SCIENCE

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Purpose of Study

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

We aim

- To develop interest and enthusiasm for Science.
- To provide every pupil with the scientific experience to which they are entitled.
- To develop scientific skills, knowledge and understanding for Science, as far as possible in a practical way.
- To develop an understanding of the relevance of Science in an everyday context.
- Link Science where necessary to other areas of the curriculum.

National Curriculum

- 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.

EYFS - Reception	Key Stage 1	Key Stage 2
Pupils should be taught to: **Communication and Language** • Make comments about what they have heard and ask questions to clarify their understanding. **Personal, Social and Emotional Development** • Manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of healthy food choices. **Understanding the World** • Explore the natural world around them, making observations and drawing pictures of animals and plants. • Know some similarities and differences between	Pupils should be taught to: **Working Scientifically:** • asking simple questions and recognising that they can be answered in different ways. • observing closely, using simple equipment • performing simple tests. • identifying and classifying. • using their observations and ideas to suggest answers to questions. • gathering and recording data to help in answering questions. *Year 1 programme of study* **Plants:**	Pupils should be taught to: ***Lower Key Stage 2 programme of study*** **Working scientifically** • asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests • making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions

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.	• 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. **Animals, including humans:** • 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. **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 **Seasonal changes**: • observe changes across the four seasons • observe and describe weather associated with the seasons and how day length varies. Year 2 programme of study **Living things and their habitats** • 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	• recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings. *Year 3 programme of study* **Plants** • 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. **Animals, including humans** • 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. **Rocks and Fossils** • 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.

	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. **Plants** • 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. **Animals, including humans** • 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. **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 particular uses • find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	**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 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. **Forces and magnets** • 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. *Year 4 programme of study* **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 • recognise that environments can change and that this can sometimes pose dangers to living things. **Animals, including humans** • 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. **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. **Sound** • 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. **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. ***Upper key stage 2 programme of study*** **Working scientifically** • planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs

		• using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments. *Year 5 programme of study* **Living things and their habitats** • 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. **Animals, including humans** • describe the changes as humans develop to old age. **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. **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 the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. **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 programme of study* **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. **Animals including humans** • 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. **Evolution and inheritance** • 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. **Light** • 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. **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 position of switches • use recognised symbols when representing a simple circuit in a diagram

Content

The contribution of science to teaching in other curriculum areas

English - Science contributes significantly to the teaching of English in our school by actively promoting the skills of reading, writing, speaking and listening. Some of the texts that the children study in Literacy are of a scientific nature. The children develop oral skills in science lessons through discussions (for example of the environment) and through recounting their observations of scientific experiments. They develop their writing skills through writing reports and projects and by recording information.

Mathematics - Science contributes to the teaching of mathematics in a number of ways. Science generates data that can be collected, analysed and presented in various ways. When working scientifically, children are expected to search for patterns in the results they collect and to interpret evidence and draw conclusions. The children use weights and measures and learn to use and apply number. Through working on investigations they learn to estimate and predict. They develop the skills of accurate observation and recording of events. They use numbers in many of their answers and conclusions.

Computing - Children use ICT in science lessons where appropriate. They use it to support their work in science by learning how to find, select, and analyse information on the Internet. Children use ICT to research, record, present and interpret data and to review, modify and evaluate their work and improve its presentation. Digital cameras, digital microscopes, digital thermometers and timers are also used regularly.

Personal, social and health education (PSHE) and citizenship - Science makes a significant contribution to the teaching of personal, social and health education. This is mainly in two areas. Firstly, the subject matter lends itself to raising matters of citizenship and social welfare. For example, children study the way people recycle material and how environments are changed for better or worse. Secondly, children benefit from the nature of the subject in that it gives them opportunities to take part in debates and discussions. Science promotes the concept of positive citizenship and studies topics such as healthy eating, drugs, alcohol.

Spiritual, moral, social and cultural development - Science teaching offers children many opportunities to examine some of the fundamental questions in life, for example, the evolution of living things and how the world was created. Through many of the amazing processes that affect living things, children develop a sense of awe and wonder regarding the nature of our world. Science raises many social and moral questions. Through the teaching of science, children have the opportunity to discuss, for example, the effects of smoking and the moral questions involved in this issue. We give them the chance to reflect on the way people care for the planet and how science can contribute to the way we manage the earth's resources. Science teaches children about the reasons why people are different and, by developing the children's knowledge and understanding of physical and environmental factors, it promotes respect for other people.

Quality of Education

Intent
At Asby Endowed, it is our intention to develop in all young people a lifelong curiosity and interest in the sciences. When planning for the science curriculum, we intend for children to have the opportunity, wherever possible, to learn through varied systematic investigations, leading to them being equipped for life to ask and answer scientific questions about the world around them. As children progress through the year groups, they build on their skills in working scientifically, as well as on their scientific knowledge, as they develop greater independence in planning and carrying out fair and comparative tests to answer a range of scientific questions.

