UKS2 (Y5/6) Science Curriculum: Year A and B

What are the aims and intentions of this curriculum?

That children:

- 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

Curriculum Drivers -

Term	Topic/Unit	Knowledge	Skills	Enquiry Questions	Vocabulary
Year A Autumn	Properties and changes of materials (Y5)	• 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	• Compare • Group/classify • Give reasons • Explain • Separate • Ask questions • Devise • Plan • Predict • Investigate • Measure • Record • Interpret • Conclude • Ask (follow up questions)	• Can you organise these materials based on whether they are reversible changes? • How does the surface area of an object affect the time it takes to sink? • What happens to raisins when you put them in lemonade? • Is there a pattern in the time it takes a sugar cube to dissolve in different liquids?	Thermal/ electrical insulator / conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material

		• 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			

Working scientifically				
Observe changes over time	Notice patterns	Grouping and Classifying	Comparative tests	Secondary sources
• If I wet different materials, will they be restored to their natural state? • What happens to raisins when you put them in lemonade?	• Is there a pattern in the time it takes a sugar cube to dissolve in different liquids?	• Can you sort and organise materials by how long they take to freeze?	• Which material would make the best shelter for an animal? • Which food item would take longest to dissolve in boiling water?	• Videos

Possible Activities	• Investigate the properties of different materials in order to recommend materials for particular functions depending on these properties e.g. test waterproofness and thermal insulation to identify a suitable fabric for a coat. • Explore adding a range of solids to water and other liquids e.g. cooking oil, as appropriate. • Investigate rates of dissolving by carrying out comparative and fair test. • Can create a chart or table grouping/comparing everyday materials by different properties • Can use test evidence gathered about different properties to suggest an appropriate material for a particular purpose • Separate mixtures by sieving, filtering and evaporation, choosing the most suitable method and equipment for each mixture. *Explore a range of non-reversible changes e.g. rusting, adding fizzy tablets to water, burning. • Carry out comparative and fair tests involving non-reversible changes e.g. What affects the rate of rusting? What affects the amount of gas produced? • Research new materials produced by chemists e.g. Spencer Silver (glue of sticky notes) and Ruth Benerito (wrinkle free cotton).
Key Learning	• Materials have different uses depending on their properties and state (liquid, solid, gas). Properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets. Some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment. • Mixtures can be separated by filtering, sieving and evaporation. • Some changes to materials such as dissolving, mixing and changes of state are reversible, but some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible.
COMMON MISCONCEPTIONS	•Thermal insulators keep cold in or out • thermal insulators warm things up • solids dissolved in liquids have vanished and so you cannot get them back • lit candles only melt, which is a reversible change.

Term	Topic/Unit	Knowledge	Skills	Enquiry Questions	Vocabulary
Year A Spring 1	Living things and their habitats (Y5) Lifecycles and reproduction	• 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 • Know the life process of reproduction in some plants and animals.	• Describe • Compare • Identify (patterns) • Observe • Sequence • Present	• What is the difference between the life cycles of a mammal, an amphibian, and insect and a bird? • Describe the life process of reproduction in some plants and animals. • Is there a relationship between a mammal's size and its gestation period? • How does a bean change as it germinates?	Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis , asexual, plantlets, runners, bulbs, cuttings

Working scientifically				
Observe changes over time	Notice patterns	Grouping and Classifying	Comparative tests	Secondary sources
• How does a bean change as it germinates? • How does a newt/dragonfly change from gestation onwards?	• Is there a relationship between a mammal's size and its gestation period?	• Compare a collection of animals based on similarities and differences in their life cycle.	• Which seed takes the longest time to fall?	• Gestation identification of animals • Describe the life process of reproduction in some plants and animals. • YouTube videos of gestation/life cycles of plants/animals

Possible Activities	• Use secondary sources and, where possible, first-hand observations to find out about the life cycle of a range of animals. • Compare the gestation times for mammals and look for patterns e.g. in relation to size of animal or length of dependency after birth. • Look for patterns between the size of an animal and its expected life span. • Grow and observe plants that reproduce asexually e.g. strawberries, spider plants, potatoes. • Take cuttings from a range of plants e.g. African violet, mint. • Plant bulbs and then harvest to see how they multiply. • Use secondary sources to find out about pollination.

