The Vision for Science

Science is the study of the natural and physical world through observation, experimentation and enquiry. At Ravensfield, a carefully developed and progressive curriculum firmly embeds and revisits the theoretical and experimental domains of physics, chemistry and biology.

Through practical and engaging experiences, our science lessons aim to encompass a sense of awe and wonder, while encouraging the children's natural curiosity and love of learning. Within each science concept studied, age-related scientific vocabulary is introduced and revised. The theoretical aspects of each concept are strongly supported through working scientifically. This occurs through precise questioning, hypothesising, interpretation and evaluation.

Our overall aim is that all children understand the vital importance of science and how working as scientists will enable future discoveries, innovations and the understanding of our world. Our school values of love, honesty, forgiveness, respect and hope are supported by science as the subject allows children to explore the world around them and beyond to be inspired by the discoveries they make.

Science Long Term Plan

Subject	Domains	Concepts
Biology	Animals including Humans Plants Living things and their habitats Evolution and inheritance Working Scientifically Famous scientists and discoveries	The human body Animals Caring for the planet Plants Animal needs for survival Living things and their habitats Nutrition and diet Food waste Biodiversity Grouping and classifying living things Habitats Deforestation Food chains Life cycles Variation

		Adaptation
Chemistry	Everyday materials Rocks States of Matter Properties and changes of materials Working Scientifically Famous scientists and discoveries	Materials Plastic Rocks Fossils Soil Particles Reversible and irreversible changes
Physics	Seasonal changes Electricity Light Forces Sound Earth and Space Working Scientifically Famous scientists and discoveries	Seasonal changes Light and Dark Forces Magnets Sound Electricity Space Global Warming

Nursery								
Autumn			Spring			Summer		
Biology	Chemistry	Physics	Biology	Chemistry	Physics	Biology	Chemistry	Physics
-Animals including humans		-Seasonal changes	-Living things and their habitats -Animals including humans		-Seasonal changes		-Everyday materials	-Forces -Seasonal changes
Reception								
Autumn			Spring			Summer		
Biology	Chemistry	Physics	Biology	Chemistry	Physics	Biology	Chemistry	Physics

-Animals including humans.		-Seasonal changes	-Living things and their habitats -Animals including humans -Seasonal changes	-Everyday materials				-Seasonal changes
Year 1								
Autumn			Spring			Summer		
Biology	Chemistry	Physics	Biology	Chemistry	Physics	Biology	Chemistry	Physics
-The human body	-Materials	-Seasonal changes	-Planting -Animals -Caring for the planet		-Seasonal changes	-Plants -Planting -Growing and cooking		-Seasonal changes
Year 2								
Autumn			Spring			Summer		
Biology	Chemistry	Physics	Biology	Chemistry	Physics	Biology	Chemistry	Physics
-Animal needs for survival -Humans	-Materials -Plastic		-Plants (light and dark) -Living things and their habitats		-Light and Dark	-Plants (bulbs and seeds) -Growing up -Wildlife		
Year 3								
Autumn			Spring			Summer		
Biology	Chemistry	Physics	Biology	Chemistry	Physics	Biology	Chemistry	Physics
-Skeletons -Movement -Nutrition and diet -Food Waste	-Rocks			-Fossils -Soils	-Light	-Plants -Biodiversity		-Forces -Magnets

Year 4								
Autumn			Spring			Summer		
Biology	Chemistry	Physics	Biology	Chemistry	Physics	Biology	Chemistry	Physics
-Group and classify living things	-States of matter				-Sound -Electricity -Energy	-Habitats - Deforestation- The Digestive System -Food chains		
Year 5								
Autumn			Spring			Summer		
Biology	Chemistry	Physics	Biology	Chemistry	Physics	Biology	Chemistry	Physics
		-Forces -Space -Global warming	-Animals including humans -Life cycles	-Properties of materials		Reproduction	-Reversible and irreversible changes -Plastic pollution	
Year 6								
Autumn			Spring			Summer		
Biology	Chemistry	Physics	Biology	Chemistry	Physics	Biology	Chemistry	Physics
-Living things and their habitats		-Electricity -Renewable energy	-Circulatory system -Diet, drugs and lifestyle		-Light -Light pollution	-Variation -Adaptations	-Fossils	

End points:

