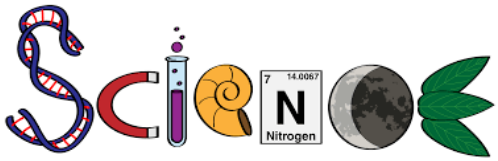
Heatherside Junior School – Science Overview



Intent:

The National Curriculum for Science at Key Stage 2 enables pupils to:

- Develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics;
- Develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them;
- Assimilate the scientific knowledge required to understand the uses and implications of science, today and for the future.

At Heatherside, we believe Science is a core part of any child's learning journey: Science holds the key to unlocking a lifelong curiosity and wonderment about the world around us. Pupils are encouraged to be curious, ask questions about what they observe and will be helped to understand scientific ideas and phenomena by using different types of enquiry to answer their own questions.

We want to support out children to:

Develop understanding of the process and methods of science through different types of science enquiries that help children to answer scientific questions about the world around them.

Develop conceptual understanding through the specific disciplines of biology, chemistry and physics.

Develop scientific knowledge through the specific disciplines of biology, chemistry and physics.

Be equipped with the scientific knowledge required to understand the uses and implications of science today and for the future.

Implementation

Science is taught weekly with a key idea/question investigated within each unit. Scientific knowledge and skills are taught in conjunction with each other. Where possible, children are given the opportunity to link their learning to mathematics through the use of measurement and statistics.

Our Science Curriculum is sequenced coherently so useful knowledge and skills builds through the three distinct disciplines of biology, chemistry and physics, ensuring both the children's substantive (scientific) and disciplinary (skills) knowledge are built upon in unison. The National Curriculum is broken into units of work which are then shared between year groups. Each year group plan their own science lessons using the progression of skills document to determine specific learning objectives, build upon prior knowledge and ensure a complete coverage of the curriculum.

Whilst all disciplinary skills are taught from Year 3 onwards, our planning and teaching allows pupils to become more confident when using these because they are embedded within lessons. Repeated exposure will allow children the opportunity to demonstrate increased independence by the time they reach Years 5 and 6. The same approach is taken with the use of scientific language so that pupils become familiar with the necessary vocabulary and can use it accurately before moving onto KS3. This learning is supported through the use of widgets, word banks and working walls.

Impact

Through the successful teaching of science at Heatherside Junior School, our approach results in fun, engaging and a high-quality science education, which provides children with the foundations to understand the world.

In order to assess the success of the curriculum, pupils will be able to demonstrate their learning through the use of pupil voice, carefully planned assessment tasks and book monitoring.

In order to demonstrate that we have accomplished our aims, pupils should:

- Be able to question ideas and reflect on their existing knowledge.
- Make links between different areas of science and other subject areas
- Demonstrate that they are becoming increasingly independent when instigating their own scientific questions and interpreting their findings
- Show confidence to use and explain scientific vocabulary.
- Transition to the next stage of their education with a keen interest in the continued learning of this subject.

Contribution to SMSC and British Values:

- Enabling a better understanding of meaning and purpose in natural and physical phenomena.
- Promoting an interest in all living things: from the smallest micro-organism to the largest mammals and plants.
- Creating a curiosity about materials, forces, space and the beauty in natural objects.
- Encouraging an open-minded approach to others' ideas, and an ability to draw conclusions based on evidence rather than personal views.
- Considering the environment, the use of natural resources, and the effect on the future of the planet and its inhabitants.
- Discussions and practical activities in groups which encourages team work and taking roles of responsibility.
- Making links with discoveries in the past and work being carried out for our future.
- Exploring discoveries and contributions made by men and women across the world in all countries and cultures.

Start here

3

Light and shadow
How do we see?
Recognise how shadows are formed.
Recognise that light is reflected.

Rocks and soils.
Comparing and grouping.
Describing fossils.
What are soils made of?

Forces and magnets
Attract and repelling materials.
Identify two poles on a magnet.

Teeth and digestion
Parts of the digestive system.
Types of human teeth.
Interpret food chains.

4

Plants and seeds.
Parts of a plant.
What plants need to grow. How water is transported.
Pollination.

Moving and growing
Human and animal muscles and skeletons.

Sound
How sound is made.
Vibrations, pitch and volume of a sound.

Electricity
What uses electricity?
Construct simple circuits.
Switches within a circuit.
Conductors of electricity.