Key Learning	• As part of their life cycle, plants and animals reproduce. Most animals reproduce sexually. This involves two parents where the sperm from the male fertilises the female egg. Animals, including humans, have offspring which grow into adults. In humans and some animals, these offspring will be born live, such as babies or kittens, and then grow into adults. In other animals, such as chickens or snakes, there may be eggs laid that hatch to young which then grow to adults. Some young undergo a further change before becoming adults e.g. caterpillars to butterflies. This is called a metamorphosis. • Plants reproduce both sexually and asexually. Bulbs, tubers, runners and plantlets are examples of asexual plant reproduction which involves only one parent. Gardeners may force plants to reproduce asexually by taking cuttings. Sexual reproduction occurs through pollination, usually involving wind or insects.
COMMON MISCONCEPTIONS	• All plants start out as seeds • all plants have flowers • plants that grow from bulbs do not have seeds • only birds lay eggs.

Term	Topic/Unit	Knowledge	Skills	Enquiry Questions	Vocabulary
Year A Spring 2	Animals, including humans (Y5) Changes as humans develop - puberty	• describe the changes as humans develop to old age	• Some aspects to be taught through the Sex and Relationships Curriculum. • Research • Compare • Sequence • Record • Report	• What are the changes as humans develop from birth to old age? • Can you identify all the stages in the human life cycle? • Does age affect a human's reaction time? • Are the oldest children always the tallest?	Puberty – the vocabulary to describe sexual characteristics

Working scientifically				
Observe changes over time	Notice patterns	Grouping and Classifying	Comparative tests	Secondary sources
• How do humans change from birth to old age? • Look at baby/toddler/now photographs	• Are the oldest children in school the tallest? • Can we notice similarities/differences in old and new photographs?	• Can you identify all the stages in the human life cycle?	• Does age affect a human's reaction time?	• Life process of reproduction in animals and plants (children research and create life cycle presentation) • Puberty features for boys and girls

Possible Activities	• This unit is likely to be taught through direct instruction due to its sensitive nature, although children can carry out a research enquiry by asking an expert e.g. school nurse to provide answers to questions that have been filtered by the teacher.

Key Learning	• When babies are young, they grow rapidly. They are very dependent on their parents. As they develop, they learn many skills. At puberty, a child's body changes and develops primary and secondary sexual characteristics. This enables the adult to reproduce. • This needs to be taught alongside PSHE. The new statutory requirements for relationships and health education can be found below: • statutory guidance on Physical health and mental wellbeing (primary and secondary). • Other useful guidance includes: • Joint briefing on teaching about puberty in KS2 from PHSE Association and Association for Science Education • Briefing on humans development and reproduction in the Primary Curriculum from PHSE Association and Association for Science Education.
COMMON MISCONCEPTIONS	• A baby grows in a mother's tummy • a baby is "made"

Term	Topic/Unit	Knowledge	Skills	Enquiry Questions	Vocabulary
Year A Summer 1 Geography link - Rainforests	Living things and their habitats (Y6) Classification and micro-organisms	• 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	• Describe • Compare • Identify (patterns) • Observe • Sequence • Present • Classify • Create • Give reasons	• Do all flowers have the same number of petals? • How would you make a classification key for vertebrates/invertebrates or microorganisms? • Which is the most common type of invertebrate on our school playing field? Would this be the same in other environments? • What are the reasons for classifying plants and animals? Carl Linnaeus formal classification	Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering, non-flowering

Working scientifically				
Observe changes over time	Notice patterns	Grouping and Classifying	Comparative tests	Secondary sources
Does a bean seed grow in the same way with/without soil/water/light?	• Do all flowers have the same number of petals?	• How would you make a classification key for vertebrates/invertebrates or microorganisms?	• Which is the most common type of invertebrate on our school playing field?	• What are the reasons for classifying plants and animals? Carl Linnaeus formal classification

