Windmill Hill Academy

Science Knowledge and Skills Organiser

Knowledge Organisers for the priority subject for each concept to be issued 2-3 weeks before the learning block is taught.
Metacognition: Metacognition can take many forms; it includes knowledge about when and how to use particular strategies for learning or problem-solving. *These will vary depending on the needs of each class.*

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.

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.

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. This knowledge and skills organiser for science demonstrates the progression through the year groups. This includes regular opportunities to revisit prior learning and build upon this.

Science	**Term**		**Term**		**Term**	
EYFS	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
	30 – 50 Months		40 – 60 Months		Early Learning Goal (ELG)	
Knowledge	**<u>Physical Development</u>** **<u>Health and self-care</u>** ▪ *To observe the effects of physical activity on their bodies.* **<u>Understanding The World</u>** **<u>The World</u>** ▪ *To talk about some of the things they have observed such as plants, animals, natural and*		**<u>Physical Development</u>** **<u>Health and self-care</u>** ▪ *To eat a healthy range of foodstuffs and understand a need for variety in food.* ▪ *To show some understanding that good practices with regard to exercise, eating, sleeping and hygiene can contribute to good health.* **<u>Understanding The World</u>**		**<u>Physical Development</u>** **<u>Health and self-care</u>** ▪ *To know the importance for good health of physical exercise, and a healthy diet.* **<u>Understanding The World</u>** **<u>The World</u>** ▪ *To know about similarities and differences in relation to places, objects, materials and living*	

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	found objects. ▪ *To develop an understanding of growth, decay and changes over time.* ▪ *To show care and concern for living things and the environment.* **Expressive Arts and Design** **Exploring and using Media and Materials** ▪ *To begin to be interested in and describe the texture of things.*		**The World** ▪ *To look closely at similarities, differences, patterns and change.*		*things. They make observations of animals and plants.*	
Skill Progression	**Understanding The World** **The World** ▪ *Can comment and ask questions about aspects of their familiar world such as the place where they live or the natural world.* ▪ *Talk about some of the things they have observed such as plants, animals, natural and found objects.* ▪ *Talk about why things happen and how things work.* ▪ *Show care and concern for living things and the environment.* **Expressive Arts and Design** **Exploring and using Media and Materials** ▪ *Begin to be interested in and describe the texture of things.*		**Physical Development** **Health and self-care** ▪ *Show some good practices with regard to exercise, eating, sleeping and hygiene can contribute to good health.* **Understanding The World** **The World** ▪ *Describe some similarities, differences, patterns and change.*		**Physical Development** **Health and self-care** ▪ *Can talk about ways to keep healthy and safe.* **Understanding The World** **The World** ▪ *They talk about the features of their own immediate environment and how environments might vary from one another.* ▪ *They explain why some things occur, and talk about changes.*	
Meta Cognition						
Year 1	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Concept	**Rebellion and Invasion**	**Natural elements**	**Civilisation**	**Environmental**	**Discoveries**	**Culture**
Knowledge	**Everyday Materials** *Revisit learning from EYFS Autumn*	**Seasonal Changes (Autumn)** *Revisit learning from*	**Seasonal Changes (Winter)** *Revisit learning from Autumn 1 and 2*	**Plants** *Revisit learning from Autumn and Spring 1*	**Seasonal Changes (Summer)** *Revisit learning from*	**Animals and humans** *Revisit learning from Spring*

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	▪ *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*	*EYFS and Autumn 1* ▪ *Observe changes across the four seasons* ▪ *Observe/describe weather associated with the seasons and how day length varies*	▪ *Observe changes across the four seasons* ▪ *Observe/describe weather associated with the seasons and how day length varies*	▪ *Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees* ▪ *Identify and describe the basic structure of a variety of common flowering plants, including trees.* **Seasonal Changes (Spring)** ▪ *Observe changes across the four seasons* ▪ *Observe/describe weather associated with the seasons and how day length varies*	*Spring* ▪ *Observe changes across the four seasons* ▪ *Observe/describe weather associated with the seasons and how day length varies.* **Plants** ▪ *Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees* ▪ *Identify and describe the basic structure of a variety of common flowering plants, including trees.*	▪ *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* ▪ *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*
Skill Progression	**<u>Working scientifically</u>** **Planning Investigations** Pupils can plan an enquiry	**<u>Working scientifically</u>** **Planning Investigations** Pupils can ask questions	**<u>Working scientifically</u>** **Recording evidence** Pupils record work with	**<u>Working scientifically</u>** **Conducting Investigations** Pupils can use equipment	**<u>Working Scientifically</u>** **Conclusions/Predictions** Pupils can analyse data	**<u>Working scientifically</u>** **Conclusions/Predictions** Pupils can analyse data

