Science Curriculum
Year 5 and 6 – Cycle B

Purpose of study

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

Aims

The national curriculum for science aims to ensure that all pupils:

♣ develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics

♣ develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them

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

Scientific knowledge and conceptual understanding

The programmes of study describe a sequence of knowledge and concepts. While it is important that pupils make progress, it is also vitally important that they develop secure understanding of each key block of knowledge and concepts in order to progress to the next stage. Insecure, superficial understanding will not allow genuine progression: pupils may struggle at key points of transition (such as between primary and secondary school), build up serious misconceptions, and/or have significant difficulties in understanding higher-order content. Pupils should be able to describe associated processes and key characteristics in common language, but they should also be familiar with, and use, technical terminology accurately and precisely. They should build up an extended specialist vocabulary. They should also apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data. The social and economic implications of science are important but, generally, they are taught most appropriately within the wider school curriculum: teachers will wish to use different contexts to maximise their pupils' engagement with and motivation to study science.

Attainment targets - By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study.

Key Stage 1	Lower Key Stage 2	Upper Key Stage 2
The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information. They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos. 'Working scientifically' is described separately in the programme of study, but must always be taught through and clearly related to the teaching of substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content. Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.	The principal focus of science teaching in lower key stage 2 is to enable pupils to broaden their scientific view of the world around them. They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions. They should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out. 'Working scientifically' must always be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content. Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.	The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings. 'Working and thinking scientifically' is described separately at the beginning of the programme of study, but must always be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content. Pupils should read, spell and pronounce scientific vocabulary correctly.
Working Scientifically - **The nature, processes and methods of science** 'Working scientifically' specifies the understanding of the nature, processes and methods of science for each year group. It should not be taught as a separate strand. The notes and guidance give examples of how 'working scientifically' might be embedded within the content of biology, chemistry and physics, focusing on the key features of scientific enquiry, so that pupils learn to use a variety of approaches to answer relevant scientific questions. These types of scientific enquiry should include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. Pupils should seek answers to questions through collecting, analysing and presenting data. 'Working scientifically' will be developed further at key stages 3 and 4, once pupils have built up sufficient understanding of science to engage meaningfully in more sophisticated discussion of experimental design and control.		
During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content: ♣ asking simple questions and recognising that they can be answered in different ways ♣ observing closely, using simple equipment ♣ performing simple tests ♣ identifying and classifying ♣ using their observations and ideas to suggest answers to questions ♣ gathering and recording data to help in answering questions.	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.	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 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
Plants	**Plants**	

Pupils should be taught to: ♣ identify and name a variety of common wild and garden plants, including deciduous and of a variety of common flowering plants, including trees. Pupils should be taught to: ♣ observe and describe how seeds and bulbs grow into mature plants ♣ find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.	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 ♣ explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	
Animals including Humans Pupils should be taught to: ♣ identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals ♣ identify and name a variety of common animals that are carnivores, herbivores and omnivores ♣ describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) ♣ identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. Pupils should be taught to: ♣ notice that animals, including humans, have offspring which grow into adults ♣ find out about and describe the basic needs of animals, including humans, for survival (water, food and air) ♣ describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	**Animals including Humans** Pupils should be taught to: ♣ identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat ♣ identify that humans and some other animals have skeletons and muscles for support, protection and movement. 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.	**Animals including Humans** Pupils should be taught to: ♣ describe the changes as humans develop to old age. 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.
Everyday Materials Pupils should be taught to: ♣ distinguish between an object and the material from which it is made ♣ identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock ♣ describe the simple physical properties of a variety of everyday materials ♣ compare and group together a variety of everyday materials on the basis of their simple physical properties.	**Rocks** 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.	**Properties and changes of Materials** Pupils should be taught to: ♣ compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets ♣ know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution ♣ use knowledge of solids, liquids and gases to decide how mixtures might be separated, 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.
Uses of Everyday Materials Pupils should be taught to: ♣ identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses ♣ find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	**Light** Pupils should be taught to: ♣ recognise that they need light in order to see things and that dark is the absence of light ♣ notice that light is reflected from surfaces ♣ recognise that light from the sun can be dangerous and that there are ways to protect their eyes ♣ recognise that shadows are formed when the light from a light source is blocked by an opaque object ♣ find patterns in the way that the size of shadows change.	**Light** Pupils should be taught to: ♣ recognise that light appears to travel in straight lines ♣ use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye ♣ explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes ♣ use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.
Seasonal Changes Pupils should be taught to: ♣ observe changes across the four seasons ♣ observe and describe weather associated with the seasons and how day length varies.	**Forces and Magnets** 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 attracted to a magnet, and identify some magnetic materials ♣ describe magnets as having two poles	**Earth and Space** Pupils should be taught to: ♣ describe the movement of the Earth, and other planets, relative to the Sun in the solar system ♣ describe the movement of the Moon relative to the Earth ♣ describe the Sun, Earth and Moon as approximately spherical bodies ♣ use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.

