Science at Parkgate Juniors

Think like a Scientist!

'Be the change you wish to see in the world!' (Mahatma Gandhi)

What would our life be without The Internet, mobile phones, electric light or antibiotics….?

Is a scientist somebody working in a laboratory, wearing a white lab coat and glasses?

At Parkgate, we believe that these and other questions prove that undoubtedly Science is a huge part of our everyday life and a driving force behind many breakthrough technology developments ensuring that our lives on this planet are as good as they can be.

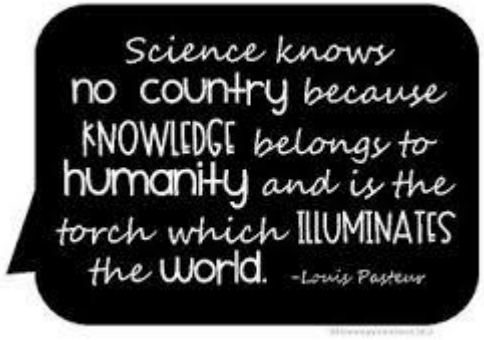
That is why Scientific literacy is crucial to develop an understanding of the complex and rapidly changing world we live in!

It is the goal of our curriculum to provide an inquiry-based approach to learning science, with 'fun' experiments, hands-on activities that encourage investigative skills and stimulate curiosity in finding out why things happen and how things work.

We take every opportunity to relate Science to the needs and interests of our pupils and make it relevant to their day-to-day life.

Think like a scientist – think outside the box! Are you the future Game designer? Software engineer, Multimedia artist, Biochemist, Forensic scientist?

Be the change you want to see in the world! Pupils want to see that their learning leads to real change, not just exam results.



Science policy on a page

Purpose and Aims

Purpose

To encourage a love of Science and develop an understanding of the world around us. To explore how scientific processes and beliefs and how these have changed over time.

Aims

To encourage an interest and curiosity for Science and Technology.
To stimulate curiosity in finding out why things happen and how things work.
To develop an awe in nature.
To encourage questioning.
To communicate using scientific language.

Provision

Our curriculum is categorised in two ways:

- **Breadth** - which gives pupils experiences of a range of scientific knowledge and topics as well as develop investigative questioning and skills
- **Depth** - which helps pupils to think and act like Scientists. Our curriculum covers animal and human biology, plant biology, forces and physics, the solar system and chemical processes. We also look back at the past to learn how ideas change over time and develop questioning attitudes to scientific beliefs today. Every opportunity is taken to relate Science to the needs and interests of our pupils. Science is studied throughout the year academic year and across the key stage so that pupils gain a growing developmental understanding of the ideas, skills and processes in our Science curriculum. Every opportunity for learning outside the classroom is used. The study of important scientists inspires pupils and provides examples of scientific careers and future opportunities.

Progression

Progression

Our curriculum is based on both subject areas and progression in investigative skills. The vast majority of pupils work within age-related expectations with some pupils needing extra support and others developing a deeper understanding of the subject. Information is passed between year groups to build on previous learning and extend areas of learning where possible.

Assessment and reporting

We assess half termly for both investigative skills and knowledge of National Curriculum areas. This information is reported to leadership and passed between classes.

Monitoring, evaluation and improvement

Leadership involves monitoring of pupil outcomes, the quality of teaching and the curriculum and development of staff skills. Strengths in the subject are developed through team-teaching and planning and staff training. Areas that need development are addressed with the support of year group colleagues and the Science Lead. The Science Lead tracks progress over time and monitors pupil's enjoyment and enthusiasm of the subject, making changes to the curriculum to encourage this interest and curiosity.