Possible Activities	• Use secondary sources to learn about the formal classification system devised by Carl Linnaeus and why it is important. • Use first-hand observation to identify characteristics shared by the animals in a group. • Use secondary sources to research the characteristics of animals that belong to a group. • Use information about the characteristics of an unknown animal or plant to assign it to a group. • Classify plants and animals, presenting this in a range of ways e.g. Venn diagrams, Carroll diagrams and keys. • Create an imaginary animal which has features from one or more groups.
Key Learning	• Living things can be formally grouped according to characteristics. Plants and animals are two main groups but there are other livings things that do not fit into these groups e.g. micro-organisms such as bacteria and yeast, and toadstools and mushrooms. Plants can make their own food whereas animals cannot. • Animals can be divided into two main groups: those that have backbones (vertebrates); and those that do not (invertebrates). Vertebrates can be divided into five small groups: fish; amphibians; reptiles; birds; and mammals. Each group has common characteristics. Invertebrates can be divided into a number of groups, including insects, spiders, snails and worms. • Plants can be divided broadly into two main groups: flowering plants; and non-flowering plants.
COMMON MISCONCEPTIONS	• All micro-organisms are harmful • mushrooms are plants.

Term	Topic/Unit	Knowledge	Skills	Enquiry Questions	Vocabulary
Year A Summer 2	Evolution and Inheritance	• recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago • recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution	• Recognise • Identify • Describe • Explore • Ask • Research • Conclude • Design • Compare	• What information does a fossil provide? • How do living things change over time? • How are the skeletons of apes, humans and Neanderthals different? • How do different animal embryos change? • Is there a pattern between the size and shape of a bird's beak and the food it will eat? • What is the most common eye colour?	Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils

Working scientifically				
Observe changes over time	Notice patterns	Grouping and Classifying	Comparative tests	Secondary sources
• How do different animal embryos change? • How do living things change over time? • What information does a fossil provide?	• Is there a pattern between the size and shape of a bird's beak and the food it will eat?	• How are the skeletons of apes, humans and Neanderthals different?	• What is the most common eye colour? • Is there an even spread of eye colour in the three Y5/6 classes?	• Are Kipling's 'Just So' stories based on facts? • Features that are passed on -Darwin, Wallace • Evolution of animals ie woolly mammoth and elephant, dinosaurs and crocodiles/chickens

Possible Activities	
	• Design a new plant or animal to live in a particular habitat. • Use models to demonstrate evolution e.g. 'Darwin's finches' bird beak activity. • Use secondary sources to find out about how the population of peppered moths changed during the industrial revolution. • Make observations of fossils to identify living things that lived on Earth millions of years ago. • Identify features in animals and plants that are passed on to offspring and explore this process by considering the artificial breeding of animals or plants e.g. dogs. • Compare the ideas of Charles Darwin and Alfred Wallace on evolution.

	• Research the work of Mary Anning and how this provided evidence of evolution.
Key Learning	• All living things have offspring of the same kind, as features in the offspring are inherited from the parents. Due to sexual reproduction, the offspring are not identical to their parents and vary from each other. • Plants and animals have characteristics that make them suited (adapted) to their environment. If the environment changes rapidly, some variations of a species may not suit the new environment and will die. If the environment changes slowly, animals and plants with variations that are best suited survive in greater numbers to reproduce and pass their characteristics on to their young. Over time, these inherited • Can explain the process of evolution • Can give examples of how plants and animals are suited to an environment • Can give examples of how an animal or plant has evolved over time e.g. penguin, peppered moth www.planassessment.com © PLAN 2020 6 characteristics become more dominant within the population. Over a very long period of time, these characteristics may be so different to how they were originally that a new species is created. This is evolution. • Fossils give us evidence of what lived on the Earth millions of year ago and provide evidence to support the theory of evolution. More recently, scientists such as Darwin and Wallace observed how living things adapt to different environments to become distinct varieties with their own characteristics.
COMMON MISCONC EPTIONS	• Adaptation occurs during an animal's lifetime: giraffes' necks stretch during their lifetime to reach higher leaves and animals living in cold environments grow thick fur during their life • Offspring most resemble their parents of the same sex, so that sons look like fathers • All characteristics, including those that are due to actions during the parent's life such as dyed hair or footballing skills, can be inherited • Cavemen and dinosaurs were alive at the same time.