	♣ predict whether two magnets will attract or repel each other, depending on which poles are facing.	
Living Things and their habitats Pupils should be taught to: ♣ explore and compare the differences between things that are living, dead, and things that have never been alive ♣ identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other ♣ identify and name a variety of plants and animals in their habitats, including microhabitats♣ describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.	**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.	**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. 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 microorganisms, plants and animals ♣ give reasons for classifying plants and animals based on specific characteristics.
	States of matter Pupils should be taught to: ♣ compare and group materials together, according to whether they are solids, liquids or gases ♣ observe that some materials change state when they are heated or cooled, and measure or research the temperature at 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.	**Forces:** Pupils should be taught to: ♣ explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object ♣ identify the effects of air resistance, water resistance and friction, that act between moving surfaces ♣ recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.
	Sound Pupils should be taught to: ♣ identify how sounds are made, associating some of them with something vibrating ♣ recognise that vibrations from sounds travel through a medium to the ear ♣ find patterns between the pitch of a sound and features of the object that produced it ♣ find patterns between the volume of a sound and the strength of the vibrations that produced it ♣ recognise that sounds get fainter as the distance from the sound source increases.	**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
	Electricity Pupils should be taught to: ♣ identify common appliances that run on electricity ♣ construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers ♣ identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery ♣ recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit ♣ recognise some common conductors and insulators, and associate metals with being good conductors.	**Electricity** Pupils should be taught to: ♣ associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit ♣ compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches ♣ use recognised symbols when representing a simple circuit in a diagram.

Non- Negotiables – Working Scientifically

W1: Plan enquiries, including recognising and controlling variables where necessary. W2: Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work. W3: Take measurements, using a range of scientific equipment, with increasing accuracy and precision. W4: Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs, and models. W5: Report findings from enquiries, including oral and written explanations of results, explanations involving causal relationships, and conclusions. W6: Present findings in written form, displays and other presentations. W7: Use test results to make predictions to set up further comparative and fair tests. W8: Use simple models to describe scientific ideas, identifying scientific evidence that has been used to support or refute ideas or arguments.

Investigation, enquiry, what to change, what we used, what we did, what we found out Investigation, enquiry, prediction, variable, dependent variable, independent variable, constant, patterns, equipment, apparatus, method, results, conclusion Investigation, enquiry, prediction, variable, dependent variable, independent variable, constant, patterns, equipment, apparatus, method, results, conclusion

	Autumn		Spring		Summer	
Topic	**How is new life created?**	**How do our bodies function?**	**What is the best material for _____?**	**How do forces act upon us in our everyday life?**	**How do you brighten a bulb?**	**Independent scientific enquiry – questions to build on prior knowledge/challenge misconceptions.**
	Animals including humans B3: Describe the changes as humans develop to old age. **Living things and their habitats**	**Animals including humans** B4: Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. B6: Describe the ways in which nutrients and water are transported within animals.	**Everyday materials** C1: 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.	**Forces and air resistance** P3: Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.	**Understanding electrical circuits** P14: Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. P15: Compare and give reasons for variations in how components function, including the	**Working scientifically** W1: Plan enquiries, including recognising and controlling variables where necessary. W2: Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work. W3: Take measurements, using a range of