Subject: Science **Subject Lead: Joanna Merchel**

<table>
<tr><td rowspan="3">Intent</td><td colspan="8">Aims/ Statement of Intent: At Parkgate children are exposed to high quality science teaching to help them understand the world and inspire their curiosity about natural phenomena. Our curriculum is enquiry-based and provides opportunities develop scientific knowledge, learning and carrying methods of enquiry developing the necessary disciplinary knowledge for the children to think and act like inquisitive scientists! We offer broad and balanced, coherently planned and sequenced curriculum so that the pupils are equipped with the scientific skills and knowledge required to understand the uses and implications of science today and for the future.</td></tr>
<tr><td colspan="8">Knowledge and skills: Science teaching is carefully sequenced to ensure a clear progression of substantive knowledge and disciplinary knowledge. Each lesson is designed to explore and build on children’s prior knowledge, allowing for misconceptions to be addressed effectively. The substantive knowledge builds progressively to develop children’s understanding of concepts, models, laws and theories through the specific disciplines of biology, chemistry, physics and the solar system. The disciplinary knowledge builds progressively to enable children to work scientifically. Children ask scientific questions and consider which types of scientific enquiry are likely to be the best way of answering them. They draw conclusions and use scientific vocabulary to discuss and present their findings in a range of different ways.</td></tr>
<tr><td rowspan="3">Implementation</td><td colspan="8">Approaches to learning/How our pupils learn: Science is studied throughout the academic year and across the key stage so that pupils gain a growing developmental understanding of the ideas, skills and processes, which are revisited as pupils progress through school. Our curriculum is categorised in two ways:
Breadth - which gives pupils experiences of a range of scientific knowledge and topics as well as develop investigative questioning and skills.
Depth - which helps pupils to think and act like Scientists. Our curriculum substantive knowledge covers animal and human biology, plant biology, forces and physics, the solar system and chemical processes. We also look back at the past to learn how ideas change over time and develop questioning attitudes to scientific beliefs today. Key scientists and significant discoveries are studied to inspire pupils and provide examples of STEM careers.
The disciplinary knowledge explores different aspects of scientific enquiry: comparative and fair testing, identifying, classifying and grouping, pattern seeking, observing over time, research using secondary sources. Pupils develop their working scientifically skills, such as: asking questions, making predictions, setting up tests, observing and measuring, recording data, interpreting and communicating results, evaluating data.</td></tr>
<tr><td colspan="8">Support: Scaffolded tasks, using apparatus and flexible grouping to carry out investigations, guided examples, displays and visual vocabulary for the unit</td></tr>
<tr><td colspan="8">Enrichment (including link and opportunities): Every opportunity is taken to relate Science to the needs and interests of our pupils. Every opportunity for learning outside the classroom is used. We build up our pupils’ science capital through: visits from STEM Ambassadors and parents talking about their STEM related careers, use of technology GC/Purple Mash making links to science in a daily life; virtual workshops/ museum virtual tours; school trips, the study of important scientists, competitions, Science Week, Science days; specialised workshops, Cross Curricular week, CREST science activities, Eco Council promoting sustainability, Veolia partnership.</td></tr>
<tr><td rowspan="2">Impact</td><td colspan="4">Skills: Pupils have an understanding of the key areas of knowledge and communicate science procedural language accurately. They ask questions and make observations about the world around them using scientific knowledge. They plan and carry out scientific enquiries, analyse and interpret data, draw conclusions.</td><td colspan="4">Attitudes/ wellbeing and personal development: Pupils demonstrate natural curiosity about how the world works around us resulting in their high science capital. They are resilient and open to new experiences. They have high future careers aspirations and explore science further. They have an understanding of some of the major environmental issue facing our planet and an appreciation of the importance of science to wider society.</td></tr>
<tr><td>Book study method</td><td>SDS</td><td>Pupil Voice</td><td>Purple mash tasks</td><td>Learning walks</td><td>Quizzes</td><td>Assessment</td><td>Retrieval Practices</td></tr>
</table>

	Marking and feedback		Google classroom				Work&Planning scrutiny	

Curriculum Overview - Science

		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2		
Lower Key Stage 2	Year 3	Forces and Magnets	Rocks, fossils and soil	Light	Plants	Plants/ Animals and Humans	Animals and Humans: Healthy Eating, Healthy Body	Year 3	Lower Key Stage 2
	Year 4	Living Things and Habitats: Classification Food chains	Animals including Humans	Animals including Humans: Teeth and digestion	States of Matter	Electricity: Circuits and Components	Sound	Year 4	
Upper Key Stage 2	Year 5	Earth and Space	Forces	Properties of Materials	Changes of Materials	Life Cycles Animals including Humans	Life Cycles Living Things and their Habitats	Year 5	Upper Key Stage 2
	Year 6	Light	Living Things and their Habitats: Evolution and Adaptation	Electricity	Animals including Humans: Humans and Health	Animals including Humans: Humans and Health	Living Things and Their Habitats: Classification	Year 6	

Biology	Physics	Chemistry

Year 3 Science Map

Working Scientifically	Forces and Magnets	Investigating Plants	Light and Shadows
asking relevant questions and using different types of scientific enquiries to answer them **• setting up simple practical enquiries, comparative and fair tests** **• making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions** **• recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables** **• reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions** **• using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions** **• identifying differences, similarities or changes related to simple scientific ideas and processes** **• using straightforward scientific evidence to answer questions or to support their findings**	• compare how things move on different surfaces • notice that some forces need contact between two objects, but magnetic forces can act at a distance • observe how magnets attract or repel each other and attract some materials and not others • compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials • describe magnets as having two poles • predict whether two magnets will attract or repel each other, depending on which poles are facing **Rocks, fossils and soil** • 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	• identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers • explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant • investigate the way in which water is transported within plants • explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal **Healthy eating, healthy bodies** • 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	• recognise that they need light in order to see things and that dark is the absence of light • notice that light is reflected from surfaces • recognise that light from the sun can be dangerous and that there are ways to protect their eyes • recognise that shadows are formed when the light from a light source is blocked by a solid object • find patterns in the way that the size of shadows change

Year 3 Progression in Scientific knowledge – End of Year expectations

Topic	Expectations
Investigating Plants **Key Words** Ground, transport, attract bees, catch sunshine, green, air, nutrients, growth, pollen, pollination, seed formation, seed dispersal, nutrition, support, anchor, reproduction	• identify parts of flowering plants **• identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers** • describe why healthy roots and a healthy stem are needed for plants to grow • recognise that the leaves of a plant are associated with healthy growth and more specifically nutrition • recognise that plants need light, water and warmth and healthy leaves, roots and stems in order to grow well • know that water travels from the roots up the stem **• 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** • know that plants make their own food • know that fertilisers contain minerals • understand that plants absorb minerals from the soil (Teacher Note: plants create their own food using sunlight, water and carbon dioxide, they do not absorb food from the soil) • describe how changes to light and fertiliser affect plant growth • explain that differences in plant growth are due to the amount of light and/or water **• investigate the way in which water is transported within plants** • describe how the stem has a role in support and nutrition (transport of water) • explain why healthy roots and a healthy stem are needed for plants to grow **• explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal** • describe why plants need flowers • sequence pictures to show the life cycle of a plant • describe how pollen and seeds are dispersed • explain the role of bees and insects in pollination • describe the processes of pollination, seed formation and seed dispersal • compare the roots of different plants (e.g. desert plants or rainforest trees (Note: rainforest trees have very shallow roots as the quality of the soil is poor and most of the nutrients are near the surface **Common Misconceptions:** Some children may think: • plants eat food • food comes from the soil via the roots • flowers are merely decorative rather than a vital part of the life cycle in reproduction • plants only need sunlight to keep them warm • roots suck in water which is then sucked up the stem.

