Hennock Community Primary School
Science Curriculum

Our Curriculum statements are designed to be used as a supportive tool to plan teaching and learning across our school. The key skills are derived from the National Curriculum and spilt into individual year groups to support a progressive approach and mixed age classes.

We believe that Science permeates every aspect of our lives, from the technology we use on a daily basis to the natural world around us that sustains life on earth. Igniting children's curiosity and passion to question and deepen their knowledge and understanding is central to our role as Science leaders. We believe that through Science, we can support the development of problem solving, critical thinking, evaluating and communicating that can be applied to the everyday challenges they face. We believe that igniting a passion in Science will give children the tools they need to discuss and debate global issues that will impact their lives and prepare them for a changing future.

We believe that our lessons should be rooted in exploration and development of ideas from one lesson to the next, so they can build on their previous learning creating a solid foundation of knowledge. We believe practical experiences should be meaningful and rigorous and lead children to question what they have done and where they should go next. We believe that Science should be inclusive and create experiences where everyone can take part.

Vocabulary

Children's command of vocabulary is fundamental to learning and progress across the curriculum. Vocabulary is developed actively, building systematically on pupil's current knowledge and deepening their understanding

of etymology and morphology (word origins and structures) to increase their store of words. Simultaneously, pupils make links between known and new vocabulary, and discuss and apply shades of meaning. In this way, children expand the vocabulary choices that are available to them. It is essential to introduce technical vocabulary which define each curriculum subject. Vocabulary development is underpinned by an oracy culture and a tiered approach. High value is placed on the conscious, purposeful selection of well-chosen vocabulary and appropriate sentence structure to enrich access to learning and feed into written work across the curriculum.

KS1 Science Vocabulary List

Plants (Y1) Leaf, flower, blossom, petal, fruit, berry, root, seed, trunk, branch, stem, bark, stalk, bud	**Animals inc Humans (Y1)** Head, body, eyes, ears, mouth, teeth, leg, tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves	**Everyday Materials (Y1)** Object, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, card/cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, floppy, waterproof, absorbent, breaks/tears, rough, smooth, shiny, dull,	**Seasonal Change (Y1)** Weather (sunny, rainy, windy, snowy etc.) Seasons (winter, summer, spring, autumn) Sun, sunrise, sunset, day length	**Living Things and their habitats (Y2)** Living, dead, never been alive, suited, suitable, basic needs, food, food chain, shelter, move, feed	**Plants (Y2)** As for Year 1 plus light, shade, sun, warm, cool, water, grow, healthy	**Animals inc Humans (Y2)** Offspring, reproduction, growth, child, young/old stages (examples - chick/hen, baby/child/adult, caterpillar/butterfly), exercise, heartbeat, breathing, hygiene, germs, disease, food types (examples – meat, fish, vegetables, bread, rice, pasta)	**Uses of Everyday Materials (Y2)** As for Year 1 plus opaque, transparent and translucent, reflective, non-reflective, flexible, rigid Shape, push/pushing, pull/pulling, twist/twisting, squash/squashing, bend/bending, stretch/stretching	**Rocks** Rock, stone, pebble, boulder, grain, crystals, layers, hard, soft, texture, absorb water, soil, fossil, marble, chalk, granite, sandstone, slate, soil, peat, sandy/chalk/clay soil

		see-through, not see-through						

Lower KS2 Science Vocabulary List

Plants (Y3)	**Animals inc Humans (Y3)**	**Light (Y3)**	**Forces and Magnets (Y3)**	**Living Things and their habitats (Y4)**	**Animals inc Humans (Y4)**	**States of Matter (Y4)**	**Sound (Y4)**
Photosynthesis, pollen, insect/wind pollination, seed formation, seed dispersal (wind dispersal, animal dispersal, water dispersal	Nutrition, nutrients, carbohydrates, sugars, protein, vitamins, minerals, fibre, fat, water, skeleton, bones, muscles, joints, support, protect, move, skull, ribs, spine	Light, light source, dark, absence of light, transparent, translucent, opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous	Force, push, pull, twist, contact force, non-contact force, magnetic force, magnet, strength, bar magnet,	Classification, classification keys, environment, habitat, human impact, positive, negative, migrate, hibernate	Digestive system, digestion, mouth, teeth, saliva, oesophagus, stomach, small intestine, nutrients, large intestine, rectum,	Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle	Sound, source, vibrate, vibration, travel, pitch (high, low), volume, faint, loud, insulation

			ring magnet, button magnet, horseshoe magnet, attract, repel, magnetic material, metal, iron, steel, poles, north pole, south pole		anus, teeth, incisor, canine, molar, premolars, herbivore, carnivore, omnivore, producer, predator, prey, food chain		
	Electricity (Y4) Electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit,						

