The Big Ideas for Science

Science Intent

At Discovery Primary Academy, we encourage children to be inquisitive throughout their time at the academy. The science curriculum inspires a healthy curiosity in children about our universe and promotes respect for the environment. We believe science should promote the acquisition of knowledge, concepts, skills and positive attitudes through the key knowledge that has been identified within each unit and across each year group. Throughout our academy, children are encouraged to develop and use a range of working scientifically skills including questioning, researching and observing for ourselves. We promote and celebrate these skills. We ensure our science curriculum builds and develops throughout the children's time at the school.

Working Scientifically

There are five areas of scientific enquiry. Working scientifically will be taught alongside scientific enquiry:

- Pattern seeking
- Observation over time
- Comparative and fair testing
- Identifying, classifying and grouping
- Researching secondary sources

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Working Scientifically in EYFS

Children in EYFS will be encouraged through high quality continuous provision to have their own ideas and find ways to solve problems themselves. As part of the EYFS curriculum, FS children safely explore a range a materials, tools and techniques. High quality interactions with skilled adults support children to make links, notice patterns and talk about things they have observed. Staff plan opportunities for independent and adult directed 'Understanding the world' opportunities across the curriculum. High quality provision and teaching enables children to begin to develop their 'working scientifically' skills.

Planning	Conducting Experiments	Recording Evidence	Reporting Findings	Conclusions and Predictions
• Choose the resources they need for their chosen activities and say when they do or don't need help. • Have their own ideas • Find ways to solve problems and find new ways to do thinks • Make simple predictions • Plan and make decisions about how to solve a problem or reach a goal	• Test their ideas. • Safely explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function. • Know about similarities and differences in relation to objects, materials and living things. • Make observations of animals and plants.	• Develop ideas of grouping, sequencing, cause and effect. • Represent their own ideas, thoughts and feelings through design and technology, art, music, dance, role play and stories.	• Recognise findings and talk about what they have found out in simple terms. • Talk about the features of their immediate environment and how environments might vary from one another. • Explain why some things occur and talk about changes.	• Gather and record basic data alongside an adult e.g., observational drawing / scribed pupil voice. • Use their observations to suggest simple answers to basic questions, with the necessary scaffolding from an adult.

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National Curriculum Statutory Requirements for KS1 & KS2

KS1 – Y1 & 2	LKS2 – Y3&4	UKS2 – Y5&6
During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content: ● asking simple questions and recognising that they can be answered in different ways ● observing closely, using simple equipment ● performing simple tests ● identifying and classifying ● using their observations and ideas to suggest answers to questions ● gathering and recording data to help in answering questions	During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content: ● asking relevant questions and using different types of scientific enquiries to answer them ● setting up simple practical enquiries, comparative and fair tests ● making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers ● gathering, recording, classifying and presenting data in a variety of ways to help in answering questions ● recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables ● reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions ● using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions ● identifying differences, similarities or changes related to simple scientific ideas and processes ● using straightforward scientific evidence to answer questions or to support their findings.	During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content: ● planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary ● taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate ● recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs ● using test results to make predictions to set up further comparative and fair tests ● reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations ● identifying scientific evidence that has been used to support or refute ideas or arguments

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Working Scientifically Skills Progression in KS1 & KS2

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Asking and answering questions	Use everyday language/begin to use simple scientific words to ask or answer a scientific question.	Suggest ideas, ask simple questions and know that they can be answered/investigated in different ways including use of scientific language from the national curriculum.	Use ideas to pose questions, independently, about the world around them and use different types of scientific enquiries to answer them.	Suggest relevant questions and know that they could be answered in a variety of ways. Answer questions using straight forward scientific evidence.	Raise different types of scientific questions, and hypotheses.	Pose/select the most appropriate line of enquiry to investigate scientific questions.
Making predictions	Begin to say what might happen in an investigation.	Begin to make predictions.	Make predictions and begin to give a reason.	Make predictions and give a reason using simple scientific vocabulary.	Make predictions and give a reason using scientific vocabulary.	Make predictions and give a reason using scientific vocabulary. Base predictions on findings from previous investigations.
Making observations	Observe objects, materials and living things and describe what they see.	Observe something closely and describe changes over time.	Make decisions about what to observe during an investigation.	Make systematic and careful observations.	Plan and carry out comparative and fair tests, making systematic and careful observations.	Make their own decisions about which observations to make, using test results and observations to make predictions or set up further comparative or fair tests.
Equipment and measurements	Use simple, nonstandard equipment and measurements in a practical task.	Use simple equipment to take measurements, make observations and carry out simple tests.	Take accurate measurements using standard units.	Take accurate measurements using standard units and a range of equipment.	Take measurements using a range of scientific equipment with increasing accuracy and precision. Making repeat readings if appropriate.	Choose the most appropriate equipment to take measurements, explaining how to use it accurately. Decide how long to take measurements for,

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						checking results with additional readings.
Identifying and classifying	Sort and group objects, materials and living things, with help, according to simple observational features.	Decide, with help, how to group materials, living things and objects, noticing changes over time and beginning to see patterns.	Talk about criteria for grouping, sorting and categorising, beginning to see patterns and relationships.	Identify similarities/ differences /changes when talking about scientific processes. Use and begin to create simple keys.	Use and develop keys to identify, classify and describe living things and materials.	Identify and explain patterns seen in the natural environment.
Engaging in practical enquiry (investigating)	Follow instructions to complete a simple test individually or in a group.	Do things in the correct order when performing a simple test and begin to recognise when something is unfair.	Discuss enquiry methods and describe a fair test.	Make decisions about different enquiries, including recognising when a fair test is necessary and begin to identify variables.	Plan a range of science enquiries, including comparative and fair tests.	Select and plan the most suitable line of enquiry, explaining which variables need to be controlled and why, in a variety of comparative and fair tests.
Recording and reporting findings	Begin to record simple data. Talk about their findings and explain what they have found out.	Gather data, record and talk about their findings, in a range of ways, using simple scientific vocabulary.	Record their findings using scientific language and present in note form, diagrams, tables and charts.	Choose appropriate ways to record and present information, findings and conclusions (e.g., displays, oral or written explanations).	Record data and results of increasing complexity using scientific diagrams, labels, classification keys, tables, bar and line graphs and models.	Choose the most effective approach to record and report results, linking to mathematical knowledge.
Drawing conclusions	Explain, with help, what they think they have found out.	Use simple scientific language to explain what they have found out.	Draw, with help, a simple conclusion based on evidence from an enquiry or observation.	Use recorded data to make predictions, pose new questions and suggest improvements for further enquiries.	Use a simple mode of communication to justify their conclusions on a hypothesis. Begin to recognise how scientific ideas change over time.	Identify validity of conclusion and required improvement to methodology. Discuss how scientific ideas develop over time.
Analysing data **Evaluating and raising further**	Use every day or simple scientific language to ask and/or answer a question on given data.	Identify simple patterns and/or relationships using simple comparative language.	Gather, record and use data in a variety of ways to answer a simple question.	Identify, with help, changes, patterns, similarities and	Use relevant scientific language and illustrations to discuss,	Identify and explain causal relationships in data and identify evidence that supports

questions and predictions.				differences in data to help form conclusions. Use scientific evidence to support their findings.	communicate and justify their scientific ideas.	or refutes their findings, selecting fact from opinion.

