critical thinkers • Develop a use of skills of enquiry, analysis, interpretation and evaluation. • Increase their understanding of the world around them and their place in it. • Develop an interest in the wider world around them. • Develop a sense of identity through learning about how they can impact on the wider world. • Develop a love of reading through the use of science-based fiction and non-fiction sources. • Explain not only about the world but also how it works, how it fits together and how to make a difference and become positive contributors to it. • Ensure the children develop the key skills of scientific enquiry, outdoor learning and fieldwork, use of equipment and materials. • Develop the knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics. • Develop and understanding of the implications of science, today and for the future. • Ensure children know more, remember more and understand more.

Year	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
EYFS	**Living things and their habitats Animals including humans (5 senses, human body)**	**Seasonal changes (Autumn)**	**Seasonal changes (Winter) Materials (Boat for Gingerbread man)**	**Living things and their habitats (Chick life-cycle) Seasonal changes (Spring) Materials (Exploring Changes of Matter)**	**Living things and their habitats Plants**	**Living things and their habitats Animals including humans (Minibeasts life-cycles, pets) Seasonal changes (Summer) Magnets**

1	Seasonal changes		Materials	Humans (Senses)	Plants	Animals including humans
2	Everyday Uses of Materials		Animals, including humans	Plants	Living things and their habitats Animals, including humans	
3	Rocks	Rocks/Forces	Animals, including humans	Plants	Light	Forces and Magnets
4	Sound	Electricity	Electricity	States of matter: changing state, evaporation, condensation and the water cycle.	Living things and their habitats inc. food chains.	The digestive system inc. teeth in humans and their simple functions.
5	Forces	Forces	Earth and Space	Living things & their habitats	Properties & changes of materials	Animals, including humans
6	**Light** Behaviour of light, seeing, shadows	**Animals including humans:** circulatory system, impact of diet, exercise, drugs and lifestyle on body function, transport of nutrients and water	**Living things and their habitats** Classification: Microorganisms, plants and animals	Scientific enquiry skills	**Electricity** Variation in voltage, function components and use of symbols in circuit diagrams	**Evolution and inheritance** change over time, fossil evidence, offspring similarities and variation adaptation to suit environment and resulting evolution

Progression in Knowledge

(National Curriculum statements in red are from other linked topics.)

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6

Knowledge PLANTS	*Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes*	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.	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)	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)	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	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	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	As for Year 1 plus light, shade, sun, warm, cool, water, grow, healthy	Photosynthesis, pollen, insect/wind pollination, seed formation, seed dispersal (wind dispersal, animal dispersal, water dispersal)	Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate	Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings	Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering, non-flowering

Knowledge Living things and their habitats	*Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.*	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)	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)	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)	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.
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	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	Living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed • Names of local habitats e.g. pond, woodland etc.	Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, support, protect, move, skull, ribs, spine, muscles, joints	Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate	Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings	Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering, non-flowering

		• Parts of the body including those linked to PSHE teaching (see joint document produced by the ASE and PSHE Association) • Senses – touch, 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	• Names of micro-habitats e.g. under logs, in bushes etc.				
Knowledge Animals including humans	Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.	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.	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.	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.	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) Conception and sexual intercourse are introduced in simple terms so the children understand that a baby is formed by the joining of an ovum and sperm. They also learn that the ovum and sperm carry genetic information that carry personal characteristics.	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) Sexual intercourse is explained in slightly more detail than in the previous year. Children are encouraged to ask questions and seek clarification about anything they don't understand. Further details about pregnancy are introduced including some facts about the development of the foetus and some simple explanation about alternative ways of conception, e.g. IVF. Children learn that having a baby is a personal choice. Details of contraceptive options and methods are not taught as this is not age-appropriate. The children also learn about childbirth and the stages of development

							of a baby, starting at conception.