	component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol						

Upper KS2 Science Vocabulary List

Living Things and their habitats (Y5)	**Animals including Humans (Y5)**	**Properties and Changes of Materials (Y5)**	**Earth and Space (Year 5)**	**Forces (Y5)**	**Living Things and their habitats (Y6)**	**Animals inc Humans (Y6)**	**Evolution and Inheritance (Y6)**	**Light (Y6)**
Life cycle, reproduce, sexual, sperm, fertilises, egg, live young,	Human development, baby, toddler, child, teenage, adult, puberty,	Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution,	Earth, Sun, Moon, (Mercury, Jupiter, Saturn,	Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple	Vertebrates, fish, amphibians, reptiles, birds, mammals	Heart, pulse, rate, pumps, blood, blood vessels, transport	Offspring, sexual reproduction, vary, characteristics, suited, adapted, environme	Light, light source, dark, absence of light, transparent, translucent,

metamorphosis, asexual, plantlets, runners, bulbs, cuttings	gestation, length, mass, grow, grows, growing	soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material	Venus, Mars, Uranus, Neptune), spherical, solar system, rotates, star, orbit, planets	machines, levers, pulleys, gears	, invertebrates, insects, spiders, snails, worms, flowering, non-flowering	ed, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs, lifestyle	nt, inherited, species, fossils	opaque, shiny, matt, surface, shadow, reflect, mirror, sunlight, dangerous straight lines, light ray
Electricity (Y6) Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery,								

bulb, buzzer, motor, switch, voltage								

As a small school, with classes in curriculum phases, our curriculum is delivered as a two-year rolling programme. Teachers deliver the program of study to afford the greatest opportunity for cross curricular links, although many of the Science units stand alone to avoid tenuous links.

Our rolling program groups units that deal with similar concepts together to enable complete coverage of all curriculum objectives over 2 years.

they are given the opportunity to explore new ideas as well as test them. Curiosity is celebrated within the classroom and when we assess their prior knowledge we also seek to record their questions and ideas for investigations.

We seek opportunities to develop ‘Science Capital’ with Science visits and visitors as well as valuing the experiences and expertise they bring to the lesson. Along with participating in an annual Science week, where children work across phases to upskill our more mature members of the school as well as allowing our younger pupils to explore other aspects of Science.

We use Outdoor Learning, the school grounds and local area to support the delivery of topics across each year, where appropriate.

We teach Science with inclusion in mind, using technology to support children who find sharing their ideas through writing a barrier to their communication. The use of video recording plays an important part in giving all children a voice and allowing them to contribute on an equal footing.

Purely practical based sessions can be recorded using technology, which captures children's observations, discussions and completion of scientific investigations.

The profile of Science is kept high throughout the school with a whole school science board show casing each class's work.

The National Curriculum		
Key stage 1 programme of study - years 1 and 2 **Working scientifically** During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content: • 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 **Notes and guidance (non-statutory)** Pupils in years 1 and 2 should explore the world around them and raise their own questions. They should experience different types of scientific enquiries, including practical activities, and begin to recognise ways in which they might answer scientific questions. They should use simple features to compare objects, materials and living things and, with help,	**Lower key stage 2 programme of study** **Working scientifically** During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content: • 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	**Upper key stage 2 programme of study** **Working scientifically** During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content: • 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

decide how to sort and group them, observe changes over time, and, with guidance, they should begin to notice patterns and relationships. They should ask people questions and use simple secondary sources to find answers. They should use simple measurements and equipment (for example, hand lenses, egg timers) to gather data, carry out simple tests, record simple data, and talk about what they have found out and how they found it out. With help, they should record and communicate their findings in a range of ways and begin to use simple scientific language. These opportunities for working scientifically should be provided across years 1 and 2 so that the expectations in the programme of study can be met by the end of year 2. Pupils are not expected to cover each aspect for every area of study. **Year 1 programme of study** **Plants** Pupils should be taught to: • identify and name a variety of common wild and garden plants, including deciduous and evergreen trees	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 • 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,	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

• identify and describe the basic structure of a variety of common flowering plants, including trees **Notes and guidance (non-statutory)** Pupils should use the local environment throughout the year to explore and answer questions about plants growing in their habitat. Where possible, they should observe the growth of flowers and vegetables that they have planted. They should become familiar with common names of flowers, examples of deciduous and evergreen trees, and plant structures (including leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem). Pupils might work scientifically by: observing closely, perhaps using magnifying glasses, and comparing and contrasting familiar plants; describing how they were able to identify and group them, and drawing diagrams showing the parts of different plants including trees. Pupils might keep records of how plants have changed over time, for example, the leaves falling off trees and buds opening; and compare and contrast what they have found out about different plants. **Animals, including humans** Pupils should be taught to:	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. **Notes and guidance (non-statutory)** Pupils in years 3 and 4 should be given a range of scientific experiences to enable them to raise their own questions about the world around them. They should start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions; recognise when a simple fair	as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments **Notes and guidance (non-statutory)** Pupils in years 5 and 6 should use their science experiences to: explore ideas and raise different kinds of questions; select and plan the most appropriate type of scientific enquiry to use to answer scientific questions; recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why. They should use and develop keys and other information records to

