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| PLANTS | KS1(prior learning)  | YEAR 3 | YEAR 5 | YEAR 4  | YEAR 6 | KS3 (future learning) |
| National Curriculum Objectives and Progression | EYFS: Explore the natural world around them, making observations and drawing pictures of animals and plantsYear 1: * Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.
* Identify and describe the basic structure of a variety of common flowering plants, including trees.

Year 2: * 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 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.
 | Living things and their habitats: * Describe the life process of reproduction in some plants and animals.
 | Living things and their habitats: * Recognise that living things can be grouped in a variety of ways.
* Explore and use classification keys to help group, identify, and name a variety of living things in their local and wider environment.
 | Living Things and their habitats: * Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals
* Give reasons for classifying plants and animals based on specific characteristics.

Revision Statements EKS2: * name, locate and describe the functions of the main parts of plants, including those involved in reproduction [year 5] and transporting water and nutrients [year 3]
* describe the requirements of plants for life and growth [year 3]
 | * Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms
* The reactants in, and products of, photosynthesis, and a word summary for photosynthesis
* The dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere
* The adaptations of leaves for photosynthesis
 |
| Sticky Knowledge  |  | Plants are producers, they make their own food. Plants have roots, which provide support and draw water from the soil. Seeds/ bulbs require the right conditions in order to grow (NRS GREN).Seeds are formed by pollination. New flowers are produced by seed dispersal.  |  |  |  |  |
| Vocabulary  | Petal, stem, leaf, roots, seed, bulb, evergreen, deciduous.  | Pollination, evaporation, nutrients, seed dispersal, fertilisation, ovule, stamen, anther, reproduction. | Pollination, fertilisation, pollen, anther, stamen, stigma style, ovule, seed.  |  |  |  |

Plants

EYFS & KS1:

EYFS: Explore and identify plants.

Year 1: Know the basic structure of a plant and trees and can begin to identify evergreen and deciduous trees.

Year 2: Know how they grow and things that are needed for them to grow.

KS2:

Year 3: Know the functions of each part of the plant begin to explore in greater detail the things required to help a plant grow and how it may vary from plant to plant.

Year 3: Understand how plants reproduce and a plant’s life cycle.

Year 5: Explore in more detail reproduction in plants both sexual and asexual.

Year 6: Classify and group plants on observable features and common characteristics and give reasons for doing so.

KS3:

Reproduction, photosynthesis and how photosynthesis effects our world (oxygen and carbon dioxide in the atmosphere and how we need that to live).

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| Animals Including Humans | KS1 (prior learning) | YEAR 3 | YEAR 4 | YEAR 5 | YEAR 6 | KS3 (future learning) |
| National Curriculum Objectives and Progression | EYFS: Explore the natural world around them, making observations and drawing pictures of animals and plants.Year 1: * 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.

Year 2: * 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.
 | * 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.
 | * the structure and functions of the human skeleton, to include support, protection, movement and making blood cells
* biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles
* the function of muscles and examples of antagonistic muscles**Nutrition and Digestion**
* the content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed
* calculations of energy requirements in a healthy daily diet
* the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases
* the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts)
* the importance of bacteria in the human digestive system
* plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots**Gas Exchange Systems:**
* 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, using a pressure model to explain the movement of gases, including simple measurements of lung volume
* the impact of exercise, asthma and smoking on the human gas exchange systemthe role of leaf stomata in gas exchange in plant**Reproduction:**
* 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**Health**:
* The effects of recreational drugs (including substance misuse) on behaviour, health and life process.
 |
| Sticky Knowledge | There are many different groups of animals with different characteristics. Animals need food to survive and animals have different diets that help them to grow, repair their bodies, be active and stay healthy. Animals move in order to survive. Exercise keeps animals Bodies in good condition and increases survival chances. All animals die eventually. Animals reproduce when they reach maturity.  | Animals unlike plants cannot make their own food they have to get their food. Many animals have skeletons to support their bodies and protect vital organs. Muscles are connected to bones and move them when they contract.  | Different animals have different teeth to help them eat. Different teeth do different jobs. The food that we eat needs to be broken down, inside our digestive system, into other substances that our bodies can use and any waste is removed. Blood takes nutrients around the body. Nutrients produced by plants move from primary consumers and then secondary consumers through the food chain.  | Different animals mature at different rates and at different ages. Puberty is something e all go through, a process which helps our bodies for being adults and for reproduction. Hormones control these changes, which can be physical and emotional.  | The heart pumps blood around the body. Oxygen is breathed into the lungs where it is absorbed by the blood and transported. Muscles need oxygen to release energy from food to do work.  |  |
| Vocabulary | Fish, amphibians, reptiles, birds, mammals, herbivore, carnivore, omnivore, sight, hearing, touch, smell, tasteBaby, toddler, child, teenager, adult, Young, offspring, grow, develop, exercise, diet, nutrition, hygiene, germs | Fibre, fats (saturated and unsaturated) vitamins, minerals, skeleton, muscles, tendons, joints, vertebrate, invertebrate, energy.  | Digest, oesophagus, stomach, liver, small intestine, large intestine, molar, premolar, canine, incisor, producer, consumer, prey, predator, excretion, habitat, decomposer, food web.  | Gestation, asexual and sexual reproduction, prenatal, adolescence, puberty, adulthood, life expectancy, old age, hormones,  | Heart, blood vessels, lungs, oxygenated and deoxygenated blood, arteries, veins, capillaries, drugs, alcohol, smoking, diet, exercise.  |  |

