Science



Subject Definitions

**KS1 definition:**

Science is studying the natural and humanly constructed world around them through observation and experiment.

**KS2 definition:**

Science is learning about systematic study of the natural world through observing, testing and analyzing evidence.

Long Term Plan

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Year Group** | **Autumn 1** | **Autumn 2** | **Spring 1** | **Spring 2** | **Summer 1** | **Summer 2** |
| **Caterpillars****(KUW)** | All about me | Colours everywhere  | On the go  | On the farm  | Yummy Foods  | The Seaside  |
| **Butterflies****(KUW)** | All about me | Celebrations of the world  | Pirates  | New Life  | Traditional Tales  | People who help us  |
| **Reception****(KUW)** | All about me | Mini-beasts  | Transport  | The World  | Animals  | Superhero’s  |
| **Year 1** | Seasons/ weather | Animals Including humans (Ourselves) | Animals including humans | Materials | Materials | Plants |
| **Year 2** | Animals including humans | Animals including humans (Humans)  | Living things and their habitats | Materials | Plants |  |
| **Year 3** | Animals including humans  | Light | Rocks and Soil | Forces and Magnets | Plants |  |
| **Year 4** | Sound | Electricity | States of Matter | Animals including humans | Living things and their habitats |  |
| **Year 5** | Properties of materials | Changing materials reversible and irreversible changes | Forces | Earth and Space | Living things and their habitats | Animals including humans |
| **Year 6** | Living things and their habitats | Animals including humans | Evolution and Inheritance | Evolution and Inheritance | Light | Electricity |

Progression - **Working Scientifically** Progression

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Nursery (2 Year olds)** | **Nursery (3/4 year olds)** | **Reception** | **Year 1** | **Year 2** |
| **Plan**  | (Birth to 5 matters – Range 5)Comments and asks questions about aspects of their familiar world such as the place where they live or the natural world. Talks about why things happen and how things work Developing an understanding of growth, decay and changes over time.Shows care and concern for living things and the environment.Begin to understand the effect their behaviour can have on the environment.  | (Birth to 5 matters - Range 6)Looks closely at similarities, differences, patterns and change in nature.Knows about similarities and differences in relation to places, objects, materials and living things Talks about the features of their own immediate environment and how environments might vary from one another Makes observations of animals and plants and explains why some things occur, and talks about changes. | (Early Learning Goals) Explore the natural world around them, making observations and drawing pictures of animals and plants. Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter. | Children ask simple questions.  | Children ask simple questions and recognise that they can be answered in different ways.  |
| **Do**  | Children observe and use simple equipment. They perform simple tests with support. They identify and classify.  | Children observe closely, using simple equipment.They perform simple tests. (without support from an adult)They identify and classify.  |
| **Record**  | Children gather and record data as a group (this can be whole class)  | Children gather and record data to help in answering questions.  |
| **Evaluate**  | Children begin to use their observations and ideas to suggest answers to questions.  | Children use their observations and ideas to suggest answers to questions.  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Year 3** | **Year 4** | **Year 5** | **Year 6** |
| **Plan**  | Children ask questions and use different types of scientific enquiries to begin to answer them. They set up simple practical enquires and fair tests (with support initially)  | Children ask relevant questions and use different types of scientific enquires to answer them. They set up simple practical enquires, comparative and fair tests.  | Children plan different types of scientific enquires to answer questions.  | Children plan different types of scientific enquires to answer questions, including recognising and controlling variables where necessary.  |
| **Do**  | Children make careful observations and, where appropriate, take accurate measurements using a range of equipment, including thermometers. They gather, record and present data to help answer questions.  | Children make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.  | Children take measurements, using a range of scientific equipment, with increasing accuracy, and with encouragement taking repeat readings.  | Children take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.  |
| **Record**  | Children record findings using simple scientific language, drawings, labelling diagrams, creating keys, bar charts and tables (with support initially)  | Children gather, record, classify and present data in a variety of ways to help answer questions. They record findings using simple scientific language, drawings, labelling diagrams, creating keys, car charts and tables.  | Children record data and results using scientific diagrams and labels, classification keys, tables, bar and line graphs.  | Children record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables scatter graphs, bar and line graphs.  |
| **Evaluate**  | Children report on findings from enquires, including oral and written explanations. They use results to begin to draw simple conclusions, make predictions and raise further questions.  | Children report on findings from enquires, including oral and written explanations, displays or presentations of results and conclusions. They use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. They identify differences, similarities or changes related to simple scientific ideas and processes. They use straightforward scientific evidence to answer questions or to support their findings.  | Children begin to use test results to make predictions to set up further comparative fair tests. They report findings from enquires, including conclusions and explanations, in oral and written forms. They identify scientific evidence that has been use to support ideas.  | Children use test results to make predictions to set up further comparative and fair tests. They report and present 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 identify scientific evidence that has been used to support or refute ideas of arguments.  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Caterpillars** | **Butterflies** | **Reception** |
| **Animals (Including Humans)**  | Make connections between the features of their family and other families.Notice differences between people.Explore and respond to different natural phenomena in their setting and on trips. | Understand the key features of the life cycle of a plant and an animal. | Describe what they see, hear and feel whilst outside.Explore the natural world around them. |
| **Plants**  | Explore and respond to different natural phenomena in their setting and on trips. | Plant seeds and care for growing plants. | Describe what they see, hear and feel whilst outside.Explore the natural world around them. |
| **Living things and their habitats**  | Explore and respond to different natural phenomena in their setting and on trips. | Begin to understand the need to respect and care for the natural environment and all living things.Talk about what they see, using a wide vocabulary | Describe what they see, hear and feel whilst outside.Recognise some environments that are different from the one in which they live.Explore the natural world around them. |
| **Seasonal Changes**  | Explore and respond to different natural phenomena in their setting and on trips. |  | Describe what they see, hear and feel whilst outside.Understand the effect of changing seasons on the natural world around them.Explore the natural world around them. |
| **Materials**  | Explore materials with different properties. Explore natural materials, indoors and outside. | Use all their senses in hands-on exploration of natural materials. Explore collections of materials with similar and/or different properties. Talk about what they see, using a wide vocabulary.Explore how things work. Talk about the differences between materials and changes they notice. | Explore similarities and differences in relation to places, objects and materials.  |
| **Forces**  | Repeat actions that have an effect.  | Explore and talk about different forces they can feel. |  |