• 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 **Notes and guidance (non-statutory)** Pupils should use the local environment throughout the year to explore and answer questions about animals in their habitat. They should understand how to take care of animals taken from their local environment and the need to return them safely after study. Pupils should become familiar with the common names of some fish, amphibians, reptiles, birds and mammals, including those that are kept as pets. Pupils should have plenty of opportunities to learn the names of the main body parts (including head, neck, arms, elbows, legs, knees, face, ears, eyes,	test is necessary and help to decide how to set it up; talk about criteria for grouping, sorting and classifying; and use simple keys. They should begin to look for naturally occurring patterns and relationships and decide what data to collect to identify them. They should help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used. They should learn how to use new equipment, such as data loggers, appropriately. They should collect data from their own observations and measurements, using notes, simple tables and standard units, and help to make decisions about how to record and analyse this	identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment. They should make their own decisions about what observations to make, what measurements to use and how long to make them for, and whether to repeat them; choose the most appropriate equipment to make measurements and explain how to use it accurately. They should decide how to record data from a choice of familiar approaches; look for different causal relationships in their data and identify evidence that refutes or supports their ideas. They should use

hair, mouth, teeth) through games, actions, songs and rhymes. Pupils might work scientifically by: using their observations to compare and contrast animals at first hand or through videos and photographs, describing how they identify and group them; grouping animals according to what they eat; and using their senses to compare different textures, sounds and smells. **Everyday materials** Pupils should be taught to: • 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 **Notes and guidance (non-statutory)** Pupils should explore, name, discuss and raise and answer questions about everyday materials so that they become familiar with the names of materials and properties such as: hard/soft; stretchy/stiff;	data. With help, pupils should look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions. With support, they should identify new questions arising from the data, making predictions for new values within or beyond the data they have collected, and finding ways of improving what they have already done. They should also recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. Pupils should use relevant scientific language to discuss their ideas and communicate their findings	their results to identify when further tests and observations might be needed; recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact. They should use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas and should talk about how scientific ideas have developed over time. These opportunities for working scientifically should be provided across years 5 and 6 so that the expectations in the programme of study can be met by the end of year 6. Pupils are not

shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent. Pupils should explore and experiment with a wide variety of materials, not only those listed in the programme of study, but including for example: brick, paper, fabrics, elastic, foil.

Pupils might work scientifically by: performing simple tests to explore questions, for example: 'What is the best material for an umbrella? … for lining a dog basket? … for curtains? … for a bookshelf? … for a gymnast's leotard?'

Seasonal changes
Pupils should be taught to:
- observe changes across the 4 seasons
- observe and describe weather associated with the seasons and how day length varies

Notes and guidance (non-statutory)
Pupils should observe and talk about changes in the weather and the seasons.
Note: pupils should be warned that it is not safe to look directly at the sun, even when wearing dark glasses.
Pupils might work scientifically by: making tables and charts about the weather; and making displays

in ways that are appropriate for different audiences.

These opportunities for working scientifically should be provided across years 3 and 4 so that the expectations in the programme of study can be met by the end of year 4. Pupils are not expected to cover each aspect for every area of study.

Year 3 programme of study

Plants
Pupils should be taught to:
- identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers
- explore the requirements of plants

expected to cover each aspect for every area of study.

Year 5 programme of study

Living things and their habitats
Pupils should be taught to:
- 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

Notes and guidance (non-statutory)
Pupils should study and raise questions about their local environment

of what happens in the world around them, including day length, as the seasons change. **Year 2 programme of study** **Living things and their habitats** Pupils should be taught to: • 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 **Notes and guidance (non-statutory)** Pupils should be introduced to the idea that all living things have certain characteristics that are essential for keeping them alive and healthy. They should raise and answer questions that help them to become familiar with the life processes that are	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 **Notes and guidance (non-statutory)** Pupils should be introduced to the relationship between structure and function: the idea that every part has a job to do. They should explore questions that focus on the role of the roots and stem in nutrition and	throughout the year. They should observe life-cycle changes in a variety of living things, for example, plants in the vegetable garden or flower border, and animals in the local environment. They should find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall. Pupils should find out about different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals. Pupils might work scientifically by: observing and comparing the life cycles of plants and