Term	Topic/Unit	Knowledge	Skills	Enquiry Questions	Vocabulary
Year B	Animals, including humans	• identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood	• Identify • Recognise • Describe • Observe	• Which organs of the body make up the circulation system?	Heart, pulse, rate, pumps, blood, blood vessels,

Autumn	(circulatory system)	• 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	• Give reasons • Fair test	• What are the functions of the heart, blood vessels and blood? • What ways are nutrients and water transported within animals, including humans? • What is the impact of diet, exercise, drugs and lifestyle on the way the body functions? • How does my heart rate change over the day? • Is there a pattern between what we eat and drink and how fast we can run? • Is the recovery rates for boys and girls the same? • Which type of exercise has the greatest effect on our heart rate? • How does the length of time we exercise for affect our heart rate? • Are all drugs bad for you?	transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs, lifestyle

Working scientifically				
Observe changes over time	Notice patterns	Grouping and Classifying	Comparative tests	Secondary sources
• How does my heart rate change over the day?	• Is there a pattern between what we eat for breakfast and how fast we can run?	• Which organs of the body make up the circulation system and where are they found?	• Which type of exercise has the greatest effect on our heart rate?	• Models of circulatory system • What are the functions of the heart, blood vessels and blood?

	• Is the recovery rates for boys and girls the same?		• How does the length of time we exercise for affect our heart rate? • What would happen if all our blood was replaced with water?	• Role play activities (circulatory system)

Possible Activities	• Create a role play model for the circulatory system. • Carry out a range of pulse rate investigations: ▪ fair test – effect of different activities on my pulse rate ▪ pattern seeking – exploring which groups of people may have higher or lower resting pulse rates ▪ observation over time - how long does it take my pulse rate to return to my resting pulse rate (recovery rate) ▪ pattern seeking – exploring recovery rate for different groups of people. • Research the negative effects of drugs (e.g. tobacco) and the benefits of a healthy diet and regular exercise by asking an expert or using carefully selected secondary sources.
Key Learning	• The heart pumps blood in the blood vessels around to the lungs. Oxygen goes into the blood and carbon dioxide is removed. The blood goes back to the heart and is then pumped around the body. Nutrients, water and oxygen are transported in the blood to the muscles and other parts of the body where they are needed. As they are used, they produce carbon dioxide and other waste products. Carbon dioxide is carried by the blood back to the heart and then the cycle starts again as it is transported back to the lungs to be removed from the body. This is the human circulatory system. • Diet, exercise, drugs and lifestyle have an impact on the way our bodies function. They can affect how well out heart and lungs work, how likely we are to suffer from conditions such as diabetes, how clearly we think, and generally how fit and well we feel. Some conditions are caused by deficiencies in our diet e.g. lack of vitamins. This content is also included in PSHE.
COMMON MISCONCEPTIONS	• Your heart is on the left side of your chest • the heart makes blood • the blood travels in one loop from the heart to the lungs and around the body • when we exercise, our heart beats faster to work the muscles more • some blood in our bodies is blue and some blood is red • we just eat food for energy • all fat is bad for you • all dairy is good for you • protein is good for you, so you can eat as much as you want • foods only contain fat if you can see it • all drugs are bad for you

Term	Topic/Unit	Knowledge	Skills	Enquiry Questions	Vocabulary
Year B Spring 1	Electricity (Y6)	• 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. •	• Observe • Notice • Predict • Collect evidence • Record information • Notice patterns • Draw a conclusion (with support)	• What happens to a bulb if I change the wattage? • What happens to my circuit if I remove one of the components? • What symbols do I need to represent my circuit?	Electricity, electrical appliance/ device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol

Working scientifically

Observe changes over time	Notice patterns	Grouping and Classifying	Comparative tests	Secondary sources
• How long will a bulb stay lit for? • Will a battery last forever?	• Is there a pattern between the size of a bulb and how bright it glows? • What determines how loud and long a buzzer goes for?	• How could you organise all the components from a circuit? • *Looking at types, sizes and voltages of batteries – how are they same and how do they differ?	• How would our day be different if we had no electricity?	• Circuit boards