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Key Concepts

KC1: Cause and Effect
KC1a: Recognise that one event leads to another and explain the process.
KC1b: Nature can behave in predictable ways.
KC1c: Identify and test cause and effect relationships to explain change.
KC1d: Cause and effect relationships may be used to predict phenomena in natural or designed systems.

KC2: Similarity and Difference
KC2a: Recognise similarities and differences between organisms and objects.
KC2b: Organisms can be grouped based on their features and properties.
KC2c: Organisms and objects have no connection.
KC2d: Variation happens over time in the natural world.
KC2e: Diversity in the natural world is essential for survival.

KC3: Change
KC3a: Changes in the natural world happen over a long period of time.
KC3b: Some things stay the same while other things change.
KC3c: Change is measured in terms of differences over time and may occur at different rates.
KC3d: Stability might be disturbed either by sudden events or gradual changes that accumulate over time.

KC4: Structures and Functions
KC4a: Objects and organisms have different uses and are designed based on their function(s)
KC4b: Explain how these structures and substructures serve functions.
KC4c: Objects or models, natural and designed structures/systems can be analysed to determine how they function.

KC5: Systems
KC5a: Objects and organisms can be described in terms of their parts.
KC5b: Systems in the natural and designed world have parts that work together.
KC5c: A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot.

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Foundation Stage

EYFS: **Light and Dark**	
Development Matters Objectives	Key Knowledge and vocabulary
3-4 Years ● Talk about what they see using a wide vocabulary ● Talk about the differences between materials and the changes they notice. Reception ● Explore the natural world around them.	<u>Key Concepts</u> KC4 <u>New Learning and Vocabulary</u> Know that light enables us to see Know that darkness is the absence of light Know that the following are natural sources of light - Sun, Fire, Lightning Know that the following are man-made sources of light - Lightbulb, television screen Know that a source is where the light begins or comes from. Electricity is used to power man-made light sources. Electricity can be stored in batteries to be used in a torch A long time ago people used candles to light their homes. Know that the sun is a ball of fire in the sky and provides us with our daylight and our heat. The sun's light shines on the moon and makes it look as if it is shining. The moon is not a source of light. Know that light travels in a straight line (demonstrate with a torch) Know that a shadow occurs when the light is blocked. <u>Vocabulary</u> bright, reflective, shadow, neon, dull <u>Learning through play</u> Making shadow puppets, exploring different sources of light, making paper lanterns, exploring different kinds of materials (reflective and non-reflective) building lighthouses, writing with highlighters on black paper & revealing with blue lights

EYFS: **Seasonal Changes**	
Development Matters Objectives	Key Knowledge and vocabulary
3-4 Years ● Talk about what they see using a wide vocabulary ● Understand the key features of a life cycle of a plant and animal. Reception ● Explore the natural world around them.	<u>Key Concepts</u> KC3 <u>New Learning and Vocabulary</u> **<u>Autumn</u>** Know that the months of September, October and November are in the season of autumn. Know that Autumn is one of the four seasons which comes after Summer and before Winter.

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• Describe what they see, hear and feel whilst outside. • Understand the effect of changing seasons on the natural world around them. ELG • Understand some important processes and changes in the natural world around them including the seasons.	Know that, in Autumn, the temperature cools down and the hours of daylight get shorter so it is darker earlier than in Summer. Know that many trees shed their leaves in Autumn and that the leaves change colour from green to brown or red or yellow Know that some trees don't lose their leaves at all as they keep them all year. Know that animals like squirrels begin to store food including nuts for Winter by burying them in the ground. Know that many animals hibernate during Autumn and Winter. Know that hibernate means to sleep through a long period of time. Know that the following animals hibernate- Fox, hedgehog, badger. Vocabulary autumn, conker, rustling, tumbling, crunchy **Winter** Know that there are four seasons - Autumn, Winter, Spring, Summer Know that Winter includes the months of December, January and February Know that in Winter the weather is usually cold and wet. When the temperature falls below 0 degrees Celsius then water freezes (turns solid) Know what a thermometer looks like and how you read one Know what ice feels like and observe it melting. Know that ice melts when the temperature rises. Vocabulary icicle, frozen, melting **Spring** Know that there are four seasons - Autumn, Winter, Spring, Summer Know that Spring includes the months of March, April, May Know that Spring is one of four seasons in a year. It's after winter and before summer. Know that in Spring, the Earth's axis is tilted toward the sun, increasing the number of daylight hours and bringing warmer weather. Understand what we mean by daylight hours. Know that many trees, flowers, plants and bulbs begin to grow during Spring. Know that they need water, light, warmth and soil to grow. Know that many animals have babies in early Spring. Know that in Spring the weather usually turns warmer. Know that leaves begin to grow on trees. Know that plants start to develop flowers. Know that young animals such as chicks and lambs are born. Know that a chick is a young bird, especially one which is newly hatched. Know that a lamb is a baby sheep Know that the first spring flowers are typically daffodils, dandelions and tulips.