1) **To develop excitement, curiosity and understanding of the natural world**
2) **To develop excitement, curiosity and understanding of the physical world**
3) **To develop excitement, curiosity and understanding of chemical world**
4) **To work scientifically**
5) **To learn about famous discoveries and scientists through the ages**

Progression map

End point	Concepts	Nursery	Reception	Y1	Y2	Y3	Y4	Y5	Y6
To develop excitement, curiosity and understanding of the natural world	**Plants**	Plant seeds and care for growing plants Understand the key features of the life cycle of a plant and an animal. Begin to understand the need to respect and care for the natural environment	Describe events in some detail Explore the natural world around them. Explore the natural world around them, making observations and drawing pictures of animals and 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	• Observe and describe how seeds and bulbs grow into mature plants • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy	• Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers • Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary			

		and all living things Begin to describe a sequence of events, real or fictional, using words such as 'first', 'then...'				from plant to plant • Investigate the way in which water is transported within plants • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal			
	Animals including humans	Make healthy choices about food, drink, activity and toothbrushing Begin to understand the need to respect and care for the natural environment and all living things Begin to describe a sequence of events, real	Know and talk about the different factors that support their overall health and wellbeing: - regular physical activity, toothbrushing, eating healthy etc Describe what they see, hear and feel while they are outside Manage their own basic	• Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals • Identify and name a variety of common animals that are carnivores, herbivores and omnivores • Describe and compare the structure of a	• 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	• 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	• Describe the simple functions of the basic parts of the digestive system in humans • Identify the different types of teeth in humans and their simple functions • Construct and interpret a variety of food chains, identifying producers,	• Describe the changes as humans develop to old age.	• 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 body's function • Describe the ways in which

		or fictional, using words such as 'first', 'then...'	hygiene and personal needs	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.	humans of exercise, eating the right amounts of different types of food, and hygiene	support, protection and movement	predators and prey		nutrients and water are transported within animals, including humans
	Living things and their habitats	Begin to understand the need to respect and care for the natural environment and all living things	Recognise some environments that are different to the one in which they live Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has		• 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		• Recognise that living things can be grouped in a variety of ways • explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment • Recognise that environments can change and that this can	• 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	• 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

			been read in class Explore the natural world around them		basic needs of different kinds of animals and plants, and how they depend on each other • Identify and name a variety of plants and animals in their habitats, including microhabitats • Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food		sometimes pose dangers to living things		on specific characteristics
	Evolution and inheritance	Begin to make sense of their own life-story and family's history. Begin to understand the need to respect and care for the natural environment	Talk about members of their immediate family and community						• Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years

		and all living things							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
To develop excitement, curiosity and understanding of the physical world	**Seasonal changes**		Describe events in some detail Understand the effect of changing seasons on the natural world around them. Understand some important processes and changes in the	• Observe changes across the 4 seasons • Observe and describe weather associated with the seasons and how day length varies					

			natural world around them, including the seasons Explore the natural world around them						
	Electricity	Explore how things work.	Explore how things work.				• Identify common appliances that run on electricity • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers • Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery		• Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit • Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches • Use recognised symbols when representing a

							• Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit • Recognise some common conductors and insulators, and associate metals with being good conductors		simple circuit in a diagram
	Light	Explore how things work Increasingly follow rules, understanding why they are important	Explore how things work			• 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			• Recognise that light travels 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

						are formed when the light from a light source is blocked by an opaque object • Find patterns in the way that the size of shadows change			light sources to our eyes or from light sources to objects and then to our eyes • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them
	Forces and Magnets	Explore how things work Explore and talk about different forces they can feel Increasingly follow rules, understanding why they are important	Explore how things work			• Compare how things move on different surfaces • Notice that some forces need contact between 2 objects, but magnetic forces can act at a distance • Observe how magnets attract or repel each other and attract some materials and not others		• Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • Identify the effects of air resistance, water resistance and friction, that act between moving surfaces	

						• 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 2 poles • predict whether 2 magnets will attract or repel each other, depending on which poles are facing		• Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect	
	Sound	Explore how things work Listen with increased attention to sounds	Explore how things work				• Identify how sounds are made, associating some of them with something vibrating • Recognise that vibrations from sounds travel through a medium to the ear		