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	▪ *Pupil can offer ways of gathering evidence to answer a question, e.g. by deciding on the best material to use for a particular application.* **Content** **Chemistry –materials** Materials have physical properties which can be investigated and compared ▪ *Correctly identify both object and material.* ▪ *Identify and name a range of materials.* ▪ *Describe a range of properties of a variety of materials.* ▪ *Classify a variety of materials into groups based on physical properties.*	▪ *Pupil can offer ways of gathering evidence to answer a question, e.g. by deciding on the best material to use for a particular application.* **Content** **Physics – Seasonal Changes** Day, night, month, seasonal change & year are caused by the position/movement of the Earth ▪ *Describe seasonal changes.* ▪ *Relate weather patterns and day length to seasons.*	diagrams and label them ▪ *Pupil can, with prompting, identify what might usefully be recorded, e.g. drawing structures of plants or recording changing day length.* ▪ *Pupil can, with prompting, identify key findings from an enquiry.* **Content** **Physics – Seasonal Changes** Day, night, month, seasonal change & year are caused by the position/movement of the Earth ▪ *Describe seasonal changes.* ▪ *Relate weather patterns and day length to seasons.*	to take measurements ▪ *Pupil can examine objects to note key features, e.g. observe growth of plants they have planted.* ▪ *Pupil can, with support, conduct simple tests, e.g. comparing the properties of different materials.* **Content** **Biology – Plants** Life exists in a variety of forms and goes through cycles ▪ *Identify a range of local plants.* ▪ *Name parts of a range of familiar plants.* ▪ *Compare/contrast a collection of items, sorting into categories 'living', 'dead' and 'things that have never been alive'.*	▪ *Pupil can collect data, e.g. comparing and contrasting familiar plants.* Pupils can draw conclusions ▪ *Pupil can suggest answers to enquiry questions using data, e.g. describe how to group plants.* **Content** **Biology – Plants** Life exists in a variety of forms and goes through cycles ▪ *Identify a range of local plants.* ▪ *Name parts of a range of familiar plants.* *Compare/contrast a collection of items, sorting into categories 'living', 'dead' and 'things that have never been alive'.*	▪ *Pupil can collect data, e.g. comparing and contrasting familiar plants.* Pupils can draw conclusions ▪ *Pupil can suggest answers to enquiry questions using data, e.g. describe how to group plants.* **Content** **Biology Animals** Life exists in a variety of forms and goes through cycles ▪ *Name a variety of common animals.* ▪ *Identify and group a range of familiar animals.* **Biology Humans** The human body has a number of systems, each with its own function ▪ *Identify key features of a range of common animals.* ▪ *Relate each of the human senses to organs.*

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Meta Cognition						
Year 2	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Concept	**Rebellion and Invasion**	**Natural elements**	**Civilisation**	**Environmental**	**Discoveries**	**Culture**
Knowledge	**Everyday Materials** *Revisit learning from Y1 Autumn 1* ▪ *Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching* ▪ *Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses*	**Animals and humans** *Revisit learning from Y1 Summer 2* ▪ *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*	**Everyday Materials** *Revisit learning from Autumn* ▪ *Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching* ▪ *Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses*	**Plants** *Revisit learning from Y1 Summer* ▪ *Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy* ▪ *Observe and describe how seeds and bulbs grow into mature plants*	**Plants** *Revisit learning from Y1 Summer* ▪ *Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy* ▪ *Observe and describe how seeds and bulbs grow into mature plants*	**Living things and habitats** *Revisit learning from Spring* ▪ *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 micro habitats ▪ *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*
Skill Progression	**Working scientifically** **Planning Investigations** Pupils can plan an enquiry ▪ *Pupil can suggest different ways of answering a question, e.g. testing the suitability of materials for different purposes.* **Conclusions predictions** Pupils can analyse data ▪ *Pupil can collect data relevant to the answering of questions, e.g. seeing how the*	**Working scientifically** **Recording Evidence** Pupils record work with diagrams and label them ▪ *Pupil can, with assistance, draw and label diagrams, e.g. recording plants changing over time, starting from seed/ bulb.* **Content** **Biology - Living Things and their Habitats, Plants, Animals including Humans** Life exists in a variety of	**Working scientifically** **Conducting Experiments** Pupils can use equipment to take measurements ▪ *Pupil can examine carefully, e.g. using a hand lens.* ▪ *Pupil can conduct simple tests, e.g. setting up comparative tests to show that plants need water and light.* **Recording Evidence** Pupils record work with diagrams and label them ▪ *Pupil can, with*	**Working scientifically** **Planning Investigations** Pupils can ask questions ▪ *Pupil can ask simple questions that can be tested, e.g. about the local environment and how organisms depend on each other.* **Reporting Findings** Pupils process findings to develop conclusions and identify causal relationships ▪ *Pupil can identify and group key outcomes from*	**Working scientifically** **Planning Investigations** Pupils can plan an enquiry ▪ *Pupil can suggest different ways of answering a question, e.g. testing the suitability of materials for different purposes.* **Conclusions predictions** Pupils can analyse data ▪ *Pupil can collect data relevant to the answering of questions, e.g. seeing how the*	**Working scientifically** **Recording Evidence** Pupils record work with diagrams and label them ▪ *Pupil can, with assistance, draw and label diagrams, e.g. recording plants changing over time, starting from seed/ bulb.* **Content** **Biology - Living Things and their Habitats, Plants, Animals including Humans** Habitats provide living

