Progression in Science

Intent

We aim for children to have acquired the essential characteristics of scientists:

• The ability to think independently and raise questions about working scientifically and the knowledge and skills that it brings.

• Confidence and competence in the full range of practical skills, taking the initiative in, for example, planning and carrying out scientific investigations.

• Excellent scientific knowledge and understanding which is demonstrated in written and verbal explanations, solving challenging problems and reporting scientific findings.

• High levels of originality, imagination or innovation in the application of skills.

• The ability to undertake practical work in a variety of contexts, including fieldwork.

• A passion for science and its application in past, present and future technologies

Implementation:

1. Curriculum drivers (Spirituality, Democracy, Possibilities and Community) shape our curriculum breadth in science. They are derived from an exploration of the backgrounds of our students, our beliefs about high quality education and our values. They are used to ensure we give our students appropriate and ambitious curriculum opportunities.
2. Cultural capital gives our students the vital background knowledge required to be informed and thoughtful members of our community who understand and believe in British values.
3. Curriculum breadth is shaped by our curriculum drivers, cultural capital, subject topics and our ambition for students to study the best of what has been thought and said by many generations of academics and scholars.
4. Our curriculum distinguishes between subject topics and 'threshold concepts'. Subject topics are the specific aspects of subjects that are studied.
5. **Threshold concepts** tie together the subject topics into meaningful schema. The same concepts are explored in a wide breadth of topics. Through this 'forwards-and-backwards engineering' of the curriculum, students return to the same concepts over and over and gradually build understanding of them. In Science, these threshold concepts are; **Work scientifically, Biology, Chemistry and Physics.**

6. **Knowledge categories:** These categories help students to relate each topic to previously studied topics and to form strong, meaningful schema. In Science these knowledge categories include: **Living things, Forces, Light and sound, Earth and Space, Evolution and inheritance, Electricity and Materials.**
7. Cognitive science tell us that working memory is limited and that cognitive load is too high if students are rushed through content. This limits the acquisition of long-term memory. Cognitive science also tells us that in order for students to become creative thinkers, or have a greater depth of understanding they must first master the basics, which taken time.
8. **Milestones:** For each of the threshold concepts three Milestones, each of which includes the procedural and Knowledge categories in each subject give students a way of expressing their understanding of the threshold concepts. Milestone 1 is to taught across Years 1 and 2, milestone 2 is taught across Year 3 and 4 and milestone 3 is taught across Year 5 and Year 6
9. **Cognitive Domains:** Within each Milestone, students gradually progress in their procedural fluency and semantic strength through three cognitive domains: basic, advancing and deep. The goal for students is to display sustained mastery at the 'advancing' stage of understanding by the end of each milestone and for the most able to have a greater depth of understanding at the 'deep' stage.
10. **Driver words-** move the learning from basic to deep and show progression through the milestones.
11. **Pedagogical Content Knowledge and Strategies:** As part of our progression model we use a different pedagogical style in each of the cognitive domains of basic, advancing and deep. This is based on the research of Sweller, Kirschner and Rosenshine who argue to direct instruction in the early stages of learning and discovery based approaches later. We use direct instruction in the basic domain and problem based discovery in the deep domain. This is called the reversal effect.
12. Also as part of our progression model we use POP tasks (Proof of Progress) which shows our curriculum expectations in each cognitive domain.
13. Our curriculum design is based on evidence from cognitive science; three main principles underpin it:
    - Learning is most effective with spaced repetition.
    - Interleaving helps pupils to discriminate between topics and aids long-term retention.
    - Retrieval of previously learned content is frequent and regular, which increases both storage and retrieval strength.
14. In addition to the three principles we also understand that learning is invisible in the short-term and that sustained mastery takes time.
15. Our content is subject specific. We make intra-curricular links to strengthen schema.
16. Continuous provision, in the form of daily routines, replaces the teaching of some aspects of the curriculum and, in other cases, provides retrieval practice for previously learned content.

Milestone 1 Key Stage 1	Milestone 2 Lower Key Stage 2	Milestone 3 Upper Key Stage 2
Working scientifically		
Ask simple questions. • Observe closely, using simple equipment. • Perform simple tests. • Identify and classify. • Use observations and ideas to suggest answers to questions. • Gather and record data to help in answering questions.	• Ask relevant questions. • Set up simple, practical enquiries and comparative and fair tests. • Make accurate measurements using standard units, using a range of equipment, e.g. thermometers and data loggers. • Gather, record, classify and present data in a variety of ways to help in answering questions. • Record findings using simple scientific language, drawings, labelled diagrams, bar charts and tables. • Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. • Use results to draw simple conclusions and suggest improvements, new questions and predictions for setting up further tests. • Identify differences, similarities or changes related to simple, scientific ideas and processes. • Use straightforward, scientific evidence to answer questions or to support their findings.	Plan enquiries, including recognising and controlling variables where necessary. • Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work. • Take measurements, using a range of scientific equipment, with increasing accuracy and precision. • Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs, and models. • Report findings from enquiries, including oral and written explanations of results, explanations involving causal relationships, and conclusions. • Present findings in written form, displays and other presentations. • Use test results to make predictions to set up further comparative and fair tests. • Use simple models to describe scientific ideas, identifying scientific evidence that has been used to support or refute ideas or arguments.