	Vocabulary spring, catkin, daffodil **Summer** Know that there are four seasons - Autumn, Winter, Spring, Summer. Know that Summer includes June, July, August. Know that Summer is the hottest of the four temperate seasons, falling after spring and before autumn. Know that the temperature around the UK rises and there is usually less rain than at any other time of the year. Know that in the summer, there are more hours of daylight. This means it gets lighter earlier in the morning and the evenings are lighter until later. Know that Summer falls in different months of the year, depending on where you are in the world. Know that you can get sunburn if you don't protect your skin. Know that you should wear sun cream and a hat to protect you from the sun. Know that you wear different clothes like shorts, t-shirts and dresses in Summer. Know that the 6 weeks holiday are in the Summer months. Know that you might have a picnic, go swimming, go to the beach or go on holiday. Know that you will see sunflowers, lavender, daisies and green leaves. Know that you will see butterflies, bees and wasps Vocabulary temperature, sunrays, scorching, ultraviolet Learning through play Making leaf puppets, going on an Autumn walk, printing with leaves, exploring the different colours associated with each season. Making art from natural objects. Making trees throughout the seasons

EYFS: **Our bodies**	
Development Matters Objectives	Key Knowledge and vocabulary
Reception ● Know and talk about the different factors that support their overall health and wellbeing: - regular physical activity - healthy eating - toothbrushing ELG ● Manage their own basic hygiene and personal needs including dressing, going to the toilet and understanding the importance of healthy food choices.	Key Concepts KC4 New Learning and Vocabulary Know the parts of the body including head, shoulders, arms, legs, stomach, back, hands, fingers, feet, knee, toes, elbow, wrist, neck, chest, ankle, shin. Know the following facial features - face, nose, ears, forehead, eyes, cheeks, chin, mouth. Know the following internal organs - brain (where we think), lungs (fill up with air when we breathe), heart (pumps blood around our bodies). Know that our skeleton protects our internal organs. Know that our heart beats faster when we do exercise. Know that blood flows around our bodies.

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	Know that to survive our bodies need air (oxygen), water, food and shelter Know that we should eat a healthy diet Know how to keep our bodies clean- showering or bathing, washing our bodies/ hair, clean clothes Know that we need to clean our teeth twice a day Know that we should brush our teeth for 2 minutes Know that if we don't keep our teeth clean they could develop holes that would need fillings Vocabulary exercise, heart, pulse, healthy, unhealthy

EYFS: **Polar Regions**	
Development Matters Objectives	Key Knowledge and vocabulary
3- 4 Years ● Talk about what they see using a wide vocabulary ● Begin to understand the need to respect and care for the natural environment. ● Know that there are different countries in the world and talk about the differences they have experienced or seen in photos. Reception ● Recognise some environments that are different to the one in which they live. ● Understand the effect of changing seasons on the natural world around them. ● Recognises some similarities and differences between life in this country and life in other countries. ELG ● 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.	Key Concepts KC3 New Learning and Vocabulary Know that the world is split into 2 hemispheres. The two hemispheres are split by an imaginary line called the equator. The closer you are to the equator, the hotter the temperature The further away you are to the equator the colder the temperature Know that the Polar regions are the furthest away from the Equator Know that this means they are very cold and covered in ice for most if not all of the year Know that these animals live in the Arctic- Arctic fox, Polar Bear, Arctic Hare, Walrus Know that these animals live in the Antarctic- Penguins, Leopard seal, Blue Whale, Orca whale Know that you would have to wear protective clothing in such a cold climate Know that the Inuit are an indigenous people of the Arctic Know that in the past Innuit lived in Igloos in winter Know that igloo is a house made from blocks of snow and ice Vocabulary icicle, polar, igloo, Inuits, husky Learning through play Exploring globes and non-fiction texts, arctic animal small worlds, building with "ice" blocks (blocks wrapped in white paper), exploring colours linked to the different climates-cold colours. Packing a suitcase with suitable clothes

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EYFS: **Safari**	
Development Matters Objectives	Key Knowledge and vocabulary
3- 4 Years ● Talk about what they see using a wide vocabulary ● Begin to understand the need to respect and care for the natural environment. ● Know that there are different countries in the world and talk about the differences they have experienced or seen in photos. Reception ● Recognise some environments that are different to the one in which they live. ● Understand the effect of changing seasons on the natural world around them. ● Recognises some similarities and differences between life in this country and life in other countries. ELG ● 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.	<u>Key Concepts</u> KC3 <u>New Learning and Vocabulary</u> Know that the world is split into 2 hemispheres. The two hemispheres are split by an imaginary line called the equator. The closer you are to the equator, the hotter the temperature The further away you are to the equator the colder the temperature To know that Africa sits on the equator so parts of it are very hot To know the following animals, live in the wild in Africa- Elephant, giraffe, Know that homes in some parts of Africa may look different to the houses we live in Know that traditional African clothes often have bright, bold patterns <u>Vocabulary</u> savannah, plain, safari, desert, humid <u>Learning through play</u> Exploring globes and non-fiction texts, safari animal small world, exploring colours linked to the different climates-warm colours, explorers role play. Packing a suitcase with suitable clothes

EYFS: **How have I changed since I was a baby?**	
Development Matters Objectives	Key Knowledge and vocabulary
3-4 Years ● Begin to make sense of their own life story and family history. ELG	<u>Key Concepts</u> KC3 <u>New Learning and Vocabulary</u> Know that I have changed since I was born Know that when I was a born I was a baby

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● Know some similarities and differences between things in the past and now, drawing on their experiences and what has been read in class.	Know that when babies are born they cannot speak or walk and drink milk Know that babies need lots of care and looking after Know what they looked like as a baby Know some things they can do now that I couldn't do when I was born- walk, run, skip, jump etc Know that we are a baby first, then a toddler, then a child, then a teenager and then an adult Know who my family members are from the past and present and be able to talk about them by looking at photographs Know that the future is time to come Know about past and present events in their own lives and the lives of family members <u>Vocabulary</u> teenager, toddler, adult, baby, child

EYFS: **Healthy Eating**	
Development Matters Objectives	Key Knowledge and vocabulary
Reception ● Know and talk about the different factors that support their overall health and wellbeing: - regular physical activity - healthy eating - toothbrushing ELG ● Manage their own basic hygiene and personal needs including dressing, going to the toilet and understanding the importance of healthy food choices.	<u>Key Concepts</u> KC4 <u>New Learning and Vocabulary</u> Know that healthy foods can help to give our bodies the vitamins and nutrients it needs Know that in order to be healthy our bodies needs a balanced diet Know that a balanced diet means eating lots of different food- some we need more of than others Know that some foods- fruits and vegetables- should be eaten 5 times a day Know the names of some foods that are healthy Know that other foods should only be eaten as a treat- sugary foods Know that surgery foods are not good for our teeth Know that different foods are from different food groups Know the following food groups- fruits, vegetables, dairy, fats, sugary food, carbohydrates and some food that are in them. <u>Vocabulary</u> healthy, unhealthy, fat, vegetable, sugar