Possible Activities	• Construct a range of circuits. • Explore which materials can be used instead of wires to make a circuit. • Classify the materials that were suitable/not suitable for wires. • Explore how to connect a range of different switches and investigate how they function in different ways. • Choose switches to add to circuits to solve particular problems, such as a pressure switch for a burglar alarm. • Apply their knowledge of conductors and insulators to design and make different types of switch. • Make circuits that can be controlled as part of a DT project.
Key Learning	• Many household devices and appliances run on electricity. Some plug in to the mains and others run on batteries. An electrical circuit consists of a cell or battery connected to a component using wires. If there is a break in the circuit, a loose connection or a short circuit, the component will not work. A switch can be added to the circuit to turn the component on and off. • Metals are good conductors so they can be used as wires in a circuit. Non-metallic solids are insulators except for graphite (pencil lead). Water, if not completely pure, also conducts electricity.
COMMON MISCONCEPTIONS	• Larger-sized batteries make bulbs brighter • a complete circuit uses up electricity • components in a circuit that are closer to the battery get more electricity.

Term	Topic/Unit	Knowledge	Skills	Enquiry Questions	Vocabulary
Year B Spring 2	Light (Y6)	• 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	• Explore • Observe • Sort • Notice (patterns) • Describe • Ask (questions to be investigated) • Measure • Record • Conclude • Report • Investigate	• How does the eye help us to see? Do you notice any differences in your eye when the light changes? • How does light contribute to a rainbow? • Can I sort different types of light source? • What happens if rays/beams of lights are blocked? • If the lights are off, can you still see? Can you see better with a torch or the light off an iPad,	As for Year 3 - Light, plus straight lines, light rays

				the light off a calculator? • Can you identify all the colours of light that make white light when mixed together? • What colours do you get if you mix different colours of light together?	

Working scientifically				
Observe changes over time	Notice patterns	Grouping and Classifying	Comparative tests	Secondary sources
• How does the eye help us to see? Do you notice any differences in your eye when the light changes? • How does light contribute to a rainbow?	• Can I sort different types of light source? • What happens if rays/beams of lights are blocked?	• Can you identify all the colours of light that make white light when mixed together? • What colours do you get if you mix different colours of light together?	• If the lights are off, can you still see? Can you see better with a torch or the light off an iPad, the light off a calculator?	• Make a reflective collar for a pet • Making dark boxes • Covering torches with different coloured cellophane, what can you see when you shine it on the wall?

Possible Activities	• Explore different ways to demonstrate that light travels in straight lines e.g. shining a torch down a bent and straight hose pipe, shining a torch through different shaped holes in card. • Explore the uses of the behaviour of light, reflection and shadows, such as in periscope design, rear view mirrors and shadow puppets.
Key Learning	• Light appears to travel in straight lines, and we see objects when light from them goes into our eyes. The light may come directly from light sources, but for other objects some light must be reflected from the object into our eyes for the object to be seen. • Objects that block light (are not fully transparent) will cause shadows. Because light travels in straight lines the shape of the shadow will be the same as the outline shape of the object.
COMMON MISCONCEPTIONS	• We see objects because light travels from our eyes to the object.

Term	Topic/Unit	Knowledge	Skills	Enquiry Questions	Vocabulary
Year B Summer 1	Earth and Space (Y5)	• 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	• Explore • Notice • Research • Classify • Devise • Plan • Predict • Investigate • Measure • Record • Interpret • Conclude	• Can you observe and identify all the phases in the cycle of the Moon?	Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, solar system, rotates, star, orbit, planets

Working scientifically				
Observe changes over time	Notice patterns	Grouping and Classifying	Comparative tests	Secondary sources
• How does my shadow change over the day? • Does the moon change shape? Why? • Can you observe and identify all the phases in the cycle of the Moon?	• Is there a pattern between the size of a planet and the time it takes to travel around the sun?	• How could you organise all the objects in the solar system into groups? • *How are the Earth, Sun and Moon the same or different?	• How could you organise all the objects in the solar system into groups? • Which planet would be the best for us to live on if we couldn't live on Earth?	• Video/diagram of planets orbiting the sun