Animals including Humans

EYFS: Observe nature and animals and begin to draw them.

Year 1: Introduce animals and the animal groups and what animal’s diets are like (herbivore, carnivore and omnivore). Introduce basic parts of the human body and introduce those that are associated with the five senses.

Year 2: Begin to notice that animals have offspring when they become adults and their basic needs for survival. Begin to describe the importance of exercise, diet, and eating the right types of food in humans.

Year 3: Begin to look at the skeletons of animals and humans and how they move. Discover that unlike plants animals cannot make their own food and begin to identify the right types of and amount of nutrition that a human needs.

Year 4: Construct and interpret food chains of animals identifying predators and prey. Begin to look at the digestive system and what happens to food when we eat those foods that were learnt in year 3, identify the different types of teeth and how they are used for different jobs.

Year 5: Begin to describe the changes that humans go through in their life from baby to old age.

Year 6: Begin to look at the circulatory system and how blood is moved around the body. Identify and recognise that drugs, alcohol and smoking are bad for your body and again go over the importance of exercise and diet. Describe the importance of how water and nutrients are transported around the bodies of animals and humans.

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| Living Things and their Habitats | KS1 (prior learning) | YEAR 3 | YEAR 4 | YEAR 5 | YEAR 6 | KS3 (future learning) |
| National Curriculum Objectives and Progression | EYFS: 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. Year 2: * 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.
 |  | * 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.
 | * 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 micro-organisms, plants and animals
* Give reasons for classifying plants and animals based on specific characteristics.
 | **Relationships in an ecosystem*** The interdependence of organisms in an ecosystem, including food webs and insect pollinated crops.
* The importance of plant reproduction through insect pollination in human food security.
* How organisms affect, and are affected by, their environment, including the accumulation of toxic materials.
 |
| Sticky Knowledge | Some things are living, some were once living and some things never lived. Different animals and plants live in different places. Living things are adapted to survive in different habitats. Environmental changes can affect plants and animals that live there.  |  | Living things can be divided into groups based upon their characteristics. Environmental changes affects different habitats differently. Different organisms are affected differently by environmental change. Different food chains occur in different habitats. Human activity significantly affects the environment.  | Different animals mature at different rates and live to different ages. Some organisms reproduce sexually where offspring inherit information from both parents. Some organisms reproduce asexually by making a copy of a single parent. Environmental change can affect how well an organism is suited to its environment. Different types of organisms have different lifecycles.  | Variation exists within a population (and between offspring of some plants)*This key idea is duplicated in Year 6 Evolution and inheritance*. Organisms best suited to their environment are more likely to survive long enough to reproduce. Organisms are best adapted to reproduce are more likely to do so. Competition exists for resources and mates.  |  |
| Vocabulary | Living, dead, never alive, habitats, micro-habitats, food, environment, food chain, carnivore, herbivore, omnivore, producer, predator, prey.  |  | Organisms, species, classification, characteristics, environment, adapt, climate change, deforestation, pollution, urbanisation, endangered species, extinct, fish, mammal, bird, amphibian, reptile.  | Reproduction, sexual and asexual reproduction, gestation, metamorphosis, life cycle, pollination, offspring, fertilise, fertilisation, mammal, reptile, amphibian, adolescent, adult.  | Classification, Linnaean system, variation, Microorganisms, bacteria, virus, fungi, fungus, ferment, microscope, decompose.  |  |

Living Things and their Habitats

EYFS: Begin to know differences in environments

Year 2: Begin to identify what a habitat is and what they provide. Begin to look at simple food chains and that animals obtain their food from plants and other animals. Discover living, dead and never alive.