States of matter
Solids, liquids and gas.
Heating and cooling.
Evaporation and condensation.

Habitats
Identify how livings things can be grouped.
Use classification keys.
Environmental changes.

5

Forces
Gravity
Air resistance, water resistance and friction.
Levers. Pulleys and gears.
How things move on different surfaces.

Space
Recognising the movement of the moon and Earth in relation to the Sun.

Materials
Understand reversible and irreversible changes.

6

Lifecycles
Life cycles of mammals, amphibians, insects and birds.
Reproduction in plants and animals.

Circulatory system
Names and functions of the circulatory system.
Impact of diet and exercise.
Nutrient and water transportation.
Nutrients come from the food we eat.

Electricity
Brightness and voltages. Components and their functions. Using symbols when drawing circuits.

Light
How light travels.
Light sources.

Living things and their habitats
Characteristics.

Evolution and inheritance
How living things change over time. Variation in offspring.
Adaptations.

Secondary school ready!

Heatherside Junior School – Hampshire Safety in Science

It is the responsibility of teachers to take every reasonable precaution to ensure the safety of themselves, pupils and colleagues. This involves identifying hazards and the risks they may present.

The precise definitions of *hazard* and *risk*, are as follows:
• a ***hazard*** is something with the potential to cause harm
• a ***risk*** is the likelihood of a hazard causing harm in practice.

There are two broad stages to carrying out a risk assessment. The first stage involves the identification of the hazards and the second involves working out how the activity can be carried out so that the risks presented by these hazards can be minimised. Teachers should carry out this process in science whenever they are carrying out an activity that presents hazards.

The hazard cards from Hampshire set out the regulations and advice from the local authority concerning hazards associated with common procedures and materials used in science in Key Stages 1 and 2. Teachers will need to consult this when carrying out their risk assessments prior to teaching a unit of work.

Teachers in Hampshire have access to a wide range of safety advice through the local authority's membership of CLEAPSS. CLEAPSS also produces a range of guidance and advice which is available via their website: http://primary.cleapss.org.uk/.

Teachers must:
• carry out the process of risk assessment as necessary, consulting the science co-ordinator if the risks are high;
• take reasonable care of themselves and others;
• if appropriate, try out practical activities themselves before using them with pupils;
• follow the advice given in this publication and by CLEAPPS;
• support the implementation of all health and safety procedures and policies;
• follow the guidelines on the hazard cards to minimise risk;
• ensure that other adults and pupils in the room are aware of the risk involved in the activity, and the actions that should be taken to minimise risk;
• ensure that pupils have an opportunity to discuss any hazards, and what they should do to keep themselves safe;
• report any shortcomings in line with the school's procedures.

In science, a key element of our work is safety. However, this does not mean creating a completely *risk-free* environment for pupils. Our key principle should be to: *"Teach children how to be safe rather than being safe for the children."*

This key principle supports recognised good practice formally outlined in National Curriculum general teaching requirements:
"When working with tools, equipment and materials, in practical activities and in different environments, including those that are unfamiliar, pupils should be taught:
• about hazards, risks and risk control
• *to recognise hazards, assess consequent risks and take steps to control the risk to themselves and others*
• to use available information to assess the immediate and cumulative risks
• to manage their environment to ensure the health and safety of themselves and others
• to explain the steps they take to control risks."

Animals Including Humans & Living Things and Their Habitats - WHAT CHILDREN WILL LEARN (SUBSTANTIVE KNOWLEDGE)