Vocabulary	Model and encourage children to use vocabulary such as: • names of animals, live, on land, in water, jungle, desert, North Pole, South Pole, sea, hot, cold, wet, dry, snow, ice Expose children to supplementary vocabulary such as: • environment, polar regions, ocean, camouflage Model and encourage children to use vocabulary such as: • hair (black, brown, dark, light, blonde, ginger, grey, white, long, short, straight, curly), eyes (blue, brown, green, grey), skin (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 Expose children to supplementary vocabulary such as: • bald, elderly, wrinkles, male, female, freckles	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 body including those linked to PSHE teaching (see joint document produced by the ASE and PSHE Association) • Senses – touch, see, smell, taste, hear, fingers (skin), eyes, nose, ear and tongue	Offspring, reproduction, growth, child, young/old stages (examples - chick/hen, baby/child/adult, caterpillar/butterfly), exercise, heartbeat, breathing, hygiene, germs, disease, food types (examples – meat, fish, vegetables, bread, rice, pasta)	Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, support, protect, move, skull, ribs, spine, muscles, joints	Digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, nutrients, large intestine, rectum, anus, teeth, incisor, canine, molar, premolars, herbivore, carnivore, omnivore, producer, predator, prey, food chain	Puberty – the vocabulary to describe sexual characteristics , Making love, Having sex, Sexual intercourse	Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs, lifestyle Body image, Self-image, Looks, Personality, Perception, Self-esteem, Affirmation, Comparison, Oestrogen, Fallopian Tube, Cervix, Develops, Breasts, Hips, Adam's Apple, Scrotum, Genitals, Hair, Broader, Wider, Semen, Erection, Ejaculation, Urethra, Wet dream, Growth spurt, Larynx, Facial hair, Pubic hair, Hormones, Scrotum, Testosterone, Circumcised, Uncircumcised, Foreskin, Epididymis, Fertilised, Unfertilised, Conception, Sexual intercourse, Embryo, Umbilical cord, IVF, Foetus, Contraception, Pregnancy, Sanitary products, Tampon, Pad, Towel, Liner, Hygiene, Age appropriateness, Legal, Laws, responsible, Teenager, right, responsibilities, Negative body-talk, mental health, midwife, labour, opportunities, freedoms, attraction, relationship, love, sexting, transition, secondary, journey, worries, anxiety, excitement

Knowledge Evolution and inheritance	*Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.*		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)	Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 - Rocks)	Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats)		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	Model and encourage children to use vocabulary such as: • names of animals, live, on land, in water, jungle, desert, North Pole, South Pole, sea, hot, cold, wet, dry, snow, ice Expose children to supplementary vocabulary such as: • environment, polar regions, ocean, camouflage Model and encourage children to use vocabulary such as: • hair (black, brown, dark, light, blonde, ginger, grey, white, long, short, straight, curly), eyes (blue, brown, green, grey), skin (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 Expose children to supplementary vocabulary such as: • bald, elderly, wrinkles, male, female, freckles Model and encourage children to use vocabulary such as: • plant, tree, bush, flower, vegetable, herb, weed, animal, names of		Living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed • Names of local habitats e.g. pond, woodland etc. • Names of micro-habitats e.g. under logs, in bushes etc.	Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil	Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate		Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils

	plants and animals they see, name of a contrasting environment e.g. beach, forest.						

Knowledge Seasonal changes	*Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.*	Observe changes across the four seasons. • Observe and describe weather associated with the seasons and how day length varies.		Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light)		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	Model and encourage children to use vocabulary such as: • 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 Expose children to supplementary vocabulary such as: • hibernate, migrate, snowflake	Weather (sunny, rainy, windy, snowy etc.) • Seasons (winter, summer, spring, autumn) • Sun, sunrise, sunset, day length		Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous		Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, solar system, rotates, star, orbit, planets	