Animals, including humans: Healthy Eating and Healthy Bodies	• identify some foods needed for a healthy and varied diet • name the components of a healthy and varied diet • describe how their diet is balanced **• 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** • describe the role of different food groups • compare and contrast diets of animals including pets • describe an adequate and varied diet for humans, recognising that there are many ways of achieving this
Key words: **Balanced diet, carbohydrates, protein, fats, fibre, fruit and vegetables, bones, muscles, femur, ribs, spine, tibia, shoulder blade, hollow, relax and contract, protect, support, internal skeleton, exoskeleton**	• know they have bones and muscles in their body • state that they and other animals have skeletons • identify animals that do not have an internal skeleton (invertebrates) • group animals with and without an internal skeleton • describe some advantages of having an internal skeleton over no skeleton or an exoskeleton • describe some observable characteristics of bones • describe the main functions of their skeletons • state that movement depends on both skeleton and muscles • state that when one muscle contracts another relaxes • **identify that humans and some other animals have skeletons and muscles for support, protection and movement** • recognise that their skeletons grow as they grow • *describe problems associated with broken bones or bones disease* **Common misconceptions:** Some children may think: • certain whole food groups like fats are 'bad' for you • certain specific foods, like cheese are also 'bad' for you • diet and fruit drinks are 'good' for you • snakes are similar to worms, so they must also be invertebrates • invertebrates have no form of skeleton.
Rocks, Fossils and Soil	• observe the characteristics of a variety of rocks • name and describe the characteristics of several rocks • identify fossils in rocks • classify rocks from the evidence of investigations • explain that rocks are used for different purposes dependent on their physical properties • explain that different types of rock react differently to physical forces (e.g. water, rubbing) • **compare and group together different kinds of rocks on the basis of their appearance and simple physical properties** • understand that there are rocks under the Earths' surface • relate the simple physical properties of some rocks to their formation • explain why certain rocks are used for different purposes and why some rocks could be used for these jobs for example: Marble- kitchen worktops or statues, Slate roof tiles, Granite walls • explain how a model (e.g. biscuits, chocolate bars) can be used to represent sedimentary, metamorphic and igneous rocks • explain why we might find lots of the same types of rock in one place • **describe in simple terms how fossils are formed when things that have lived are trapped within rock**
Key words: Rock, soil, marble, granite, sand, stone, slate, chalk, clay, peat, hard, soft, texture, absorbed, permeable, pebble, characteristic, surface, organic, impermeable, crystal, grains, crumbly, igneous, sedimentary, metamorphic, fossils	

	• describe how Mary Anning discovered fossils • explain why we do not see the soft parts of animals in fossils • recognise that soil is a mixture of different materials and living things • recognise that soil contains dead plants and animals • recognise that there is rock under all surfaces and that soils come from rocks • **recognise that soils are made from rocks and organic matter** **Common misconceptions:** Some children may think: • rocks are all hard in nature • rock-like, man-made substances such as concrete or brick are rocks • materials which have been polished or shaped for use, such as a granite worktop, are not rocks as they are no longer 'natural' • certain found artefacts, like old bits of pottery or coins, are fossils • a fossil is an actual piece of the extinct animal or plant • soil and compost are the same thing
Light and Shadows **Key words:** Shadow, light, flames, opaque, block, direction, light, travels, shortest, longest, highest, torch, shape, similar, transparent, translucent, light source, sun, object daytime, night-time, reflect, shine, shiny, absorb, reflective surface, surface, mirror, sundial, block, lamp **Common misconceptions:** Some children may think: • we can still see even where there is an absence of any light • our eyes 'get used to' the dark • the moon and reflective surfaces are light sources • a transparent object is a light source	• name a number of light sources, including the sun • describe and compare some light sources • state that light sources are seen when light from them enters the eyes • **recognise that light from the sun can be dangerous and that there are ways to protect their eyes** • recognise that they cannot see in the dark • recognise that light travels from a source • **recognise that they need light in order to see things and that dark is the absence of light** • explain that places are dark because there is no light and a light source is needed to help us see in such places • **notice that light is reflected from surfaces** • state that reflections can be seen in shiny surfaces • makes generalisations about shiny surfaces (e.g. smooth) • demonstrate light travelling using a torch and record light bouncing off a mirror • identify suitable reflective clothing for travelling in the dark • explain that they cannot see shiny objects in the dark because there are no light sources • recognise that when light is blocked, a shadow is formed • **recognise that shadows are formed when the light from a light source is blocked by a solid object** • recognise that shadows are similar in shape to the objects forming them • make observations of changes in shadows • explain that shadows are formed when light from a source is blocked • state that even transparent objects block some light and form shadows • describe the difference in shadows cast by opaque, translucent and transparent materials • explore how to make shadows of different shapes and sizes • **find patterns in the way that the size of shadows change** • *use ideas about shadows to make predictions about the shadows formed by different objects or materials*