Implementation
At Asby Endowed, the acquisition of key scientific knowledge is an integral part of our science lessons. Scientific vocabulary is regularly displayed in the classrooms, which enables children to learn and retain the important, useful and powerful vocabulary and knowledge contained within each unit. The progression of skills for working scientifically are developed throughout the year groups and scientific enquiry skills are of key importance within lessons. Scientific knowledge and enquiry skills are developed with increasing depth and challenge as children move through the year groups. They complete investigations and hands-on activities while gaining the scientific knowledge for each unit. Interwoven into the teaching sequence are key assessment questions. (Wordwall is frequently used for this, especially in KS2). These allow teachers to assess children's levels of understanding at various points in the lesson. They also enable opportunities to recap concepts where necessary. The sequence of

lessons helps to embed scientific knowledge and skills, with each lesson building on previous learning. There is also the opportunity to regularly review and evaluate children's understanding. Activities are effectively differentiated so that all children have an appropriate level of support and challenge.

We plan to ensure that teachers are equipped with secure scientific subject knowledge, enabling them to deliver high-quality teaching and learning opportunities while making them aware of possible scientific misconceptions.

Impact

The successful approach to the teaching of science at Asby Endowed results in an engaging, high-quality science education. Progress is measured through a child's ability to know more, remember more and explain more. The Assessment at Asby Endowed is teacher based, ongoing, and formed using formal and informal strategies. The curriculum allows for children to retain prior learning, and explicitly make connections between what they have previously learned and what they are currently learning.

We want our pupils to feel confident in their scientific knowledge and enquiry skills and be excited about science, showing that they are actively curious to learn more. Throughout each key stage, we teach pupils to see the relevance of what they learn in science lessons to real-life situations and also the importance of science in the real world.

Progression of Knowledge

Substantive knowledge in Science builds progressively to develop children's understanding of concepts, models, laws and theories. It is organised into the following four areas:

Biology
- Living things and their environment
- Reproduction, inheritance and evolution

Chemistry
- States of matter
- Materials (properties and changes)

Physics
- Energy
- Forces

Earth Science
- Earth and space

Disciplinary knowledge in Science builds progressively to enable children to work scientifically and covers the following aspects:

- Methods used to answer questions
- Using apparatus and techniques
- Data analysis
- Using evidence to develop explanations.

	Throughout the year	
EYFS	**Communication and Language** • I can learn new vocabulary. • I can ask questions to find out more and to check what has been said to me. • I can articulate my ideas and thoughts in well-formed sentences. • I can describe events in some detail. • I can use talk to help work out problems and organise thinking and activities, and to explain how things work and why they might happen. • I can use new vocabulary in different contexts. **Personal, Social and Emotional Development** • I know and talk about the different factors that support my overall health and wellbeing: o regular physical activity o healthy eating o toothbrushing o sensible amounts of 'screen time' o having a good sleep routine o being a safe pedestrian	**Understanding the World** • I can explore the natural world around me. • I can describe what I see, hear and feel while I am outside. • I can recognise some environments that are different to the one in which I live. • I understand the effect of changing seasons on the natural world around me. **Science** • Explore the natural world around them • Make observations about the world around them • Make observations about plants and animals • Create drawings of plants and animals • Identify some similarities and differences between the natural world around them and contrasting environments • Know the four seasons • Describe characteristics of the four seasons • Identify changing states of matter

	Autumn term	Spring term	Summer term
2022-2023	**<u>Animals Including Humans (Biology)</u>** • Know the following parts of the human body: ***head, hair arms, legs, shoulders, knees, feet, fingers, toes, eyes, ears, nose, mouth, teeth, stomach, back, neck*** • Know which part of the body is associated with each **sense**: ***ears-hear, eyes-see, nose-smell, hands-touch, tongue-taste.*** • Know a variety of common **animals** including **fish:** *stingray, goldfish;* **Amphibians:** *frogs*, *snakes, lizards, crocodiles;* **Birds:** *chicken, eagle, robin, duck;* and **Mammals:** *cow, pig, sheep, horse, goat, tiger, dog.* • Know what is a **carnivore, herbivore** and **omnivore.** Carnivores: crocodile, snake, lion, penguin. Herbivores – cow, sheep, horse, rabbit. Omnivores – human, pig, bear, birds. • Know the structure of a variety of common animals: *specific fish, amphibians, reptiles, birds, and mammals including pets.* • Know the difference between living and non-living things.	**<u>Everyday Materials (Chemistry)</u>** • Identify and name the following everyday **materials**: ***wood, plastic, glass, metal, water*** *and* ***rock,*** and know the difference between these materials. • Distinguish between an object and the **material** from which it is made. • Describe the simple **physical properties** (**hard/soft, stretchy/stiff, shiny/dull, rough/smooth, bendy/not bendy, waterproof/ not waterproof, absorbent/ not absorbent, opaque/ transparent**) of the above everyday **materials**. • Compare everyday materials based on physical properties and justify these groupings. **<u>Seasonal Changes, including seasonal foods (Physics)</u>** **<u>Autumn/Winter</u>** • Name the 4 seasons and observe and identify changes across the 4 seasons. • Describe food associated with the seasons. • Understand that seasonal food is fresh food that is ready to eat during its preferred season. • Understand how day length varies.	**<u>Plants (Biology)</u>** • Know and name a variety of **deciduous** and **evergreen** trees. • Know the following common *plants:* ***daisy, rose, poppy, dandelion, buttercup, conifer, grass, hedges.*** • Identify following parts of a **deciduous and evergreen** tree: **roots, trunk, branches, leaves.** • Identify and describe the following parts of plants using real life parts: **leaves, flowers (blossom), petals, fruit, roots, bulb, seed, stem.** **<u>Living Things and their Habitats (Local/UK) (Biology)</u>** • Classify (sort) things that are **living, dead** or have **never lived**. • Compare and explore differences between things that are living, dead or have never lived. • Know the habitat of local/UK living things and explain how they are suited to their habitat and depend on each other, e.g. *fish – water, birds– trees.* • Describe how different habitats provide for the basic needs of plants and animals. • Name plants and animals in a range of **habitats,** including **micro-habitats.** • Explain a simple **food chain**, identifying the **producer, prey, predator, consumer.**