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	shapes of some materials can be changed. Pupils can draw conclusions ▪ *Pupil can answer enquiry questions using data and ideas, e.g. to help decide how the properties of certain materials make them suitable for certain applications.* **Content** **Chemistry –Use of everyday materials** Materials have physical properties which can be investigated and compared ▪ *Describe changes achieved by applying forces in different directions.* The physical properties of materials determine their uses ▪ *Select and justify a material for a particular use.*	forms and goes through cycles – Animals ▪ *Describe the relationship between adult animals and their offspring.* The human body has a number of systems, each with its own function ▪ *Describe the importance of a healthy diet and exercise.*	*assistance, draw and label diagrams, e.g. recording plants changing over time, starting from seed/ bulb.* **Content** **Chemistry –Use of everyday materials** Materials have physical properties which can be investigated and compared ▪ *Describe changes achieved by applying forces in different directions.* The physical properties of materials determine their uses ▪ *Select and justify a material for a particular use.*	*enquiry, e.g. describing conditions in different habitats and how these affect the numbers and types of organisms.* **Content** **Biology - Living Things and their Habitats, Plants, Animals including Humans** Habitats provide living things with what they need ▪ *Explain how, for a named animal or plant, it gets what it needs from its habitat and other living things that are there.* ▪ *Identify a range of living things in habitats of various sizes.* ▪ *Construct a simple food chain and identify what is eating what.* ▪ *Explore and identify what plants need to thrive.*	*shapes of some materials can be changed.* Pupils can draw conclusions ▪ *Pupil can answer enquiry questions using data and ideas, e.g. to help decide how the properties of certain materials make them suitable for certain applications.* **Content** **Biology - Living Things and their Habitats, Plants, Animals including Humans** Habitats provide living things with what they need ▪ *Explain how, for a named animal or plant, it gets what it needs from its habitat and other living things that are there.* ▪ *Identify a range of living things in habitats of various sizes.*	things with what they need ▪ *Explain how, for a named animal or plant, it gets what it needs from its habitat and other living things that are there.* ▪ *Identify a range of living things in habitats of various sizes.* ▪ *Construct a simple food chain and identify what is eating what.* ▪ *Explore and identify what plants need to thrive.*

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				Life exists in a variety of forms and goes through cycles - Plants ▪ *Describe stages of development of a full-grown plant.*	▪ *Construct a simple food chain and identify what is eating what.* ▪ *Explore and identify what plants need to thrive.* Life exists in a variety of forms and goes through cycles - Plants ▪ *Describe stages of development of a full-grown plant.*	
Meta Cognition						
Year 3	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Concept	**Rebellion and Invasion**	**Natural elements**	**Civilisation**	**Environmental**	**Discoveries**	**Culture**
Knowledge	**Forces and magnets** *Revisit learning from Y1/2* ▪ *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*		**Light and sound** *Revisit learning from Autumn 1.* ▪ *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*	**Rocks** *Revisit learning from Autumn and Spring 1* ▪ *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*	**Animals and Humans** *Revisit learning from Y1 Summer and Y2 Autumn* ▪ *Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition*	**Plants** *Revisit learning from Y1 Summer and Y2 Spring/Summer.* ▪ *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*

