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.

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.

Diversity: we have carefully planned our curriculum to include diversity (gender, disability, BAME – Black, Asian and Minority Ethnic) to ensure it is a diverse and inclusive curriculum. Where there are key links, these are highlighted below in orange.

Science	**Term**		**Term**		**Term**	
EYFS	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
	3- 4 years		Reception		Early Learning Goal (ELG)	
Knowledge	**<u>Physical Development</u>** ▪ *Make healthy choices about food, drink, activity and toothbrushing.* **<u>Understanding The World</u>** ▪ *Understand the key features of the life cycle of a plant and an animal.*		**<u>Physical Development</u>** ▪ *Know and talk about the different factors that support their overall health and wellbeing: regular physical activity, healthy eating, toothbrushing, sensible amounts of 'screen time',*		**<u>Understanding the world</u>** **<u>People, culture and communities</u>** ▪ *Describe their immediate environment using knowledge from observation, discussion, stories, non-fiction texts and maps.*	

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	▪ *Begin to understand the need to respect and care for the natural environment and all living things.* ▪ *Talk about the differences between materials and changes they notice.* ▪ *Continue to develop positive attitudes about the differences between people.* ▪ *Know that there are different countries in the world and talk about the differences they have experienced or seen in photos.* **Expressive Arts and Design** ▪ *Develop their own ideas and then decide which materials to use to express them.*		*having a good sleep routine, being a safe pedestrian* **Understanding the world** ▪ *Recognise some similarities and differences between life in this country and life in other countries.* ▪ *Describe what they see, hear and feel whilst outside.* ▪ *Recognise some environments that are different to the one in which they live.*		**The natural world** ▪ *Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class.*	
Skill Progression	**Understanding The World** ▪ *Plant seeds and care for growing plants.* ▪ *Explore and talk about different forces they can feel.* **Expressive Arts and Design** ▪ *Join different materials and explore different textures.*		**Physical Development** ▪ *Further develop the skills they need to manage the school day successfully: lining up and queuing, mealtimes, personal hygiene.* **Understanding The World** ▪ *Explore the natural world around them.* ▪ *Understand the effect of changing seasons on the natural world around them.*		**Personal, social and emotional development** **Managing self** ▪ *Manage their own basic hygiene and personal needs, including dressing, going to the toilet and understanding the importance of healthy food choices.* **Understanding The World** **The natural world** ▪ *Explore the natural world around them, making observations and drawing pictures of animals and plants.* ▪ *Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.*	
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**

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Knowledge	**Everyday Materials** *Revisit learning from EYFS Autumn* ▪ *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*	**Seasonal Changes (Autumn)** *Revisit learning from EYFS and Autumn 1* ▪ *Observe changes across the four seasons* ▪ *Observe/describe weather associated with the seasons and how day length varies*	**Seasonal Changes (Winter)** *Revisit learning from Autumn 1 and 2* ▪ *Observe changes across the four seasons* ▪ *Observe/describe weather associated with the seasons and how day length varies*	**Plants** *Revisit learning from Autumn and Spring 1* ▪ *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*	**Seasonal Changes (Summer)** *Revisit learning from 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.*	**Animals and humans** *Revisit learning from Spring* ▪ *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*

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						carnivores, herbivores and ▪ *omnivores*
Skill Progression	**Working scientifically** **Planning Investigations** Pupils can plan an enquiry ▪ *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.*	**Working scientifically** **Planning Investigations** Pupils can ask questions ▪ *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.*	**Working scientifically** **Recording evidence** Pupils record work with 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.*	**Working scientifically** **Conducting Investigations** Pupils can use equipment 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',*	**Working Scientifically** **Conclusions/Predictions** Pupils can analyse data ▪ *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'*	**Working scientifically** **Conclusions/Predictions** Pupils can analyse data ▪ *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**

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	▪ *Classify a variety of materials into groups based on physical properties.*			*'dead' and 'things that have never been alive'.*	*and 'things that have never been alive'.*	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.*
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,*	**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)*	**Everyday Materials** *Revisit learning from 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,*	**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* ▪ *Observe and compare 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* ▪ *Observe and compare 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*

	including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses	▪ *Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene*	*glass, brick, rock, paper and cardboard for particular uses*	*from around the world.*	*from around the world.*	*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.* ▪ *(habitats of animals around the world how do they need to adapt- can also link to humans)*

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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 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.*	**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 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*	**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 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*	**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 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	**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 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.*	**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 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*

	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.*		*a healthy diet and exercise.*	*applying forces in different directions.* The physical properties of materials determine their uses ▪ *Select and justify a material for a particular use.*	▪ *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.* Life exists in a variety of forms and goes through cycles - Plants ▪ *Describe stages of development of a full-grown plant.*	**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.* Life exists in a variety of forms and goes through cycles - Plants	*chain and identify what is eating what.* ▪ *Explore and identify what plants need to thrive.*