							• Find patterns between the pitch of a sound and features of the object that produced it • Find patterns between the volume of a sound and the strength of the vibrations that produced it • Recognise that sounds get fainter as the distance from the sound source increases		
	Earth and Space							• 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	
To develop excitement, curiosity and understanding of the chemical world	**Materials**	Use all their senses in hands-on exploration of natural materials Explore collections of materials with similar and/or different properties Talk about the differences between materials and changes they notice Join different materials and explore different textures Explore how things work	Explore how things work	• 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	• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching			• 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	

				simple physical properties				solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • Demonstrate that dissolving, mixing and changes of state are reversible changes • Explain that some changes result in the formation of new materials,	

								and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda	
	Rocks and fossils	Explore how things work Identify familiar objects and properties	Explore how things work			• 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			
	States of matter	Explore how things work	Understand some important processes and changes in the				• Compare and group materials together, according to whether they		

		Identify familiar objects and properties Increasingly follow rules, understanding why they are important	natural world around them, including the changing states of matter. Connect one idea or action to another				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		
To work scientifically	**Ask questions**	Understand 'why' questions, like: "Why do you think the caterpillar got so fat?	Ask questions to find out more and to check what has been said to them	Ask simple questions.	Ask simple questions and recognise that they can be answered in different ways.	Ask questions and understand there are different enquiry types they could use to answer them.	Ask relevant questions and use different types of scientific enquiry to answer them.	Ask scientific questions and begin to understand which questions would be best suited to each enquiry type.	Ask relevant scientific questions and choose which enquiry type would be best suited to answer them.
	Plan	Select and use activities and resources, with help when needed. This helps them to achieve a goal	Create collaboratively, sharing ideas, resources and skills	Verbally state what they are going to investigate.	Make simple predictions based on a question. Identify what they will	Make relevant predictions. Identify what they will change, observe	Make predictions based on simple scientific knowledge.	Make predictions based on scientific knowledge.	Make predictions based on scientific knowledge. Plan different

		they have chosen, or one which is suggested to them			change and keep the same.	and keep the same. With support, set up simple practical enquiries.	Identify what they will change, observe or measure and keep the same. Set up simple practical enquiries, comparative and fair tests.	With support, plan different types of scientific enquiry. Where appropriate, identify the dependent, independent and controlled variables.	types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
	Make observations	Identify familiar objects and properties	Explore the natural world around them, making observations and drawing pictures of animals and plants	Observe closely.	Observe closely, using simple equipment.	Begin to use scientific equipment to make observations.	Make systematic and careful observations.	Use a range of scientific equipment to make systematic and careful observations.	Use a range of scientific equipment to make systematic and careful observations with increased complexity.
	Take measurements	Use one-handed tools and equipment, for example, making snips in paper with scissors	Develop their small motor skills so that they can use a range of tools competently, safely and confidently. Suggested tools: pencils for drawing and writing, paintbrushes, scissors, knives, forks and spoons	Carry out simple tests using non-standard measurements when appropriate.	Perform simple tests using standard units when appropriate.	Carry out tests and simple experiments and take measurements using standard units.	Take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.	Take accurate measurements using a range of scientific equipment. Start to take repeat readings when appropriate.	Take accurate measurements using a range of scientific Equipment, with increasing accuracy and precision, taking repeat readings when appropriate.

	Gather, Record and Classify Data			Gather and record simple data. Sort objects and living things into groups based on simple properties.	Gather and record data to help in answering questions. Identifying and classifying	Gather and record data in different ways to help answer questions. Recording findings using simple scientific language, drawings, labelled diagrams, bar charts, and tables.	Gather, record and classify data in a variety of ways to help in answering questions. Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.	Gather, record and classify data with increasing complexity to help in answering questions. Record data using scientific diagrams and labels, classification keys, tables, bar and line graphs.	Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
	Present Findings	Compare quantities using language: 'more than', 'fewer than' Talk about and identify the patterns around them. For example: stripes on clothes, designs on rugs and wallpaper. Use informal language like 'pointy', 'spotty', 'blobs', etc	Use talk to help work out problems and organise thinking and activities, and to explain how things work and why they might happen	Explain what they found out to an adult or a partner.	Talk about what they have found out and how they found it out.	Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.	Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.	Report and present findings from enquiries, including conclusions. Begin to identify causal relationships in oral and written forms such as displays and other presentations.	Report and present findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations.
	Answer questions and	Make comparisons between objects relating	Make comments about what they have	Answer simple questions.	Use their observations and ideas to	Make simple conclusions. Use results, findings or	Use straight-forward scientific	Use scientific evidence to answer questions.	Use scientific evidence to answer