	▪ *Describe magnets as having two poles* ▪ *Predict whether two magnets will attract or repel each other, depending on which poles are facing*	*there are ways to protect their eyes* ▪ *Recognise that shadows are formed when the light from a light source is blocked by a solid object* ▪ *Find patterns in the way that the size of shadows change*	*things that have lived are trapped within rock* ▪ *Recognise that soils are made from rocks and organic matter*	*from what they eat* ▪ *Identify that humans and some other animals have skeletons and muscles for support, protection and movement*	▪ *Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers* ▪ *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*
Skill Progression	**Working Scientifically** **Planning Investigations** Pupils can identify and manage variables ▪ *Pupil can set up a comparative test, e.g. how far things move on different surfaces.* **Recording evidence** Pupil can display data using line graphs ▪ *Pupil can, with prompting, gather and display evidence in various ways, e.g. about the ways that magnets behave in relation to each other.* **Reporting findings**	**Working Scientifically** **Planning Investigations** Pupils ask questions ▪ *Pupil can, with support, develop relevant, testable questions, e.g. what happens to shadows when the light source moves.* **Conducting experiments** Pupils explore how to improve the quality of data	**Working Scientifically** **Conducting Experiments** Pupils can use equipment to take measurements ▪ *Pupil can use various equipment, as instructed, e.g. using a hand lens to examine rocks.* **Recording evidence** Pupils can display data	**Working Scientifically** **Planning Investigations** Pupils ask questions ▪ *Pupil can, with support, develop relevant, testable questions, e.g. what happens to shadows when the light source moves.* **Reporting Findings** Pupils process findings to	**Working Scientifically** **Planning Investigations** Pupils can plan an enquiry ▪ *Pupil can plan enquiry, such as comparative or fair test, e.g. comparing the effect of different factors on plant growth.* **Recording Evidence** Pupils record work with

	Pupils process findings to develop conclusions and identify causal relationships ▪ *Pupil can, with prompting, write a conclusion based on evidence, e.g. exploring the strengths of different magnets.* **Conclusions/Predictions** Pupils can analyse data ▪ *Pupil can, with prompting, recognise patterns that relate to scientific ideas, e.g. investigating the behaviour of magnets.* **Pupils can develop investigation further** ▪ *Pupil can suggest how an investigation could be extended, e.g. suggesting creative uses for different magnets.* **Content** **Physics – Forces** There are contact and non-contact forces; these affect the motion of objects ▪ *Compare how an object, such as a toy car, will move on different surfaces.* ▪ *Recognise the difference between contact and contact forces.* ▪ *Describe how magnets attract or repel each other and attract magnetic materials.* ▪ *Group materials on the basis of testing for being magnetic.* ▪ *Describe and identify the poles of a magnet.* ▪ *Predict outcomes of a particular arrangement of magnets.*	▪ *Pupil can use standard measurements when taking measurements, e.g. measuring distances between a light source and an object.* **Content** **Physics – Light and Sound** Light & sound can be reflected & absorbed and enable us to see & hear ▪ *Relate being able to see to the presence of light.* ▪ *Describe how some objects reflect light.* ▪ *Describe how and why our eyes should be protected from sunlight.* ▪ *Explain how shadows are made.* ▪ *Describe how to change the size of a shadow.*	using labelled diagrams, keys, tables and bar charts ▪ *Pupil can, with prompting, use tables to record evidence, e.g. recording what happens when various rocks are rubbed together.* **Reporting Findings** Pupils use displays and presentations to report on findings ▪ *Pupil can indicate findings from an enquiry that could be reported, e.g. answering questions about how rocks are formed.* **Conclusions/Predictions** Pupils can draw conclusions ▪ *Pupil can, with support, use evidence to produce a simple*	develop conclusions and identify causal relationships ▪ *Pupil can, with prompting, write a conclusion based on evidence.* **Content** **Biology – Animals including humans** Life exists in a variety of forms and goes through cycles – Animals ▪ *Describe why animals depend on the correct nutrition.* The human body has a number of systems, each with its own function ▪ *Explain which parts of the skeleton provide support and protection, and how they allow for movement.*	diagrams and label them ▪ *Pupil can, with prompting, draw and label diagrams, e.g. to show how water travels in a plant.* **Content** **Biology - Plants** Habitats provide living things with what they need ▪ *Explain what all plants need to flourish and recognise how these requirements vary in amount.* Life exists in a variety of forms and goes through cycles – Plants ▪ *Describe what each part of a flowering plant does.* ▪ *Explain, with the aid of a diagram or plant, how water is carried up from the soil.* ▪ *Explain how pollination, seed formation and seed dispersal*