Understanding plants - LIVING THINGS

AUTUMN SPRING SUMMER CONTINUOUS PROVISION National Curriculum Year Group

NC1 Identify and name a variety of common plants, including garden plants, wild plants and trees and those classified as deciduous and evergreen. NC1 Identify and describe the basic structure of a variety of common flowering plants, including roots, stem/trunk, leaves and flowers. • NC2 Observe and describe how seeds and bulbs grow into mature plants. • NC2Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.	NC3 Identify and describe the functions of different parts of flowering plants: roots, stem, leaves and flowers. • NC3 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. • NC3 Investigate the way in which water is transported within plants. • NC3 Explore the role of flowers in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	*Relate knowledge of plants to studies of evolution and inheritance.* • *Relate knowledge of plants to studies of all living things*

Understand animals and humans - LIVING THINGS

NC1 Identify and name a variety of common animals that are birds, fish, amphibians, reptiles, mammals and invertebrates. NC1 Identify and name a variety of common animals that are carnivores, herbivores and omnivores. NC1 Describe and compare the structure of a variety of common animals (birds, fish, amphibians, reptiles, mammals and invertebrates, including pets). NC1 Identify name, draw and label the basic parts of the human body and say	• NC2 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. • NC4Construct and interpret a variety of food chains, identifying producers, predators and prey NC2 Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain,	• NC5Describe the changes as humans develop to old age. • NC6Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. • NC6Recognise the importance of diet, exercise, drugs and lifestyle on the way the human body functions. • NC6Describe the ways in which nutrients and water are transported within animals, including humans.

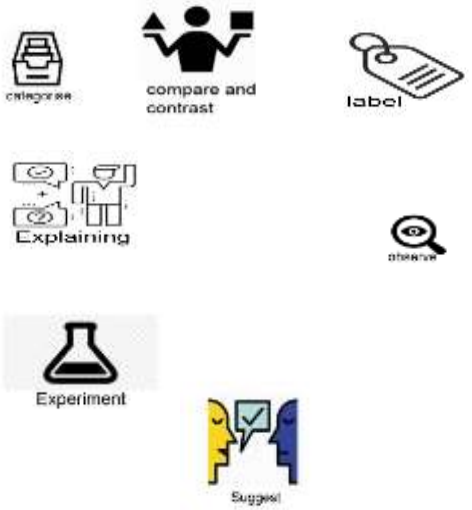
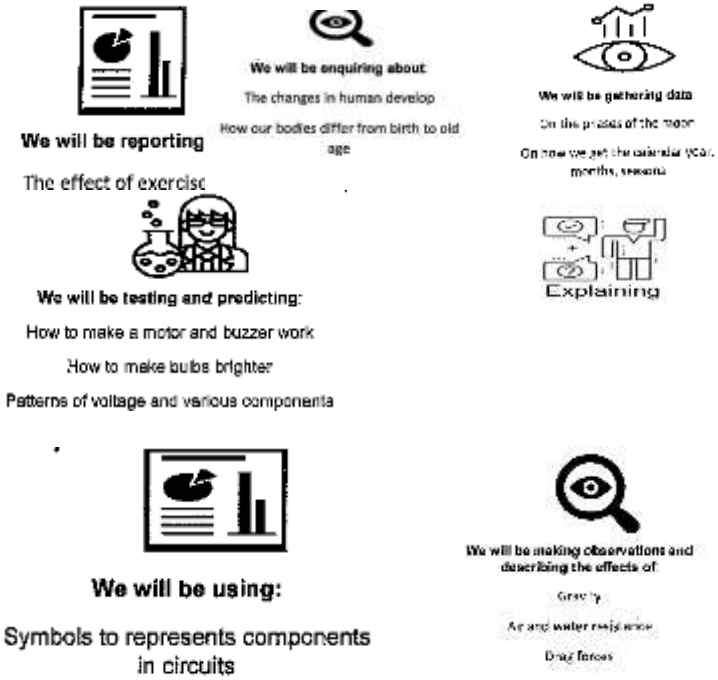
which part of the body is associated with each sense. • NC2 Notice that animals, including humans, have offspring which grow into adults. • NC2 Investigate and describe the basic needs of animals, including humans, for survival (water, food and air). • NC2 Describe the importance for humans of exercise, eating the right amounts of different types of food and hygiene.	and identify and name different sources of food. NC3Identify that humans and some animals have skeletons and muscles for support, protection and movement. NC4Identify the different types of teeth in humans and their simple functions. NC3 Identify that animals, including humans, need the right types and amounts of nutrition, that they cannot make their own food and they get nutrition from what they eat. NC4Describe the simple functions of the basic parts of the digestive system in humans.	
Investigate living things – LIVING THINGS 		
NC2Explore and compare the differences between things that are living, that are dead and that have never been alive. • NC2 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.	NC4 Recognise that living things can be grouped in a variety of ways. • NC4 Explore and use classification keys to help group, identify and name a variety of living thing in their local and wider environments. • NC4Recognise that environments can change and that this can sometimes pose dangers to specific habitats.	• NC5Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. • NC5Describe the life process of reproduction in some plants and animals. • NC6Describe 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. • NC6 Give reasons for classifying plants and animals based on specific characteristics.