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Year 1

Year 1 Autumn Term - Materials	
National Curriculum Objectives	Key Knowledge and vocabulary
● 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. **Big Questions:** 1. What materials are used to make things around us? 2. Can you group materials based on their properties? 3. Can you tell if a material is bendy or rigid? 4. What properties should the material of a raincoat have? 5. What material would be best to make Pippin and her owner's raincoats? 6. What have we learnt about the properties of materials?	Key Concepts KC4 New Learning Know from observation how to distinguish between materials made of wood, plastic, glass, metal, rock. Know that an object is made from/of a material. Know that materials can be hard, soft, strong, weak, absorbent, heavy, light, solid, smooth and rough; these descriptions denote the properties of a material. Know that matter (stuff) is made from tiny building blocks. Vocabulary Tier 2: wood, glass, plastic, metal, rock Tier 3: material, physical properties

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Year 1 Autumn & Summer Term - Seasons	
National Curriculum Objectives	Key Knowledge and vocabulary
• Observe changes across the four seasons. • Observe and describe weather associated with the seasons and how day length varies. **Big Questions:** 1. Which months are in each season? 2. What happens to the length of the day in each season? 3. How does the weather change during the seasons? 4. What do animals do in each season? 5. How do deciduous trees change in each season? How do some trees change in each season? 6. What changes do we see during the seasons?	Key Concepts KC3 New Learning Know that days are longer in the summer and shorter in winter. Know that weather changes through the year, getting hotter in the summer and colder in the winter. Know that the winter is likely to bring ice on the ground when water freezes due to the cold. Know that the Earth orbits the Sun with one orbit constituting a year of 365/366 days. Vocabulary Tier 2: rainy, sunny, cloudy, snowy, windy, stormy, day, night Tier 3: season, winter, spring, summer, autumn, winter, weather, changes, thermometer, orbit.

Year 1 Spring Term - Plants	
National Curriculum Objectives	Key Knowledge and vocabulary
• 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. **Big Questions:** 1. What conditions do plants need to grow? What do plants need to grow? 2. What are the main parts of a plant?	Key Concepts KC4 New Learning Know a rose bush, a sunflower and a dandelion by sight. Know an oak tree, a birch tree and a horse chestnut tree by sight. Know that evergreen trees maintain their leaves throughout the year and that deciduous trees shed their leaves in autumn. Know that a flowering plant consists of roots, stem, leaves and flowers, and that a tree's stem is called a trunk. Vocabulary Tier 2: tree, wild plant, garden plant, fruit Tier 3: deciduous, evergreen, grow, bark, branches, seed, leaf, leaves, roots

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3. Can you identify and name common garden plants? Can you name garden plants? 4. Can you identify and name common wild plants? Can you name wild plants? 5. Can you identify and name common trees? Can you name trees? 6. Can you identify and label different plants and trees? Can you name and label plants and trees?	

Year 1 Summer Term – Animals, including humans	
National Curriculum Objectives	Key Knowledge and vocabulary
● Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. ● Identify and name a variety of common animals that are carnivores, herbivores and omnivores. ● Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). ● Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. **Big Questions:** 1. Can you name and group common animals? 2. What is the difference between a vertebrate and an invertebrate? 3. What do animals eat?	Key Concepts KC2 & KC3 New Learning Know examples of a fish, amphibian, reptile, bird and mammal. Know what herbivorous, carnivorous and omnivorous mean. Know animals that are carnivores or herbivores and that many humans are examples of omnivores. Know that fish, amphibians, reptiles, birds and mammals are vertebrates, which means they are animals that have a backbone Know that fish are different in having gills so that they can breathe underwater **and** scaly skin Know that amphibians are different in that they begin their lives with gills but then develop lungs and breath on land Know that reptiles are different in that they breath air **and** have scaly skin Know that birds are different to other animals in that they have feathers and wings Know that mammals are different to other animals in that they have fur/hair **and** they feed milk to their young Know and identify feet, legs, arms, hands, torso, head, skin, ears, eyes, nose, mouth and tongue are part of the body Know that eyes are associated with sight, ears with sound, nose with smell, tongue with taste and skin with touch. Vocabulary Tier 2: fish, birds, human body, sight, touch, taste, smell, hear, meat eater, plant eater Tier 3: amphibians, reptiles, mammals, carnivores, herbivores, omnivores, reptiles, senses

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4. What are the parts of our body and senses? 5. What body parts do different animals have? 6. Can you write a fact file about an animal?	

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Year 2

Year 2 Autumn Term - Animals, including humans	
National Curriculum Objectives	Key Knowledge and vocabulary
● Describe the importance for humans of exercise, eating the right amounts of different types of food and hygiene. ● Describe the basic needs of animals, including humans, for survival (water, food and air). **Big Questions:** **Healthy Food** 1. Where should food be stored? Where do I keep my food? 2. How does food keep me healthy? 3. What counts as my 5 a day? 4. What do I know about keeping healthy? **Hygiene** 1. Why is exercise important for humans? Why do I need exercise? 2. Which foods are best for me to keep healthy? Which foods are best for me? 3. How do germs make us ill? 4. What is good hygiene? How do I keep clean? 5. How can we keep our bodies healthy?	Key Concepts KC1 New Learning Know the basic food groups: fruits and vegetables, carbohydrates, protein, dairy, fat and sugary foods Know that more than half of our diet should be made up of carbohydrates, fruit and vegetables Know that fats and sugary foods should be eaten rarely and in small amounts Know that people need to exercise often to help their body stay strong and fit Know that keeping clean, including washing and brushing teeth, is an important part of staying healthy Vocabulary Tier 2: children, adults, workout, being clean, eating the right amount Tier 3: balanced diet, survival, diet, hygiene, offspring

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Year 2 Spring Term - Materials

These objectives were met before in Year 1.