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				conclusion, e.g. changes that occur when rocks are in water. **Content** **Chemistry – Rocks** Different rocks have different properties and the formation of soil & fossils can be explained ▪ *Explain how fossils are formed* ▪ *Describe how soil is made.* Materials have physical properties which can be investigated and compared ▪ *Examine and test rocks, grouping them according to the results.*		*play a role in the reproduction of flowering plants.*
Meta Cognition						
Year 4	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Concept	**Rebellion and Invasion**	**Natural elements**	**Civilisation**	**Environmental**	**Discoveries**	**Culture**
Knowledge	**Electricity** *Revisit learning from Y3.* ▪ *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*		**Animals and humans** *Revisit learning from Y2 Autumn and Year 3 Summer.* ▪ *Describe the simple functions of the basic parts of the*	**Living and Habitats** *Revisit learning from Y2 Summer* ▪ *Recognise that living things can be grouped in a variety of ways*	**Light and Sound** *Revisit learning from Y3 Spring* ▪ *Identify how sounds are made, associating some of them with*	**States of Matter** *Revisit previous learning* ▪ *Compare and group materials together, according to*

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	buzzers ▪ *Recognise some common conductors and insulators, and associate metals with being good conductors* ▪ *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*	*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*	▪ *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.*	*something vibrating* ▪ *Recognise that vibrations from sounds travel through a medium to the ear* ▪ *Recognise that sounds get fainter as the distance from the sound source increases* ▪ *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*	*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*
Skill Progression	**<u>Working Scientifically</u>** **Planning investigations** Pupils can plan an enquiry Pupil can plan investigations using different types of scientific enquiry, e.g. exploring various materials by observing change over time, running comparative tests and conducting surveys. **Recording evidence** Pupils can display data using line graphs	**<u>Working Scientifically</u>** **Planning investigations** Pupils can ask questions ▪ *Pupil can develop relevant, testable questions, e.g. based on observations of animals.*	**<u>Working Scientifically</u>** **Recording Evidence** Pupils record work with diagrams and label them ▪ *Pupil can use words and diagrams to record findings, e.g. how habitats change*	**<u>Working Scientifically</u>** **Planning Investigations** Pupils can identify and manage variables ▪ *Pupil can set up comparative and fair tests, e.g. finding patterns in the sounds made*	**<u>Working Scientifically</u>** **Conducting Experiments** Pupils can use equipment to take measurements ▪ *Pupil can use various equipment, as instructed, repeatedly and*

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	▪ *Pupil can use various ways to record, group and display evidence, e.g. grouping and classifying various materials.* **Reporting Findings** Pupils process findings to develop conclusions and identify causal relationships ▪ *Pupil can write a conclusion based on evidence, e.g. effect on brightness of bulbs if more cells are added.* Pupils use displays and presentations to report on findings ▪ *Pupil can present findings either in writing or orally, e.g. relating to investigating which materials are conductors.* **Conclusion/Predictions** Pupils can analyse data ▪ *Pupil can recognise patterns that relate to scientific ideas, e.g. finding out which materials make better earmuffs.* **Content** **Physics – Electricity** Electricity can make circuits work and can be controlled to perform useful functions. ▪ *List examples of appliances that run on electricity.* ▪ *Construct a simple circuit and name its components.* ▪ *Sort materials into conductors and insulators, identifying metals as conductors.* ▪ *Predict whether a particular arrangement of components will result in a bulb lighting.*	**Recording evidence** Pupils can display data using labelled diagrams, keys, tables and bar charts ▪ *Pupil can use various ways to record evidence, e.g. comparing the teeth of herbivores and carnivores.* **Content** **Biology - Animals Including Humans** The human body has a number of systems, each with its own function ▪ *Identify what each of the principal organs in the digestive system do.* ▪ *Describe the function of each type of tooth in the human skull.* ▪ *Use a food chain to represent predator-prey relationships.*	*during the year.* **Content** **Biology - Biology Living Things and their Habitats** Living things can be classified according to observable features ▪ *Suggest different ways of sorting the same group of living things, e.g. grouping birds according to where they live, what they eat and size of adults.* ▪ *Use classification keys to group and identify members from a range of familiar and less familiar living things.* Habitats provide living things with what they need ▪ *Describe examples of living things that are threatened by changes to environments, e.g. owls and habitat loss.*	*by elastic bands of different thicknesses.* **Conclusion/Predictions** Pupils can develop investigation further ▪ *Pupil can use evidence to suggest further relevant investigations, e.g. making own instruments, using ideas about pitch and volume.* Pupils can analyse data ▪ *Pupil can recognise patterns that relate to scientific ideas, e.g. finding out which materials make better earmuffs.* **Content** **Physics – Light and Sound** Light & sound can be reflected & absorbed and enable us to see & hear ▪ *Explain, with reference to vibrations, how an object makes a sound.*	*with care, e.g. thermometers.* Pupils explore how to improve the quality of data ▪ *Pupil can recognise the importance of using standard units and measures accurately, e.g. measuring temperature when investigating its effect on washing drying.* **Conclusion/Predictions** Pupils can draw conclusions ▪ *Pupil can use evidence to produce a simple conclusion, e.g. the effect of temperature on various substances.* **Content** **Chemistry – States of Matter** Materials have physical properties which can be