• NC2Identify and name a variety of plants and animals in their habitats, including micro-habitats. • NC2Describe 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.		
Understand evolution and inheritance – EVOLUTION AND INHERITANCE 		
Identify how humans resemble their parents in many features.	• *Identify how plants and animals, including humans, resemble their parents in many features.* • NC6 *Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.* • NC6 *Identify how animals and plants are suited to and adapt to their environment in different ways*	• NC6Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. • NC6Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. • NC6Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
Investigate materials – PROPERTIES OF MATERIALS 		
NC1Distinguish between an object and the material from which it is made. • NC1Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock.	**Rocks and Soils** • NC3 Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.	NC5Compare and group together everyday materials based on evidence from comparative and fair tests, including their hardness, solubility, conductivity (electrical and thermal), and response to magnets. • NC5 Understand how some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution.

• NC1 Describe the simple physical properties of a variety of everyday materials. • NC1Compare and group together a variety of everyday materials on the basis of their simple physical properties. • NC2 Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. • NC2 Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick/rock, and paper/cardboard for particular uses.	*• Relate the simple physical properties of some rocks to their formation (igneous or sedimentary).* • NC3 Describe in simple terms how fossils are formed when things that have lived are trapped within sedimentary rock. • NC3 Recognise that soils are made from rocks and organic matter. **States of Matter** • NC4Compare and group materials together, according to whether they are solids, liquids or gases. • NC4 Observe that some materials change state when they are heated or cooled, and measure the temperature at which this happens in degrees Celsius (°C), building on their teaching in mathematics. • NC4Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	• NC5Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. • NC5Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. • NC5Demonstrate that dissolving, mixing and changes of state are reversible changes. • NC5 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, oxidisation and the action of acid on bicarbonate of soda.
Understand movement, forces and magnets – FORCES 		
• *Notice and describe how things move, using simple comparisons such as faster and slower.* • *Compare how different things move.*	NC3 Compare how things move on different surfaces.	**Magnets** • NC3 Describe magnets as having two poles.

	• NC3 Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • NC3 Observe how magnets attract or repel each other and attract some materials and not others. • NC3 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. • NC3 Describe magnets as having two poles. • NC3 Predict whether two magnets will attract or repel each other, depending on which poles are facing.	• NC3Predict whether two magnets will attract or repel each other, depending on which poles are facing. **Forces** • NC5Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. • NC5Identify the effect of drag forces, such as air resistance, water resistance and friction that act between moving surfaces. • *Describe, in terms of drag forces, why moving objects that are not driven tend to slow down.* • *Understand that force and motion can be transferred through mechanical devices such as gears, pulleys, levers and springs.* • NC5 Understand that some mechanisms including levers, pulleys and gears, allow a smaller force to have a greater effect.
Understand light and seeing – LIGHT AND SOUND 		
Observe and name a variety of sources of light, including electric lights, flames and the Sun, explaining that we see things because light travels from them to our eyes.	NC3Recognise that they need light in order to see things and that dark is the absence of light. • NC3 Notice that light is reflected from surfaces. • NC3 Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.	NC6Understand that light appears to travel in straight lines. • NC6Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eyes. • NC6 Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them, and to predict the size of shadows when the position of the light source changes.

	• NC3Recognise that shadows are formed when the light from a light source is blocked by a solid object. • NC3 Find patterns in the way that the size of shadows change.	• NC6 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.
Investigate sound and hearing – LIGHT AND SOUND 		
• *Observe and name a variety of sources of sound, noticing that we hear with our ears.*	• NC4 Identify how sounds are made, associating some of them with something vibrating. • NC4 Recognise that vibrations from sounds travel through a medium to the ear.	NC4 Find patterns between the pitch of a sound and features of the object that produced it. • NC4 Find patterns between the volume of a sound and the strength of the vibrations that produced it. • NC4 Recognise that sounds get fainter as the distance from the sound source increases.
Understand electrical circuits – ELECTRICITY 		
NC4*Identify common appliances that run on electricity.* • NC4 *Construct a simple series electrical circuit.*	NC4identify common appliances that run on electricity. • NC4Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. • NC4Identify 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. • NC4Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.	• NC6Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. • NC6Compare 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. • NC6 Use recognised symbols when representing a simple circuit in a diagram.