	Year 3 Animals, including humans	Year 4 Animals, including humans	Year 5	Year 6 Y6 Animals, including humans
Key Substantive Knowledge	**Title – Moving and Growing (Term 3)** ● All vertebrates have internal skeletons that protect vital organs. ● Invertebrates have exoskeletons that protect vital organs. ● Bones are connected (but can move relative to each other) at joints. ● Muscles connect to bones and move them when they contract. ● Humans require a balanced diet to remain healthy but healthy diets vary depending upon the type of activity that humans do. ● Animals need a variety of foods to help them grow and survive. The main food groups are: ● Meat, dairy and pulses provide protein for muscles. ● Grains and root vegetables provide carbohydrates for energy. ● Fat for insulation and energy. ● Fruit and vegetables for minerals, vitamins and fibre. ● These are essential to keep our bodies working well and protect us from illnesses.	**Title – Teeth and Digestion (Term 1)** ● Different animals require different foods to survive. ● Humans have 2 sets of teeth in their lifetimes. ● Humans have three main types of teeth- incisors, canines and molars. ● Incisors help to bite off and chew pieces of food. ● Canines are used for tearing and ripping food. ● Molars help to crush and grind food. ● The nutrients in food have to get to every part of the body. The blood transports them. ● The role of digestion is to get the nutrients in food to dissolve in the blood. The main parts of the digestive system are: mouth, tongue, teeth, oesophagus, stomach and small and large intestine.	**Title – Lifecycles (Term 3)** ● Humans have different stages of life. ● The stages last for different periods until they are adult. ● Boys and girls will have ● Puberty is a time in the human life cycle when the body goes through changes. ● *Link back to PSHE / SRE curriculum*	**Title – Animals including humans (Term 1)** ● All animals need oxygen to survive. Air is breathed into the lungs where the oxygen in the air is passed into the blood. Every part of animals' bodies need oxygen, especially muscles. ● Muscles need a supply of oxygen and sugar (glucose) to make them work, they are supplied by the blood. ● Exercise helps the heart to work more efficiently. ● Eating a healthy diet helps to keep the blood vessels from getting blocked. ● Avoiding smoking and alcohol puts less stress on the whole system and keeps it healthier. ● Blood Vessels are the tubes that blood flows through.
National Curriculum Statutory Requirement	**Year 3** ***Pupils should be taught to:*** ● *identify that humans and some other animals have skeletons and muscles for support, protection and movement.* ● *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*	**Year 4** ***Pupils should be taught to:*** ● *describe the simple functions of the basic parts of the digestive system in humans* ● *identify the different types of teeth in humans and their simple functions* *construct and interpret a variety of food chains, identifying producers, predators and prey*	**Year 5** ***Pupil should be taught to:*** ● *describe the changes as humans develop to old age*	**Year 6** ***Pupils should be taught to:*** ● *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*

PLANTS - WHAT CHILDREN WILL LEARN (SUBSTANTIVE KNOWLEDGE)

	Year 3	Year 4	Year 5	Year 6
Key Substantive Knowledge	**Title - Plants and Seeds (Term 3)** ● Plants do not eat food so have to make their own. ● As well as food, plants also make oxygen which is given out back into the air through leaves. ● The water is taken up through the roots from the soil. ● Flowering plants reproduce by the process of pollination. ● Pollination leads to the formation of a seed which can grow into a new plant. ● Stamen holds pollen. ● Stigma collects pollen. ● Ovaries contain eggs that grow into seeds when pollen from the male moves down the stigma and meets the egg. ● Flowers have petals also are a range of colours, patterns, and smells to attract insects. ● There are two types of pollination- Insect and wind ● Seed dispersal increases the chances of seeds germinating and growing into a mature plant. ● Coloured and scented petals and attract insects.	**Title - Habitats - Living things and their habitats unit (Term 1)** ● In any habitat there are food chains and webs where nutrients are passed from one organism to another when it is eaten. If the population of one organism in the chain or web is affected, it has a knock-on effect to all the others. ● Environmental change (the seasons, human activity, climate change) affects different organisms differently and therefore different habitats differently because all organisms in a habitat are interdependent. ● Living things can be divided into groups based upon their characteristics. ● Classification keys help group, identify and name living things.	**Title – Lifecycles (Term 3)** ● Mammals, amphibians, insects and birds have different life cycles. ● Lifecycles vary in time depending on the species of animal. Plants reproduce in different ways. A plant life cycle is dependent on pollinators. Bulbs reproduce asexually.	**Title – Living things and their habitats (Term 2)** ● All living (and extinct) organisms are classified into groups based upon their physical features. ● This includes animals, plants, fungi, and microorganisms like bacteria. ● Within each of these broad groups, organisms are classified into small subgroups. Animals- invertebrates, mammals, birds, amphibians, reptiles and fish, Plants- flowering plants, ferns, conifers, moss. ● Bacteria are a group of organisms that are not visible to the naked eye but are very abundant and have distinct physical features we can only see under powerful microscopes.
National Curriculum Statutory Requirement	**Year 3** ***Pupils should be taught to:*** ● *identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers* ● *explore the requirements of plants 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*	**Found in living things and their habitats**	**Found in living things and their habitats**	***Year 6 Living things and their habitats*** ***Pupils should be taught to:*** ● *describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals* ● *give reasons for classifying plants and animals based on specific characteristics*

	explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal			

VARIATION AND EVOLUTION *(some Living Things and Their Habitats)* - WHAT CHILDREN WILL LEARN (SUBSTANTIVE KNOWLEDGE)