common to all living things. Pupils should be introduced to the terms ‘habitat’ (a natural environment or home of a variety of plants and animals) and ‘microhabitat’ (a very small habitat, for example for woodlice under stones, logs or leaf litter). They should raise and answer questions about the local environment that help them to identify and study a variety of plants and animals within their habitat and observe how living things depend on each other, for example, plants serving as a source of food and shelter for animals. Pupils should compare animals in familiar habitats with animals found in less familiar habitats, for example, on the seashore, in woodland, in the ocean, in the rainforest. Pupils might work scientifically by: sorting and classifying things according to whether they are living, dead or were never alive, and recording their findings using charts. They should describe how they decided where to place things, exploring questions like: ‘Is a flame alive? Is a deciduous tree dead in winter?’ and talk about ways of answering their questions. They could construct a simple food chain that includes humans (eg, grass, cow, human). They could describe the conditions in different habitats and microhabitats (under log, on	support, leaves for nutrition and flowers for reproduction. Note: pupils can be introduced to the idea that plants can make their own food, but at this stage they do not need to understand how this happens. Pupils might work scientifically by: comparing the effect of different factors on plant growth, for example, the amount of light, the amount of fertiliser; discovering how seeds are formed by observing the different stages of plant life cycles over a period of time; looking for patterns in the structure of fruits that relate to how the seeds are dispersed. They might observe how water is transported in plants, for example, by putting cut,	animals in their local environment with other plants and animals around the world (in the rainforest, in the oceans, in desert areas and in prehistoric times), asking pertinent questions and suggesting reasons for similarities and differences. They might try to grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs. They might observe changes in an animal over a period of time (for example, by hatching and rearing chicks), comparing how different animals reproduce and grow. **Animals, including humans**

stony path, under bushes); and find out how the conditions affect the number and type(s) of plants and animals that live there. **Plants** Pupils should be taught to: • 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 **Notes and guidance (non-statutory)** Pupils should use the local environment throughout the year to observe how plants grow. Pupils should be introduced to the requirements of plants for germination, growth and survival, as well as the processes of reproduction and growth in plants. Note: seeds and bulbs need water to grow but most do not need light; seeds and bulbs have a store of food inside them. Pupils might work scientifically by: observing and recording, with some accuracy, the growth of a variety of plants as they change over time from a seed or bulb, or observing similar plants at different stages of growth; setting up a comparative test to	white carnations into coloured water and observing how water travels up the stem to the flowers. **Animals, including humans** Pupils should be taught to: • 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 **Notes and guidance (non-statutory)** Pupils should continue to learn about the importance of nutrition and should be introduced to the main body	Pupils should be taught to: • describe the changes as humans develop to old age **Notes and guidance (non-statutory)** Pupils should draw a timeline to indicate stages in the growth and development of humans. They should learn about the changes experienced in puberty. Pupils could work scientifically by researching the gestation periods of other animals and comparing them with humans; by finding out and recording the length and mass of a baby as it grows. **Properties and changes of materials**

show that plants need light and water to stay healthy. **Animals, including humans** Pupils should be taught to: • 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 **Notes and guidance (non-statutory)** Pupils should be introduced to the basic needs of animals for survival, as well as the importance of exercise and nutrition for humans. They should also be introduced to the processes of reproduction and growth in animals. The focus at this stage should be on questions that help pupils to recognise growth; they should not be expected to understand how reproduction occurs. The following examples might be used: egg, chick, chicken; egg, caterpillar, pupa, butterfly; spawn, tadpole, frog; lamb, sheep. Growing into adults can include reference to baby, toddler, child, teenager,	parts associated with the skeleton and muscles, finding out how different parts of the body have special functions. Pupils might work scientifically by: identifying and grouping animals with and without skeletons and observing and comparing their movement; exploring ideas about what would happen if humans did not have skeletons. They might compare and contrast the diets of different animals (including their pets) and decide ways of grouping them according to what they eat. They might research different food groups and how they keep us healthy, and design meals based on what they find out. **Rocks**	Pupils should be taught to: • 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,

adult. Pupils might work scientifically by: observing, through video or first-hand observation and measurement, how different animals, including humans, grow; asking questions about what things animals need for survival and what humans need to stay healthy; and suggesting ways to find answers to their questions. **Uses of everyday materials** Pupils should be taught to: • 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 **Notes and guidance (non-statutory)** Pupils should identify and discuss the uses of different everyday materials so that they become familiar with how some materials are used for more than one thing (metal can be used for coins, cans, cars and table legs; wood can be used for matches, floors, and telegraph poles) or different materials are used for the same thing (spoons can be made	Pupils should be taught to: • 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 **Notes and guidance (non-statutory)** Linked with work in geography, pupils should explore different kinds of rocks and soils, including those in the local environment. Pupils might work scientifically by: observing	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

from plastic, wood, metal, but not normally from glass). They should think about the properties of materials that make them suitable or unsuitable for particular purposes and they should be encouraged to think about unusual and creative uses for everyday materials. Pupils might find out about people who have developed useful new materials, for example John Dunlop, Charles Macintosh or John McAdam. Pupils might work scientifically by: comparing the uses of everyday materials in and around the school with materials found in other places (at home, the journey to school, on visits, and in stories, rhymes and songs); observing closely, identifying and classifying the uses of different materials, and recording their observations.	rocks, including those used in buildings and gravestones, and exploring how and why they might have changed over time; using a hand lens or microscope to help them to identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them. Pupils might research and discuss the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed. Pupils could explore different soils and identify similarities and differences between them and investigate what happens when rocks are rubbed together or what changes occur when they are in water. They can raise and	**Notes and guidance (non-statutory)** Pupils should build a more systematic understanding of materials by exploring and comparing the properties of a broad range of materials, including relating these to what they learnt about magnetism in year 3 and about electricity in year 4. They should explore reversible changes, including evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes. Pupils should explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example, vinegar with bicarbonate