	• NC4Recognise some common conductors and insulators, and associate metals with being good conductors.	
Understand the Earth's movement in space - EARTH AND SPACE		
Observe the apparent movement of the Sun during the day. • NC1 Observe changes across the four seasons. • NC1 Observe and describe weather associated with the seasons and how day length varies.	• NC5*Describe the movement of the Earth relative to the Sun in the solar system.* • NC5*Describe the movement of the Moon relative to the Earth.*	NC5Describe the movement of the Earth, and other planets, relative to the Sun in the solar system. • NC5Describe the movement of the Moon relative to the Earth. • NC5 Describe the Sun, Earth and Moon as approximately spherical bodies. • NC5 Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.
Driver Word's Progression		
		

Progression in Science Vocabulary

Milestone 1 Key Stage 1	Milestone 2 Lower Key Stage 2	Milestone 3 Upper Key Stage 2
Tier 2 vocab- Diver words.		
Draw, label, name, recognise, describe, match, identify, observe, list, apply, follow instructions, place, plan, think, illustrate, explain, group, design, summarise, notice, construct, predict **Suggest, create, diagnose, modify, devise, prove, contrast, evidence, reason and justify.**	**Answer questions, compare and contrast, recommend, suggest reasons, reason, justify, propose, arrange, complete, experiment, summarise, cite evidence, relate, note, similarities and differences,** **Explain concepts, give examples, Demonstrate, Prove or disprove.**	**Graph, interpret, generalise, argue the statement, demonstrate, present, adapt, explain patterns, continuous variables.**
Tier 2- Working scientifically		
• Question, answer, observe, equipment, identify, classify, sort, group, record, map, data, compare, describe, Biology, Chemistry, Physics.	Scientific enquiry, comparative and fair test, systematic, accurate, measurements, equipment, datalogger, thermometer, gather, classify, labelled diagrams, differences and similarities, changes, improve, construct, prove.	Present, interpret, varibales, precision, repeat readings, report, conclusion, causal relationships, explanations, degree of trust, reliability, quantitative measurements
Tier 3 subject specific vocabulary		

<table>
<tr><th colspan="3">Understanding plants</th></tr>
<tr>
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<tr><td>Deciduous</td><td>A tree that loses its leaves in the Autumn.</td></tr>
<tr><td>Evergreen</td><td>A tree that keeps its leaves all year round.</td></tr>
<tr><td>Reproduction</td><td>Where new plants/animals are produced.</td></tr>
<tr><td>Bulb</td><td>A bulb is structurally a short stem with fleshy leaves</td></tr>
<tr><td>Roots</td><td>Transports water through the plant and holds the plant firm in the ground.</td></tr>
<tr><td>Stem</td><td>Supports the plants and transports water from the roots.</td></tr>
</table>
Nutrients – the essential food for a living thing to grow and survive.
Water
Temperature – how hot or cold something is.
Flowers, Blossom, Fruit, Vegetable

Holly, Yew, Sots Pine
Oak, Beech, Willow

Flowers: Daisy, snowdrop, daffoldil, Rose, Poppies, sun flower,

Birds- Wren, Blackbird, Robin, Carrion Crow, Magpie, pigeon, Sparrow Hawk
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Warmth, growth, height, function, support, seed dispersal, capillary, xylem, phloem, stamen, anther, pollen, oxygen, carbon dioxide, photosynthesis, pollination, fertilizer, nutrition

Ash, Silver birch, maple, Horse Chestnut

Foxglove, bluebell, dandelion, lavender, geranium,

Birds- Rook, blue tit, Great Tit, chaffinch, sparrow, Wren, Kestrel, Heron,

Fertilise – The male part meeting the female part to produce a new living thing
Insect – A small animal that has six legs and generally one or two pairs of wings
Leaves- These make food for the plant using sunlight and carbon dioxide from the Life processes – The series of processes in the life of an organism including reproduction
Nectar - a sugary fluid within flowers to encourage pollination
Nutrients - These substances are needed by a living things to grow and survive. Plants get nutrients from the soil and also make their own food in their leaves
Pollen - a fine powdery substance, discharged from the male part of the flower that fetilises the female part
Pollination – transferring pollen to allow fertilisation
Roots- These anchor the plant into the ground and absorb water and nutrients from the soil.
Stamen- The male parts of the flower. The stamen is made up of the <u>anther</u> and the <u>filament</u>. The filament's job is to hold up the anther. The job of the anther is to make the pollen.
Stem -This holds the plant up and carries water and nutrients from the soil to the leaves. A trunk is the stem of a tree.
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Trees- Sycamoore, Alder, Lime, Crab Apple, , Hawthorne, Rowan

Flowers- Primrose, heather, pansies, honeysuckle, chrysanthemum, Birds-Tawny owl, Barn owl, swallow, House Martin, Greenfinch, Coal Tit, Warbler. Kite

Photosynthesis
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<tr><th colspan="3">Understand animals and humans and Investigate living things</th></tr>
<tr>
<td>
Birds – animal with feathers and wings.