	▪ *Predict how the operation of a switch will affect bulbs lighting.*				▪ *Describe the role of a medium in the transmission of sound.* ▪ *Describe the effect of moving further from the source of a sound.* ▪ *Explain with reference to a particular object how the pitch of the sound can be changed.* ▪ *Explain with reference to a particular object how the volume of the sound can be changed.*	investigated and compared ▪ *Group materials according to their state of matter.* Materials can exist in different states and that these states can sometimes be changed ▪ *Describe how evaporation and condensation happen in the water cycle, and how temperature affects evaporation.* ▪ *Identify changes of state and research values of degrees Celsius at which changes happen.*
Meta Cognition						
Year 5	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Concept	**Rebellion and Invasion**	**Natural elements**	**Civilisation**	**Environmental**	**Discoveries**	**Culture**
Knowledge	**Forces** *Revisit learning from Y3 Autumn* ▪ *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*		**Properties and Changes of Materials** *Revisit learning from Y1 and Y2.* ▪ *Compare and group together everyday materials on the*	**Living things and Habitats** *Revisit learning from Y4 Spring* ▪ *Describe the differences in the life cycles of a mammal, an*	**Earth and Space** *Revisit learning from Autumn and Spring.* ▪ *Describe the movement of the Earth, and other planets, relative*	**Animals and humans** *Revisit learning from Y4 Spring.* ▪ *Describe the changes as humans develop to old age*

	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.*	*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* ▪ *Demonstrate that dissolving, mixing and changes of state are reversible changes* ▪ *Explain that some changes result in the formation of new materials and*	*amphibian, an insect and a bird* ▪ *Describe the life process of reproduction in some plants and animals.*	*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*	▪ *Describe the life process of reproduction in some plants and animals*

		that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. ▪ *Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic*			

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Skill Progression	**Working Scientifically** **Planning investigations** Pupils can identify and manage variables ▪ *Pupil can, with prompting, identifies and manages variables, e.g. when exploring falling paper cones.* **Conducting Experiments** Pupils explore how to improve the quality of data ▪ *Pupil can take measurements that are precise as well as accurate, e.g. measuring the force needed to pull different shapes of boat through the water.* Pupils understand the role of repeat readings ▪ *Pupil can know how to process repeat readings, e.g. when timing falling objects.* **Recording evidence** Pupils can display data using labelled diagrams, keys, tables and bar charts ▪ *Pupil can, with prompting, use various ways to record complex evidence, e.g. when investigating how gears and levers enable a small force to have a larger effect.* **Reporting Findings** Pupils process findings to develop conclusions and identify causal relationships ▪ *Pupil can, with prompting, write a conclusion using evidence and identifying causal links, e.g. investigating what makes a parachute fall quicker.* **Reporting findings** Pupils explain confidence in findings ▪ *Pupil can, with support, indicate why some results may not be entirely trustworthy, e.g. when timing falling objects.*	**Working Scientifically** **Planning investigations** Pupils can plan an enquiry ▪ *Pupil can, with support, can answer questions using evidence gathered from different types of scientific enquiry, e.g. comparing life cycles of different plants using change over time, surveys and secondary research.* **Conclusions/Predictions** Pupils can draw conclusions ▪ *Pupil can suggest further relevant comparative or fair tests, e.g. when testing materials for various properties to determine their suitability for an application.* **Content** **Chemistry – Properties and changes of materials** Materials have physical properties which can be investigated and compare. ▪ Test and sort a	**Working Scientifically** **Recording evidence** Pupils can display data using line graphs ▪ *Pupil can use a line graph to record basic data, e.g. length and mass of a baby as it grows.* **Reporting Findings** Pupils use displays and presentations to report on findings ▪ *Pupil can, with support, display and present key findings from enquiries orally and in writing, e.g. suggesting reasons for similarities and differences between various animals.* **Conclusions/Predictions** Pupils can draw conclusions ▪ *Pupil can show how evidence supports mammals and relating them to adult mass.* **Content** **Biology - Living Things and their Habitats.**	**Working Scientifically** **Conducting Experiments** Pupils can use equipment to take measurements ▪ *Pupil can, following discussion of alternatives, selects appropriate equipment, e.g. using a shadow stick and measuring length and angle of shadow.* **Recording Evidence** Pupils record work with diagrams and label them ▪ *Pupil can start to use labelled diagrams to show more complex outcomes, e.g. comparing the time of day at different places on the earth.* **Content** **Physics – Earth and Space** Day, night, month, seasonal change & year are caused by the position and movement of the	**Working Scientifically** **Recording evidence** Pupils can display data using line graphs ▪ *Pupil can use a line graph to record basic data, e.g. length and mass of a baby as it grows.* **Reporting Findings** Pupils use displays and presentations to report on findings ▪ *Pupil can, with support, display and present key findings from enquiries orally and in writing, e.g. suggesting reasons for similarities and differences between various animals.* **Conclusions/Predictions** Pupils can draw conclusions ▪ *Pupil can show how evidence supports mammals and relating them to adult mass.a*