	B7: Describe the difference in the life cycle of a mammal, bird, amphibian, and an insect. B8: Describe the life process of reproduction in some plants and animals.			P4: Identify the effect of drag forces, such as air resistance, water resistance and friction that act between moving surfaces. P5: Describe, in terms of drag forces, why moving objects that are not driven tend to slow down. P6: Understand that force and motion can be transferred through mechanical devices such as gears, pulleys, levers and springs. P7: Understand that some mechanisms including levers, pulleys and gears, allow a smaller force to have a greater effect.	brightness of bulbs, the loudness of buzzers and the on/off position of switches. P16: Use recognised symbols when representing a simple circuit in a diagram.	scientific equipment, with increasing accuracy and precision. W4: Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs, and models. W5: Report findings from enquiries, including oral and written explanations of results, explanations involving causal relationships, and conclusions. W6: Present findings in written form, displays and other presentations. W7: Use test results to make predictions to set up further comparative and fair tests. W8: Use simple models to describe scientific ideas, identifying scientific evidence that has been used to support or refute ideas or arguments.
Resources	Life cycle diagrams, access to internet, plants for dissection, cheese puffs, flower cut outs, Ipads for recording	Stopwatches, red water beads, ping pong balls, red foam, hoops and skipping roles to create model of circulatory system (everyday school equipment.)	Bullbs, wires, batteries, containers, range of materials, kettle, thermometer, magnets.	Large trays, flour, cocoa/chocolate powder, marbles, ball bearings, golf balls etc, iPads and laptops, internet access – research, reference materials, Plastic Bag Parachute sheet • Plastic bags, string/wool, paper clips, rubber bands, Measuring cylinders or equivalent, Water, Plasticine, Stopwatches	Electrical wires with crocodile clips, Bulbs, Bulb Holders, Batteries (a selection of batteries with different voltages), Battery Holders (single and double), Buzzers, Motors, circuit diagrams, images of symbols,	(resources dependent on children's chosen enquiries)
Vocabulary	Foetus, gestation, baby, toddler, teenager, puberty, adolescent, adult, elderly, development, growth, gametes, reproduction, pollination, life cycle, mammal, insect, bird, reptile, amphibian	Heart, blood vessel, vein, artery, capillary, aorta, blood, oxygenated, deoxygenated, nutrient, transport, pump, exercise.	Material, property, conductivity, insulation, soluble, magnetic, flexible, transparent, opaque, translucent	Force, friction, Newton, gravity, newton meters, air resistance, water resistance, gears, pulleys, levers	circuit, series/ parallel, conductors, insulators, amps, volts, , Thomas Edison, Nikola Tesla, Alessandro Volta, Michael Faraday, home, alternating current, direct current, battery, cell. Bulb, battery, cell, wires, switch, motor, buzzer, scientific, informal, circuit, diagram, voltage, brightness, loudness, increase, decrease.	Enquiry, fair test, variable, independent, dependent, control, repeat test, reliable, accurate, measurement, apparatus, equipment, method, diagram, results, line graph, bar chart, pie chart, conclusion, presentation, evaluation.