	answer questions about the way soils are formed. **Light** Pupils should be taught to: • 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	of soda. They should find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton. Note: pupils are not required to make quantitative measurements about conductivity and insulation at this stage. It is sufficient for them to observe that some conductors will produce a brighter bulb in a circuit than others and that some materials will feel hotter than others when a heat source is placed against them. Safety guidelines should be followed when burning materials.

	Notes and guidance (non-statutory) Pupils should explore what happens when light reflects off a mirror or other reflective surfaces, including playing mirror games to help them to answer questions about how light behaves. They should think about why it is important to protect their eyes from bright lights. They should look for, and measure, shadows, and find out how they are formed and what might cause the shadows to change. Note: pupils should be warned that it is not safe to look directly at the sun, even when wearing dark glasses. Pupils might work scientifically by: looking for patterns in what happens to shadows when the light	Pupils might work scientifically by: carrying out tests to answer questions, for example, 'Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?' They might compare materials in order to make a switch in a circuit. They could observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes. They might research and discuss how chemical changes have an impact on our lives, for example, cooking, and discuss the creative use of new materials such as

	source moves or the distance between the light source and the object changes. **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	polymers, super-sticky and super-thin materials. **Earth and space** Pupils should be taught to: • 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

	• describe magnets as having 2 poles • predict whether 2 magnets will attract or repel each other, depending on which poles are facing **Notes and guidance (non-statutory)** Pupils should observe that magnetic forces can act without direct contact, unlike most forces, where direct contact is necessary (for example, opening a door, pushing a swing). They should explore the behaviour and everyday uses of different magnets (for example, bar, ring, button and horseshoe). Pupils might work scientifically by: comparing how different things move and grouping them; raising questions and carrying out	**Notes and guidance (non-statutory)** Pupils should be introduced to a model of the sun and Earth that enables them to explain day and night. Pupils should learn that the sun is a star at the centre of our solar system and that it has 8 planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006). They should understand that a moon is a celestial body that orbits a planet (Earth has 1 moon; Jupiter has 4 large moons and numerous smaller ones). Note: pupils should be warned that it is not safe to look directly at the sun, even when wearing dark

	tests to find out how far things move on different surfaces, and gathering and recording data to find answers to their questions; exploring the strengths of different magnets and finding a fair way to compare them; sorting materials into those that are magnetic and those that are not; looking for patterns in the way that magnets behave in relation to each other and what might affect this, for example, the strength of the magnet or which pole faces another; identifying how these properties make magnets useful in everyday items and suggesting creative uses for different magnets. **Year 4 programme of study**	glasses. Pupils should find out about the way that ideas about the solar system have developed, understanding how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists such as Ptolemy, Alhazen and Copernicus. Pupils might work scientifically by: comparing the time of day at different places on the Earth through internet links and direct communication; creating simple models of the solar system; constructing simple shadow clocks and sundials, calibrated to show midday and the

	Living things and their habitats Pupils should be taught to: • 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 **Notes and guidance (non-statutory)** Pupils should use the local environment throughout the year to raise and answer questions that help them to identify and study plants and animals in their habitat.	start and end of the school day; finding out why some people think that structures such as Stonehenge might have been used as astronomical clocks. **Forces** Pupils should be taught to: • 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

	They should identify how the habitat changes throughout the year. Pupils should explore possible ways of grouping a wide selection of living things that include animals, flowering plants and non-flowering plants. Pupils could begin to put vertebrate animals into groups, for example: fish, amphibians, reptiles, birds, and mammals; and invertebrates into snails and slugs, worms, spiders, and insects. Note: plants can be grouped into categories such as flowering plants (including grasses) and non-flowering plants, for example ferns and mosses. Pupils should explore examples of human impact (both positive and negative)	including levers, pulleys and gears allow a smaller force to have a greater effect **Notes and guidance (non-statutory)** Pupils should explore falling objects and raise questions about the effects of air resistance. They should explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall. They should experience forces that make things begin to move, get faster or slow down. Pupils should explore the effects of friction on movement and find out how it slows or stops moving objects, for example, by observing the effects of a brake on a

	on environments, for example, the positive effects of nature reserves, ecologically planned parks, or garden ponds, and the negative effects of population and development, litter or deforestation. Pupils might work scientifically by: using and making simple guides or keys to explore and identify local plants and animals; making a guide to local living things; raising and answering questions based on their observations of animals and what they have found out about other animals that they have researched. **Animals, including humans** Pupils should be taught to:	bicycle wheel. Pupils should explore the effects of levers, pulleys and simple machines on movement. Pupils might find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation. Pupils might work scientifically by: exploring falling paper cones or cupcake cases, and designing and making a variety of parachutes and carrying out fair tests to determine which designs are the most effective. They might explore resistance in water by making and testing boats of different shapes. They might design and make products that use levers, pulleys, gears and/or