National Curriculum Objectives	Key Knowledge and vocabulary
• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. • Describe how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. **Big Questions:** 1. What are objects made from?What are things made from? 2. What are the properties of materials? What do materials feel and look like? 3. What materials would be best for a toy boat? 4. How do I make a boat to carry a bear? 5. Did my boat keep the bear dry? 6. What do I know about materials?	Key Concepts KC2 & KC3 Revision **Materials (Year 1)** • 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. New Learning Know that materials can have useful properties for a given job (including being waterproof, strong, hard, soft, flexible, rigid, light or heavy). Know that many types of materials are waterproof, strong, hard, cotton wool, flexible, rigid, light or heavy. Know that a toy boat would need to be waterproof and float and that some materials would be better than others for this purpose. Vocabulary Tier 2: wood, metal, glass, plastic, brick, rock, paper, cardboard Tier 3: suitability, squash, bend, twist, stretch, absorbent, waterproof

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Year 2 Summer Term – Living things and their habitats

National Curriculum Objectives	Key Knowledge and vocabulary
• 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. **Big Questions:** 1. What living things can we find around us? What living things can we find around us? 2. How can I identify if something is alive? How do I know that something is alive? 3. Are you alive? How do you know? 4. How do I know a dog is a living thing?	Key Concepts KC2 & KC4 New Learning Know that living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things. Know that animals and plants have adapted to their environment. Know that plants absorb energy from the Sun; that this energy is consumed by herbivorous animals; and that carnivorous animals eat other animals. Know that the arrows on a food chain show the direction that the energy travels. Vocabulary Tier 2: living, dead, never alive, alive, food, hot, warm, cold, dry, damp, wet, bright, shade, dark Tier 3: habitat, micro-habitat, food chain, shelter, seashore, woodland, ocean, rainforest, conditions, desert

5. What is the difference between something living and nonliving? What can a real dog do that a toy cannot?	

Year 2 Summer Term – Animals, including humans	
National Curriculum Objectives	Key Knowledge and vocabulary
• Understand that animals, including humans, have offspring which grow into adults. **Big Questions:** 1. How do animals change as they grow? 2. How do humans change as they grow? 3. What are the basic needs to keep humans and animals alive? What do humans and animals need to stay alive? 4. How can I make a minibeast habitat suitable to keep it alive? How can I make a minibeast home to keep it alive? 5. Why is the ladybird home suitable for a ladybird? Why is the ladybird home good for a ladybird? 6. What do I know about animals including humans?	Key Concepts KC3 New Learning Know that animals, including humans, need food, water and air to survive. Know that animals, including humans, have offspring which grow into adults. Vocabulary Tier 2: Children, adults, workout, being clean, eating the right amount of food Tier 3: offspring, survival, exercise, hygiene, diet

The Big Ideas for Science

Year 2 Summer Term - Plants	
These objectives were met before in Year 1.	
National Curriculum Objectives	Key Knowledge and vocabulary
• 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 **Big Questions:** 1. How can I look closely at plants and trees and record what I see? 2. What are seeds and bulbs? 3. What is the life cycle of a plant? 4. What do plants need to survive? What do plants need to live? 5. Which plants do we eat? 6. How can I compare how different plants grow?	Key Concepts KC4 Revision **Plants (Year 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. New Learning Know that seeds and bulbs need to be buried underground in soil and that they will grow into adult plants under the right conditions (water, warmth) Know that plants that are deprived of light, food or air will not grow and will die. Know that plants and animals produce offspring that grow into adults. Vocabulary Tier 2: mature, water, light, grow Tier 3: seeds, bulbs, temperature, roots, stem, leaf, flower, grain, nutrition, fruit, germinate, life cycle, life process

The Big Ideas for Science

Year 3

Year 3 Autumn Term - Rocks	
National Curriculum Objectives	Key Knowledge and vocabulary
• 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. **Big Questions:** 1. Can you identify different types of rocks? 2. What are the basic physical properties of different types of rocks and how do these rocks form the earth's crust? What do different rocks look like and how are they made? 3. What is soil? 4. Which soil is best? 5. How are fossils formed? 6. What's so amazing about rocks?	Key Concepts KC2 & KC3 New Learning Know that there are three kinds of rocks: igneous, sedimentary and metamorphic. Know that the Earth has a solid crust made up of tectonic plates with molten rock beneath. Know that granite and basalt are types of igneous rock and that igneous rocks form from molten rock below the Earth's crust. Know that limestone and sandstone are types of sedimentary rock which form when small, weathered fragments of rock or shell settle and stick together, often in layers. Know that marble and slate are types of metamorphic rock which form when rocks in Earth's crust get squashed and heated in processes such as when tectonic plates press against each other. Know that fossils form when a plant or animal dies and is quickly covered with silt or mud so that it cannot be rotted by microbes or eaten by scavenging animals; in time layers of sediment build, squashing the mud and turning it to stone around the dead plant or animal; the materials in the body are replaced by minerals that flow in water through the rock, leaving a rock in the shape of the animal or plant that was once there. Know that soil is made from tiny particles of rock broken down by the action of weather (weathering). Vocabulary Tier 2: rocks, soil, formed Tier 3: igneous, sedimentary, metamorphic, anthropic, permeable, impermeable, chemical fossil, body fossils, trace fossils, cast fossil, mould fossil, replacement fossil, organic matter, topsoil, subsoil, base rock

The Big Ideas for Science

Year 3 Autumn Term – Animals, including humans	
These objectives were met before in Year 2.	
National Curriculum Objectives	Key Knowledge and vocabulary
• 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. **Big Questions:** 1. How could we group animals by what they eat? 2. Why is it important that animals (including humans) eat the right types and amounts of nutrition? Why do animals (including humans) need a varied nutrition (different foods)? 3. Do all animals have the same types of skeletons? 4. Why do we need a skeleton? 5. How do muscles and bones help us to move? 6. How do animals (including humans) live and move?	Key Concepts KC4 Revision **Animals, including humans (Year 2)** ● Understand that animals, including humans, have offspring which grow into adults. ● 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. New Learning Know that proteins are good for growth, carbohydrates for energy and fruit and vegetables provide vitamins and minerals which help keep us healthy (e.g. calcium for healthy bones and teeth). Know that getting the right amount of each food group (including over half of the diet made up of fruit, vegetables and carbohydrates) is called a balanced diet. Know that lack of a nutrient can cause ill health; for example, a lack of vitamin D leads to a disease called rickets. Know that excess of a food group can cause ill health, such as tooth decay due to excess sugar **NB – some food groups are difficult to afford for some families so sensitivity is required in teaching this area.** Know that excess fat from fatty foods can cause obesity Know that animals, including humans, have a skeleton made up of solid objects. Know that some animals (such as insects) have an exoskeleton. Know that many invertebrates (such as earthworms and slugs) have water held inside by muscles which act like a skeleton. Know that skeletons provide support for muscles and protect the body. Know that human skeletons are made up of bones and cartilage. Know that muscles can only contract, so they must be arranged in pairs in the body so that as one contracts the other loosens. Vocabulary Tier 2: food, carbohydrates, meat, fruit and vegetables, fish, starchy, food, dairy, protein, fats, sugar, bones, vitamins, minerals Tier 3: nutrition, balanced diet, skeleton, muscles