Year 4: begin to recognise that animals and living things can be grouped in lots of different ways and begin to use the ideas of classification. Environments can change and that may have an impact on animals, plants and habitats.

Year 5: Begin to look at life cycles of the different groups of animals including humans, look at the reproduction of plants and animals.

Year 6: Continue to look further into classification and classify animals and plants using characteristics and begin to explain why they have been able to classify those living things in that way.

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| Evolution and Inheritance | KS1 (prior learning) | YEAR 3 | YEAR 4 | YEAR 5 | YEAR 6 | KS3 (future learning) |
| National Curriculum Objectives and Progression |  | Linked too Year 3 Materials – Rocks and Soils: * Describe in simple terms how fossils are formed when things that have lived are trapped within rock
 |  |  | * 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.

Use Living things and their habitats Curriculum objectives: * Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals
* Give reasons for classifying plants and animals based on specific characteristics.
 | **Inheritance, chromosomes, DNA and genes*** 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
* Differences between species
* The variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation
* The variation between species and between individuals of the same species meaning some organisms compete more successfully, which can drive natural selection
* Changes in the environment which 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
* The importance of maintaining biodiversity and the use of gene banks to preserve hereditary material
 |
| Sticky Knowledge |  | Fossils were formed millions of years ago. Fossils are not bones. When an animal or plant dies and is trapped under rock, soil, sand or other materials, the animal matter dissolves over time and is replaced by minerals leaving a replica of the original bone called a fossil.  |  |  | Fossils are evidence nad proof that living things have changed over time and they can provide information about living things that inhabited the Earth millions of years ago.Life cycles have evolved to help organisms survive to adulthood. Taken from Year 6 Living Things and their Habitats: Over time the characteristics that are most suited to the environment become increasingly common. Variation exists within a population (and between offspring of some plants) Organisms best suited to their environment are more likely to survive long enough to reproduce. Organisms are best adapted to reproduce are more likely to do so. Competition exists for resources and mates. |  |
| Vocabulary |  |  |  |  | Fossils, fossilisation, Adaptation, Evolution, Characteristics, Genetics, Variation, Natural selection, adaptive traits, inherited traits, mutation, habitat |  |

Evolution and Inheritance:

Year 3: Children are introduced to fossils and a basic summary of how fossils are formed as part of their rocks and soils topic.

Year 6: Children will use the theory of evolution to identify how living things have changed (using their knowledge from living things and their habitats topic) and that fossils provide the evidence of how living things have changed over millions of years and how this supports the theory of evolution and natural selection.

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| Materials | KS1 (prior learning) | YEAR 3 | YEAR 4 | YEAR 5 | YEAR 6 | KS3 (future learning) |
| National Curriculum Objectives and Progression | Year 1: **Everyday Materials:** * Distinguish between an object and the material from which it is made
* Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock
* Describe the simple physical properties of a variety of everyday materials
* Compare and group together a variety of everyday materials on the basis of their simple physical properties

Year 2: **Uses of Everyday Materials:** * Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for different uses
* Compare how things move on different surfaces.
* Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching
 | **Rocks and Soils:** * 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.
 | **States of Matter:** * Compare and group materials together, according to whether they are solids, liquids or gases
* Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)
* Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.
 | **Properties and Changes of Materials:*** 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.
 | * Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago
 | The particulate nature of matter* The properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure
* Changes of state in terms of the particle model

**Materials*** The order of metals and carbon in the reactivity series
* The use of carbon in obtaining metals from metal oxides
* Properties of ceramics, polymers and composites (qualitative)