	• 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 **Notes and guidance (non-statutory)** Pupils should be introduced to the main body parts associated with the digestive system, for example: mouth, tongue, teeth, oesophagus, stomach, and small and large intestine, and explore questions that help them to understand their special functions.	springs and explore their effects. **Year 6 programme of study** **Living things and their habitats** Pupils should be taught to: • 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 **Notes and guidance (non-statutory)**

	Pupils might work scientifically by: comparing the teeth of carnivores and herbivores and suggesting reasons for differences; finding out what damages teeth and how to look after them. They might draw and discuss their ideas about the digestive system and compare them with models or images. **States of matter** Pupils should be taught to: • 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	Pupils should build on their learning about grouping living things in year 4 by looking at the classification system in more detail. They should be introduced to the idea that broad groupings, such as micro-organisms, plants and animals can be subdivided. Through direct observations where possible, they should classify animals into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals). They should discuss reasons why living things are placed in one group and not another. Pupils might find out about the significance of the work of scientists such as Carl

	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 **Notes and guidance (non-statutory)** Pupils should explore a variety of everyday materials and develop simple descriptions of the states of matter (solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container). Pupils should observe water as a solid, a liquid and a gas and should note the changes to water when it is heated or cooled. Note: teachers should avoid using materials where	Linnaeus, a pioneer of classification. Pupils might work scientifically by: using classification systems and keys to identify some animals and plants in the immediate environment. They could research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system. **Animals including humans** Pupils should be taught to: • identify and name the main parts of the human circulatory system, and describe the functions of the

	heating is associated with chemical change, for example, through baking or burning. Pupils might work scientifically by: grouping and classifying a variety of different materials; exploring the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party). They could research the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid. They might observe and record evaporation over a period of time, for example, a puddle in the playground or washing on a line, and investigate the effect of	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 **Notes and guidance (non-statutory)** Pupils should build on their learning from years 3 and 4 about the main body parts and internal organs (skeletal, muscular and digestive system) to explore and answer questions that help them to understand how the circulatory system enables the body to function.

	temperature on washing drying or snowmen melting. **Sound** Pupils should be taught 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 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	Pupils should learn how to keep their bodies healthy and how their bodies might be damaged – including how some drugs and other substances can be harmful to the human body. Pupils might work scientifically by: exploring the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health. **Evolution and inheritance** Pupils should be taught to: • recognise that living things have changed over time and that fossils

	Notes and guidance (non-statutory) Pupils should explore and identify the way sound is made through vibration in a range of different musical instruments from around the world; and find out how the pitch and volume of sounds can be changed in a variety of ways. Pupils might work scientifically by: finding patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses. They might make earmuffs from a variety of different materials to investigate which provides the best insulation against sound. They could make and play their own instruments by using what	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 **Notes and guidance (non-statutory)** Building on what they learned about fossils in the topic on rocks in year 3, pupils should find out more about how living

	they have found out about pitch and volume. **Electricity** Pupils should be taught to: • 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	things on earth have changed over time. They should be introduced to the idea that characteristics are passed from parents to their offspring, for instance by considering different breeds of dogs, and what happens when, for example, labradors are crossed with poodles. They should also appreciate that variation in offspring over time can make animals more or less able to survive in particular environments, for example, by exploring how giraffes' necks got longer, or the development of insulating fur on the arctic fox. Pupils might find out about the work of palaeontologists such as Mary Anning and about

	lights in a simple series circuit • recognise some common conductors and insulators, and associate metals with being good conductors **Notes and guidance (non-statutory)** Pupils should construct simple series circuits, trying different components, for example, bulbs, buzzers and motors, and including switches, and use their circuits to create simple devices. Pupils should draw the circuit as a pictorial representation, not necessarily using conventional circuit symbols at this stage; these will be introduced in year 6. Note: pupils might use the terms current and voltage,	how Charles Darwin and Alfred Wallace developed their ideas on evolution. Note: at this stage, pupils are not expected to understand how genes and chromosomes work. Pupils might work scientifically by: observing and raising questions about local animals and how they are adapted to their environment; comparing how some living things are adapted to survive in extreme conditions, for example, cactuses, penguins and camels. They might analyse the advantages and disadvantages of specific adaptations, such as being on 2 feet rather than 4, having a long or a short beak, having gills or