• shadows contain details of the object, such as facial features on their own shadow • shadows result from objects giving off darkness.	• *describe how the length of a shadow changes throughout the day as the sun moves across the sky* • *describe how nocturnal animals are adapted to use what little light there is or their other senses in the dark (e.g. cats, aye-aye, lemurs)* • *describe how Percy Shaw invented cat's eyes and explain their importance to road safety*
Forces and Magnets **Key words:** Force, push, pull, speed up, slow down, change shape, change direction, movement, direction, friction, magnets, magnetic, surface, magnetism, north pole, south pole, repel, attract, twist, contact force, non-contact force, magnetic force, strength, bar magnet, ring magnet, button magnet, horseshoe magnet, magnetic material, metal, iron, steel **Common misconceptions:** Some children may think: • the bigger the magnet the stronger it is • all metals are magnetic.	• recognise that pushes and pulls are forces • recognise that a force acts in a particular direction • observe the movements, shape and direction of objects when forces act on them • describe how to make a familiar object start moving by pushing or pulling • describe how to use pushes and pulls to make familiar objects speed up, slow down, change direction or shape • produce annotated drawings showing the direction of force needed to make an object move • identify friction as a force • observe and explore how friction affects the movement of objects • describe some ways in which friction between solid surfaces can be increased or decreased • **compare how things move on different surfaces** • **observe how magnets attract or repel each other and attract some materials and not others** • classify materials as magnetic or non-magnetic • **compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials** • describe the difference between a magnet and a magnetic material • **notice that some forces need contact between two objects, but magnetic forces can act at a distance** • describe what happens when some materials are put near a magnet • recall that magnets have a north and a south pole • **describe magnets as having two poles**

	• describe the direction of forces between magnets • **predict whether two magnets will attract or repel each other, depending on which poles are facing** • *describe some everyday uses of magnets* • *explain that a compass works by lining up with the Earth's magnetic field* • *describe how lodestone was found to be a naturally occurring magnet and was used as the first compass for navigation*

Year 4 Science Map

Working Scientifically	Teeth and Digestion	Solids, liquids and gases	Sounds and vibrations
• **asking relevant questions and using different types of scientific enquiries to answer them** • **setting up simple practical enquiries, comparative and fair tests** • **making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers** • **gathering, recording, classifying and presenting data in a variety of ways to help in answering questions** • **recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables** • **reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions** • **using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions** • **identifying differences, similarities or changes related to simple scientific ideas and processes** • **using straightforward scientific evidence to answer questions or to support their finding**	• 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 each other, depending on which poles are facing **Electricity: Circuits and components** • identify common appliances that run on electricity • construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers • identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery • recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit • recognise some common conductors and insulators, and associate metals with being good conductors	• compare and group materials together, according to whether they are solids, liquids or gases • observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) • identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature **Living things and their habitats: Classification and interdependence** • 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 • construct and interpret a variety of food chains, identifying producers, predators and prey	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

Year 4

Progression in Scientific Knowledge

Animals including humans: Teeth and Digestion **Key words:** Teeth and eating: incisor, molar, canine, diet, decay, healthy, teeth, acids, sugars, mouth, rip, tear, chew, grind, digestive system: saliva tongue, toilet waste, nutrients energy, stomach, large/small intestine, brain, lungs, movement, acids, urine, faeces, oesophagus	• **describe the simple functions of the basic parts of the digestive system in humans** • identify a wider range of body parts, possibly include internal organs • name the different organs in the digestive system • describe the role of each organ • **identify the different types of teeth in humans and their simple functions** • recognise they need to take care of their teeth • name the different types of teeth • recall the role of each type of teeth in digestion • explain how they should look after their teeth and recognise why they need to do so • state that animals have different diets and may have different kinds of teeth • explain why the teeth of certain types of animals need to be different • explain why humans do not have a full set of adult teeth at birth **Common misconceptions:** Some children may think: • arrows in a food chains mean 'eats' • the death of one of the parts of a food chain or web has no, or limited, consequences on the rest of the chain • there is always plenty of food for wild animals • your stomach is where your belly button is • food is digested only in the stomach • when you have a meal, your food goes down one tube and your drink down another • the food you eat becomes "poo" and the drink becomes "wee"
Living things and their habitats: Classification and Interdependence (This includes food chains statement from animals including humans) **Key words:** Predator, prey, producer, river, ocean, desert, arctic, rainforest, mountain, farmland, wood, dry, wet, vegetation, shelter, vertebrate, invertebrate, classify, characteristic, flowering plant, non-flowering plant (fern, moss), Classification, classificationkeys, environment, habitat, human impact, positive, negative, migrate, hibernate	• **recognise that living things can be grouped in a variety of ways** • describe different animals and plants live in different habitats • use keys to identify some animals and plants • **explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment** • ***construct and interpret a variety of food chains, identifying producers, predators and prey*** • identify that some animals feed on other animals and some on plants • represent feeding relationships within a habitat by food chains beginning with a green plant which 'produces' food for the other organisms • use and understand the terms: producer and consumer • **recognise that environments can change and that this can sometimes pose dangers to living things** • explain why it is necessary to use a reasonably large sample when investigating the preferences of small invertebrates • describe how animals in two habitats are suited to the conditions • **Common misconceptions:** Some children may think: • the death of one of the parts of a food chain or web has no or limited consequences on the rest of the chain • there is always plenty of food for wild animals • animals are only land-living creatures • animals and plants can adapt to their habitats, however they change • all changes to habitats are negative
States of Matter Solids, Liquids and Gases	• name some solids and liquids • state that air is a gas • measure volumes of liquid and masses of solids • describe the differences between solids and liquids