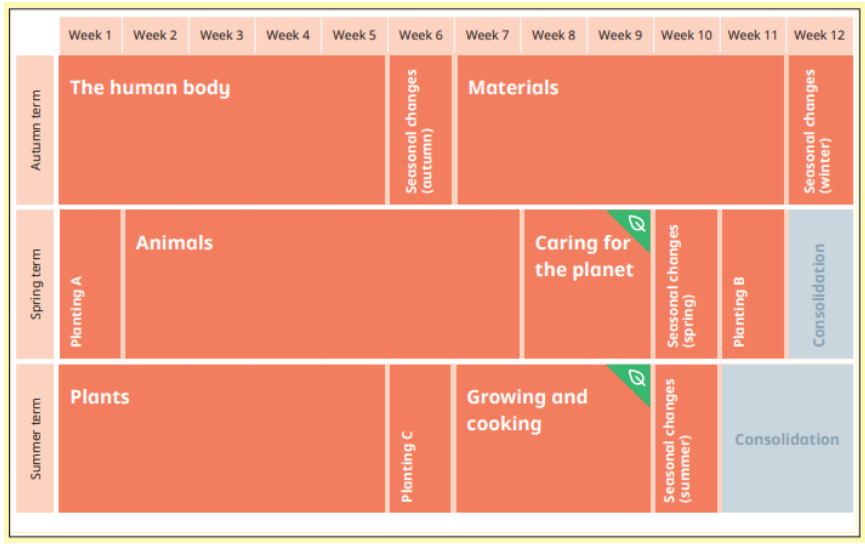
	make conclusions	to size, length, weight and capacity Connect one idea or action to another	heard and ask questions to clarify their understanding. Describe what they see, hear and feel whilst outside Connect one idea or action to another		suggest answers to questions.	observations to answer questions.	evidence to answer questions or to support their findings. Use results to draw simple conclusions. Begin to identify differences, similarities or changes related to simple ideas or processes.	Make conclusions based on scientific evidence and from their own testing and findings. Identify differences, similarities or changes related to simple ideas or processes.	questions. Make conclusions based on scientific evidence and from their own testing and findings. Identify scientific evidence that has been used to support or refute ideas or arguments.
	Evaluate					Suggest questions for further investigation.	Begin to make predictions for new values, suggest improvements and raise further questions.	Make predictions for new values, suggest improvements and raise further questions.	Use test results to make predictions to set up further comparative and fair tests. Suggest investigation improvements including accuracy of results. Provide some simple examples of how to extend the investigation.
To learn about famous discoveries and scientists				Charles Darwin	Florence Nightingale (Pioneer Nurse)	James Hutton (Modern geologist)	Jane Goodall Anders Celsius	Isaac Newton Katherine Johnson, Dorothy	Carl Linnaeus Benjamin Franklin

through the ages						Mary Anning (pioneering palaeontologist)	Daniel Fahrenheit Lord Kelvin Alexander Graham Bell Thomas Edison	Vaughan and Mary Jackson Greta Thunberg	Thomas Edison William Armstrong (hydroelectric power) Edmond Becquerel (solar power) Charles Brush (wind turbines) Jerry Whitfield (biomass generation) Isaac Newton Ibn al - Haytham Daniel Hale Williams (first successful heart surgery)