Knowledge Materials	*Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.*	Distinguish between an object and the material from which it is made. • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. • Describe the simple physical properties of a variety of everyday materials. • Compare and group together a variety of everyday materials on the basis of their simple physical properties.	Identify and 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.	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) • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (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.	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	Model and encourage children to use vocabulary such as: • 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 Expose children to supplementary vocabulary such as: • solid, liquid, gas, most suited	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	Names of materials – wood, metal, plastic, glass, brick, rock, paper, cardboard Properties of materials – as for Year 1 plus opaque, transparent and translucent, reflective, non-reflective, flexible, rigid Shape, push/pushing, pull/puling, twist/twisting, squash/squashing, bend/bending, stretch/stretching	Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil 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	Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle	Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material	
Knowledge Rocks	*Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.*	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)	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)	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.			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	Model and encourage children to use vocabulary such as: • 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 Expose children to supplementary vocabulary such as: • solid, liquid, gas, most suited	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	Names of materials – wood, metal, plastic, glass, brick, rock, paper, cardboard Properties of materials – as for Year 1 plus opaque, transparent and translucent, reflective, non-reflective, flexible, rigid Shape, push/pushing, pull/puling, twist/twisting, squash/squashing, bend/bending, stretch/stretching	Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil			Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils
Knowledge Light	*Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.*	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)		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.			• 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	Model and encourage children to use vocabulary such as: • Sun, sunny, light, shadow, shady, clouds, torch, see-through, non-see-through, source, light source Expose children to supplementary vocabulary such as: • casting a shadow, pale, dark, transparent, opaque	Head, body, eyes, ears, mouth. • Parts of the body including those linked to PSHE teaching (see joint document produced by the ASE and PSHE Association) • Senses – touch, see, smell, taste, hear, fingers (skin), eyes, nose, ear and tongue		Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous			As for Year 3 - Light, plus straight lines, light rays
Knowledge Forces	*Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.*		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)	Compare how things move on different surfaces. • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Observe how magnets attract or repel each other and attract some materials and not others. • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. • Describe magnets as having two poles. • Predict whether two magnets will attract or repel each other, depending on which poles are facing.		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	Model and encourage children to use vocabulary such as: • 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 Expose children to supplementary vocabulary such as: • force, rotate, solid, liquid, gravity		Names of materials – wood, metal, plastic, glass, brick, rock, paper, cardboard Properties of materials – as for Year 1 plus opaque, transparent and translucent, reflective, non-reflective, flexible, rigid Shape, push/pushing, pull/puling, twist/twisting, squash/squashing, bend/bending, stretch/stretching	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		Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears	
Knowledge Sound	*Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.*	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)			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	Model and encourage children to use vocabulary such as: • sound, noise, listen, hear, music, voices, bird song, traffic, sirens, thunder, high, low, loud, quiet, soft, volume, crackle, thunder, hum, buzz, roar Expose children to supplementary vocabulary such as: • source, crescendo, vibration, pitch	Head, body, eyes, ears, mouth, • Parts of the body including those linked to PSHE teaching (see joint document produced by the ASE and PSHE Association) • Senses – touch, see, smell, taste, hear, fingers (skin), eyes, nose, ear and tongue			Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation		
Knowledge Electricity	*Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.*				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.		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	Model and encourage children to use vocabulary such as: • Sun, sunny, light, shadow, shady, clouds, torch, see-through, non-see-through, source, light source Expose children to supplementary vocabulary such as: • casting a shadow, pale, dark, transparent, opaque				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 N.B. Children in Year 4 do not need to use standard symbols for electrical components, as this is taught in Year 6.		Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage
Knowledge Earth and space	*Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.*	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)				• 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	Model and encourage children to use vocabulary such as: • Sun, Moon, Earth, star, planet, sky, day, night, space, round, light, heavy, fall, bounce, float, rise, fall, air Expose children to supplementary vocabulary such as: • sunrise, sunset, astronaut, astronomer, constellation, orbit, nocturnal, slow-motion, magnify	Weather (sunny, rainy, windy, snowy etc.) • Seasons (winter, summer, spring, autumn) • Sun, sunrise, sunset, day length				Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, solar system, rotates, star, orbit, planets	

	PROGRESSION IN SCIENTIFIC ENQUIRY			
	EYFS	**Y1/2**	**Y3/4**	**Y5/6**
Asking questions and recognising that they can be answered in different ways		**Asking simple questions and recognising that they can be answered in different ways** • While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions. • The children answer questions developed with the teacher often through a scenario. • The children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered.	**Asking relevant questions and using different types of scientific enquiries to answer them** • The children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions. • The children answer questions posed by the teacher. • Given a range of resources, the children decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have chosen to answer their question.	**Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary** • Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. • Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work.