Key words: Water, air, ice, milk, lemonade, juice, metal, solid, liquid, gas, pour, flow, change shape, squash, heat, cool, grain/granular, temperature, thermometer, freeze, melt, boil, evaporate, condense, steam, smoke, sea water, properties, melting point, degrees Celsius, water cycle	• recognise that gases flow from place to place • describe the behaviour and properties of gases • recognise that air is a material and that it is one of a range of gases which have important uses • compares simple solids and liquids e.g. in terms of ease of squashing or pouring • **compare and group materials together, according to whether they are solids, liquids or gases** • describe how liquids evaporate to form gases and that gases change shape and flow from place to place • make clear distinctions between the properties of solids, liquids and gases • identify a wide range of contexts in which changes e.g. evaporation take place • recognise everyday substances as mixtures of solids, liquids and/or gases • know that gases can be easily compressed • recognise that for a substance to be detected by smell, some of it must be in the gas state • state that ice, water and steam are the same material • **observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)** • describe what happens to water when it is heated and cooled • describe how to change water into ice and steam and steam into water • describe that when ice melts it turns to liquid • explain the relationship between liquids and solids in terms of melting and freezing • explain the relationship between liquids and gases in terms of evaporation and condensation • describe a few examples where these changes occur • describe how changes can be reversed • name and describe examples of the main processes associated with water changing state • recognise that these processes can be reversed • describe the water cycle in terms of these processes • **identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature** • explain how changing conditions affects processes such as evaporation and condensation • identify a range of contexts in which changes take place e.g. evaporation, condensation • know that temperature can affect the rate of evaporation or condensation **Common misconceptions:** Some children may think: • 'solid' is another word for hard or opaque • solids are hard and cannot break or change shape easily and are often in one piece • substances made of very small particles like sugar or sand cannot be solids • particles in liquids are further apart than in solids and they take up more space • when air is pumped into balloons, they become lighter • water in different forms – steam, water, ice – are all different substances • all liquids boil at the same temperature as water (100 degrees) • melting, as a change of state, is the same as dissolving • steam is visible water vapour (only the condensing water droplets can be seen
Sound and vibrations **Key words:** Sound, pitch, volume, vibrations, medium, insulation, travel, instrument	• recognise and describe many sounds • state that they hear sounds through their ears • recognise that when sounds are generated by objects, something moves or vibrates • **identify how sounds are made, associating some of them with something vibrating** • describe how sounds are generated by specific objects • suggest ways of producing sounds • generalise that sounds are produced when objects vibrate • identify what is vibrating in a range of musical instruments • **recognise that vibrations from sounds travel through a medium to the ear** • *recognise that sounds travel through solids, water and air* • **find patterns between the pitch of a sound and features of the object that produced it** • *generalise the effects of changes on sound e.g. the tighter the tension the higher the pitch* • know that altering vibrations alters the pitch or volume • **find patterns between the volume of a sound and the strength of the vibrations that produced it** • distinguish between pitch and loudness • *suggest how to change the loudness of the sounds produced by a range of musical instruments* • *describe ways in which the pitch of a sound made by a particular instrument or vibrating object can be raised or lowered* • **recognise that sounds get fainter as the distance from the sound source increases** • describe what they observe when they move further away from a source of sound • *group instruments independently by the way sounds are produced*

	provide annotated drawings of how sounds/ instruments produce sounds identifying the vibrating part
Electricity: Circuits and Component **Key words:** Battery, cell, wires, switch, crocodile clips, buzzer, bulb, circuit, symbols, insulator, conductor, plastic, metal, electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, positive, negative, connect/connections, loose connection, short circuit, motor, non-metal	• **identify common appliances that run on electricity** • describe some of the dangers associated with mains electricity • name some components of a simple electrical circuit • know that batteries are sources of electricity • construct a working circuit • **construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers** • make drawings of simple working circuits • make circuits from drawings provided • describe the effect of making and breaking one of the contacts on a circuit • compare different circuits e.g. for brightness of bulb • **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 for a circuit to work it must be complete • explain why some circuits work and others do not • **recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit** • construct a home-made switch • describe how switches work • identify materials as conductors or insulators • construct simple circuits and use them to test whether materials are electrical conductors or insulators **Common misconceptions:** Some children may think: • electricity flows to bulbs, not through them • electricity flows out of both ends of a battery • electricity works by simply coming out of one end of a battery into the component.

Year 5 Science Map

Working Scientifically	Life Cycles	Forces	Earth and Space
• **planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary** • **taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate** • **recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs** • **using test results to make predictions to set up further comparative and fair tests** • **reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations** • **identifying scientific evidence that has been used to support or refute ideas or argument**	• describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • describe the life process of reproduction in some plants and animals • describe the changes as humans develop to old age **Changes of Materials** • compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets • know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution • use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • demonstrate that dissolving, mixing and changes of state are reversible changes • explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda	• explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • identify the effects of air resistance, water resistance and friction, that act between moving surfaces • recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect	• 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