The Big Ideas for Science

Year 3 Spring Term - Forces and Magnets	
National Curriculum Objectives	Key Knowledge and vocabulary
• 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. **Big Questions:** 1. How do we make objects move? 2. How will the surface affect the performance of a moving object? How does an object move on different surfaces? 3. Can objects be moved without a push or a pull? 4. Are all materials magnetic?	Key Concepts KC1 New Learning Know that a force can be thought of as a push or a pull. Know that there are three types of contact force: impact forces, frictional forces and strain forces. Know that objects move differently on rough and smooth surfaces; objects resist movement more on rough surfaces because there is higher friction as the object moves. Know that there are also non-contact forces that can act between objects without them touching and that magnetism is an example of a non-contact force. Know that magnets have two poles called north and south Know that like poles (south-south and north-north) of two magnets repel each other and that opposite poles of two magnets (north-south) attract each other. Know that there is a magnetic field around a magnet which is strongest at each pole. Know that some materials are magnetic while other materials are non-magnetic Vocabulary Tier 2: push, pull. surface, magnet, attract Tier 3: force, friction, magnetic field, pole, north, south, repel, attract, compass

5. How can we test the strengths of magnets? How strong are magnets?	

Year 3 Spring Term - Plants	
These objectives were met before in Year 2.	
National Curriculum Objectives	Key Knowledge and vocabulary
• Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. • Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. • Investigate the way in which water is transported within plants. • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. **Big Questions:** 1. What do the different parts of a plant do? 2. How does water get transported through a plant? How does water travel through a plant? 3. What is photosynthesis? How do leaves make food? 4. What is the life cycle of a plant? 5. How do plants reproduce? 6. What do I know about plants?	Key Concepts KC1 & KC3 Revision **Plants (Year 2)** • 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. New Learning Know that different parts of plants have one or more functions. Know that the roots collect water and minerals from the soil, and hold the plant firmly in the ground. Know that the stem holds up the leaves so that they can gather light to make food and holds up the flowers so that they can receive pollen and disperse their fruits; know that the stem also transports water and minerals from the roots to the other parts of the plant. Know that the leaves make food by trapping light and using its energy to turn carbon dioxide and water into carbohydrates. Know that the function of a flower is reproduction. Vocabulary Tier 2: trunk, leaves, flowers, life, growth, soil, transported, roots, stem, nutrients, life cycle Tier 3: pollination, seed formation, seed dispersal, petal, pollen, fertilisation, germination, ovary, ovule, sepal, stamen, anther, filament, stigma, style

The Big Ideas for Science

Year 3 Summer Term - Light	
National Curriculum Objectives	Key Knowledge and vocabulary
• Recognise that he/she needs 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 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 changes. **Big Questions:** 1. What is light? 2. How do we see? 3. How does light reflect from different surfaces? How does light reflect? 4. How do we protect our eyes? How can we keep our eyes safe? 5. How are shadows formed? How are shadows made? 6. How do shadows change	Key Concepts KC1 New Learning Know that light is a form of energy. Know that we need light to see things and that darkness is the absence of light. Know that light travels in straight lines. Know that light is reflected when it travels from a light source and then 'bounces' off an object. Know that everything that we can see is either a light source or something that is reflecting light from a light source into our eyes. Know that the Sun is a light source, but that the Moon is not and is merely reflecting light from the Sun. Know that many light sources give off light and heat. Know that filaments in traditional bulbs heat up until they glow, giving off light and heat. Know that fluorescent bulbs glow when electricity adds energy to a gas within the bulb. Know that sunglasses can protect eyes from sunlight but looking at the Sun directly – even with sunglasses – can damage the eyes. Know that opaque objects block light creating shadows and that light passes through transparent objects. Know that opacity/transparency and reflectiveness are properties of a material. Know that as objects move towards a light source, the size of the shadow increases. Know how to show the changing of shadow size by drawing a diagram with straight lines representing light. Vocabulary Tier 2: light, dark, bounce, mirror, ray, sun, travel, straight, block Tier 3: source, reflect, beam, visible, glare, pupil, retina, opaque, translucent, transparent, shadow

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Year 4

Year 4 Autumn Term - Sound	
National Curriculum Objectives	Key Knowledge and vocabulary
• Identify how sounds are made, associating some of them with something vibrating. • Recognise that vibrations from sound 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. **Big Questions:** 1. How are sounds made? 2. Why does sound change in volume? 3. What happens to sounds when they travel a distance? 4. What changes the pitch of a sound? 5. How do we hear?	Key Concepts KC1 New Learning Know that sound is generated when an object vibrates; some of the energy from the vibrating object is transferred to the air, making the air particles move. Know that sound is a form of energy that transfers in a longitudinal wave - like that seen in a slinky - *not* a transverse wave - like that seen in water ripples. Know that sound travels through a medium (e.g. particles in the air) and thus sound does not travel through a vacuum which has no particles in it at all. Know that longitudinal sound waves are detected in the ear by humans and that the brain interprets this as the sounds we hear. Know that sound travels at different speeds through different objects; it travels at around 340 metres per second in air, much slower than light travels. Know that pitch is how high or low a sound is and that this is determined by how many vibrations per second are being made by the vibrating object; the number of vibrations per second is called frequency. Know that volume is how loud or quiet a sound is and that this is determined by the amount of energy in the wave. Know that the volume of a sound is quieter if the listener is further away from the object. Vocabulary Tier 2: sound, volume, loud, quiet, ear, distance, instruments Tier 3: amplitude, travel, waves, particles, high pitch, low pitch, pitch, energy, vibrate, absorb, soundproof