Foundation Stage Knowledge Progression - Understanding the World

Science Knowledge Progression - Plants



**Lower KS2**

**Year 3 – Su1**

* Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.
* Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant.
* Investigate the way in which water is transported within plants.
* Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

**Year 4 – Su1 (Living things and their habitats)**

* Recognise that living things can be grouped in a variety of ways.

**Upper KS2**

**Year 5 – Su1 (Living things and their habitats)**

* Describe how living things are classified into broad groups according to common observation characteristics and based on similarities and differences, including micro-organisms, plants and animals.
* Give reasons for classifying plants and animals based on specific characteristics.

**Year 6 – Au1 (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.

**KS1**

**Year 1 – Su2**

* Name common plants, including deciduous and evergreen.
* Identify and describe the basic structure of a variety of common flowering plants, including trees.

**Year 2 – Su1**

* 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.

Science Knowledge Progression - Animals Including Humans



 **Lower KS2**

**Year 3 – Aut 1**

* Identify that animals including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat.
* Identify that humans and some other animals have skeletons and muscles for support, protection and movement.

**Year 4 – Spr 2**

* 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.

**KS1**

**Year 1 – Aut 2 & Spr 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 – Aut 1 & 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.

**Upper KS2**

**Year 5 – Sum 2**

* Describe the changes as humans develop from birth to old age.

**Year 6 – Aut 2**

* Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.
* Identify and name the main parts of the human circulatory system and describe the function of the heart, blood vessels and blood.
* Describe the ways in which nutrients and water are transported within animals, including humans.

Science Knowledge Progression – Living Things and Their Habitats



 **Lower KS2**

**Year 3 – Sum 1 (Plants)**

* Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.

**Year 4 – Sum 1**

* 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 environment.
* Recognise that environments can change and that this can sometimes pose dangers to living things.