Fish – animal with gills and lives in water.
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Carnivore- An animal that feeds on other animals.
Digest- Break down food so it can be used by the body.
Herbivore- An animal that eats plants.
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Amphibians – animals that can live in the water or land.

Reptiles – animal with scaly/rough skin that is cold blooded.

mammals – animals with fur or hair that give birth to live offspring.

Invertebrates – animal without a backbone

Food chain – order that animals depend on their food.

Carnivores - An animal that feeds on other animals.

Herbivores - An animal that eats plants.

Omnivores – An animal that eats plants and animals.

Habitat – the place where an animal lives.

Natural – God created.

man-made – made by people.

MRS GREN

Offspring – the young of animals.

Diet – the food animals eat.

Exercise	**Physical exercise to keep our body fit.**
Diet	**Correct food and water a living thing needs.**
Hygiene	**How clean something is to stop things spreading.**
Nutrition	**Food we need to live.**
Energy	**The power needed to carry out a task.**

Large intestine- Part of the intestine where water is absorbed from remaining waste food. Stools are formed in the large intestine
Oesophagus- A muscular tube which moves food from the mouth to the stomach.
Omnivore- e An animal that eats plants and animals.
Rectum- Part of the digestive system where stools are stored before leaving the body through the anus.
Stomach-An organ in the digestive system where food is broken down with stomach acid and by being churned around
Small intestine- Part of the intestine where nutrients are absorbed into the body.

enamel	Hard white outer layer of the tooth
root	Anchors the permanent tooth into the gum
calcium	A chemical that helps keep your teeth strong
incisor	Front teeth for ripping food
canine	Sharp, pointed teeth for tearing food
molars	Have 3 roots and used for chewing and mashing food before it passes down the oesophagus
saliva	Chemical in the mouth that helps to soften the food before being swallowed.

Nutrition - the food we eat
Omnivore - a living thing that eats both plants and meat
Reproduce - to create more of the same species
Reptiles - a type of animal that is cold-blooded and has scaly skin
Respiration - taking in gas and giving out another (breathing in humans)
Sensitivity - using your senses (see, smell, hear, touch, taste)

n, domain,kingdom, phylum, class, order, family genus, species, characteristics, microorganisms o flowering non-flowering

puberty life cycle gestation growth reproduce foetus baby fertilisation toddler child teenager adult old age life expectancy adolescence adulthood early adulthood middle adulthood late adulthood childhood

Arteries – Muscular-walled tubes that transport blood from the heart to other parts of the body
Blood – Red liquid that circulates in arteries and veins, carrying oxygen to and carbon dioxide from tissues of the body
Blood vessel – A tubular structure carrying blood

Body parts (hand, nose, mouth, eyes)

Dead, alive, habitats, dependence, MRS GREN, suitability, micro-habitats, environment, natural

Habitat	**The place where an animal lives.**
Microhabitat	**The place within the habitat where the animal lives. E.g. under a rock.**
Alive	**A living thing that is have all the life processes.**
Dead	**Something that was once living.**
Never Alive	**Something that has never had any life processes.**

Vertebrate - an animal with a backbone

Amphibians – an animal that is orn in water but develops lungs and lives on land later in its life.
Birds- a type of animal that has wings and is born from a hard-shelled egg.
Carnivore – a living thing that just eats meat.
Characerisitic- a feature or quality.
Excretion- to dispose of waste.
Fish- a type of animal that lives in water and has scales, gills and fins.
Group- sorting things based on their similarities
Herbivore- a living thing that eats just plants.
Invertebrate- an animal that does not have a back bone.
Mammal- a type of animal that has hair on its body and usually drinks milk from its mother as a baby.

through the tissues and organs
Bones – Hard whitish tissue making up the skeleton in humans and other vertebrates
Circulatory system – The system that circulates blood through the body, including the heart, blood vessels and blood
Heart – A hollow muscular organ that pumps the blood through the circulatory system
Lungs – Pair of organs situated within the ribcage where oxygen can pass into the blood and carbon dioxide be removed
Muscles – A band or bundle of fibrous tissues that have the ability to contract, producing movement in or maintaining

		positions of parts of the body **Nutrients –** A substance that provides nourishment essential for the maintenance of life and for growth **Organs –** Part of an organism that is typically self-contained and has a specific vital function (e.g. the heart and lungs) **Veins –** Tubes forming part of the blood circulation system of the body, carrying mainly oxygen-depleted blood towards the heart **Vitamins –** Organic compounds essential for normal growth and **Annelid –** A segmented worm