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					▪ *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* ▪ *Describe magnets as having two poles* ▪ *Predict whether two magnets will attract or repel each other, depending on which poles are facing*		**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 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*	**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 things that have lived are trapped within rock* ▪ *Recognise that soils are made from rocks and organic matter.* ▪ *Comparisons around the World.*	**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 from what they eat* ▪ *Identify that humans and some other animals have skeletons and muscles for support, protection and movement.*	**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* ▪ *Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers* ▪ *Investigate the way in which water is*

				▪ *Structural and behavioural adaptations, similarities and differences across the World.*	*transported within plants* ▪ *Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.* ▪ *Diverse range of plants across the World. How plants are used or relied upon by the different cultures of the world.*
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** Pupils process findings to develop conclusions and identify causal relationships	**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 ▪ *Pupil can use standard measurements when taking*	**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 using labelled diagrams, keys, tables and bar charts	**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 develop conclusions and identify causal relationships	**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 diagrams and label them ▪ *Pupil can, with prompting, draw and label*

	▪ *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.*	*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.*	▪ *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 conclusion,*	▪ *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, 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 play a role in the reproduction of flowering plants.*

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				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.*		
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 buzzers*		**Animals and humans** *Revisit learning from Y2 Autumn and Year 3 Summer* ▪ *Describe the simple functions of the basic parts of the digestive system in humans*	**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 from Year 2 Spring 2* ▪ *Compare and group materials together, according to whether they are*

	▪ *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*	▪ *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*	*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.	**<u>Working Scientifically</u>** **Planning investigations** Pupils can ask questions ▪ *Pupil can develop relevant, testable questions, e.g. based on*	**<u>Working Scientifically</u>** **Recording Evidence** Pupils record work with diagrams and label them ▪ *Pupil can use words and diagrams to*	**<u>Working Scientifically</u>** **Planning Investigations** Pupils can identify and manage variables ▪ *Pupil can set up comparative and fair tests, e.g.*	**<u>Working Scientifically</u>** **Conducting Experiments** Pupils can use equipment to take measurements ▪ *Pupil can use various equipment, as*

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	Recording evidence Pupils can display data using line graphs ▪ *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.* **<u>Content</u>** **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.*	*observations of animals.* **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.* **<u>Content</u>** **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.*	*record findings, e.g. how habitats change during the year.* **<u>Content</u>** **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.*	*finding patterns in the sounds made 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.* **<u>Content</u>** **Physics – Light and Sound** Light & sound can be reflected & absorbed and enable us to see & hear ▪ *Explain, with reference to vibrations, how*	*instructed, repeatedly and 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.* **<u>Content</u>** **Chemistry – States of Matter**

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	▪ *Predict whether a particular arrangement of components will result in a bulb lighting.* ▪ *Predict how the operation of a switch will affect bulbs lighting.*			*owls and habitat loss.*	*an object makes a sound.* ▪ *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.*	Materials have physical properties which can be 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*		**Properties and Changes of Materials** *Revisit learning from Y1 and Y2*	**Living things and Habitats** *Revisit learning from Y4 Spring*	**Earth and Space** *Revisit learning from Autumn and Spring*	**Animals and humans** *Revisit learning from Y4 Spring*

	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.*	▪ *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* ▪ *Demonstrate that dissolving, mixing and changes of*	▪ *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.* ▪ *(female scientist Jane Goodal)*	▪ *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*	▪ *Describe the changes as humans develop to old age* ▪ *Describe the life process of reproduction in some plants and animals*

		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.* ▪ *Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic*			

Windmill Hill Academy

Science Knowledge and Skills Organiser

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.	**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**	**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	**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*

Windmill Hill Academy

Science Knowledge and Skills Organiser

	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.*	▪ Test and sort a 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.*	**Biology - Living Things and their Habitats.** 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.*	and movement of the 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.

Windmill Hill Academy

Science Knowledge and Skills Organiser

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*	**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*

		adaptation may lead to evolution.		*explain why shadows have the same shape as the objects that cast them*	
Skill Progression	**<u>Working Scientifically</u>** **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.* **<u>Content</u>** **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.*	**<u>Working Scientifically</u>** **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* **<u>Content</u>**	**<u>Working Scientifically</u>** **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*	**<u>Working Scientifically</u>** **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	**<u>Working Scientifically</u>** **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*

		Biology - Evolution and Inheritance Living things exhibit 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.*	*plant 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*	▪ *Pupil can consider how by modifying 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*	**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.*

			blooded and gives birth to live young. ▪ *Explain why certain features are useful in classifying living things, e.g. backbones in animals and flowers in plants.*	*identifying causal links, e.g. in the 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					