**KS1**

**Year 1 – Aut 2 & Spr 1 (Plants) & Sum 2 (Animals Including Humans)**

* Name common plants and describe the basic structure of flowering plants, including trees.
* 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 humans)

**Year 2 – Spr 1**

* 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.

**Upper KS2**

**Year 5 – Sum 1**

* Describe the differences in the lifecycles of a mammal, an amphibian, an insect and a bird.
* Describe the life processes of reproduction in some plants and animals.

**Year 6 – Aut 1**

* 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.

Science Knowledge Progression – Materials



 **Lower KS2**

**Year 3 –**

**Year 4 (States of Matter) – Spr 1**

* Compare and group materials together, according to whether they are solids, liquids or gases (states of matter)
* 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 (States of matter)
* Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. (states of matter)

**Upper KS2**

**Year 5 – Aut 1**

* 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 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 this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

**Year 6 –**

**KS1**

**Year 1 – Spr 2 and Sum 1**

* 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.

**Year 2 – Spr 2**

* 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.

Science Knowledge Progression – Light and Sound



**KS1**

**Year 1 –**

**Year 2 –**

 **Lower KS2**

**Year 3 –Aut 2 (Light)**

* Recognise that they need light in order to see things and that dark is the absence of light.
* Notice that light is reflected from surfaces.
* Recognise that light from the sun can be dangerous and that there are ways to protect our eyes.
* Recognise that shadows are formed when the light source is blocked by a solid object.
* Find patterns in the way the size of the shadows change.

**Year 4 –Aut 1 (Sound)**

* To 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 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 sound gets fainter as the distance from the sound source increases.

**Upper KS2**

**Year 5 –**

**Year 6 – Sum 1 (Light)**

* Recognise that light travels 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 object that casts them.

Science Knowledge Progression – Electricity and Forces

**Lower KS2**

**Year 4 - Aut 2 (Electricity)**

* Identify common appliances that run on electricity.
* Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.
* Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery
* Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.
* Recognise some common conductors and insulators, and associate metals with being good conductors.

**KS1**

**Year 1 – Spr 2 & Sum 1 (Materials)**

* 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 – Spr 2 (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.
* Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

**Upper KS2**

**Year 5 – Spr 1 (Forces)**

* Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.
* Identify the effects of air resistance, water resistance and friction that act between
* moving surfaces.
* Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.

**Year 6 – Sum 2 (Electricity)**

* 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 potion of switches.
* Use recognised symbols when representing a simple circuit in a diagram.

 **Lower KS2**

**Year 3 – Spr 2 (Forces)**

* 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.

Science Knowledge Progression – Stand Alone Units



 **Lower KS2**

**Year 3 –Spr 1 (Rocks)**

* Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.
* Describe in simple terms how fossils are formed when things that have lived are trapped within a rock.
* Recognise that soils are made from rocks and organic matter

**Year 4 –**





**Upper KS2**

**Year 5 –Spr 2 (Earth and Space)**

* Describe the movement of the Earth and other planets, relative to the sun in the solar system.
* Describe the movement of the moon relative to the Earth.
* Describe the Sun, Earth and Moon as approximately spherical bodies.
* Use Earth rotation to explain day and night due to the apparent movement of the sun across the sky.

**Year 6 – Spr 1 & 2 (Evolution and Inheritance)**

* 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.
* Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.

**KS1**

**Year 1 –Aut 1 (Seasonal Changes)**

* Observe changes across the four seasons. Observe and describe weather associated with the seasons and how day length varies.