	but these should not be introduced or defined formally at this stage. Pupils should be taught about precautions for working safely with electricity. Pupils might work scientifically by: observing patterns, for example, that bulbs get brighter if more cells are added, that metals tend to be conductors of electricity, and that some materials can and some cannot be used to connect across a gap in a circuit.	lungs, tendrils on climbing plants, brightly coloured and scented flowers. **Light** Pupils should be taught to: • 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 **Notes and guidance (non-statutory)** Pupils should build on the work on light in year 3, exploring the way that light behaves, including light sources, reflection and shadows. They should talk about what happens and make predictions. Pupils might work scientifically by: deciding where to place rear-view mirrors on cars; designing and making a periscope and using the idea that light appears to travel in straight lines to explain how it works. They might

		investigate the relationship between light sources, objects and shadows by using shadow puppets. They could extend their experience of light by looking a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water, and coloured filters (they do not need to explain why these phenomena occur). **Electricity** Pupils should be taught to: • 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 **Notes and guidance (non-statutory)** Building on their work in year 4, pupils should construct simple series circuits, to help them to answer questions about what happens when they try different components, for example, switches, bulbs, buzzers and motors. They should learn

		how to represent a simple circuit in a diagram using recognised symbols. Note: pupils are expected to learn only about series circuits, not parallel circuits. Pupils should be taught to take the necessary precautions for working safely with electricity. Pupils might work scientifically by: systematically identifying the effect of changing one component at a time in a circuit; designing and making a set of traffic lights, a burglar alarm or some other useful circuit.

Curriculum Overview at Hennock

At Hennock we use Cornerstones Education's subject scheme to deliver the science curriculum. Science programmes of study in the national curriculum are assigned to year groups. However, this is not compulsory and they must be covered before the end of the phase. We have organised the scheme so that science projects are delivered in a two-year rolling programme in termly or half-termly blocks across the year. Physics is not formally introduced until Key Stage 2. However, in Key Stage 1, children have opportunities to explore natural phenomena, such as shadows.

In the Cornerstones Curriculum, the names of the science projects are matched to the national curriculum aspects, for example, Living things and their habitats and Earth and space and in Key Stage 1, the aspect of Animals, including humans has been separated so that children study humans before expanding to explore animals.

The science projects are sequenced to develop both children's substantive and declarative knowledge, and if possible, make meaningful links to other projects. For example, in Lower KS2, the projects Plant Nutrition and Reproduction is taught alongside the design and technology project Greenhouse and the art and design project Beautiful Botanicals. These links allow children to embed their substantive knowledge in new and often real-life contexts.

The sequencing of projects ensures that children have the substantive knowledge and vocabulary to comprehend subsequent projects fully. Each project's place in the year has also been carefully considered. For example, projects that involve growing plants or observing animals are positioned at a suitable time of year to give children the best possible opportunity to make first-hand observations. Within all the science projects, disciplinary knowledge is embedded within substantive content.

Links with EYFS

The science curriculum begins as soon as the children start school in the EYFS. Learning in science links to the EYFS Statutory Educational Programme: Understanding the world. The activities and enhanced provision in our early years curriculum guide children to make sense of their physical world. They build essential knowledge and understanding that they will apply in science in KS1. Throughout their time in the EYFS explore and understand seasonal changes in the natural world around them.

Key Stage 1

In Cycle A children begin the autumn term with the project Human Survival, learning about the survival needs of humans, before expanding to study animals within their habitats in the project Habitats.
In the spring term, children learn about Seasonal Changes, they learn broadly about seasonal changes linked to weather, living things and day length. The Plant Survival project also explores survival, with children observing what plants need to grow and stay healthy.
Finally, in the summer term, the project Animal Survival, revisits learning from the autumn term, thinking about what animals need to survive.

In Cycle B children start the autumn term with Everyday Materials, linking this learning to the design and technology project Shade and Shelter. In the Human Senses project, they learn about parts of the human body and those associated with the senses.
In the spring term, children develop their understanding of materials in the project Uses of Materials and begin to understand changes in materials through simple physical manipulation, such as bending and twisting.
In the summer term, they explore seasonal changes in the project Plant Parts. They finish with the project Animal Parts, linking back to their knowledge about body parts and senses and identifying commonalities.

Lower Key Stage 2

In Cycle A, children start their scientific learning with the project Light and Shadows, where they are explicitly introduced to the subject of light, with children learning about shadows and reflections, revisiting language

from Key Stage 1, including opaque and transparent. The second autumn term project, Sound, introduces the concept of sound, with children identifying how sounds are made and travel. They learn and use new vocabulary, such as pitch and volume, and identify properties of materials associated with these concepts.
In the spring term, children study electricity by creating and recording simple circuits in the project Electrical Circuits and Conductors. They build on their knowledge of the properties of materials, identifying electrical conductors and insulators.
Children begin to link structure to function in the summer Plant Nutrition and Reproduction project, identifying the plant parts associated with reproduction and water transport. Up to this point, children have had many opportunities for grouping and sorting living things.
In the project Grouping and Classifying, children recognise this as ‘classification’ and explore classification keys.