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	Content **Physics – Forces** There are contact and non-contact forces; these affect the motion of objects ▪ *Explain that gravity causes objects to fall towards Earth.* ▪ *Describe how motion may be resisted by air resistance, water resistance or friction.* ▪ *Describe how some devices may turn a smaller force into a larger one.*	range of materials based on their physical properties. ▪ Describe how some materials, e.g. sugar, will dissolve and can be retrieved. ▪ Justify separation techniques proposed, with reference to materials being separated. ▪ Show how the original materials can be retrieved from each of these changes. ▪ Identify reactants and products of chemical changes and recognise these as being irreversible. The physical properties of materials determine their uses. ▪ *Use evidence to justify the selection of a material for a purpose.*	Life exists in a variety of forms and goes through cycles. ▪ *Identify similarities and differences in two different life cycles, e.g. sparrow and butterfly, with reference to eggs and intermediate stages.* ▪ *Describe the changes as humans develop to old age, e.g. trends in changes to size, weight, mobility etc.*	Earth. ▪ Draw a diagram or use a model to describe planetary orbits. ▪ Draw a diagram or use a model to describe the Moon's orbit around the Earth. Day, night, month, season change, and year are cause by the position change and movement of the Earth. ▪ Describe the Sun, Earth & Moon as spheres. ▪ Use a diagram or model to explain why the Sun seems to travel across the sky, and what causes day and night.	*conclusion, e.g. researching gestation periods of various* ***Content*** **Biology - Animals including Humans** Life exists in a variety of forms and goes through cycles . ▪ *Identify similarities and differences in two different life cycles, e.g. sparrow and butterfly, with reference to eggs and intermediate stages.* ▪ *Describe the changes as humans develop to old age, e.g. trends in changes to size, weight, mobility etc.* The human body has a number of systems, each with its own function. ▪ *Describe in sequence the stages of reproduction in some plants and*

					animals, e.g. dog and a thistle.

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Meta cognition						
Year 6	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Concept	**Rebellion and Invasion**	**Natural elements**	**Civilisation**	**Environmental**	**Discoveries**	**Culture**
Knowledge	**Electricity** *Revisit learning from Y4 Autumn* ▪ *Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in a 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*		**Evolution and Inheritance** *Revisit learning from Autumn* ▪ *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.*	**Living Things and Habitats** *Revisit learning from Y5 Spring* ▪ *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.*	**Light and sound** *Revisit learning from Y3 Spring and Y4 Summer* ▪ *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*	**Animals and Humans** *Revisit learning from Y5 Summer* ▪ *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*