		Arachnid – An animal that has eight legs and a body formed of two parts **Crustaceans –** Mostly live in water with a hard shell and segmented body **Habitat –** The natural home or environment of an animal, plant or other organism **Insect –** A small animal that has six legs and generally one or two pairs of wings **Microorganism –** A microscopic organism, especially a bacteria, virus or fungus
Understand evolution and inheritance		
	Adaptation – The process of change so that an organism or species can become better suited to their environment **Fossil –** The remains or impression of a prehistoric plant or animal embedded in rock and preserved **Inherit –** To gain a quality, characteristic or predisposition genetically from a parent or ancestor **Offspring –** A person's child or children/ an animal's young **Variations**- The differences between individuals within a species.	Scientists- Charles Darwin and Alfred Wallace **Body fossil –** Preserved remains of the body of the

	Characteristics- The distinguishing features or qualities that are specific to a species. **Breeding –** The mating and production of offspring by animals **Habitat**- Refers to a specific area or place in which particular animals and plants can live. **Environment**- An environment contains many habitats and includes areas where there are both living and non- living things. Adaptation- the process of change by which an organism or species becomes better suited to its environment P**alaeontologist**- an expert in or student of palaeontology **Palaeontology** - the branch of science concerned with fossil animals and plants	actual animal or plant itself **Environment –** The surroundings or conditions in which a person, animal, or plant lives **Evolution –** The process by which different kinds of living organism are believed to have developed from earlier forms during the history of the earth **Reproduction –** The production of offspring by a sexual or asexual process **Selective breeding –** The process by which humans use animal breeding and plant breeding to develop selective characteristics by choosing particular animals and plants **Metamorphosis –** The process of transformation from an immature form to an adult form in two

		or more distinct stages **Sexual reproduction –** Offspring get genes from both mum and dad, inheriting a mix of features from both.**Trace fossil –** Indirect evidence of life in the past such as the footprints, tracks, burrows, borings and waste left behind by **Natural selection**- The process where organisms that are better adapted to their environment tend to survive and produce more offspring. **Adaptive traits**- Genetic features that help a living thing to survive. **Inherited traits**- These are traits you get from your parents. Within a family, you will often see similar traits, e.g. curly hair.
Investigate materials		

Material, wood, plastic, glass, metal, water and rock. brick/rock, and paper/cardboard

Transparent	**You can see through it.**
Suitability	**Having the right material for the specific purpose.**
Properties	**What a material is like and how it behaves.**
Materials	**Are what an object is made from.**

Rocks and Soils

Crust –the outer layer of the Earth
Decay- to rot or decompose
Fossil- the preserved remains of dead organism.
Geologist- a person who studies rocks
Igneous Rock- rock formed from cooled magma.
Impermeable- doesn't allow liquid to pass through
Inner core- the very centre of the Earth.
Mantle- the part of the Earth between the crust and the core.
Metamorphic rock – rock formed from changes of heat or pressure.
Microbe- a small living thing.
Mine- to dig into the Earth for rocks and minerals.
Permeable- allows liquid to passs
Rock- any naturally occuring solid mineral material.
Sedimentary rock- rock formed by layers of sediment.
Soil- made up of pieces of rock, minerals, decaying plant material, microbes and water.

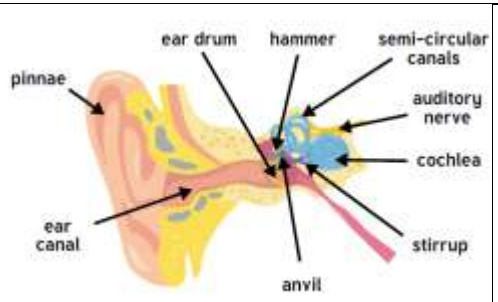
change - to make different
collection - when water flows back into rivers, streams and lakes and gets carried back to sea
condensation - when water vapour cools and turns back into water
evaporation - when water is heated and turns into water vapour
freeze - when something is put at a very low temperature
gas - a state of matter that has no defined shape or volume
heat - when something is put at a hot temperature
liquid - a state of matter that flows freely but keeps the same volume
precipitation - when water falls from the clouds in the sky