The Big Ideas for Science

Year 4 Autumn Term - States of Matter	
National Curriculum Objectives	Key Knowledge and vocabulary
• Compare and group materials together, according to whether they are solids, liquids or gases. • Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. **Big Questions:** 1. How is energy transferred up the food chain? What is a food chain? 2. Why do humans have different types of teeth? What teeth do humans have and what do they do? 3. What happens in our bodies to the food we eat?	Key Concepts KC3 New Learning Know that things are composed of a material in one of three states of matter: solid, liquid or gas. Know that things are made of particles and that these are organised differently in different states. Know that materials can change state when temperature changes. Know that there are bonds between the particles in a solid. Know that when solids turn into liquids, this is called melting and that the reverse process is called freezing. Know that when liquids turn into gases, this is called evaporation and that the reverse process is called condensation. Know that when solids turn into a gas without passing through the liquid state, this is called sublimation. Know that the melting point of water is 0° C and that the boiling point of water is 100° C. Know that water flows around our world in a continuous process called the water cycle. Know that, along with evaporation, water on the Earth's surface moves to the air in a process called transpiration in which water turns into water vapour (gas) on the surface of leaves on plants. Know that rain condenses in clouds and falls to earth as rain, snow or hail in a process called precipitation. Know that water flows across the land in rivers and streams in a process called surface run-off and under the ground as groundwater. Vocabulary Tier 2: solid, liquid, gas, heated, cooled, temperature Tier 3: changing state, evaporate, condensation, water cycle, the rate of evaporation, particles, Celsius

Year 4 Spring Term – Animals, including humans	
National Curriculum Objectives	Key Knowledge and vocabulary
• 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.	Key Concepts KC4 & KC5 New Learning Know that food passes through the body with the nutrients being extracted and the waste products excreted, and that this process is called digestion. Know that the process of digestion begins with food being chewed in the mouth by the teeth and saliva added. Know that a human has three types of teeth – incisors, canines and molars – and that these each perform different functions.

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• Construct and interpret a variety of food chains, identifying producers, predators and prey. **Big Questions:** 1. How is energy transferred up the food chain? What is a food chain? 2. Why do humans have different types of teeth? What teeth do humans have and what do they do? 3. What happens in our bodies to the food we eat?	Know that incisors slice food, canines tear food (especially meat) and that molars grind food. Know that children develop an initial set of teeth which are gradually replaced between the ages of 6 and 12. Know that a food chain traces the path of energy through a habitat. Know that all energy for a food chain initially comes from the Sun which is absorbed and turned into energy by plants which are called producers. Know that consumers take in energy by eating. Know that an animal that is eaten by another is called prey, and that an animal that eats other animals is called a predator. Know that the first consumer in a food chain is called a primary consumer, the second is called a secondary consumer and above it is called a tertiary consumer. Know that the arrows in a food chain show the direction that energy is travelling through a habitat. Vocabulary Tier 2: tongue, stomach, pancreas, liver, gallbladder, anus, small intestine, large intestine, rectum, oesophagus Tier 3: digestive system, food chain, producers, prey, predator

Year 4 Spring Term - Electricity	
National Curriculum Objectives	Key Knowledge and vocabulary
• Identify common appliances that run on electricity. • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. • Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. • Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp light in a simple series circuit. • Recognise some common conductors and insulators, and associate metals with being good conductors.	Key Concepts KC5 New Learning Know that electrical energy is one of many forms of energy. Know that current electricity is the flow of charged particles called electrons around a circuit. Know that electrical current flows well through some materials, called electrical conductors, and poorly through other materials, called electrical insulators. Know that conductors have free electrons and that when electrical current flows around a conductor the electrons move. Know that electrical conductivity (how well a material conducts electricity) is an example of a property. Know that metals are good electrical conductors. Know that more than one cell lined up to work together is called a battery. Know that electrical current can flow if there is a complete circuit. Know that when electrical current flows through a circuit component within that circuit – such as buzzers which make a noise and bulbs which emit light – begin to work. Know that a switch functions by completing or breaking a complete circuit. Know how to construct a simple circuit using components. Know that exposure to high levels of electrical current can be dangerous. Vocabulary Tier 2: motor, buzzer, switch, electricity, appliances, mains, wires, bulbs, crocodile clips, bulb holder, cell, cell holder

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Big Questions: 1. What common appliances run on electricity? What electrical items do we use? 2. Can you construct an electrical circuit? 3. How does a switch work? 4. What materials conduct electricity? 5. Why are insulators important in a circuit?	Tier 3: neutron, electron, proton, nucleus, atom, current, conductor, insulator

Year 4 Summer Term - Living things and their habitats	
These objectives were met before in Year 2.	
National Curriculum Objectives	Key Knowledge and vocabulary
• Recognise that living things can be grouped in a variety of ways. • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. • Recognise that environments can change and that this can sometimes pose dangers and have an impact on living things. **Big Questions:** 1. How are living things grouped? 2. How do you identify vertebrates and invertebrates? 3. What is living in your local habitat? 4. How do you use classification keys?	Key Concepts KC3 Revision **Living things and their habitats (Year 2)** ● 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. New Learning Know that animals can be grouped based on their physical characteristics and based on their behaviour. Know that living things are divided into kingdoms: the animal kingdom, plants, fungi, bacteria, and single-celled organisms. Know that a species is a group of living things that have many similarities that can reproduce together and produce offspring. Know how to use a classification key to identify living things. Know how to create a classification key to sort plants on the school premises. Know that changes to the environment can make it more difficult for animals to survive and reproduce; in extreme cases this leads to extinction. Know that human activity can change the environment for many living things, endangering their existence.

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5. How have changes in the environment impacted upon habitats? 6. What do I know about living things and their habitats?	Vocabulary Tier 2: bird, habitat, key, environment, global, local Tier 3: organism, variation, classification, vertebrates, invertebrates, reptile, mammal, amphibian, characteristic, wildlife, endangered, conservation, extinct

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Year 5

Year 5 Autumn Term - Materials	
These objectives were met before in Year 2, Year 3 and Year 4.	
National Curriculum Objectives	Key Knowledge and vocabulary
• 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. • Recognise that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. • Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. • Demonstrate that dissolving, mixing and changes of state are reversible changes. • Explain that some changes result in the formation of new materials and that this kind of change is not usually reversible, including changes associated with burning	<u>Key Concepts</u> KC2 & KC3 <u>Revision</u> **Materials (Year 2)** • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. • Describe how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. **Forces and Magnets (Year 3)** • 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. **States of Matter (Year 4)** • Compare and group materials together, according to whether they are solids, liquids or gases. • Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. **Electricity (Year 4)** • Recognise some common conductors and insulators, and associate metals with being good conductors. <u>New Learning</u> Know that materials can be sorted in a variety of ways based on their properties. Know that in some solid materials the bonds between particles break when surrounded by a liquid; this allows the liquid to absorb the solid; when this happens, the solid is called a solute, the liquid is called a solvent and the result is a solution; when a solid does dissolve in a liquid it is described as being soluble in that solvent; when it cannot it is insoluble. Know that a reversible change is one that can be reversed. Know that an irreversible change is one that cannot be reversed. Know that filtering allows solids and liquids to be separated and that sieving allows solids made up of different sizes parts to be separated.