Making observations and taking measurements	**Observing over time** • How does a puddle change over time? • How does a snowman change as it melts? • How does the natural world change with the seasons? **Encouraging scientific enquiry** **Comparative testing** • How does popcorn made in a microwave compare to popcorn made on a fire? • How quickly do ice cubes melt in different areas of the playground? • How are pizza bases different when made with different flours? • How does a loaf cook differently in different tins? • How do cupcakes cook if they have different amounts of mixture? **Observing over time** • How does the block of ice change over time? • How does a snowman change over time? • How does cake mixture/bread dough change as it is cooked? **Comparative testing** • Compare the shape of shadows made by different objects. **Observing over time** • How do the Sun and shade change during the day? • How does a toy's shadow change during the day? **Comparative testing** • How many cubes/small plastic animals can fit in different 'boats'? • Compare how cars move down ramps/gutters.	**Observing closely, using simple equipment** • Children explore the world around them. They make careful observations to support identification, comparison and noticing change. They use appropriate senses, aided by equipment such as magnifying glasses or digital microscopes, to make their observations. • They begin to take measurements, initially by comparisons, then using non-standard units.	**Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers** • The children make systematic and careful observations. • They use a range of equipment for measuring length, time, temperature and capacity. They use standard units for their measurements.	**Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate** • The children select measuring equipment to give the most precise results e.g. ruler, tape measure or trundle wheel, force meter with a suitable scale. • During an enquiry, they make decisions e.g. whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value).

	• Compare how wheels turn when sand or water is poured through. • Compare how objects fall with and without parachutes. • Compare how different balls bounce. • Compare how things move when blown. • Compare how a marble moves through different liquids. • Compare how different paper aeroplanes fly. **Comparative testing** • How does rain sound different when it lands in different containers? **Observing over time** • Listen to the siren of an emergency vehicle as it approaches and moves away. **Comparative testing** • Make and testing air-propelled rockets to find out which is the 'best'. • Compare how different objects move when falling and bouncing.			
Engaging in practical enquiry to answer questions	**Encouraging scientific enquiry** **Classification** • Sort animals according to where they live. **Researching using secondary sources** • Learn how animals from a different habitat are cared for. • Learn about animals in a different habitat. **Encouraging scientific enquiry** **Classification** • Sort images of people according to their characteristics. **Researching using secondary sources** • Find out information from visitors (dentist, nurse etc.). **Pattern seeking** • Are taller children faster?	**Performing simple tests** • The children use practical resources provided to gather evidence to answer questions generated by themselves or the teacher. They carry out: tests to classify; comparative tests; pattern seeking enquiries; and make observations over time. Identifying and classifying • Children use their observations and testing to compare objects, materials and living things. They sort and group these things, identifying their own criteria for sorting. • They use simple secondary sources (such as identification sheets) to name living things. They describe the characteristics they used to identify a living thing.	**Setting up simple practical enquiries, comparative and fair tests** • The children select from a range of practical resources to gather evidence to answer questions generated by themselves or the teacher. • They follow their plan to carry out: observations and tests to classify; comparative and simple fair tests; observations over time; and pattern seeking. Explanatory note A comparative test is performed by changing a variable that is qualitative e.g. the type of material, shape of the parachute. This leads to a ranked outcome. A fair test is performed by changing a variable that is quantitative e.g. the	**Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary** • The children select from a range of practical resources to gather evidence to answer their questions. They carry out fair tests, recognising and controlling variables. They decide what observations or measurements to make over time and for how long. They look for patterns and relationships using a suitable sample.