Chemists- Spencer Silver and Ruth Benerito

Thermal conductor – A material or device which allows heat or electricity to carry through
Dissolve – When something solid mixes with a liquid and becomes part of the liquid
Flexible – Capable of bending easily without breaking
Insulator – A substance which does not readily allow the passage of heat or sound
Irreversible – Cannot be reversed back to its original state
Reversible – Able to be reversed back to its original state
Soluble – Able to be dissolved, especially in water
Thermal – Relating to heat

		property - a characteristic **solid** - a state of matter that is firm and stable **temperature** - how hot or cold something is **thermometer** - an instrument used for measuring temperature **Gas –** An air-like fluid substance which expands freely to fill any space available **Material – The** matter from which a thing is or can be made from	
Understand movement, forces and magnets			
magnets **Pull-** to move something towards **Push-** to move somehting away.	**Attract-** to puul towards **Contact-** when objects touch. **Different-** not the same**.** **Distance-** the length between two objects. **Force-** a push or a pull that acts upon an object that can. **Friction-** the force that acts upon one surface when it moves against another. **Magnet-** a piece of iron that attracts and repels. **Magnetic force-** when a magnet pulls objects towards it or pushes objects away. **Repel-** to push away. **Push force –** To move something in a specific way by exerting force	**Air resistance –** A force that is caused by air with the force acting in the opposite direction to an object moving through the air **Friction –** The resistance that one surface or object encounters when moving over another **Gears –** A toothed wheel that works with others to alter the relation between the speed of a driving mechanism (e.g. engine) and the speed of the driven parts (e.g. the wheels) **Gravity –** The force that attracts a body towards the centre of the earth **Levers –** A rigid bar resting on a pivot that is used to move a heavy or firmly fixed load **Mass –** The weight measured by an objects acceleration under a given force or by the force exerted on it by gravity **Pulleys –** A wheel with a grooved rim around that changes the direction of a force applied to the cord **Water resistance -** A force that is caused by water with the force acting in the opposite direction to	
Understand light and seeing			
Light, dark, see, sun, movement, travel, flames, seasons, light source.	**Dark-** is the absense of light. **Light-** a form of energy that travels in a wave from a source.	**Filter –** Pass through a device to remove unwanted material (liquid, gas, light or sound)	

<table><tr><td>**Source**</td><td>**Where something (light) comes from.**</td></tr><tr><td>**Artificial**</td><td>**Man made.**</td></tr><tr><td>**Natural**</td><td>**God made.**</td></tr><tr><td>**Reflected**</td><td>**Bounces off an object.**</td></tr><tr><td>**Seasons**</td><td>**There are 4 throughout the year. See below.**</td></tr><tr><td>**Daylight**</td><td>**Amount of light throughout a day.**</td></tr></table>	**Light source –** Something that provides light, whether it be a natural or artifical source of light (e.g. the sun, a torch) **Ray-** waves of light are called light rays. They can also be called beams. **Reflection –** The throwing back by a body or surface of light, heat or sound without absorbing it. **Reflective –** A word which describes something that reflects light well. **Opaque –** Not able to be seen through, not transparent **Shadow –** A dark area or shape produced by a body coming between rays of light and a surface **Eyes –** Globular organs of sight in the head of humans and vertebrate animals GD- translucent, transparent, opaque.	**Periscope –** An apparatus consisting of a tube of attached to a set of mirrors or prisms through which an observer can see **things that are otherwise out of sight** **Rainbow –** An arch of colours visible in the sky, caused by the refraction and dispersion of the sun's light by rain or other water droplets in the atmosphere **Refraction –** The bending of light as it passes from one substance to another with the bending caused by the difference in density between two substances **Spectrum –** A band of colours, as seen in rainbows, produced by separation of the components of light by their different degrees of refraction
Investigate sound and hearing		
Ear- senses - hearing	**ear** - the organ used to hear **noise** - a sound - usually unwanted or unpleasant **pinnae** - the outside flaps of the ear which help 'catch' the vibrations **pitch** - how high or low a sound is **sound** - vibrations that travel through the air and other mediums and can be heard **vibration** - very quick movements **volume** - how loud or quiet a sound is	



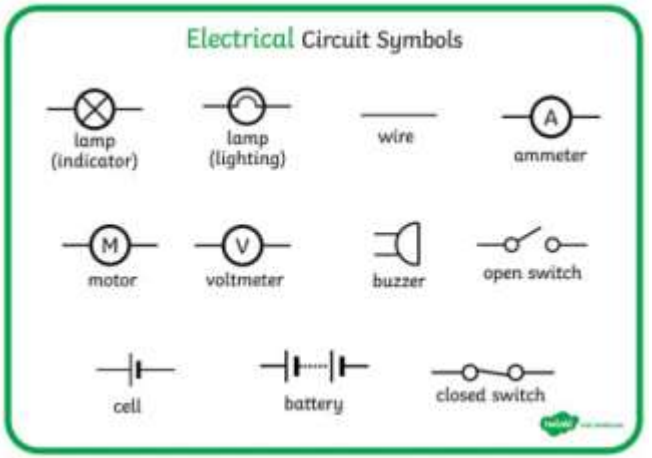
Understand electrical circuits

Appliance, battery, circuit, electricity **Appliance-** a device or piece of equipment that has been made to perform.
Battery- a small item used to power small appliances**.**
Circuit- a route through which electricity flows.