	Year 3	Year 4	Year 5	Year 6
Key Substantive Knowledge				**Title - Evolution and inheritance (Term 3)** ● Evolution happens. Over the last many millions of years there are many examples of organisms becoming extinct and others evolving into new organisms over many generations. ● Fossils are one of the main sources of evidence for evolution. They show when new organisms appear and when they go extinct. Darwin's theory of Natural Selection explains how evolution occurs.
National Curriculum Statutory Requirement		***Year 4 Living things and their habitats*** ***Pupils should be taught to:*** ● *recognise that living things can be grouped in a variety of ways* ● *explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment* ● *recognise that environments can change and that this can sometimes pose dangers to living things*	***Year 5 Living things and their habitats*** ***Pupils should be taught to:*** ● *describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird* ● *describe the life process of reproduction in some plants and animals*	***Year 6 Evolution and inheritance*** ***Pupils should be taught to:*** ● *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*

MATERIALS - WHAT CHILDREN WILL LEARN (SUBSTANTIVE KNOWLEDGE)

	Year 3	Year 4	Year 5	Year 6
Key Substantive Knowledge	**Title – Rocks (Term 1) and Soils (Term 3)** ● A rock is a solid material made up of minerals forming part of the surface of the Earth. ● Some rocks are made of grains squashed together and can contain the remains of long-dead organisms, called fossils. This type of rock is called sedimentary rock, an example would be limestone, sandstone or mudstone. ● Some rocks are made of crystals that are locked tightly together. These are called igneous and metamorphic rocks. ● Fossils tell us what has happened before. ● Fossils provide evidence. ● Palaeontologists use Fossils to find out about the past. ● Soil made of very fine rock is called silt or clay.	***Title - States of matter (Term 3)*** ● Solids hold their shape unless forced to change. ● Liquids flow easily but stay in their container because of gravity. The more viscous a liquid the less runny it is. ● Gases move everywhere and are not held in containers by gravity. ● Heating causes solids to melt into liquids and liquids to evaporate to gases. ● Cooling causes gases to condense to liquids and liquids to freeze to solids. ● The temperature at which a substance melts from a solid to a liquid is the same at which it freezes from a liquid to a solid. ● The temperature at which a substance boils from a liquid to a gas is the same at which it condenses from a gas to a liquid. ● Liquids evaporate slowly, even below their boiling temperatures. ● The water cycle is the process by which water is continuously transferred between the surface of the earth and the atmosphere.	**Title - Properties and Changes of Materials (Term 1)** ● When more than one substance are present in the same container, it is called a mixture. ● A substance is an object with the same properties throughout. ● When a substance is added to a liquid, the substance can disappear- this is called dissolving. ● A mixture of a substance that has dissolved in a liquid is called a solution. ● Mixtures can be separated if the substances have different properties. ● There are different techniques for separating mixtures- sieving, evaporating, filtering, melting. ● Sometimes, mixed substances react to make a new substance. These changes are usually irreversible.	Not taught
National Curriculum Statutory Requirement	**Year 3** ***Pupils should be taught to:*** ● *compare and group together different kinds of rocks on the basis of their appearance and simple physical properties* ● *describe in simple terms how fossils are formed when things that have lived are trapped within rock* ● *recognise that soils are made from rocks and organic matter.*	**Year 4** ***Pupils should be taught to:*** ● *compare and group materials together, according to whether they are solids, liquids or gases* ● *observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)* ● *identify the part played by*	**Year 5** ***Pupils should be taught to:*** ● *compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets* ● *know that some materials will dissolve in liquid to form a solution, and describe how to recover a*	Not Taught

		evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	*substance from a solution* ● *use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating* ● *give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic* ● *demonstrate that dissolving, mixing and changes of state are reversible changes* *explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda*	

EARTH AND SPACE - WHAT CHILDREN WILL LEARN (SUBSTANTIVE KNOWLEDGE)