2023-2024	**Animals Including Humans (Biology)** • Explain how to keep my body healthy, including the importance of **exercise**, eating the right amounts of different **food types** and **hygiene**. • Explain the following needs of **animals,** including humans, basic needs for survival for survival: **oxygen, food, water**. • **Living Things and their Habitats – Habitats around the world (Biology)** • Explore and compare the differences between things that are **living**, **dead** or 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 – e.g. polar bears – arctic, camels – desert. • To identify and name a variety of plants and animals in their **habitats**, including **microhabitats** (global) • 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.	**Uses of Everyday Materials (Chemistry)** • Know and compare the use of a variety of everyday materials including **wood, metal, plastic, glass, brick, rock, paper and cardboard** • Explore how the shape of some materials can be changed: **twisting, bending, stretching, squashing** • Know that when changing the shape of an object some will return to its original shape whilst others will remain changed. • Compare the **suitability** of everyday materials and identify particular uses. Know why a material might not be used for a specific job. **Seasonal Changes (including weather) Spring/Summer** • Observe and know changes across the 4 seasons. • Observe and describe weather associated with the seasons. • Understand how day length varies. • Know how to complete a given table to record the daily weather during periods of different seasons.	**Plants (Biology)** • Know the conditions for growing a plant. • Know that plants need **water, light** and a suitable **temperature** for **germination** • Describe how a seed or bulb grows into a plant • Make regular observations and take regular measurements **Animals, including humans - lifecycles (Biology)** . • Know that animals, including humans have **offspring** which grow into adults: *lamb – sheep; calf – cow; chick – chicken; cub – lion; puppy – dog; kitten – cat; piglet – pig; tadpole – frog* • Explain that animals, including humans grow throughout their lives (**life cycles)**. • Label a given diagram to show the following stages in the **life cycles** of animals; FROG: frogspawn, tadpole, froglet, frog; BUTTERFLY: egg, caterpillar, chrysalis, butterfly; CHICKEN: egg, chick, chicken.

Lower Key Stage 2 Year 3/4 2022 – 2023	Autumn term 1	Autumn term 2	Spring term 1	Spring term 2	Summer term 1	Summer term 2
	Animals including humans (Ourselves) (Biology) • Know how the **skeletal** and **muscular system** of a human provides **support, protection** and **movement.** • Recognise that humans cannot make their own food. • Know how nutrients, water and oxygen are transported within humans. • Know the importance of a **nutritious, balanced diet**. • Use secondary sources to explain the following food groups (**fats, fibre, carbohydrates, protein, water, vitamins and minerals, fruit** and **vegetables**). • Know a meal based on knowledge of (**fats, fibre, carbohydrates, protein, water, vitamins and minerals, fruit** and **vegetables**).	**Forces and magnets (Physics)** • Know and describe how objects move on different surfaces: **concrete, carpet, wood, cardboard, plastic, metal.** • Classify **materials** as either **magnetic** and **non-magnetic**. • Know some **forces** require contact and some can act at a distance, giving examples.	**States of matter (Chemistry)** • Know examples of **solids, liquids, gases.** • Classify examples of solids, liquids and gases using my own criteria. • Know the **water cycle** to identify the part played by **evaporation** and **condensation**. • Know how some **materials** (water, chocolate, butter) change **state** when they are heated or cooled. • Use secondary sources to research the **temperature** at which materials change **states.** • Know how **temperature** is linked to evaporation.	**Plants (Biology)** • Know the **function** of the following parts of **flowering plants**: **roots, stem/trunk, leaves, flowers.** • Know how water is **absorbed** and **transported** in plants (cut, white carnations). • Know how changes in **air, light, water, nutrients** from soil, and room to grow effect the growth of plants. • Know the **life cycle** of a flowering plant, including an explanation of the following processes: **pollination, seed formation and seed dispersal.**	**Animals including humans (Animals) (Biology)** • Classify animals with and without *skeletons (**invertebrates:** spider, snail, worms, crabs, starfish, scorpion, insects. **Vertebrates:** mammals, reptiles, fish, birds,* and observe and compare their movements). • Know how nutrients, water and oxygen are transported within animals. • Know how the **skeletal** and **muscular system** of an animal provides **support, protection** and **movement.** • Recognise that animals cannot make their own food. • Know the importance of a **nutritious, balanced diet**	**Living things and their habitats – Classifying (Biology)** • Classify **living things** into multiple self-created and justified groups. • Know that living things can be groups in a variety of ways and classify them into given groups. • Know and explain a simple **classification key**. • Explore **microhabitats** in the local environment and use or create classification keys to identify, name and group a variety of living things.