Flashback	• **That conductors let electricity pass through, and insulators prevent electricity from moving through.** • **The dangers of electricity and how insulators can protect it.** • **Plants need water, sunlight, warmth, nutrients from soil and room to go.**	• **The 7 life processes exhibited by plants.** • **Water travels from the roots up tubes (Xylem) in the stem.** • **The life cycles of mammals, birds, amphibians, insects.**	• **Reproduction can be sexual (DNA from 2 organisms combines to create offspring) or asexual (one parent organism copies its genetic information to produce identical offspring)** • **Metamorphism is a significant change in form or structure of an organism in its development.** • **The function of the heart is to pump blood around the body. The blood vessels transport the blood around the body.**	• **The function of blood is transport water, nutrients and oxygen around the body and supply it to the cells that require it.** • **The lungs provide oxygen to the blood. The heart first pumps blood to the lungs and then to the rest of the body.** • **Conductors allow electricity pass through them easily. Insulators do not allow electricity to easily pass through them. (This applies for heat conductors and insulators)**	• **When testing materials, the independent variable is the material. We should ensure we control all variables the same, so it is a fair test.** • **Materials can be used for a particular purpose depending on their combined properties.** • **Objects fall towards the earth because the force of gravity s acting between the Earth and the object.** • **Friction, air resistance and water resistance act between moving surfaces and this is what causes them to slow down when they are not being pushed.**	• **Levers, pulleys, and gears allow smaller forces to have a greater effect.** • **The larger the voltage of a cell or the more cells that are used, the brighter a bulb will shine or the louder a buzzer will be.** • **Switches are used to connect and disconnect a circuit.** • **The degrees of trust for conducting a fair test are, objectivity, accuracy, reproducibility, consensus, sample size.**
Lesson 1	**WALT: know how plants reproduce.** **Activities:** Children to recap the names of key parts of a flowering plant. Explore what reproduction means. Children to complete an investigation that model's pollination (flowers and cheese puffs) They need to understand the main causes of pollination. **Children will know:** • what reproduction is.	**WALT: know the function of the heart.** **Activities:** Children to explore what they already know. Explore the function of the heart using video, books and quick demonstrations. Children to label a diagram of the heart using a knowledge organiser – They should use arrows and colours to represent the different types of blood. **Children will know:**	**WALT: compare and group together everyday materials on the basis of their conductivity and insulation.** **Activities:** Children will explore what conductivity and insulation means. They will explore that it can be in relation to heat or electricity. They will take part in a series of investigations to consider which material are good conductors and which are good insulators.	**WALT: recognise the effects of gravity on earth.** **Activities:** Children will consider what weight is, and how the impact caused by falling objects can vary, depending on their size, shape, mass, and the height they fall from. **Children will know:** • why objects fall towards the centre of the Earth	**WALT: know the importance of the major discoveries in electricity.** **Activities:** Recap understanding of electricity and circuits. Research history of electricity and its invention. **Children will know:** • how our understanding of electricity has changed over time.	**WALT: develop scientific lines of enquiry based on what they already know.** **Activities:** Children will work in groups of 4, they will work together to create a range of scientific questions, they will write these on post it notes. They will then decide about which one they will answer. They are only bound by three rules. This should be a further question based on what they have learnt in school. • It must be able to be answered/conducted safely.