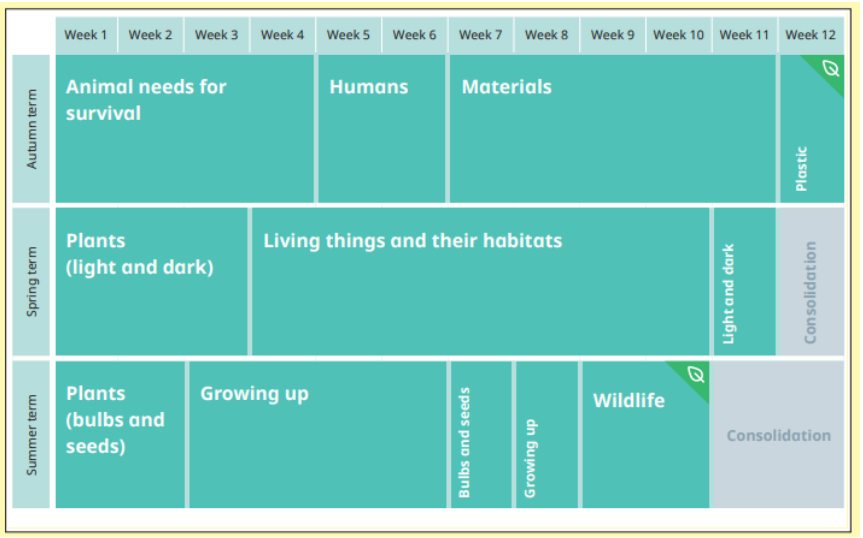
Appendix

White Rose - Year Group Specific Yearly Overviews

Year 1

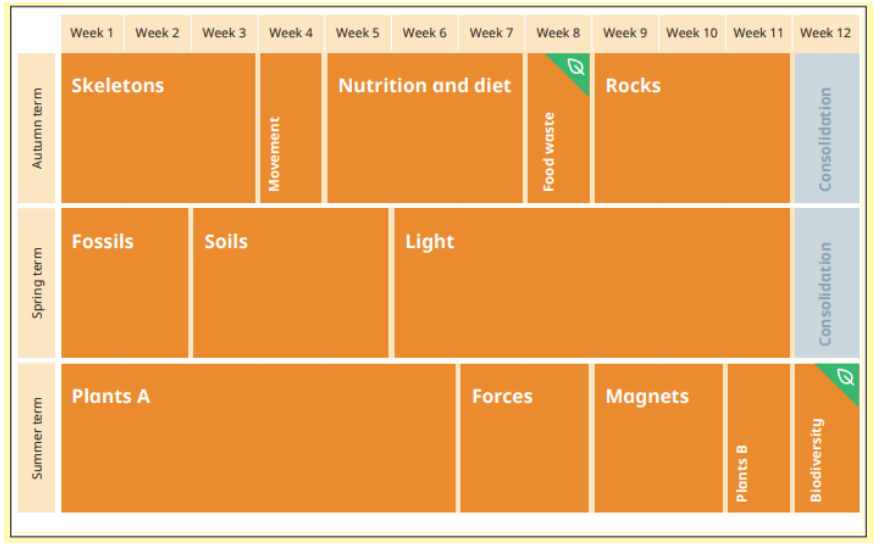


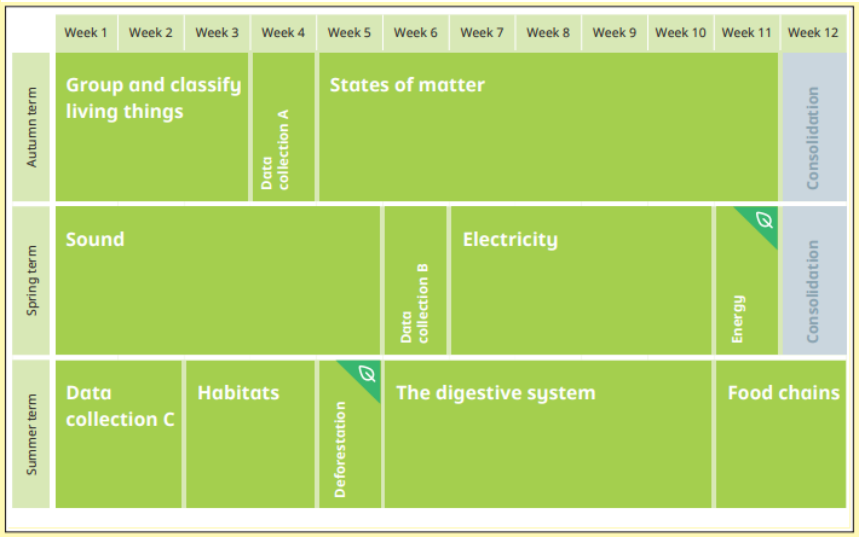
Year 2



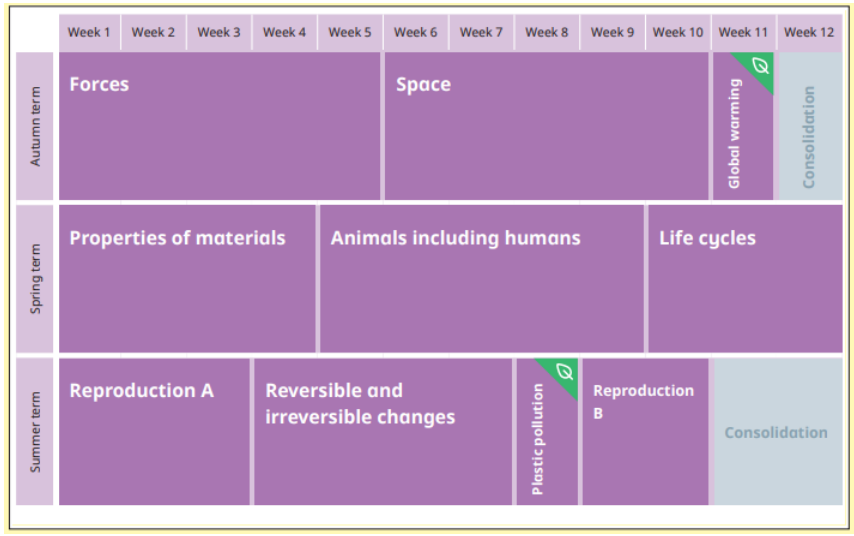
Year 3

Year 4


Week 1
Week 2
Week 3
Week 4
Week 5
Week 6
Week 7
Week 8
Week 9
Week 10
Week 11
Week 12
Autumn term
Skeletons
Movement
Nutrition and diet
Food waste
Rocks
Consolidation
Spring term
Fossils
Soils
Light
Consolidation
Summer term
Plants A
Forces
Magnets
Plants B
Biodiversity


Week 1
Week 2
Week 3
Week 4
Week 5
Week 6
Week 7
Week 8
Week 9
Week 10
Week 11
Week 12
Autumn term
Group and classify living things
Data collection A
States of matter
Consolidation
Spring term
Sound
Data collection B
Electricity
Energy
Consolidation
Summer term
Data collection C
Habitats
Deforestation