Lower Key Stage 2 Year 3/4 2023 - 2024	Autumn term 1	Autumn term 2	Spring term 1	Spring term 2	Summer term 1	Summer term 2
	Animals including humans (Biology) • Know the function of the following parts of the **digestive system**: ***Mouth, tongue, teeth, oesophagus, stomach, small and large intestine.*** • Know types of human **teeth (incisors, canines, premolars, molars)** and to explain their simple **functions.** • Know and explain differences in the teeth of **carnivores** and **herbivores**. • Use secondary sources to explain how to keep teeth **healthy** and explain possible damages to teeth. • Know simple food chains, identifying the **producers, preys, predators, consumers.**	**Light (Physics)** • Know and demonstrate that **dark** is the absence of **light.** • Know that **light** is needed in order to see and is **reflected** from a surface. • Know **natural** and **artificial** sources of light. • Know how a **shadow** is formed including the need for an **opaque** object. • Use secondary sources to understand the dangers of direct sunlight. • Use secondary sources to identify ways to protect the eyes.	**Electricity (Physics)** • Classify **appliances** into groups depending on whether or not they require **electricity** to function. • Construct a **series circuit**. • Know (picture representation) including **cells, wires, bulbs, switches** and **buzzers**. • Know the function of a **switch** and draw and label diagrams to identify how the position of the switch effects the circuit. • Know examples of **conductors** and **insulators**, identifying metals as good conductors.	**Sound (Physics)** • Know that sound is made by something **vibrating** (musical instruments) and that sound travels from a source through a medium to our ear. • Know what happens to a sound as it travels away from its source. • Know the relationship between the size of an object and the **pitch** of the sound produced. • Know the relationship between the strength of the vibrations and the **volume** it produces.	.**Living things and their habitats – Conservation (Biology)** • Using secondary sources, explain how **environment** can *change: natural reserves, garden ponds, ecologically planned parks, ice caps melting, deforestation, drought, urbanisation, pollution.* • Know how environmental changes may pose dangers to living things.	**Rocks (Chemistry)** • Know types of **rocks** and their **properties**. • Classify different types of rocks using my own criteria (appearance and physical properties). • Know the difference between **sedimentary, metamorphic** and **igneous** rock. • Know how **fossils** are formed. Know how soil is formed

	Autumn term 1	Autumn term 2	Spring term 1	Spring term 2	Summer term 1	Summer term 2
Upper Key Stage 2 Year 5/6 2022 - 2023	**Animals including humans (Biology)** • Know the **stages of growth** and development in humans: **foetus, baby, toddler, child, adolescent, adult, elderly.** • Understand **puberty** and explain the importance of puberty. • Know the changes their males and females experience during puberty.	**Forces (Physics)** • Know what **gravity** is and that unsupported objects fall towards the **Earth** because of gravity. • Know the effects of **air resistance.** • Know the effects of **water resistance.** • Know effects of **friction**. • Know how **levers**, **pulleys** and **gears** allow a smaller force to have a greater effect.	**Properties and changes in materials (Chemistry)** • Classify everyday **materials** based on their **properties: hardness, solubility, transparency, conductivity (electrical and thermal).** • Classify everyday **materials** based on their **response to magnets**. • Know which materials **conduct electricity**. • Know which materials make the best **insulators**. • Know the best temperature for **dissolving** sugar and explain how this forms a **solution.** • Know how to recover a **substance** from a solution. • Know how some materials can be **separated** *through* ***filtering, sieving*** *and* ***evaporating***. • Know how water can change state into a **liquid, gas or solid.**	**Earth and Space (Physics)** • Know **heliocentric** diagram of the **solar system**. • Know the movement of the **Earth** and other planets relative to the **sun.** • Know the movement of the **Moon** relative to the Earth. • Know how **day** and **night** are created. • Know how the **geocentric** model gave way to the heliocentric model.	**Living things and their habitats – Animal and Plant lifecycles (Biology)** • Use secondary sources to draw, label and annotate diagrams of the following life cycles**: mammal, amphibian, insect, and bird.** • Identify and explain the differences between **life cycles**. • Know the process of **sexual production in animals.** • Know the processes of **sexual** and **asexual reproduction** in **plants.**	**Living things and their habitats – Classification (Biology)** • Classify animals into **mammals, amphibians, insects and birds**, and use secondary sources to describe the physical features of each. • Describe how **living things** are classified into broad groups based on similarities and differences, including **microorganisms, plants and animals** • Give reasons for **classifying plants** and **animals** based on **specific characteristics.**
Upper Key Stage 2 Year 5/6 2023 - 2024	**Animals including humans (Biology)** • Know the main parts of the human **circulatory system:** ***heart, lung, blood vessels, arteries, veins, capillaries, left atrium, right atrium, right ventricle, left ventricle, blood.*** • Know the functions of the main parts of the **circulatory system**: ***heart, lung, blood vessels, arteries, veins, capillaries, left atrium, right atrium, right ventricle, left ventricle, blood.*** • Use secondary sources to explain the positive and negative impact of **diet, exercise, drugs**, and **lifestyle** on the way the human body functions. • Know how to lead a **healthy** lifestyle. • Know how **nutrients** and **water** are transported in animals and humans.	**Light (Physics)** • Know that **light** appears to travel in straight lines. • Know that **shadows** have the same shape as the object that casts them. • Know how the size of shadows can be altered. • Know different phenomena associated with light (eg: rainbows, colours on soap bubbles, objects looking bent in water, and coloured filters). • Know how simple optical instruments work, e.g.periscope, telescope, binoculars, mirror, magnifying glass etc.	**Electricity (Physics)** • Know to correct symbols for a **circuit** diagram. • Know dangers and precautions for working safely with **electricity**. • Know how the **voltage of cells** effects the brightness of a lamp or volume of a buzzer. • Know how changing the components in a circuit can affect the brightness of bulbs, loudness of buzzers and the impact of on/off position of **switches.**	**Evolution and inheritance (Biology)** • Know how **adaptations** make it suited to its **environment**. • Use secondary sources to explain how **fossils** are explored to provide information about **living things**. • Know ways that **living things** have changed over time. • Know that living things produce **offspring** of the same kind, but normally not **identical**. • Know the **evolution** of humans over time.	**Living things and their habitats – Looking after the Environment** • Know that **climate change** refers to long-term shifts in temperatures and weather patterns as a result of excess CO2 in the atmosphere • Explore ways to **reduce** how much **rubbish** is sent to **landfill** • Explores ways to **reduce energy consumption** • Explore what happens when **fuels are burnt** • Explore the outcomes of **COP26** • Compare **data** associated with the **weather.**	**Living things and their habitats (Biology)** • Know how **living things** are classified into groups based on observable **characteristics** and similarities and differences. • Classify a range of animals using broad groups (**vertebrates / non-vertebrates / micro-organisms**) and further sub-groups (**insects, spiders, snails, worms, fish, amphibians, reptiles, birds, mammals, fungi, moulds, bacteria, and Protista**). • Classify a range of **flowering and non-flowering plants.**