Possible Activities	• Use secondary sources to help create a model e.g. role play or using balls to show the movement of the Earth around the Sun and the Moon around the Earth. • Use secondary sources to help make a model to show why day and night occur. • Make first-hand observations of how shadows caused by the Sun change through the day. • Make a sundial. • Research time zones. • Consider the views of scientists in the past and evidence used to deduce shapes and movements of the Earth, Moon and planets before space travel.
Key Learning	• The Sun is a star. It is at the centre of our solar system. There are 8 planets (can choose to name them, but not essential). These travel around the Sun in fixed orbits. Earth takes 365¼ days to complete its orbit around the Sun. The Earth rotates (spins) on its axis every 24 hours. As Earth rotates half faces the Sun (day) and half is facing away from the Sun (night). As the Earth rotates, the Sun appears to move across the sky. The Moon orbits the Earth. It takes about 28 days to complete its orbit. The Sun, Earth and Moon are approximately spherical

COMMON MISCONCEPTION	• The Earth is flat • the Sun is a planet • the Sun rotates around the Earth • the Sun moves across the sky during the day • the Sun rises in the morning and sets in the evening • the Moon appears only at night • night is caused by the Moon getting in the way of the Sun or the Sun moving further away from the Earth.

Term	Topic/Unit	Knowledge	Skills	Enquiry Questions	Vocabulary
Year B Summer 2	Forces (Y5)	• 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	• Explore • Notice • Research • Classify • Devise • Plan • Predict • Investigate • Measure • Record • Interpret • Conclude	• Why do unsupported objects fall towards the Earth ? (forces of gravity) • What are the effects of air resistance, water resistance and friction on moving surfaces? • Can you label all the forces acting on the objects in each of these situations? • How long does a pendulum swing for before it stops? • Do all objects fall through water the same way? • Which shoe is the most slippy? • How does the surface area of a parachute affect the time it takes to fall to the ground?	Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears

Working scientifically

Observe changes over time	Notice patterns	Grouping and Classifying	Comparative tests	Secondary sources

• How long does a pendulum swing for before it stops? • Do all objects fall through water the same way?	• Why do unsupported objects fall towards the Earth ? (forces of gravity) •	• Can you label all the forces acting on the objects in each of these situations?	• What are the effects of air resistance, water resistance and friction on moving surfaces? • Which shoe is the most slippy? • How does the surface area of a parachute affect the time it takes to fall to the ground?	• Videos and clips • Books

Possible Activities	• Investigate the effect of friction in a range of contexts e.g. trainers, bathmats, mats for a helter-skelter. • Investigate the effects of water resistance in a range of contexts e.g. dropping shapes through water and pulling shapes, such as boats, along the surface of water. • Investigate the effects of air resistance in a range of contexts e.g. parachutes, spinners, sails on boats. • Explore how levers, pulleys and gears work. • Make a product that involves a lever, pulley or gear. • Create a timer that uses gravity to move a ball. • Research how the work of scientists such as Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.
Key Learning	• A force causes an object to start moving, stop moving, speed up, slow down or change direction. Gravity is a force that acts at a distance. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall. • Air resistance, water resistance and friction are contact forces that act between moving surfaces. The object may be moving through the air or water, or the air and water may be moving over a stationary object. • A mechanism is a device that allows a small force to be increased to a larger force. The pay back is that it requires a greater movement. The small force moves a long distance and the resulting large force moves a small distance, e.g. a crowbar or bottle top remover. Pulleys, levers and gears are all mechanisms, also known as simple machines.
COMMON MISCONCEPTION	• The heavier the object the faster it falls, because it has more gravity acting on it • forces always act in pairs which are equal and opposite • smooth surfaces have no friction • objects always travel better on smooth surfaces • a moving object has a force which is pushing it forwards and it stops when the pushing force wears out • a non-moving object has no forces acting on it • heavy objects sink and light objects float.