**Earth and atmosphere*** The composition of the Earth
* The structure of the Earth
* The rock cycle and the formation of igneous, sedimentary and metamorphic rocks
* Conservation of material and of mass, and reversibility, in melting, freezing, evaporation, sublimation, condensation, dissolving
* similarities and differences, including density differences, between solids, liquids and gases
* Brownian motion in gases
* diffusion in liquids and gases driven by differences in concentration
* the difference between chemical and physical changes

**Particle model*** the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density; the anomaly of ice-water transition
* atoms and molecules as particles

**Energy in matter*** changes with temperature in motion and spacing of particles
* internal energy stored in materials
 |
| Sticky Knowledge | There Are many different materials that have different describable and measurable properties. Materials that have similar properties are grouped into metals, rocks, fabrics, woods, plastic, and ceramics (including glass). The properties of a material determine whether they are suitable for a purpose. Year 2: Materials can be changed by physical force (twisting, bending, squashing and stretching).  | There are different types of rock.There are different types of soil. Soils change over time.Different plants grow in different soils. Fossils tell us what has happened before. Fossils provide evidence. Fossils provide evidence that living things have changed over time.  | Solids, liquids and gases are described as observable properties. Materials can be divided into solids, liquids and gases. Heating cause’s solids to melt into liquids and liquids evaporate into gases. Cooling causes gases to condense to liquids and liquids to freeze into solids. The temperature at which given substances change state are always the same.  | When two or more substances are mixed together and remain present the mixture can be separated. Some changes can be reversed and some cannot. Materials change state by heating and cooling. There are 4 separating techniques: Filtration and sieving, Magnetic attraction, Evaporation and Floating. When a solid is dissolved into a liquid it becomes a solution. Sometimes mixed substances react to make a new substance, these changes are usually irreversible. Heating can sometimes cause materials to change permanently. When this happens a new substance is made. These changes are not reversible.  | Taken from Year 6 Evolution:Fossils are evidence nad proof that living things have changed over time and they can provide information about living things that inhabited the Earth millions of years ago.Life cycles have evolved to help organisms survive to adulthood.  |  |
| Vocabulary | Soft, shiny, hard, dull, rough, smooth, transparent, opaque, waterproof, absorbent, metal, wood, plastic, rock, fabric. Squash, bend, twist, stretch, strong, flexible, recycle, pollution | Sedimentary, igneous and metamorphic rocks, permeable and impermeable, marble, chalk, slate, granite, natural, man-made, magma, lave, molten rock, sediment, erosion, fossilisation, fossil, bone, topsoil, bedrock, subsoil, mineral, organic matter, compost.  | Solids, liquids and gases, particles, evaporate, condense, melt, freeze, heat, cool, melting point, freezing point, boiling point, water vapour, precipitation, evaporation, condensation, atmosphere.  | Thermal conductor and thermal insulators, magnetism, electrical resistance, transparency, solutions, dissolving, substance, soluble and insoluble, reversible and irreversible changes, chemical change, new material product, sieving, filtering, magnetic attraction.  |  |  |

EYFS and KS1:

Year 1: Begin to describe the physical properties of common materials and use these to being to compare and group them.

Year 2: Identify and compare the suitability of everyday materials and look at how the shape of solid objects can be changed.

Year 3: Look at the material of rocks and how they are formed and how they are used as an everyday material.

Year 4: Introduced to the states of matter (solids, liquids and gases) and the properties of each.

Year 5: Pupils are taught about reversible and irreversible changes of materials.

KS3: Begin to learn about the periodic table of elements.

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| Forces | KS1 (prior learning) | YEAR 3 | YEAR 4 | YEAR 5 | YEAR 6 | KS3 (future learning) |
| National Curriculum Objectives and Progression |  | * Compare how things move on different surfaces
* Notice that some forces need contact between 2 objects, but magnetic forces can act at a distance
* Observe how magnets attract or repel each other and attract some materials and not others
* Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials
* Describe magnets as having 2 poles
* Predict whether 2 magnets will attract or repel each other, depending on which poles are facing.
 |  | * 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
 |  | **Energy changes and transfers*** simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged

**Forces*** forces as pushes or pulls, arising from the interaction between 2 objects
* using force arrows in diagrams, adding forces in 1 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
* force-extension linear relation; Hooke’s Law as a special case
* work done and energy changes on deformation
* non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets, and forces due to static electricity