Working Scientifically

		EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Exploring	**Questioning**	Explore 'what if' questions through play.	Ask 'why' questions.	Ask 'why' and 'what if' questions.	Use knowledge and understanding to ask 'why' and 'what if' questions.	Use knowledge and understanding to ask questions.	Use knowledge and understanding to ask questions about my observations.	Use knowledge and understanding to challenge scientific ideas and concepts.
	Explaining	With support, recall simple scientific facts. With support, pronounce simple scientific words to help with an activity. With support, describe what is happening using words or actions.	Recall some simple scientific facts. Remember and use relevant scientific words during an activity. Describe what is happening using words	Recall relevant scientific facts with some confidence. Construct an oral sentence using scientific words. Describe and recall what I have observed.	Use science ideas and facts to describe and explain. Use simple scientific words in a written sentence. Describe simple scientific models / diagrams.	Show developing knowledge and understanding of scientific ideas and concepts. Use scientific words during oral and written explanations. Describe and explain scientific models / diagrams.	Show clear knowledge and understanding of scientific ideas and concepts. Accurately use a range of scientific words during oral and written explanations. Use knowledge and understanding to describe and explain scientific models / diagrams.	Show secure knowledge and understanding of scientific ideas and concepts. Use a range of complex scientific words in a written report. Begin to use scientific models / diagrams to explain new events (linking prior knowledge).
	Diagrams	Match a picture to the correct label.	Use a word bank to match a label to the correct part of an image	Label a simple diagram using scientific words.	Label and annotate a diagram with scientific information.	Draw, label and annotate my own diagram with given scientific information.	Draw, label and annotate my own diagram with selected scientific information.	Draw, label, annotate and explain my own diagrams using scientific information.
	Secondary sources	Recall some simple scientific facts.	Begin to select some facts to use in an answer.	Select relevant scientific facts to use in an answer.	Link relevant scientific facts together in an answer.	Use scientific facts to create an argument.	Select and prioritise scientific facts to create an argument.	Present a clear and logical argument using scientific facts.
Classification	**Identifying**	With support, name things related to science.	Accurately name a range of things related to science.	Identify and name simple scientific things, ideas and processes.	Identify and name a range of scientific things, ideas and processes.	Identify and describe changes in scientific processes.	Use knowledge and understanding to help identify unknown scientific things, ideas and processes.	Use knowledge, understanding and secondary resources to identify unknown scientific things, ideas and processes.
	Classifying	Group by familiar features e.g., *Shape, size, colour.* Use given instructions to sort.	Group by similarity or difference. Sort using simple yes/no statements.	Use multiple groups when sorting. Follow and complete simple classification keys with obvious differences.	Create my own criteria for sorting. Construct a simple classification key using given information.	Create and explain my own criteria for sorting. Construct a simple classification key.	Create my own criteria for sorting, which includes a sub-group. Construct a complex classification key.	Create my own criteria for sorting, which includes multiply sub-groups. Construct and explain a complex classification key.
	Comparing	Describe given things	Identify obvious differences.	Identify similarities and differences.	Link properties to purpose and suitability.	Identify when properties change.	Describe how properties change.	Explain how and why properties change.
Experimenting and Investigating	**Predicting**	Suggest what might be 'best' or 'worst'	Suggest what might happen.	Use own knowledge to suggest what might happen in an investigation.	Predict cause and effect (casual prediction).	Predict a trend (relationship prediction).	Use knowledge and understanding to justify my prediction.	Use knowledge and understanding to generate a testable hypothesis.
	Observing	Comment on what I see.	Comment on what I see during an investigation.	Identify changes during an investigation.	Explain changes during an investigation.	Use knowledge and understanding to explain changes during an investigation.	Use knowledge and understanding to identify trends during an investigation.	Identify trends during an investigation and make justified predictions for the rest of an investigation.
	Equipment	Use a range of everyday items to investigate. Work safely when given instructions.	Use some scientific equipment. Notice risk and identify some common dangers.	Use a range of scientific equipment. identify and begin to explain common dangers.	Select suitable equipment for a given task. Predict obvious risk and act on safety suggestions.	Select and independently use a range of scientific equipment for a given task. Plan to minimize risk and work safely.	Select the most appropriate equipment for an independently designed task. Plan to minimize risk and describe safe use of equipment.	Justify reasons for selecting specific equipment and identify possible alternatives. Predict risks and explain how I can plan and control risks.