	• plants need to reproduce as well as animals. • that plants contain both male and female gametes.	• that the heart is a muscle that pumps blood around the body • that the lungs oxygenate the blood • the movement of the blood flow around the heart	**Children will know:** • what an insulator is and what a conductor is • which materials are conductors and which are insulators • that conduction and insulation is in relation to heat and electricity	• the causal link between the mass of an object and the amount of force with which gravity acts on it	• how major discoveries affected our understanding and use of electricity	• The resources/equipment required must be readily available in homes or in school. • The enquiry must only take place over the course of 2 hours (or measurements can be taken over a longer period of a week if children take responsibility for the measurements.) (They need to take into consideration what means and resources we have available in school and at home to conduct the investigation effectively – for example they couldn't test the speed of rocket fuel engines to get to the moon.) They must then briefly discuss an outline of how they might conduct this, solving problems as they go (This will not be a formal plan yet.) **Children will know:** • how to ask relevant scientific questions based on what they already know • how to recognise challenges faced when trying to answer scientific questions such as resources, time and safety
Lesson 2	**WALT: know that there are different types of reproduction in plants.** **Activities:** Children to explore the other type of reproduction – asexual reproduction. The children will produce their own plants in this way by taking cuttings and replanting them in a jar of water. **Children will know** • that all living things need to reproduce • the difference between sexual and asexual reproduction • how to to use scientific knowledge to grow their own plants	**WALT: know the main parts of the human circulatory system.** **Activities:** Children should explore the entire circulatory system including identifying the names of each type of blood vessel. All children will pretend to be a blood cell. They will have to move through the circulatory system that has been set up in the hall ensuring that they move in the right direction and collect oxygen at the lungs. **Children will know** • the main parts of the circulatory system • that blood moves away from the heart in arteries and towards the heart in veins • that blood cells transport oxygen around the body	**WALT: compare and group together everyday materials on the basis of a range of properties** **Activities:** Children will identify and discuss several different properties of a range of materials (magnetic, soluble, flexible, transparent etc.), then sort and group given sets of materials, Children to complete a carousel of activities to do this. **Children will know:** • how to describe everyday materials according to their properties • how to compare and group everyday materials according to their properties • why some everyday materials are useful due to their properties	**WALT: identify the effects of friction acting between moving surfaces**. **Activities:** Children will learn about what friction is and some ways in which it can be measured. They will also identify instances of high and low friction and conduct friction investigations **Children will know:** • friction is a force that acts between two moving surfaces • that friction could be an advantage or disadvantage and give some examples • how to carry out an investigation, making sure that it is a fair test	**WALT: use recognised symbols when representing a simple circuit in a diagram.** **Activities:** What is a circuit? How would you draw a circuit? Explain vocabulary difference cell/battery. Show symbols. Match informal and scientific symbols. Convert informal diagrams to scientific diagrams. **Children will know:** • the scientific symbols for the main parts of a circuit • how to create circuit diagrams using scientific symbols	**WALT: independently plan a science enquiry, recognising and controlling variables.** **Activities:** Now children have decided on their enquiry they must create a plan in their groups considering: the question, the independent variable, dependent variable, control variables, apparatus, diagram, method, prediction, table of results **Children will know:** • most of the variables and control what is necessary • how to make a prediction based on what they already know • how to consider safety, time and resources in their planning
Lesson 3	**WALT: know the life cycle and process of different mammals.** **Activities:** Study a range of different mammals' life cycles comparing the similarities and difference between them. What is the common theme that makes the animals all mammals? Children to order key stages in the reproduction process for a placental mammal then write how this is similar and different to other mammals (marsupials and monotremes) **Children will know:** • that mammals reproduce using sexual reproduction. • the lifecycle of a variety of mammals. • the similarities and difference between different types of mammals.	**WALT: know how oxygen, water and nutrients travel around the body.** **Activities:** What do animals need to survive? Explore blood in more detail, explore the 4 main parts of what it is made from and the mechanisms used to transport nutrients, water and oxygen around the body. Show children a demonstration of what blood is made up of using a scientific model (read water beads, ping pong balls, red foam and water.) **Children will know:** • that blood transports, nutrients, water and oxygen • the 4 main components of blood • how blood delivers nutrients, water and oxygen to the body	**WALT:** know **reasons for the particular uses of everyday materials in relation to their properties** **Activities:** Children will first recap on the vocabulary used to describe the properties of different materials, before taking a closer look at some of them, and why materials with these properties are used for certain purposes. In their independent activities, children will use their knowledge and reasoning skills to explain how the properties of a material make it useful for a specific purpose **Children will know:** • some of the different properties that each material can have • that the properties materials have can affect how they are used/what they are used for	**WALT: identify and explain the effects of air resistance.** **Activities:** Children will learn about ways in which air resistance affects moving objects, then plan and conduct investigations where they will determine how air resistance affects falling objects. **Children will know:** • that air resistance is a force that slows objects moving through the air • how to plan, carry out and assess experiments to investigate air resistance • how to draws conclusions from their investigations	**WALT: observe and explain the effects of differing voltages in a circuit** **Activities:** BBC Clip – currents and voltage. Show children a circuit diagram with the volts labelled. Discuss the location of the label and how to label a battery containing multiple cells, as opposed to a single cell. Show children a circuit diagram with the volts labelled. Discuss the location of the label and how to label a battery containing multiple cells, as opposed to a single cell. What difference do volts make? Make predictions – what will happen if to bulb, buzzer if increase voltage. Model one example using a bulb, including how to draw the circuit diagram of each step with volts labelled accurately. Pairs explore effects of increasing cells -draw diagrams **Children will know:** • the brightness of a lamp or the volume of a buzzer with the number is linked to the voltage of cells used in the circuit • how to draw circuit diagrams indicating the voltage	**WALT:** record results accurately and appropriately using measuring equipment. **Activities:** Children will conduct their investigation over the course of an afternoon. They need to take multiple readings for each test to check the reliability of the results. Each child needs to have an active role in the investigation. **Children will know:** • how to conduct a fair enquiry based on their plan • how to consider degrees of trust when conducting their investigation • how to take multiple readings and record them appropriately • how to use measuring equipment correctly to ensure accurate results