In Cycle B, having learned about human body parts, the senses and survival in Key Stage 1, children now focus on specific body systems and nutrition in Key Stage 2. In the autumn term, they learn about the skeletal and muscular systems in the project Animal Nutrition and the Skeletal System. This learning again links to other animals, with children identifying similarities and differences. Children also learn about healthy diets alongside the autumn term design and technology project Cook Well, Eatwell.
In the spring term, children link their scientific learning to the geography project Rocks, Relics and Rumbles to learn about rocks and soil. In the project Forces and Magnets, children identify magnetic materials and learn about the non-contact force of magnetism. They also begin to learn about contact forces, investigating how things move over surfaces.
In the summer term, children continue their learning about the human body as they learn about the digestive system, again making comparisons to other animals, in the project Digestive System. They finish their learning with the project States of Matter. Children learn about solids, liquids and gases and their characteristics. They understand how temperature drives the change of state.

Upper Key Stage 2

In Cycle A, children learn about the circulatory system and its roles in transporting water, nutrients and gases in the autumn term project Circulatory System. They also learn about how to keep their bodies healthy.
In the spring term, children learn about living things and their habitats and link this learning to the geography project Frozen Kingdoms.
In the summer term, children broaden their knowledge of forces, including gravity and air and water resistance, in the project Forces and Mechanisms. They revisit learning from design and technology projects, including Making It Move and Moving Mechanisms, to explore various mechanisms and their uses. Their knowledge of gravity supports the autumn term project Earth and Space, so they can understand the forces that shape planets and our solar system. They also develop their understanding of day and night, first explored in the KS1 project Seasonal Changes.

In Cycle B, children use the project Properties and Changes of Materials to revisit much of their prior learning about materials' properties and learn new properties, including thermal conductivity and solubility. To this point, children have learned much about reversible changes, such as melting and freezing, but now extend their learning to irreversible changes, including chemical changes.
Having learned that animals and plants produce offspring in earlier projects, children now focus on the human life cycle and sexual reproduction in the spring term project Human Reproduction and Ageing.
In the summer project Light Theory, children recognise that light travels in straight lines from a source or reflector to the eye and explain the shape of shadows. Finally, in the project Evolution and Inheritance, children learn about inheritance and understand why offspring are not identical to their parents. They also learn about natural selection and how this can lead to the evolution of a species.

Inclusive Approaches adopted at Hennock

At Hennock, we work to ensure that all children receive a broad and balanced curriculum where children can access the knowledge and skills with support in place to ensure that no child is left behind.

We accomplish this through the use of Ordinarily Available Inclusive Provision approaches.

These may include, but is not exhaustive, examples of the following:

Cloze paragraphs, widgets for technical vocabulary, adapted outcomes, recording pupil knowledge and understanding through scribing, video recordings of pupils investigation, laptops for extended pieces of writing, widgets and vocabulary on display, pastel coloured slides, neutral backgrounds on displays and scaffolded independent tasks

In order to assess impact - a guide

At the beginning of each unit an assessment children complete an elicitation task in the form of an 'Enquiry question', with a focus on the application of key subject specific vocabulary that will be taught during that unit.

At the end of the unit knowledge and understanding is measured through the use of an end of unit assessment and by answering the unit enquiry question with children completing the same task to measure progression based on the use of the key subject specific vocabulary.

At the end of every lesson, teachers will complete Knowledge ROCKS (Retrieval of Core Knowledge) where they ask children questions on identified knowledge from previous unites to ensure that children's learning and understanding is fully secure.

The class teacher will review the end of unit assessments and children have the opportunity to respond to misconceptions the following lesson.

During each teaching unit, teachers use AFL to pick up on misconceptions that occur during the lesson. These are often addressed in the moment and explored through oracy or through the schools feedback policy, which is addressed at the start of the next lesson. Teachers also assess children's Working Scientifically skills during the lesson and look for areas that require further development. A final judgement for Working Scientifically is

only made at the end of the Key Stage phase when children have had the opportunity to explore all aspects of the investigation cycle and had the opportunity to make these skills more substantive.

The progress of children with SEND who find writing and communication a barrier to completing a written assessment can be assessed using scribing, which is repeated at the end of unit. From this, the teacher is able to make a judgement of progress achieved from the beginning to the end of the unit.

At the end of every lesson, teachers complete a coverage assessment for key skills taught in that lesson to monitor that children are being taught key skills regularly throughout the year these can be adjusted for pupils who haven't fully secured the skill taught.

There is an expectation that work in Science books will be the same quality as that in English books with regard to presentation.

We measure the impact of Science through the following methods:

Elicitation and End of Unit Enquiry Question#
End of Unit Assessment
Marking written work
Moderation of children's learning in staff meetings, allowing opportunities for dialogue between staff members.
Annual reporting to parents on their child's progress
Learning walks
Moderation of children's learning across our Academy
Interviewing the children about their learning (Pupil Voice)
Lesson observations
Book Scrutiny
Ensuring knowledge and progression of skills is being taught.