	Designing	With support, suggest ideas to investigate. With support, say how we might investigation. Follow a short demo and spoken instructions.	I can suggest an idea to investigate and ask questions. Begin to identify variables in an investigation. Follow a short demo, spoken and picture instructions.	Demonstrate how why might investigation something. Identify which variable we are testing. Follow short spoken and written instructions in order.	Demonstrate and explain how why might investigate something. Identify a range of variables which could be tested. Follow instructions and write a simple method.	Plan a fair test by selecting variables to change and measure. Identify a range of variables which could be tested and explain appropriate tests. Design and write a simple ordered method.	Plan a fair test and ensure controlled variables are kept the same. Identify a range of variables which could be tested and devise appropriate tests. Design and write a reliable ordered method.	Plan a reliable and fair test. Explain which variables will be kept the same and devise tests which ensure these variables are controlled. Design and write a reliable and precise method.
Data	**Collecting**	Use non-standard units of measure and compare 2 things *e.g.: heavier / lighter.*	Use non-standard units of measure and compare multiply things *e.g.: lightest, light, heavier, heaviest.*	Measure using standard units: Length: cm / m Mass: g / kg Capacity: ml / l	Measure and compare using standard units: Length: mm / cm / m Mass: g / kg Capacity: ml / l	Measure and compare using standard units: Length: mm / cm / m Mass: g / kg Capacity: ml / l Time: seconds / minutes	Measure, convert and compare using standard units: Length: mm / cm / m Mass: g / kg Capacity: ml / l Time: seconds / minutes	Calculate an average from repeated measurements.
	Tables	Use a simple table to record pictures and words.	Use a simple, given table to record	Use a simple, given table to tally and record totals.	Use a frame to record a table of results.	Construct a simple table to compare cause and effect.	Use a frame to construct a complex table of results to show repeated data.	Construct a complex table of results to show repeated data.
	Graphs	Use prepared pictograms to record my observations. Add pictures to a given pictogram.	Use a frame to add pictograms and block charts. Add blocks to a given chart.	Construct simple pictograms and block charts. Use a scale on a block chart to add the correct blocks.	With support, use axes to construct a bar chart. Draw bars on a given bar chart.	Accurately and independently construct a bar chart. Plot coordinates in the first quadrant.	With support, use a frame to construct a graph and scale one axis. Join plotted coordinates with straight lines.	Accurately construct and scale a graph. Plot mean values and draw a trend line for linear data.
Making Conclusions	**Patterns and relationships**	Recognise, create and simple patterns *e.g.: size.* Use ‘more’ or ‘less’ to compare observations.	Recognise, create and describe simple patterns. Use ‘more’ or less’ to compare observations and numbers.	Describe simple patterns in data and charts. Identify differences in sets of data.	Describe simple patterns in data, charts, and graphs. Identify and explain differences in sets of data.	Describe patterns, trends and relationships in data, charts and graphs. Identify and explain differences in sets of repeated data.	Describe and compare patterns, trends and relationships in data, charts and graphs. Identify and explain differences in sets of repeated data and identify anomalies.	Describe and compare changing patterns, trends and relationships in data, charts and graphs. Identify and explain, using margin of error, differences in sets of repeated data and identify anomalies.
	Concluding	Comment on changes that I observe during an activity. Begin to talk about what we did.	Describe the changes that are happening. Explain what we did.	After an activity, recall and describe the changes that have happened. Explore different ways to do things.	Describe my results linking cause and effect. Identify weaknesses in my methods.	Describe trends and begin to use scientific observations to explain. Identify weaknesses in my methods and suggest improvements.	Use data in my conclusions and use science to explain. Identify how limitations in my methods might affect my results and suggest improvements.	Use primary and secondary data and ideas when concluding. Identity limitations in my methods and use my results data to justify improvements.