**Pressure in fluids*** atmospheric pressure, decreases with increase of height as weight of air above decreases with height
* pressure in liquids, increasing with depth; upthrust effects, floating and sinking
* pressure measured by ratio of force over area – acting normal to any surface

**Balanced forces*** opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface

**Forces and motion*** forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only)
* change depending on direction of force and its size

**Magnetism*** magnetic poles, attraction and repulsion
* magnetic fields by plotting with compass, representation by field lines
* Earth’s magnetism, compass and navigation
* the magnetic effect of a current, electromagnets, DC motors (principles only)
 |
| Sticky Knowledge |  | Magnets exert attractive and repulsive forces on each other. Magnets exert non-contact forces, which can work through some materials. Magnets exert attractive forces on some materials. Magnets forces are affected by magnet strength, object mass, distance from the object and object material.  |  | Gravity will pull unsupported objects to the Earth. Air resistance and water resistance are forces against motion caused by objects having to move air and water out of their way. Friction is a force against motion caused by two surfaces rubbing against each other. Some objects require large forces to make them move; gears, pulley and levers can reduce the force needed to make things move.  |  |  |
| Vocabulary |  | Surface, distance, move, strength, push, pull, contact force, non-contact force, friction, magnet, magnetic field, magnetic force, bar magnet, horseshoe magnet, ring magnet, magnetic poles, attract, repel, compass.  |  | Air resistance, water resistance, upthrust, buoyancy, gravitational pull, gravity, opposing forces, driving force, levers, pulleys, gears/cogs, weight, mass, kilogram, Earth |  |  |

Year 3: Forces are introduced as pushes and pulls and how things move along certain surfaces. They are also introduced to magnets that they have magnetic poles and children can begin to identify materials that are attracted to materials.

Year 5: Begin to look in more depth at different types of forces (gravity, air resistance, water resistance, friction, buoyancy, upthrust) and that they are not just push and pulls they affect the movement of an objects. Children will also be introduced to some mechanisms such as levers, pulleys and gears that will allow a smaller force to have a greater effect.

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| Light  | KS1 (prior learning) | YEAR 3 | YEAR 4 | YEAR 5 | YEAR 6 | KS3 (future learning) |
| National Curriculum Objectives and Progression |  | * 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 a solid 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
 | **Light waves*** 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; photosensitive 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
 |
| Sticky Knowledge |  | There must be light for us to see. Without light it is dark. We need light to see things even shiny things. Transparent materials let light travel through them, and opaque materials do not light through. Beams of light bounce of some materials (reflection). Shiny materials reflect light beams better than non-shiny materials. Light comes from a source.  |  |  | Light travels in straight lines. Objects can be seen because light has travelled straight to their eyes or it has been reflected from an object into their eyes. Light comes from a source to our eyes. Shadows are formed when a light source is blocked by an opaque object.  |  |
| Vocabulary |  | Light, dark, light source, visible, shadow, translucent, reflective light, reflection, ray, sun safety, dangerous, glare, UV light, direct sublight.  |  |  | Visible spectrum, prism, light waves, wavelength, straight lines, refraction, reflection.  |  |

Year 2: Senses for sight (Animals Including Humans).

Year 3: Pupils are introduced to what is light and that darkness is the absence of light. Light comes from a light source and begin to look at how we see things.

Year 6: Pupils are introduced to how light travels and that they are waves and they travel in straight lines and that it travels to an object from the source reflects of surfaces and enters our eyes OR travels straight to the eyes. Pupils are also introduced to shadows and that they are formed because the light source has been blocked by an opaque object.

KS3: Speed of light as well and how light travels in more detail including convex and cameras and materials.

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| Sound  | KS1 (prior learning) | YEAR 3 | YEAR 4 | YEAR 5 | YEAR 6 | KS3 (future learning) |
| National Curriculum Objectives and Progression |  |  | * 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
 |  | Will be revised as end of KS2 expectations.  | **Sound waves*** 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 loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal
* the auditory range of humans and animals
 |
| Sticky Knowledge |  |  | Sound travels from its source in all directions and we hear it when it travels to our ears. Sound travel can be blocked. Sound spreads out as it travels. Changing the shape, size and material of an object will change the sound it produces. Sound is produced when an object vibrates. Sound moves through all materials by making them vibrate. Changing the way an object vibrates changes its sound. Bigger vibrations produce louder sounds and smaller vibrations produce quieter sounds. Faster vibrations (higher frequencies) produce higher pitched sounds.  |  |  |  |
| Vocabulary |  |  | Ear, ear drum, vibration, particles, pitch, volume, amplitude, sound, wave, quiet, loud, high, low, travel, distance, soundproof, absorb, sound.  |  |  |  |