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				explain why shadows have the same shape as the objects that cast them	
Skill Progression	**Working Scientifically** **Conducting Experiments** Pupils understand the role of repeat readings ▪ *Pupil can identify situations in which taking repeat readings will improve the quality of evidence, e.g. investigating the behaviour of components in a circuit.* **Reporting Findings** Pupils explain confidence in findings ▪ *Pupil can, in conclusions, indicate how trustworthy they are, e.g. in relating brightness of bulb to voltage supplied.* **Content** **Physics – Electricity** Electricity can make circuits work and can be controlled to perform useful functions ▪ *Explain how number and voltage of cells affects the lamp or buzzer.* ▪ *Explain the use of switches, how bulbs can be made brighter and buzzers made louder.* ▪ *Represent a circuit that has been constructed using symbols.*	**Working Scientifically** **Planning Investigations** Pupils can plan an enquiry • *Pupil can answer questions using evidence gathered from different types of scientific enquiry, e.g. operation of circulatory system from experiment, survey and secondary research.* **Conclusions/Predictions** Pupils can draw conclusions ▪ *Pupil can identify how an idea is supported or refuted by evidence, e.g. selective breeding to produce animals or plants with desirable characteristics* **Content** **Biology - Evolution and Inheritance** Living things exhibit	**Working Scientifically** **Recording Evidence** Pupils record work with diagrams and label them. ▪ *Pupil can use labelled diagrams to show complex outcomes, e.g. relating specific adaptations of organisms to environmental factors.* **Recording Evidence** Pupils can display data using labelled diagrams, keys, tables and bar charts. ▪ *Pupil can use various ways, as appropriate, to record complex evidence, e.g. in the construction of a key to aid plant*	**Working Scientifically** **Planning Investigations** Pupils can identify and manage variables. ▪ *Pupil can identify and manage variables, e.g. distances and sizes in shadow formation.* **Conducting Experiments** Pupils can use equipment to take measurements ▪ *Pupil can use appropriate equipment, such as meter rule, to take measurements, such as distance travelled by light.* Pupils explore how to improve the quality of data ▪ *Pupil can consider how by modifying*	**Working Scientifically** **Planning Investigations** Pupils can plan an enquiry • *Pupil can answer questions using evidence gathered from different types of scientific enquiry, e.g. operation of circulatory system from experiment, survey and secondary research.* **Conclusions/Predictions** Pupils can draw conclusions • *Pupil can identify how an idea is supported or refuted by evidence, e.g. selective breeding to produce animals or plants with desirable characteristics*

		variation and adaptation and these may lead to evolution. ▪ *Use fossils as evidence that living things have changed over time, e.g. explain that these have died out and others have taken their place.* ▪ *Recognise that offspring normally vary from each other and from their parents, e.g. that puppies vary from each other and from their parents.* ▪ *Describe examples of a living thing that has adapted to live in a particular habitat and evolved as a result, e.g. a polar bear or cactus.*	*identification.* **Reporting Findings** Pupils use displays and presentations to report on findings. ▪ *Pupil can display and present key findings from enquiries orally and in writing, e.g. deciding how well classifications fit unfamiliar animals and plants.* **Content** **Biology Living Things and their Habitats** Living things can be classified according to observable features ▪ *Use similarities and differences in observable features to decide how living things should be grouped, e.g. a cat is a mammal because it is warm blooded and gives birth to live young.*	*instrument or technique, measurements can be improved, e.g. when recording route of light rays* **Recording evidence** Pupils can display data using line graphs ▪ *Pupil can use line graphs to display complex data, e.g. size of object in relation to the size of the shadow it casts.* **Reporting Findings** Pupils process findings to develop conclusions and identify causal relationships ▪ *Pupil can write a conclusion using evidence and identifying causal links, e.g. in the*	**Content** **Biology – Animals including Humans** The human body has a number of systems, each with its own function ▪ *Describe what heart, blood vessels and blood do, e.g. carry oxygen to all parts of the body.* ▪ *Suggest how their bodies are affected by substances and actions, e.g. that a high fat diet coupled with little exercise is likely to lead to obesity.* ▪ *Describe with aid of diagrams the route that water takes within animals, e.g. through the human body.*

			▪ *Explain why certain features are useful in classifying living things, e.g. backbones in animals and flowers in plants.*	*design of a periscope.* **Conclusions/Predictions** Pupils can develop investigation further ▪ *Pupil can use evidence to suggest further comparative or fair tests that would develop the investigation, e.g. in the design of rear-view mirrors for cars.* **Content** **Physics – Light** Light and sound can be reflected and absorbed and enable us to see and hear ▪ *Represent light using straight line ray diagrams.* ▪ *Draw diagrams using straight lines showing light travelling to the eye.* ▪ *Explain how we*	

				▪ *can see an object by referring to light travelling into the eye.* ▪ *Draw a diagram showing an object, shadow and light to relate object shape to shadow shape.*	
Meta Cognition					