**Year 2 –**

Science Progression – Knowledge Vocabulary

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Year 1**  | **Year 2**  | **Year 3** | **Year 4**  | **Year 5**  | **Year 6**  |
| **Plants**  | leaf, flower, petal, fruit, root, seed, trunk, branch, stem, bark, | seed, bulb, germinate, seedling, bud, flower, fruit, berry, root, temperature | stem, trunk, leaves, pollination, seed formation, seed dispersal, |  |  |  |
| **Animals including humans**  | head, body, eyes, ears, mouth, teeth, elbows, wing, claw, fin, scales, feathers, fur, beak, paws, hooves, touch, see, smell, taste, hear, nose, tongue | Offspring, grow, adults, nutrition, reproduce, survival, water, food, air, exercise, hygiene. | nutrition, nutrients, carbohydrates, routines, vitamins, minerals, fibre, skeleton, bines, muscles, joints | digestive system, digestion, herbivore, carnivore, omnivore, detritivore, producer, consumer, predator, prey, food chain, incisor, canine, premolar, molar | life cycle, puberty, sexual reproduction, menstruation, sperm, egg, foetus, gestation | heart, pulse, blood, blood vessels, lungs, circulatory system, diet, exercise, drugs, lifestyle |
| **Living things and their habitats**  |  | living, dead, never been alive, habitat, micro-habitat, food chain |  | classification, classification key, environment, habitat, vertebrates, invertebrates, amphibian, reptile, mammal, bird, fish | life cycle, reproduction, sexual reproduction, asexual reproduction, fertilise, runner, bulb, cutting, tuber, mammal, amphibian | Vertebrates, fish, amphibians, reptiles, mammals, invertebrates, micro-organisms  |
| **Evolution and Inheritance**  |  |  |  |  |  | evolution, offspring, inherited, characteristics, variation, adapted, environment, fossil, species |
| **Materials**  | object, material, wood, plastic, glass, metal, water, rock, hard, soft, stretchy, stiff, bendy, not bendy, waterproof, not waterproof, rough, smooth, shiny, dull, opaque, transparent | Uses of everyday materials: wood, metal, plastic, glass, brick, rock, paper, cardboard, transparent, translucent, opaque, flexible, rigid, reflective, nonreflective, absorbent, solid |  |  | Properties and changes of materials: Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, reversible/non reversible change |  |
| **Rocks and Soils**  |  |  | rock, fossil, soil, decayed, minerals, grains, crystals, sedimentary |  |  |  |
| **States of Matter**  |  |  |  | solid, liquid, gas, change of state, melting, freezing, melting point, boiling point, evaporation, condensation, water cycle, temperature |  |  |
| **Seasonal Changes**  | Weather, sunny, rainy, windy, snowySeasons, winter, summer, spring, autumn Sun, sunrise, sunset, |  |  |  |  |  |
| **Earth and Space**  |  |  |  |  | earth, sun, moon, planets, solar system, star, rotate, orbit, spherical |  |
| **Light and Sound**  |  |  | Light, light source, dark, transparent, translucent, opaque, shadow, reflect, mirror. | Sound, sound source, vibrations, travel, pitch, volume, insulation. |  |  |
| **Forces**  |  |  | force, magnetic force, magnet, attract, repel, poles, contact force, non-contact force |  | force, gravity, force meter, Newton (N), air resistance, water resistance, friction, mechanisms, levers, pulleys, gears |  |
| **Electricity**  |  |  |  | electricity, electrical appliances. mains, circuit, cell/ battery, switch, |  | simple series circuit, component, symbol, circuit diagram, cell/ battery, switch, voltage |

Scientists

|  |  |
| --- | --- |
| **Year Group**  | **Scientist**  |
| **Year 1** | Charles Macintosh (Materials) | * Image
* Their job titles.
* Why they are famous.
 |
| **Year 2** | Florence Nightingale (Animals including humans – Being healthy)John McAdams (Materials)  |
| **Year 3**  | Mary Anning (Rocks) Joseph Swan (Light) Sir Isaac Newton (Forces and Magnets)  | * Image
* Their job titles.
* Why they are famous.
* Where they are from
* The year they became famous
 |
| **Year 4**  | Jane Goodall (Living things and their habitats) Alessandro Volta (Electricity) Michael Faraday (Electricity)  |
| **Year 5**  | Tim Peake (Space) Brian Cox (Space) David Attenborough (Living things and their habitats)  | * Image
* Their job titles.
* Why they are famous.
* Where they are from
* The year they became famous
* Why they thought of their discovery
* What did their findings do for the future of science.
 |
| **Year 6**  | Charles Darwin (Evolution and inheritance)  |