Year 5

Progression in Scientific Knowledge

Life Cycles: Animals including Humans New born, infant, child, teenager, puberty, adult, wrinkles, grey hair, height, weight; Living Things and their Habitats **Key words:** Live young, hatch, tadpole, caterpillar, butterfly, ladybird, pupae, larvae, chrysalis, reproduction, asexual, sexual, life cycle, pollination, seed dispersal, pollen, stamen, stigma	• ***describe the changes as humans develop to old age*** • identify ways in which the appearance of humans changes as they get older and some characteristics that will not alter • recognise stages in growth and development of humans • describe the changes that happen as humans get older **Common misconceptions:** Some children may think: • all plants start out as seeds • all plants have flowers • plants that grow from bulbs do not have seeds • only birds lay eggs • ***describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird*** • recognise the similarities in the life cycles of plants and humans • ***describe the life process of reproduction in some plants and animals*** • name the parts of a flower • describe the functions of some parts of a flower • describe some of the conditions tested in investigating germination • describe the main functions of parts of a plant involved in reproduction • *explain that living things need to reproduce if the species is to survive* **Common misconceptions:** Some children may think: a baby grows in a mother's tummy • a baby is "made".
Properties and Changes of Materials **Key words:** Hardness, solubility, transparency, conductivity, thermal, insulation, dissolve, solution, separation, polymers, reversible, irreversible, evaporating, melting, evaporation, filtering,	• identify some materials that are good thermal insulators and some everyday uses of these • recognise that metals are both good thermal and good electrical conductors • **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** • **give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic** • recognise that salt or sugar dissolves in water but sand won't • name some materials that will and some that will not dissolve in water • recognise that although it is not possible to see a dissolved solid it remains in the solution • describe melting and dissolving and give everyday examples of each • separate an undissolved solid from a liquid by filtering • describe the properties of mixtures which can be separated by filtration • **know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution** • identify several factors that affect the rate at which a solid dissolves • describe some methods that are used to separate simple mixtures • explain that when solids dissolve they break up so small they can pass through the holes in the filter paper • recognise that solids remain in the solution when they dissolve • recognise that a solid can be recovered from a solution by evaporation • **use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating** • use knowledge about how a specific mixture can be separated to suggest ways in which other similar mixtures might be separated • recognise that some changes can be reserved and some cannot, classify changes in this way • recognise that dissolving is a reversible change

sieving, , dissolving, burning, rusting, vinegar, bicarbonate of soda, magnetism, insulators, conductors, soluble, insoluble	• recognise that changes of state are reversible • **demonstrate that dissolving, mixing and changes of state are reversible changes** • produce step by step descriptions of changes • identify whether some changes are reversible or not • classify some changes *e.g. dissolving* as reversible and others *e.g. burning* as irreversible • recognise that irreversible changes often make new and useful materials • recognise the hazards of burning materials • **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** • explain that in some cases the new materials made are gases and identify some evidence e.g. *vigorous bubbling* for the production of gases **Common misconceptions:** Some children may think: • thermal insulators keep cold in or out • thermal insulators warm things up • solids dissolved in liquids have vanished and so you cannot get them back • lit candles only melt, which is a reversible change.
Earth and Space **Key words:** Earth, Sun, planet, Mercury, Venus, Mars, Jupiter, Moon, Saturn, Uranus, Neptune, solar system, spherical, moon, day and night, celestial body, rotation, hemisphere, orbit, gravity, shadow, daylight	• identify and name the components of the solar system (i.e. Sun, Moon, Earth and other planets) • locate the Sun, Earth and other planets in the solar system • recognise that gravity is a force of attraction between an object and the Earth or the Moon • **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** • *explain that the changes in the appearance of the Moon over a period of 28 days arise from the Moon orbiting the Earth once every 28 days* • **describe the Sun, Earth and Moon as approximately spherical bodies** • *recognise that the Earth, Sun and Moon are spherical and support this with some evidence* • recall that a shadow from the Sun changes over the course of a day • describe how a shadow from the Sun changes over the course of a day • describe how shadows change as the Sun appears to move across the sky • explain in terms of the rotation of the Earth why shadows change and the Sun appears to move across the sky during the course of the day • recognise that it is daylight in the part of the Earth facing the Sun, that the Moon orbits the Earth • **use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky** • identify weight as a force • identify that force is measured in Newtons • name simple forces such as gravity • recognise that more than one force can act on an object • describe and explain the motion of some familiar objects in terms of several forces acting on them • use the terms 'balanced' and unbalanced' when describing several forces on an object • explain that unbalanced forces on an object cause it to speed up, change shape or slow down • *draw force diagrams with arrows showing the direction of forces acting on an object* • *use simple physical models to explain effects that are caused by the movement of the Earth* **Common misconceptions:** Some children may think: • the Earth is flat • the Sun is a planet • the Sun rotates around the Earth • the Sun moves across the sky during the day • the Sun rises in the morning and sets in the evening • the Moon appears only at night • night is caused by the Moon getting in the way of the Sun or the Sun moving further away from the Earth.
Forces **Key words:**	• **explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object** • understand that air resistance is the frictional force of air on objects moving through it • **identify the effects of air resistance, water resistance and friction, that act between moving surfaces** • describe some of the factors that increase friction between solid surfaces and increase air and water resistance • describe situations in which frictional forces are helpful as well as those in which frictional forces resist motion • describe some situations in which there is more than once force acting on an object

force, air resistance, water resistance, magnetic attraction, gravitational attraction, direction, force, motion, weight, upthrust, Newton, forcemeter, stationary, surface area, force applied, pulley, lever, gear	• *draw diagrams to illustrate forces acting on an object* • explore the effects of levers, pulleys and gears • **recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect** *describe how levers, pulleys and gears are used in everyday life* **Common misconceptions:** Some children may think: • the heavier the object the faster it falls, because it has more gravity acting on it • forces always act in pairs which are equal and opposite • smooth surfaces have no friction • objects always travel better on smooth surfaces • a moving object has a force which is pushing it forwards and it stops when the pushing force wears out • a non-moving object has no forces acting on it • heavy objects sink and light objects float.