Progression of Vocabulary

EYFS - Reception	Year 1	Year 2	Year 3
PLANTS: Seed, Plant, Grow, Change, Fruit, Vegetable **ANIMALS INCLUDING HUMANS:** Human,,Animal, Head, Ear, Eye, Mouth, Nose, Face, Hair, Baby, Child, Boy, Girl, Man, Woman, Parent, Family, **MATERIALS:** Touch, Shiny, Hard, Rough **SEASONAL CHANGES:** Weather, Seasons	**PLANTS: Trees, Deciduous, Evergreen, Roots, Trunk, Bark, Branch**, **Leaves, Wild plants**, **Garden Plants, Bulb,** Seed, , Stem, Petals **ANIMALS INCLUDING HUMANS:** Fish, Reptiles, Mammals, Birds, Amphibians (+ examples of each) Herbivore, Omnivore, Carnivore, Leg, Arm, Elbow, Head, Ear, Nose, Back, Wings, Beak **EVERYDAY MATERIALS:** Wood, Plastic, Glass, Paper, Water, Metal, Rock, Hard, Soft, Bendy, Rough, Smooth **SEASONAL CHANGES: S**ummer, Spring, Autumn, Winter, Sun, Day, Moon, Night, Light, Dark **WORKING SCIENTIFICALLY:** What…? How ….? Why …? similar different best and worst change plan look biggest and smallest compare sort and group	**PLANTS:** Seeds, Bulbs, Plants, Dispersal, Pollination, Germination, Water, Light, Suitable temperature, Growth, Healthy, Decompose **ANIMALS INCLUDING HUMANS:** Survival, Water, Air, Food, Adult, Baby, Offspring, Kitten, Calf, Puppy, Exercise, Hygiene **LIVING THINGS AND THEIR HABITATS:** Living, Dead, Habitat, Energy, Food chain, Predator, Prey, Woodland, Pond, Desert **MATERIALS:** Hard, Soft, Stretchy, Stiff, Shiny, Dull, Rough, Smooth, Bendy, Waterproof, Absorbent, Opaque, Transparent Brick, Paper, Fabrics, Squashing, Bending, Twisting, Stretching Elastic, Foil **WORKING SCIENTIFICALLY:** observe change slowly quickly describe name identify label record measure bigger and smaller pattern notice cycle predict	**PLANTS:** Air, Light, Water, Nutrients, Soil, Reproduction, Transportation, Dispersal, Pollination, Flower **ANIMALS INCLUDING HUMANS: M**ovement, Muscles, Bones, Skull, Nutrition, Skeletons, **ROCKS: F**ossils, Soils, Sandstone, Granite, Marble, Pumice, Crystals, sedimentary, metamorphic, igneous, absorbent/porous, durable, permeable, impermeable **LIGHT:** Light, Shadows, Mirror, Reflective, Dark, Reflection, light source, cast **FORCES AND MAGNETS:** Force, push, pull, open, surface, magnet, magnetic, attract, repel, magnetic poles, North, South **WORKING SCIENTIFICALLY:** Gradually identify observe recognise investigate record units table fair evidence research length observations prediction

Year 4	Year 5	Year 6
ANIMALS, INCLUDING HUMANS: Mouth, Tongue, Teeth, Oesophagus, Stomach, Small Intestine, Large Intestine, Herbivore, Carnivore, Canine, Incisor, Molar **LIVING THINGS AND THEIR HABITATS: V**ertebrates, Fish, Amphibians, Reptiles, Birds, Mammals, Invertebrates, Snails, Slugs, Worms, Spiders, Insects, Environment, Habitats **STATES OF MATTER**- Solid, Liquid, Gas, Evaporation, Condensation, Particles, Temperature, Freezing, Heating, Precipitation **SOUND:** Volume, Vibration, Wave, Pitch, Tone, Speaker **ELECTRICITY:** Cells, Wires, Bulbs, Switches, Buzzers, Battery, Circuit, Series, Conductors, Insulators, brightness **WORKING SCIENTIFICALLY:** Similarities differences research and source scientists discovery process cycle measurements conclude evaluate rank plan vary keep the same/constant bar graph table tally	**ANIMALS INCLUDIING HUMANS:** Foetus, Embryo, Womb, Gestation, Baby, Toddler, Teenager, Elderly, Growth, Development, Puberty; Circulatory, Heart, Blood Vessels, Veins, Arteries, Oxygenated, Deoxygenated, Valve, Exercise, Respiration **LIVING THINGS AND THEIR HABITATS:** Mammal, Reproduction, Insect, Amphibian, Bird, Offspring; Classification, Vertebrates, Invertebrates, Microorganisms, Amphibians, Reptiles, Mammals, Insects **PROPERTIES AND CHANGES OF MATERIALS:** Hardness, Solubility, Transparent, Opaque, Translucent, Magnetic, Filter, Evaporation, Dissolving, Mixing, Thermal conductor, thermal insulator, electrical conductor, electrical insulator **FORCES AND MAGNETS:** Air resistance, Water resistance, Friction, Gravity, Newton, Gears, Pulleys, lever, force, pivot (fulcrum) **EARTH AND SPACE:** Earth, Sun, Moon, Axis, Rotation, Day, Night, Phases of the Moon, star, constellation, waxing, waning, full, new, year, month, **WORKING SCIENTIFICALLY:** classify interpret pattern relationship prediction analyse interpret conclude evaluate rank variable constants control repeat key relationship line graph	**ANIMALS, INCLUDING HUMANS:** Nutrients, Organs, Muscles, Veins, Blood vessel, Blood, Arteries **LIVING THINGS AND THEIR HABITATS:** Arachnid, Reptile, Amphibian, Crustaceans, Vertebrate, Invertebrate, Bird **EVOLUTION AND INHERITANCE: F**ossils, Adaptation, Evolution, Characteristics, Reproduction, Genetics, Inherit **LIGHT:** Light source, Reflection, Refraction, Spectrum, Shadow, Light **ELECTRICITY:** Voltage, Switch, Current, Cell, Conductor, Circuit, Buzzer, Bulb **ENERGY AND CLIMATE CHANGE:** greenhouse effect emissions climate change sustainable solar power wind power hydro power fossil fuels carbon dioxide **WORKING SCIENTIFICALLY:** hypothesis variable constants evaluate plan conclude interpret classify categorise database enquiry control repeat support refute degree of trust scatter graph