			• why a certain material has been chosen for a specific purpose, based on its properties		• the effect of increasing or decreasing the voltage on different parts of a circuit	
Lesson 4	**WALT:** describe the similarities and differences between reproduction in insects and amphibians. **Activities:** Children to compare complete and incomplete metamorphosis in insects and amphibians. Children should draw an animal needs to try and guess the animal and other stages in its life cycle. Children to complete two life cycles with drawings and descriptions of each stage. (Provide children with a life cycle template.) **Children will know:** • what complete and incomplete metamorphosis is • the life cycles of some insects and amphibians • how to compare the life cycles of insects and amphibians	**WALT: know how our heart is affected by exercise.** **Activities:** Children to plan an investigation to measure how our heart rate is affected by exercise. They may choose to change the activity type, the intensity the activity is performed or the length of time the activity is performed. Children to also draw table (need space for repeated results. They should make predictions about the results. **Children will know:** • how to plan a fair test where they understand the independent, dependent and control variables • how to describe the method they will use and the apparatus that they will need • how to make predictions based on what they already know	**WALT: plan an investigation to find the best material for a particular purpose.** **Activities:** Up to this point, investigations have been generalised to group objects based on their properties, they will now design an investigation to accurately compare materials for a specific purpose. Firstly, they will need to establish what properties are required for a particular product. Then they need to design an investigation to test each material. They will need to formulate a table to help them collect appropriate results. This could be observations or quantitate measurements. **Children will know:** • the properties needed for a particular product • how to plan an enquiry considering all the variables • the most appropriate ways to collect data	**WALT: identify and explain the effects of water resistance.** **Activities:** Children will learn about water resistance and how it affects objects moving through water. They will then conduct water resistance investigations. **Children will know:** • that water resistance slows an object moving through water • how to plan and carry out an experiment, making sure it is a fair test • how to identify trends in results and draw conclusions	**WALT: to plan an investigation to explore variations in how components function.** **Activities:** Does wire length affect how components in a circuit work? Children discuss the question with their talk partners and feedback. Plan an investigation. Discuss investigation plan with peer partner and make improvements. Children can use a voltmeter to measure voltage. Children to be given enquiry but to plan own investigation. **Children will know:** • plan an investigation in which only one variable is changed • which variables to control • how to make predictions about how variations in component function effect the outcome	**WALT: present results using a graph/chart.** **Activities:** Children will present their results in an appropriate graph or chart. They could choose a bar chart, line graph or pie chart depending on the results they have collected. **Children will know** • an appropriate way to present their results • how to draw an accurate graph/chart – choosing appropriate increments • how to plot their data accurately
Lesson 5	**WALT: explore scientific evidence that has been used to support or refute ideas about reproduction.** **Activities:** Children will learn about the work of Jane Goodall. They will explore how her work supports the scientific ideas about a mammal's life cycle. They will complete a fact file about the like and work of Jane Goodall specifically reference how the evidence she gathered supports a scientific argument. **Children will know:** • about the work of Jane Goodall with the chimpanzees • how the evidence she gathered supports the scientific ideas of a mammal's life cycle • some of the challenges faced by Chimpanzees	**WALT: investigate, take measurements, and record the results. (Lesson 2 – heart rate investigation)** **Activities:** Based on their plan they will conduct their investigation. Children will be need to be shown how to take their partners pulse accurately and how to time the beats per minute (look at the possibility of using a heart rate monitor as a teacher example). Children should record their results in a table drawn in the previous lesson. **Children will know:** • how to take accurate measurements using a stopwatch • that taking multiple measurements checks reliability • that heart rate increases when exercise happens	**WALT: investigate to find the best material for a particular purpose, drawing conclusions from the results.** **Activities:** Children will conduct the investigations that they planned and record the result appropriately whether this is observation or quantitative measures. **Children will know:** • how to conduct a fair line of enquiry – ensuing the only variable they change is the material • how to record appropriate results • how to draw conclusions from the results about the most appropriate material for a purpose and the reasons why	**WALT: know that levers and pulleys allow a smaller force to have a greater effect.** **Activities:** Children will learn how simple machines can make it easier to move objects. They will then make and test models which have pulleys or levers. **Children will know:** • that that levers and pulleys allow a small force to have a greater effect • how to make and improve models that use pulleys or levers • how to explore the effects of changing parts of their model	**WALT: conduct a fair investigation.** **Activities:** Define what degrees of trust are. Discuss the different criteria. Which of these should you bear in mind while conducting your investigation? What will you do to ensure you can have a high degree of trust in your results? Carry out investigations planned last week. Children participate in a whole class discussion and then decide on which ways of establishing a higher degree of trust are appropriate and which are not, giving reasons why **Children will know:** • that degrees of trust are objectivity, accuracy, reproducibility, consensus, sample size • how to record findings as data • how to report findings appropriately	**WALT: draw conclusions and present scientific findings in appropriate ways.** **Activities:** Children will draw conclusions from their results and present them in writing, through video recording or through a power point presentation. They must present their conclusion and give a scientific explanation for why they thought these results occurred. **Children will know** • how to draw simple conclusions from their results • how to suggest scientific explanations for their results • how to present these in a clear way to others