	Year 3	Year 4	Year 5	Year 6
Substantive Knowledge from Learning Journeys	Not Taught	Not Taught	**Year 5 - Earth and Beyond (Term 1)** ● A Solar system is a collection of planets, which orbit (a curved path) a star (the Sun). ● Our solar system consists of 8 planets, many of those planets have moons which orbit around them. ● Earth's moon is not a planet but is a satellite which orbits Earth. ● As the Moon orbits the Earth, the Sun lights up different parts of it, making it seem as if the Moon is changing shape. We call these the phases of the moon. ● The Moon doesn't emit (give off) light itself, the 'moonlight' we see is actually the Sun's light reflected off the lunar surface. ● Gravity is force of attraction between two objects with mass (a quantity of matter) ● Differences in gravity result in smaller mass objects orbiting around lager mass objects, e.g., planets around stars and moons around planets	Not Taught
National Curriculum Statutory Requirement	Not Taught	Not Taught	**Year 5** ***Pupils should be taught to:*** ● *describe the movement of the Earth, and other planets, relative to the Sun in the solar system* ● *describe the movement of the Moon relative to the Earth* ● *describe the Sun, Earth and Moon as approximately spherical bodies* ● *use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.*	Not Taught

ELECTRICITY - WHAT CHILDREN WILL LEARN (SUBSTANTIVE KNOWLEDGE)

	Year 3	Year 4	Year 5	Year 6
Substantive Knowledge from Learning Journeys	Not Taught	**Year 4 Electricity (Term 2)** ● Electricity comes from a source. There are two main sources- batteries and mains ● A battery pushes electricity to the device and to be able to push electricity, the battery must be connected to the device using wires. This is called a circuit. ● Some materials will allow electricity to flow through them- Conductors (silver, gold and copper are good conductors. Water is also a conductor of electricity). ● Other materials will not allow electricity to flow through them- Insulators. Plastic, wood, glass and rubber are good electrical insulators. That is why they are used to cover materials that carry electricity. ● A switch opens and closes a circuit. *Children should draw the circuit as a pictorial representation – this is covered in Year 6*	Not Taught	**Year 6 Electricity (Term 2)** ● Current is the flow of electricity around a circuit. ● The power supply in a circuit pushes the current round the circuit ● The voltage of the power supply is a measure of this push ● Voltage is measure in volts ● Current is the flow of electricity through a conductor ● When current passes through a device it makes it work ● Increasing the voltage (the number of cells in the battery) increases the current. The larger the flow of current, the harder the device works ● Resistance is the slowing down of electrical current and the more devices added into a circuit, the greater the resistance. ● If there are more batteries added to a circuit this provides a bigger push on the electricity
National Curriculum Statutory Requirement	Not Taught	**Year 4** ***Pupils should be taught to:*** • *identify common appliances that run on electricity* • *construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers* • *identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery* • *recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit*	Not Taught	**Year 6** ***Pupils should be taught to:*** ● *associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit* ● *compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches* ● *use recognised symbols when representing a simple circuit in a diagram.*

		recognise some common conductors and insulators, and associate metals with being good conductors.		

ENERGY PATHWAYS (Light and Sound) - WHAT CHILDREN WILL LEARN (SUBSTANTIVE KNOWLEDGE)