Year 6 Science Map

Working Scientifically	Classification	Humans and Health	
• **planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary** • **taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate** • **recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs** • **using test results to make predictions**	• 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 characteristic	• identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood • recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function describe the ways in which nutrients and water are transported within animals, including humans	**Evolution and Inheritance** • recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago • recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents

to set up further comparative and fair tests • **reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations** • **identifying scientific evidence that has been used to support or refute ideas or arguments**	**Light** • recognise that light appears to travel in straight lines • use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye • explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes • use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them	**Electricity** • associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit • compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches • use recognised symbols when representing a simple circuit in a diagram	• identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution

Progression in Scientific Knowledge Year 6

Animals, including humans: Humans and Health **Key words:** Heart, veins, arteries, capillaries, blood, pulse, beats, oxygen, carbon dioxide nutrients, organs, drugs, medicines, minerals, vitamins, lungs, caffeine, medical, legal, illegal	• identify and name the parts of the circulatory system • know that the heart is made of muscle • describe what the heart and blood vessels do • **identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood** • state how to measure pulse rate • recognise that pulse rate is a measure of how fast the heart is beating • discover that during exercise the heart beats faster to take blood more rapidly to the muscles • make careful measurements of pulse rate • describe the different functions of the blood (e.g. transporting and protecting) • know that the blood comes from the heart in arteries and returns to the heart in veins • know that blood carries oxygen and other essential materials around the body • explain how ideas about the circulatory system have changed over time • identify some of the harmful effects of smoking • **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** • recognise that care needs to be taken with medicines and that they can be dangerous • give several reasons why it is sometimes necessary to take medicines • identify some harmful effects of drugs • identify food as a fuel for the body • name the major groups into which food is categorised and identify sources for each group • describe the main function of organs of the human body • explain the effect of diet on particular organs of the body/aspects of health • *explain the effect of exercise on particular organs of the body/aspects of health • explain how ideas about smoking have changed over time • explain why advice on diet changes (e.g. butter vs margarine, five a day, tax on sugary drinks)* **Common misconceptions:** Some children may think: • your heart is on the left side of your chest • the heart makes blood • the blood travels in one loop from the heart to the lungs and around the body • when we exercise, our heart beats faster to work the muscles more • some blood in our bodies is blue and some blood is red • we just eat food for energy • all fat is bad for you • all dairy is good for you • protein is good for you, so you can eat as much as you want • foods only contain fat if you can see it • all drugs are bad for you.
Living things and their habitats:	• recognise that there is a wide variety of living things • understand why classification is important • identify vertebrates and invertebrates • name and describe the five vertebrate groups • **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** • *devise own keys to classify organisms and objects* • **give reasons for classifying plants and animals based on specific characteristics** • *describe early ideas about classification (e.g. Aristotle)* • understand there are living things that are too small to be seen and these can affect our lives • recognise that there are

Classification **Key words:** Micro-organism, microbe, fungus, bacteria, virus, classified, classification key, yeast, characteristic, microscope	many micro-organisms, some which can cause illness or decay • recognise that there are useful micro-organisms which can be used in food production • describe how micro-organisms feed, grow and reproduce like other organisms • describe evidence, from investigations, that yeast is living • explain how micro-organisms can move from one food source to another or from one animal to another • *compare the rate of reproduction in microorganisms to other animals • describe how the development of the microscope has contributed to our understanding of microorganisms • describe how ideas about hygiene have changed over time (e.g. Semmelweis)*
Living things and their habitats: Evolution and Inheritance **Key words:** Variety, variation, offspring, species, competition, adapt, adaptation, reproduce, survive, evolve, fossil record, gills, blubber, moulting, long neck, hooves, eyelashes, tails, generation	• recognise variation in different species (e.g. dogs, horses) • recognise that offspring have some of the features of their parents • **recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents** • recognise that animals have to compete for food • describe how animals avoid predators (e.g. speed, camouflage) • describe how animals and plants are adapted to their environments • **identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution** • explain how being well adapted to an environment means an organism is more likely to survive • *explain that animals which are better adapted to an environment are more likely to survive, reproduce and pass on characteristics to their offspring meaning the animal species will gradually change and evolve (giraffe with the tallest neck could reach more leaves to feed on)* • **recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago** • explain why we do not have a complete fossil record • *describe the story of the peppered moth and how this provides evidence for natural selection • explain how antibiotic resistant bacteria provide evidence for natural selection • explain why we can see evidence for natural selection in fast reproducing organisms like bacteria (e.g. antibiotic resistant bacteria and pesticide resistant insects) • explain how the introduction of a new species to an isolated environment can effect native species (e.g. Dodo, Kakapo or Stephen's island wren) • compare the ideas of Darwin and Lamarck on evolution* **Common misconceptions:** Some children may think: • adaptation occurs during an animal's lifetime: giraffes' necks stretch during their lifetime to reach higher leaves and animals living in cold environments grow thick fur during their life • offspring most resemble their parents of the same sex, so that sons look like fathers • all characteristics, including those that are due to actions during the parent's life such as dyed hair or footballing skills, can be inherited • cavemen and dinosaurs were alive at the same time.
Light **Key words:** Reflection, transparent, translucent, opaque, periscope, luminous, non-luminous, absorb, direction	• explore how light travels using torches and periscopes • **recognise that light appears to travel in straight lines** • describe reflection as light 'bouncing off' objects • understand that in order to be seen, all non-luminous objects must reflect light • diagrammatically represent light from sources and bouncing off reflective surface using arrows • **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** • draw diagrams to illustrate how light is travelling from the source to the eye • **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** • describe a variety of ways of changing the size of the shadow produced by an object • describe the relationship between the size of a shadow and the distance between the light source and an object • diagrammatically represent the formation of shadows using arrow convention • use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them • *know that, when sunlight passes through some objects, coloured light is produced (for example in rainbows, soup bubbles and prisms) • describe how curved mirrors distort a reflection* **Common misconceptions:** Some children may think: • we see objects because light travels from our eyes to the object