Lesson 6	**WALT: compare the life cycles of different animal groups.** **Activities:** Discuss the life cycle of a bird and reptile. Children will now answer the topic question 'How is new life created?' They will do this by writing an extended script which describes life cycles and compares the similarities and differences of life cycles for different animal groups. **Children will know:** • the life cycle of a bird • how to compare how life cycles are different • how life cycles are similar	**WALT: present results, draw conclusions and provide explanations. (Lesson 3 – heart rate investigation)** **Activities:** Children to draw a line graph to represent the table, they will then draw conclusions from this and give a scientific explanation based on the scientific ideas that they have learnt about. Children to evaluate how they could improve their investigation next time. **Children will know:** • how to present result in a line graph • how to draw conclusions from their results • how their evidence supports or refutes scientific ideas • that heart rate increases because the muscles require more oxygen and nutrients therefore the blood needs to travel quicker to supply this increase in demand	**WALT: explore materials that have been invented.** **Activities:** Children will explore the difference between raw materials and materials that are created. They will focus on specific inventions of recent years and explore how they were specifically created with properties to achieve a purpose. **Children will know:** • that some materials are naturally occurring, and some are created by combing different materials • some of the materials that have been created • the initial reason for their creation and further uses in the modern day – evaluating their success	**WALT: know that gears allow a smaller force to have a greater effect.** **Activities:** Children will learn about how gears work together in transmissions and look at a variety of transmission. They will then make models to explore in greater depth how gears work. **Children will know:** • that the speed or amount of force transmitted is affected by changing the size of the gears in a transmission • how to make transmissions where two or more gears work together	**WALT: To use test results to make predictions to set up further comparative and fair tests** **Activities:** Look at last week's investigations and results- what would you do differently? Class discussion. Show how to make a further prediction based on their test results. What did your results show? How will you investigate further? What will your new prediction be? Check that children are referring to the length of wire, brightness of the bulb, loudness of the buzzer, making predictions about whichever component they did not test and the investigation type they used. Children create a new question, make predictions. How do degrees of trust come into it? Which ones are applicable to this study? Present second investigation and explain results. **Children will know:** • how to use results to make new predictions • how to plan and conduct a further investigation, considering degrees of trust	**WALT: evaluate enquiry and suggest further questions that might need to be answered.** **Activities:** As a group child will explore 3 things that went well in their enquiry and three things that could be improved. **Children will know:** • what makes a successful scientific enquiry • what went well for them • what they could do differently next time to improve their enquiry
Key Knowledge	**Children will know:** • **The life cycles of mammals, birds, amphibians, insects.** • **Reproduction can be sexual (DNA from 2 organisms combines to create offspring) or asexual (one parent organism copies its genetic information to produce identical offspring)** • **Metamorphism is a significant change in form or structure of an organism in its development.**	**Children will know:** • **The function of the heart is to pump blood around the body. The blood vessels transport the blood around the body.** • **The function of blood is transport water, nutrients and oxygen around the body and supply it to the cells that require it.** • **The lungs provide oxygen to the blood. The heart first pumps blood to the lungs and then to the rest of the body.**	**Children will know:** • **Conductors allow electricity pass through them easily. Insulators do not allow electricity to easily pass through them. (This applies for heat conductors and insulators)** • **When testing materials, the independent variable is the material. We should ensure we control all variables the same, so it is a fair test.** • **Materials can be used for a particular purpose depending on their combined properties.**	**Children will know:** • **Objects fall towards the earth because the force of gravity s acting between the Earth and the object.** • **Friction, air resistance and water resistance act between moving surfaces and this is what causes them to slow down when they are not being pushed.** • **Levers, pulleys, and gears allow smaller forces to have a greater effect.**	**Children will know:** • **The larger the voltage of a cell or the more cells that are used, the brighter a bulb will shine or the louder a buzzer will be.** • **Switches are used to connect and disconnect a circuit.** • **The degrees of trust for conducting a fair test are, objectivity, accuracy, reproducibility, consensus, sample size.**	**Children will know:** • **Children will know the variables of an investigation and decide what the independent, dependent and control variables should be.** • **If a test is repeated more times we can improve the reliability of the results.** • **Data should be presented clearly and in a way that makes the outcome clearer and supports the explanation given.**