The digestive system
Food chains

Year 5


Week 1
Week 2
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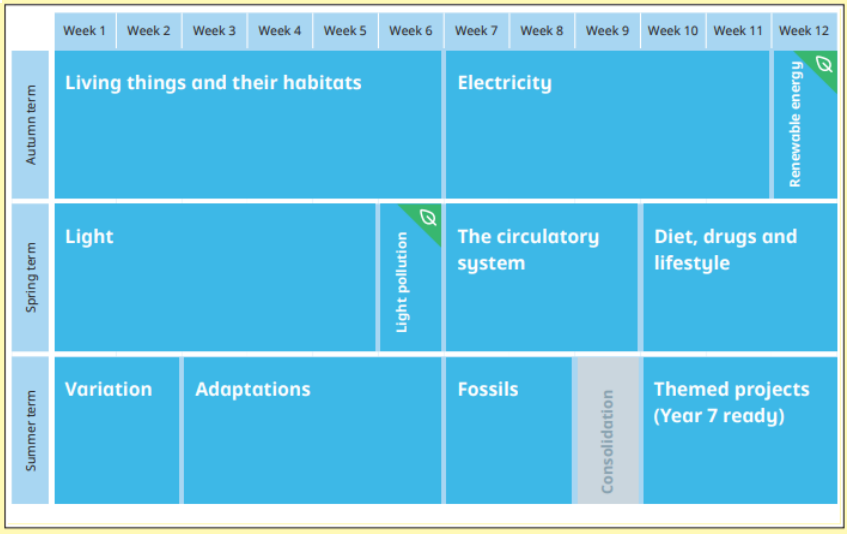
Week 5
Week 6
Week 7
Week 8
Week 9
Week 10
Week 11
Week 12
Autumn term
Forces
Space
Global warming
Consolidation
Spring term
Properties of materials
Animals including humans
Life cycles
Summer term
Reproduction A
Reversible and irreversible changes
Plastic pollution
Reproduction B
Consolidation

Year 6


Week 1
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Week 4
Week 5
Week 6
Week 7
Week 8
Week 9
Week 10
Week 11
Week 12
Autumn term
Living things and their habitats
Electricity
Renewable energy
Spring term
Light
Light pollution
The circulatory system
Diet, drugs and lifestyle
Summer term
Variation
Adaptations
Fossils
Consolidation
Themed projects (Year 7 ready)