Science Long Term Plan

EYFS/KS1 2 year cycle

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
A 2022-2023	Animals including humans – All about me *Human body & 5 senses* *Scientist: Linda Brown Buck*	Animals, including humans – All about animals *Classifying animals* *Scientist: George Mottershead*	Seasonal Changes – Autumn/Winter (including seasonal foods) *Autumn & Winter – weather* *Scientist: George James Symons*	Everyday Materials *Identifying everyday materials & properties* *Scientist/Inventor: Lego – Ole Kirk Christianen*	Plants *Basic parts of plant/Identifying plants* *Scientist (horticulturist): Capability Brown*	Living things and their habitats (Local/UK Habitats and microhabitats) *UK based & biodiversity* *Scientist: Chris Packham, Steve Backshall*
B 2023-2024	Animals including humans – growth *Human growth & development* *Scientist: Louis Pasteur*	Living things and their habitats – habitats around the world) *Global based & biodiversity* *Scientist: Rachel Carson*	Uses of Everyday Materials *Use of materials & changes* *Scientist: Charles Macintosh*	Seasonal Changes – Spring/Summer (including weather) *Spring & Summer – weather & length of day* *Scientist: Christopher Wren, Robert Hooke*	Plants *Needs of plants & lifecycle* *Scientist (horticulturist): Beatrix Potter*	Animals including humans - lifecycles *Animal lifecycles & survival needs* *Scientist: David Attenborough*

KS2 Two year cycle

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
A 2022-2023 Y3/4	Animals incl humans (ourselves) *Movement – skeleton* *Scientist: Marie Curie*	Forces and Magnets *Forces, friction & magnetic attraction* *Scientist: Issac Newton*	States of Matter *Liquids, solids & gases* *Scientist: Lord Kelvin, Antoine Lavoisier, Joseph Priestley*	Plants *Parts of plant & job; growing* *Scientist: George Washington Carver*	Animals including humans (animals) *Healthy balanced diet/need to food for animals to survive* *Scientist: Marie Maynard Daly*	Living things and their habitats *Classifying* *Scientist: Gerald Durrell, Libbie Hayman*
B 2023-2024 Y3/4	Animals inclu humans *Eating, digestion & teeth* *Scientist: William Beaumont*	Light *Light, reflections & shadows* *Scientist: Galileo Galilei*	Electricity *Simple circuits* *Scientist: Garrett Morgan, Thomas Edison, Lewis Latimer*	Sound *Changing sound* *Scientist: Alexander Graham Bell*	Living things and their habitats – Conservation *Reduce, Reuse, Recycle* *Scientist: William Russell, Rex Burch*	Rocks *Rocks, fossils & soil* *Scientist: Mary Leakey, William Smith, Inge Lehmann*
A 2022-2023 Y 5/6	Animals including Humans *Human lifecycle – gestation, puberty & death* *Scientist: Leonardo Da Vinci*	Forces *Gravity, friction, water resistance and air resistance* *Scientist: Stephen Hawking*	Properties and Changes of Materials *Dissolving, separating mixtures and irreversible changes* *Scientist: Stephanie Kwolek*	Earth and Space *Earth & solar system* *Scientist: Margaret Hamilton*	Animals, including humans *Animal & plant lifecycles* *Scientist: Jane Goodall Eva Crane*	Living things and their habitats *Classification Code* *Scientist: Carl Linnaeus*
B 2023-2024 Y5/6	Animals including humans (ourselves) *Healthy bodies* *Scientist: Dr Daniel Hale Williams*	Light *Reflection & refraction, the eye* *Scientist: Albert Einstein*	Electricity *Changing circuits* *Scientist: Steve Jobs*	Evolution and Inheritance *Variation and adaptation* *Scientist: Charles Darwin & Alfred Wallace*	Living things and their habitats - Conservation *Climate Change* *Scientist: David Attenborough*	Living things and their habitats *Micro-organisms* *Scientist: Alexandar Fleming*