Circuit	**It conducts electricity flow around using wires.**
Battery operated	**Something that works using a battery.**
Mains operated	**Something that needs to be plugged in to work.**

Circuit- A pathway that **electricity** can flow around. It includes wires and a power supply and may include bulbs, switches or buzzers.
Electrical- something that uses electricity to work.
Mains power- electricity provided by power stations.
Portable- can be easily carried around.
Pylon- a tower used for keeping electricity wires above ground.
Buzzer – an electrical device that makes a buzzing sound
Bulb – an electrical device that lights up
Motor – a device that makes movement
Switch – a component that can turn the electrical device on or off.
Cell – a device used to generate electricity, a battery is an example of this. Electrons – carry energy around the circuit
Electrical Conductor – a material/device which allows electricity to pass through
Electrical Insulator – a material/device which does not allow electricity to pass through

Components- the parts of a circuit.
Voltage- a force that makes electricity flow through a wire (it is measured in volts)



Understand the Earth's movement in space		
Light – something that makes things visible *sun, - body in the sky that produces light* *earth – the planet that we live on., Moon -*	**Axis –** An imaginary line about which a body rotates **Day –** A twenty-four hour period, from one midnight to the next, corresponding to a rotation of the earth on its axis **Solar system –** The collection of eight planets and their moons in orbit round the sun **Orbit –** The regularly repeated oval course of a celestial object around a star or planet **Moon –** A natural satellite of any planet **Night –** The period from sunset to sunrise in each twenty-four hours **Season** – *each of the four divisions of the year marked by particular weather patterns and daylight hours, resulting from the Earth's changing position with regard to the Sun (winter, autumn, summer and spring).* **Moon Phases** – *different ways the Moon looks from Earth over approximately a month (see diagram.).*	Planet names- Mars, Jupiter, Uranus, Neptune, Venus, Saturn. **Celestial –** Positioned in or relating to the sky, or outer space as observed in the astronomy **Dwarf planet –** A celestial body resembling a small planet but lacking certain technical criteria to be classed as a planet e.g. Pluto **Geocentric –** Where people believed the earth was at the centre of the solar system **Heliocentric –** Representing the sun as the centre of the solar system, the modern view of the solar system **Planet –** A celestial body moving in orbit round a star **Rotation –** The action of rotating about an axis or centre **Star –** A fixed luminous point in the night sky which is a large, remote body like the sun **Universe**- all existing matter and space considered as a whole; the cosmos **Solar**-energy from the sun. **Elliptical** – *an oval shape (e.g. an elliptical orbit).* **Eclipse** – *the obscuring of light from one celestial body by the passage of another.* **Lunar Eclipse** – *an eclipse in which the moon appears darkened as it passes the Earth's shadow.* **Solar Eclipse** - *an eclipse in which the sun is hidden by the moon*
Note		
Items in italics are not statutory in the Science National Curriculum		
How do we prepare children for KS3?	Our feeder schools will run sessions.	During Science networks, we discuss transition and projects which may aid transition. Could we write a common scientific enquiry writing frame?

		Address misconceptions early before they reach secondary- planning has a misconceptions box. Also refer to document in science lead folder addressing common misconceptions. Shared latest research by EEF with staff regarding the teaching of secondary science.
New EYFS ELG	Development matters 3 and 4 year olds **Communication and Language** -Understand 'why' questions, like: "Why do you think the caterpillar got so fat?" **Physical Development-** Make healthy choices about food, drink, activity and toothbrushing. • **Understanding the world-** Use all their senses in hands-on exploration of natural materials. • Explore collections of materials with similar and/or different properties. • Talk about what they see, using a wide vocabulary. • Begin to make sense of their own life-story and family's history. • Explore how things work. • Plant seeds and care for growing plants. • Understand the key features of the life cycle of a plant and an animal. • Begin to understand the need to respect and care for the natural environment and all living things. • Explore and talk about different forces they can feel. Talk about the differences between materials and changes they notice.	Development matters Reception **Communication and Language** – • Learn new vocabulary. • Ask questions to find out more and to check what has been said to them. • Articulate their ideas and thoughts in well-formed sentences. • Describe events in some detail. • Use talk to work out problems and organise thinking and activities. Explain how things work and why they might happen. Use new vocabulary in different contexts. **Physical Development** • Know and talk about the different factors that support their overall health and wellbeing: - regular physical activity - healthy eating - toothbrushing - sensible amounts of 'screen time' - having a good sleep routine - being a safe pedestrian **Understanding the world-** • Explore the natural world around them. • Describe what they see, hear and feel while they are outside. • Recognise some environments that are different to the one in which they live. Understand the effect of changing seasons on the natural world around them. ELG

Communication and Language	Listening, Attention and Understanding	• Make comments about what they have heard and ask questions to clarify their understanding.
Personal, Social and Emotional Development	Managing Self	• 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	The Natural World	• Explore the natural world around them, making observations and drawing pictures of animals and plants. • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.