Electricity **Key words:** Voltage, current, series, component, circuit, conductor, positive/negative terminal, complete circuit, battery, cell	know that the 'amount' of electricity (voltage) depends on the number of batteries • construct some working series circuits with specified components • recognise conventional circuit symbols • **use recognised symbols when representing a simple circuit in a diagram** • draw circuit diagrams and construct circuits from diagrams using conventional symbols • explore how to change the brightness of bulbs and the volume of a buzzer • describe ways of changing the brightness of a bulb in a circuit or the volume of a buzzer • compare different circuits (e.g. for brightness of bulb) • recall that the amount of electricity is measured in voltage • **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** • *explore the thickness of a wire in a circuit • describe the differences between wires usually used for circuits and fuse wires • describe what would happen if all the lights in a home were connected in the same circuit and one broke • explain the current in circuits using simple models and analogies (e.g. piped water, bicycle chain, children and sweets* **Common Misconceptions:** Some children may think: • larger-sized batteries make bulbs brighter • a complete circuit uses up electricity • components in a circuit that are closer to the battery get more electricity

End points for Science KS2

Working scientifically skills	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.
Biology: Understand plants	• Identify and describe the functions of different parts of flowering plants: roots, stem, leaves and flowers. • Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. • Investigate the way in which water is transported within plants.

Biology: Understand animals and humans	• 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* • 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. • Construct and interpret a variety of food chains, identifying producers, predators and prey. • Identify that humans and some animals have skeletons and muscles for support, protection and movement. • Describe the simple functions of the basic parts of the digestive system in humans. • Identify the different types of teeth in humans and their simple functions. • Describe the changes as humans develop to old age. • Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. • Recognise the importance of diet, exercise, drugs and lifestyle on the way the human body functions. • Describe the ways in which nutrients and water are transported within animals, including humans.

Biology: Investigate living things	• Recognise that living things can be grouped in a variety of ways. • Explore and use classification keys. • Recognise that environments can change and that this can sometimes pose dangers to specific habitats. • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. • Describe the life process of reproduction in some plants and animals. • Describe how living things are classified into broad groups according to common observable characteristics. • Give reasons for classifying plants and animals based on specific characteristics.
Biology: Understand evolution and inheritance	• Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. • Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. • Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
Chemistry: Investigate materials	Rocks and Soils • Compare and group together different kinds of rocks on the basis of their simple, physical properties.

	• Relate the simple physical properties of some rocks to their formation (igneous or sedimentary). • Describe in simple terms how fossils are formed when things that have lived are trapped within sedimentary rock. • Recognise that soils are made from rocks and organic matter. States of Matter • Compare and group materials together, according to whether they are solids, liquids or gases. • Observe that some materials change state when they are heated or cooled, and measure the temperature at which this happens in degrees Celsius (°C), building on their teaching in mathematics. • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. • Compare 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. • Understand how some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution. • Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. • Demonstrate that dissolving, mixing and changes of state are reversible changes.

Physics: Understand movement, forces and magnets	• 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. Compare how things move on different surfaces. • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Observe how magnets attract or repel each other and attract some materials and not others. • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. • Describe magnets as having two poles. • Predict whether two magnets will attract or repel each other, depending on which poles are facing Magnets • Describe magnets as having two poles. • Predict whether two magnets will attract or repel each other, depending on which poles are facing. Forces • Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. • Identify the 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. • Understand that some mechanisms including levers, pulleys and gears, allow a smaller force to have a greater effect.
Physics: Understand light and seeing	• Recognise that they need light in order to see things and that dark is the absence of light. • Notice that light is reflected from surfaces. • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. • Recognise that shadows are formed when the light from a light source is blocked by a solid object. • Find patterns in the way that the size of shadows change. • Understand 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 eyes. • 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. • 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.
Physics: Investigate sound and hearing	• 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.
Physics: Understand electrical circuits	• Identify common appliances that run on electricity. • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. • Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. • Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. • Recognise some common conductors and insulators, and associate metals with being good conductors. • Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. • Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. • Use recognised symbols when representing a simple circuit in a diagram.

Physics: Understand the Earth's movement in space	• Describe the movement of the Earth, and other planets, relative to the Sun in the solar system. • Describe the movement of the Moon relative to the Earth. • Describe the Sun, Earth and Moon as approximately spherical bodies. • Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.

Resources we use

Hertfordshire for Learning Scheme of Work to structure the plans

Google Classroom – Share documents with pupils, set assignments for pupils to complete, set homework/optional activities/quizzes; Share links to resources for pupils to use, Share lesson resources electronically.

Google Drive – Class drives, Staff shared drives, personal file storage drives.

BBC Bitesize KS2; Explorify, Science Twig Reporter, Anton

Science Concept Cartoons

PLAN science common misconceptions

Purple Mash science activities

School library (to research secondary sources)