Year 2: Senses for hearing (Animals Including Humans)

Year 3: Pupils will have been introduced to waves in Year 3 (light)

Year 4: Pupils will be introduced to the fact that sound also travels in waves and that sounds then travel to the ear. Pupils will also learn about volume and pitch and that sound is created from vibrations and the different speed and hardness of how an object is struck has an effect on both.

KS3: How sound is measured in more detail and learn that sounds need a medium to travel through, as well as learning the auditory range of humans and animals.

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| Earth and Space | KS1 (prior learning) | YEAR 3 | YEAR 4 | YEAR 5 | YEAR 6 | KS3 (future learning) |
| National Curriculum Objectives and Progression | * Observe changes across the 4 seasons
* bserve and describe weather associated with the seasons and how day length varies.
 |  |  | * 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.
 |  | **Space physics*** 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
 |
| Sticky Knowledge |  |  |  | Stars, planets and moons have so much mass they attract other things, including each other due to a force called gravity. Gravity works over distance. Objects with larger masses exert bigger gravitational forces. Objects like planets, moons and stars spin. Smaller mass objects like planets orbit large mass objects like stars. Stars produce vast amounts of heat and light. All other objects are lumps of rock, metal, or ice can be seen because they reflect the light of the stars.  |  |  |
| Vocabulary |  |  |  | Star, planet, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Neptune, Uranus, Spherical bodies, sphere, rotate, axis, orbit, geocentric model, heliocentric model, sun, moon, shadow, day, night, light, reflect.  |  |  |

Year 1: Seasons are introduced to pupils and that they happen over the course of the year.

Year 5: Pupils are introduced to all of the planets and stars such as sun and that they are all spherical bodies and how they travel around the Sun. Use the rotation of Earth around the sun to explain night and day (Year 3 light- how we see absence of light is darkness – day and night) and how the moon travels around the Earth.

KS3: Season are looked at in more detail, the gravity force of space and out solar systems and that a light year is a unit of measurement.

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| Electricity | KS1 (prior learning) | YEAR 3 | YEAR 4 | YEAR 5 | YEAR 6 | KS3 (future learning) |
| National Curriculum Objectives and Progression |  |  | * 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.
 | **Current electricity*** 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*** separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects
* the idea of electric field, forces acting across the space between objects not in contact
 |
| Sticky Knowledge |  |  | A source of electricity (mains of battery) is needed for electrical devices to work. Electric sources push electricity round a circuit. More batteries will push the electricity round the circuit faster. Devices work harder when more electricity goes through them. A complete circuit is needed for electricity to flow and devises to work. Some materials allow electricity to flow easily and these are called conductors. Materials that do not allow electricity to flow easily are called insulators.  |  | Batteries are a store of energy. This energy pushes electricity round the circuit. When the battery’s energy is gone it stops pushing. Voltage measures the ‘push’. The greater the current flowing through a device the harder it works. Current is how much electricity is flowing around the circuit.When current flows through wires heat is released. The greater the current, the more heat is released.  |  |
| Vocabulary |  |  | Electricity, mains-powered, battery-powered, mains electricity, appliances, devices, circuit, simple series circuit, complete circuit, incomplete circuit, bulb, cell, wire, buzzer, switch, motor, battery, electrical conductor, electrical insulator.  |  | Voltage, amps, resistance, electrons, volts, current, circuit, symbol, component function, dimmer, brighter, louder, quieter, natural electricity, man-made electricity, solar panels, power station.  |  |

Year 4: Pupils are introduced to common appliances that run on electricity and that electricity flows around a complete circuit. Pupils are also introduced to parts of a simple circuit and that switch is a break in a circuit.

Year 6: Pupils look at circuits in more detail and how the voltage of cells in a circuit affect the brightness of bulbs and the volumes of buzzers and explain how various components function within a circuit. Pupils are also introduced to the symbols of parts of a circuit (introduced in Year 4).

KS3: Pupils will learn how electricity is measured.