	Year 3	Year 4	Year 5	Year 6
Substantive Knowledge from Learning Journeys	**Title - Light and Shadow (Term 1)** ● There must be light for us to see. ● Light comes from a source. ● Light from the sun can be dangerous and that there are ways to protect their eyes. ● If an object is transparent, light will go through it and we will be able to see through it. ● If an object is opaque, it will block the light and no light will get through. This is what forms shadows. ● The closer to the light source an object is, the bigger the shadow will be. This is because the object blocks more of the light. ● The further away from the light source an object is, the smaller the shadow will be. This is because the object blocks less of the light. ● If an object is perfectly reflective, light will bounce back off it and we will see reflections of objects.	**Title – Sound (Term 3)** ● Sounds can be produced in a variety of ways and individual sounds have the properties of pitch and volume. ● When a sound is made it immediately spreads out in all directions. As it travels, its volume decreases but its pitch remains the same. ● Sound is caused by vibration (objects move rapidly back and forth or up and down) ● When objects vibrate, it makes the objects in contact with it also vibrate. This includes the air. ● The vibration travels through the air and makes other objects it is in contact with vibrate including your ear drum. ● Pitch and volume are caused by how the material vibrates. ● The pitch of a sound is caused by how fast an object vibrates. This is called the frequency of vibration. Higher the frequency, higher the pitch. ● Smaller objects or tighter strings tend to vibrate with a higher frequency. ● The volume of sound is caused by how big each vibration is. This is called the amplitude of vibration. The bigger the amplitude, the higher the volume.	Not taught	**Title – Light (Term 1)** ● When light is emitted from a light source, it travels in straight lines until it hits an object. This can be represented by an arrow. ● Shadows form when light hits an opaque object. The area behind the object is in darkness because light can only travel in straight lines. ● Shadows have the same shape as the objects that cast them. ● When light hits a transparent object, it goes through it in a straight line so we can see a clear image through it. ● When light hits a translucent material, it goes through it but is scattered This means light can pass through, but we can't see an image through it. ● When light hits a mirrored surface, it reflects off it in straight lines so we can see an image in the reflective material. We see objects when light is reflected off the object and enters the eye through the pupil.
National Curriculum Statutory Requirement	**Year 3** ***Pupils should be taught to:*** ● *recognise that they need light in order to see things and that dark is the absence of light* ● *notice that light is reflected from surfaces* ● *recognise that light from the sun can be dangerous and that there*	**Year 4** ***Pupils should be taught to:*** ● *identify how sounds are made, associating some of them with something vibrating* ● *recognise that vibrations from sounds travel through a medium to the ear* ● *find patterns between the pitch of a*		**Year 6** ***Pupils should be taught to:*** ● *recognise that light appears to travel in straight lines* ● *use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye* ● *explain that we see things because light travels from light sources to*

	are ways to protect their eyes ● *recognise that shadows are formed when the light from a light source is blocked by an opaque object* *find patterns in the way that the size of shadows change*	*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*		*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.*

FORCES - WHAT CHILDREN WILL LEARN (SUBSTANTIVE KNOWLEDGE)

	Year 3	Year 4	Year 5	Year 6
Substantive Knowledge from Learning Journeys	**Title - Forces and Magnets (Term 2)** ● Magnets attract and repel. ● Each end of a magnet is called a pole, opposite poles are called north and south. ● Magnets don't need to touch. Magnetic forces work through other materials including air, so magnets don't need to be touching to exert their force. It is called a non-contact force ● Magnets exert attractive forces on each other when the poles facing each other are north and south (opposites). ● Magnets exert repulsive forces on each other when the poles facing each other are the same. ● The strength of magnetic forces are affected by: - The strength of the magnet. - The distance between the magnet and the object. The material the object is made from.	-	**Title – Forces (Term 2)** ● When objects move through air and water, they have to push it out of the way. The water and air push back with forces called water resistance and air resistance. The harder it is to push the material out of the way the greater the resistance. ● Friction is a force against motion caused by two surfaces rubbing against each other. It occurs because no surfaces are perfectly smooth. ● Some objects require large forces to make them move; gears, pulley and levers can reduce the force needed to make things move. ● The use of levers can reduce the force needed to move things. The object you are lifting is called the load, and the force you apply to the arm to make the object move is called the effort. ● The use of pulleys can reduce the force needed to move things.	
National Curriculum Statutory Requirement	**Year 3** ***Pupils should be taught to:*** ● *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*		**Year 5** ***Pupils should be taught to:*** ● *explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object* ● *identify the effects of air resistance, water resistance and friction, that act between moving surfaces* ● *recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect*	

	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.*			

SKILLS PROGRESSION (DISCIPLINARY KNOWLEDGE) – WORKING SCIENTIFICALLY

Lower key stage 2 programme of study

Working scientifically

During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations and, where appropriate, taking accurate measurements using 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.

Upper key stage 2 programme of study

Working scientifically

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations
- identifying scientific evidence that has been used to support or refute ideas or arguments

Skills (Working scientifically)	LKS2	UKS2
Asking questions (predicting/ planning	Can set up simple practical enquiries to answer relevant scientific questions, including comparative and fair tests.	Can plan a scientific enquiry to answer relevant scientific questions, including recognising and controlling variables where necessary.
Observing (measuring and recording)	Can use systematic and careful observations, taking accurate measurements using standard units. Can record findings using scientific language, drawings, labelled diagrams and charts.	Can take measurements, using a range of scientific equipment with increasing accuracy and precision. Can record and present data and results in a range of ways with increasing accuracy.
Concluding (explaining/ justifyi	Can report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.	Can report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.
Evaluating (summarising/ reasoning/ communicating)	Can use results to draw simple conclusions and make predictions, suggest further improvements and raise further questions.	Can use test results to make predictions to set up further comparative and fair tests.