	• Are taller children stronger? **Classification** • Name and describe plants and animals they find in the school grounds. **Pattern seeking** • Look for minibeasts in different areas of the school grounds. • Look for plants in different areas of the school grounds. **Classification** • Which clothes are suitable for each season? **Classification** • Which objects/materials make dark shadows? **Pattern seeking** • Find simple patterns in how light levels and temperature change with the movement, or obscuring of, the Sun.		thickness of the material or the area of the canopy. This leads to establishing a causative relationship.	
Recording and presenting evidence		**Gathering and recording data to help in answering questions** • The children record their observations e.g. using photographs, videos, drawings, labelled diagrams or in writing. • They record their measurements e.g. using prepared tables, pictograms, tally charts and block graphs. • They classify using simple prepared tables and sorting rings.	**Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions** **Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables** • The children sometimes decide how to record and present evidence. They record their observation e.g. using photographs, videos, pictures, labelled diagrams or writing. They record their measurements e.g. using tables, tally charts and bar charts (given templates, if required, to which they can add headings). They record classifications e.g. using tables, Venn diagrams, Carroll diagrams. • Children are supported to present the same data in different ways in order to help with answering the question.	**Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs** • The children decide how to record and present evidence. They record observations e.g. using annotated photographs, videos, labelled diagrams, observational drawings, labelled scientific diagrams or writing. They record measurements e.g. using tables, tally charts, bar charts, line graphs and scatter graphs. They record classifications e.g. using tables, Venn diagrams, Carroll diagrams and classification keys. Children present the same data in different ways in order to help with answering the question.

Answering questions and concluding	**Researching using secondary sources** • Find out about how animals behave in different seasons. • Find out about the weather and seasons. **Researching using secondary sources** • Find out about shadows. • Find out about rainbows. **Research using secondary sources** • Find out about the Solar System, stars and space travel. • Find out about nocturnal animals.	**Using their observations and ideas to suggest answers to questions** • Children use their experiences of the world around them to suggest appropriate answers to questions. They are supported to relate these to their evidence e.g. observations they have made, measurements they have taken or information they have gained from secondary sources. Using their observations and ideas to suggest answers to questions • The children recognise 'biggest and smallest', 'best and worst' etc. from their data.	**Using straightforward scientific evidence to answer questions or to support their findings**. • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. The answers are consistent with the evidence. **Identifying differences, similarities or changes related to simple scientific ideas and processes** • Children interpret their data to generate simple comparative statements based on their evidence. They begin to identify naturally occurring patterns and causal relationships. **Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions** • They draw conclusions based on their evidence and current subject knowledge.	**Identifying scientific evidence that has been used to support or refute ideas or arguments** • Children answer their own and others' questions based on observations they have made, measurements they have taken or information they have gained from secondary sources. When doing this, they discuss whether other evidence e.g. from other groups, secondary sources and their scientific understanding, supports or refutes their answer. • They talk about how their scientific ideas change due to new evidence that they have gathered. • They talk about how new discoveries change scientific understanding. **Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations** • In their conclusions, children: identify causal relationships and patterns in the natural world from their evidence; identify results that do not fit the overall pattern; and explain their findings using their subject knowledge.
Evaluating and raising further questions and predictions			**Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions** • They identify ways in which they adapted their method as they progressed or how they would do it differently if they repeated the enquiry. Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • Children use their evidence to suggest values for different items tested	**Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations** • They evaluate, for example, the choice of method used, the control of variables, the precision and accuracy of measurements and the credibility of secondary sources used. • They identify any limitations that reduce the trust they have in their data.

			using the same method e.g. the distance travelled by a car on an additional surface. • Following a scientific experience, the children ask further questions which can be answered by extending the same enquiry.	**Using test results to make predictions to set up further comparative and fair tests** Children use the scientific knowledge gained from enquiry work to make predictions they can investigate using comparative and fair tests.
Communicating their findings			**Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions** • They communicate their findings to an audience both orally and in writing, using appropriate scientific vocabulary.	**Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations** • They communicate their findings to an audience using relevant scientific language and illustrations.