Science Vocabulary through HJS

Year Group	Year 3	Year 4	Year 5	Year 6
Working scientifically	Develop, enquiry, practical, fair test, compare, test, relationships, conclusion, accurate, data, chart, table, Estimate, bar chart, results, predictions, explain, reason, similar, different, question, evidence, information, findings, properties, characteristics, classify, labels, keys.		Variables, independent, dependent, control, justify, evidence, precision, accuracy, graphs, argument, causal relationship, present, prove/disprove.	
Animals including humans, including living things and their habitats	**The Body** Skeleton, bone, bones, ribs, spine, skulls, vertebrate, contract, relax, contraction, joint, move, muscles, support, protect, move. **Diet** – Nutrition, water, hydration, oxygen, feed, feeding, growth, activity, food groups, vegetables, meat, fish, balanced diet, cereals, sugars, fats, fruits, starches.	**Teeth and Digestion** tooth, teeth, incisor, molar, canine, diet, healthy, unhealthy, root, decay, food. Environment, non-flowering plants, ferns, moss, flowering plants, habitat, deforestation, population. Vertebrates: fish, birds, mammals, amphibians, reptiles. Invertebrates: snails, worms, slugs, spiders, insects.	**Life Cycles** Insect, timeline, difference, process, puberty function, womb, foetus, embryo, adolescence, lifecycle, development, changes, growth, baby, childhood, adulthood, old age, evolve, evolution, natural selection, genetics, reproduction, offspring, parents, siblings.	**Heart and Circulatory system** circulatory system, heart, valve, blood vessel, vein, artery transport, oxygenated, deoxygenated, lifestyle, drugs, function
Plants	**Plants and Seeds** Petal, stamen, stigma, style, ovary, ovule seeds, blubs, plant, germinate, roots, stem, disperse, leaves, shoot, warmth.		**Process** – fertilisation, germination, pollination	**Classification** Classify, observable characteristics, similarities, micro-organism
Variation, Evolution and Inheritance				Earth, fossils, offspring, adapt, environment, evolution environment, variation, fossils, inheritance, organisms, classification, microorganisms.
Forces and Magnets	**Forces and Magnets** Force, push, repel, attract, move, surfaces, pull, contact, distance, magnet, bar magnet, ring magnet, horseshoe magnet, poles, magnetic materials.		**Forces and Magnets** Gravity, air resistance, water resistance, friction, levers, pulleys, gears, pivot	

Light	**Light and Shadow** Light, dark, absence of light, reflect, shadow, opaque, mirror, reflective surface, translucent, block, sources, brighter, duller, bounce, sun.			**Light** Light source, refraction, reflect, prism, emit, mirror, bounce, reverse, beam, spectrum, visible, travel.
Sound		**Sound** Sound, vibration, vibrate, pitch, volume, insulation, sound wave, source, volume, absorb, eardrum, distance, particles.		
Earth and Space		**Earth and Beyond** Solar system, planets, moon, stars, gravity, orbit, rotation, moon, sun, satellite, stars, full moon, gibbous moon, half moon, crescent moon, new moon, waving moon, waning moon, day and night.		
Electricity		**Electricity** Electricity, simple circuit, light bulb, cell, wire, buzzer, switch, motor, battery, series circuit, conductor, insulator, connection, break, open/close.		**Electricity** Voltage, symbols, components, circuit diagram, brightness, functions.
Materials & Rocks and Soils	**Rocks and Soils** Mineral, crystals, properties, hardness, durability, density, porosity, fossils, sedimentary, limestone, sandstone, metamorphic, igneous.	**States of matter** Solid, Liquid, Gas, Evaporation, Condensation, Melting, Evaporating, Condensing, Boiling, Freezing, Solidifying	**Changes of state** Separating, mixtures, dissolving, evaporate, condense, pure, solution, liquid, gas, reversible and irreversible changes.	