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and the action of acid on bicarbonate of soda. **Big Questions:** 1. What is a solid, liquid and a gas? 2. What is soluble? 3. How do I separate George's marvellous medicine? 4. What is a reversible change? 5. How do I get salt from brine? 6. What is an irreversible change? 7. What are the properties of a material?	Know how to separate a mixture of sand, salt and small stones by sieving, followed by dissolving in water, followed by filtering to remove the sand from the mixture, followed finally by evaporation of the water to recover the salt. Know that materials' different properties can be tested. Vocabulary Tier 2: hardness, magnetic, mixing Tier 3: solubility, transparency, conductivity, filtering, sieving, evaporating, reversible, irreversible, substance

Year 5 Spring Term - Earth and Space	
National Curriculum Objectives	Key Knowledge and vocabulary
• 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. **Big Questions:** 1. What is in our solar system? 2. How do we know that the Earth, sun and moon are spherical bodies?	Key Concepts KC1 & KC5 New Learning Know that the universe comprises all matter and space in existence. Know that a star is an exceptionally hot ball of gas, originally made from hydrogen and helium. Know that the Sun is a star. Know that it was once thought that everything orbited the Earth, but that scientists like Copernicus and Galileo used telescopes and measurement to show that the Earth orbited the Sun. Know that there are eight major planets in our solar system. Know that the universe is utterly vast and that our solar system makes up a tiny fraction of the universe. Know that a satellite orbits a planet and that moons are natural satellites. Know that the Moon orbits the Earth roughly every 28 days. Know that as the Moon orbits the Sun, different parts of it are lit up by the Sun, which is why we see a different shape lit up on the Moon as the lunar cycle progresses. Know that all the planets in the solar system orbit the Sun and that the further away they are from the Sun, the longer their orbit, Know that the Earth spins around an imaginary line through its centre called an axis and that this axis is tilted relative to the Earth's orbit. Know that night and day are the result of the Earth rotating on its axis. Know that the tilt of the Earth towards and away from the Sun's light as the Earth orbits the Sun leads to the seasons as during winter the light is spread over a wider area.

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3. How do the spherical bodies move in relation to each other? How do the planets orbit the sun? 4. How does the moon move relative to the Earth? How does the moon orbit? 5. How does the Earth's rotation affect night and day?	Know that a solar eclipse occurs when the Moon is between the Sun and the Earth, casting a shadow on the Earth; a lunar eclipse occurs when the Earth is between the Sun and the Moon, casting a shadow on the Moon. Vocabulary Tier 2: earth, sun, moon, planets, stars, day, night Tier 3: solar system, mercury, mars, Venus, Jupiter, Saturn, Uranus, Neptune, Pluto, orbit, rotate, axis, heliocentric, geocentric, spherical

Year 5 Spring Term - Forces and magnets	
These objectives were met before in Year 3.	
National Curriculum Objectives	Key Knowledge and vocabulary
• Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. • Identify the effects of air resistance, water resistance and friction that act between moving surfaces. • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. **Big Questions:** 1. What is gravity? Why do things fall down? 2. When do we get air resistance? What makes things slow down when they fall? 3. How does a lever work? What is a lever? 4. Why are gears used? Why do we need gears?	Key Concepts KC1 Revision **Forces and magnets (Year 3)** • Compare how things move on different surfaces. • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. New Learning Know that a force is measured in a unit called Newtons, named after a British scientist called Sir Isaac Newton who discovered lots about gravity and how planets move. Know that pull forces can be measured using a device called a force meter. Know that the amount of matter in an object is its mass. Know that gravity is a force that acts between all objects in the universe, but that it acts much more strongly between objects that have more mass and that are close together. Know that unsupported objects are pulled towards the Earth by the force of gravity. Know that air resistance is a force felt by an object as it moves through the air. Know that a falling object will accelerate until its air resistance matches the gravitational force pulling it down; at this point, the object will continue to move at this speed (called its terminal velocity) without getting any quicker or slowing down. Know that a parachute's shape increases the air resistance that a falling object experiences. Know that water resistance is a force felt by an object as it moves through water. Know that the shape of an object determines how much air resistance or water resistance it experiences. Know that a lever is a rigid length pivoting around a fulcrum. Know that gears and levers are simple machines that used to allow a smaller force to have a greater effect. Vocabulary

5. What is water resistance? What makes things slow down in water?	Tier 2: force, push, pull, brake Tier 3: opposing, gravity, air resistance, water resistance, friction, streamline, gear, mechanism, leaver, cog

Year 5 Summer Term – Animals, including humans	
These objectives were met before in Year 2.	
National Curriculum Objectives	Key Knowledge and vocabulary
● Describe the changes as humans develop to old age. **Big Questions:** 1. What is gestation? How does a baby grow before it is born? 2. How do I develop? How do I change as I grow? 3. What is puberty? What happens when we get old? 4. What happens when we get old? What does the human life cycle look like? 5. How does our human life cycle compare with other creatures?	Key Concepts KC3 Revision **Animals, including humans (Year 2)** ● Understand that animals, including humans, have offspring which grow into adults. New Learning Know that humans go through stages of development; they begin as fertilised eggs and then develop into embryos before developing into babies; once they are born, these newborn babies become infants (roughly 2 months to 2 years) then into young children (roughly 2-12 years old); children develop into adults during adolescence (roughly 12-16 years old) at which age they become physically capable of reproduction; as adults develop into old age (roughly 55+ years old) they experience changes in their body which require them to move more carefully and rest more frequently. Vocabulary Tier 2: puberty, growth, toddler, baby, child, young adult, adult Tier 3: humans develop to old age

Year 5 Summer Term - Living things and their habitats	
These objectives were met before in Year 3.	
National Curriculum Objectives	Key Knowledge and vocabulary
● Describe the differences in the life cycles of a mammal, amphibian, an insect and a bird. ● Describe the life process of reproduction in some plants and animals. **Big Questions:**	Key Concepts KC2 & KC5 Revision **Plants (Year 3)** ● Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. New Learning Know that the life cycle of a living thing is a series of stages of development starting with a fertilised egg in animals.

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1. How do flowering plants reproduce? 2. What is sexual and asexual reproduction in plants? 3. What is metamorphosis? 4. How do mammals and birds reproduce? 5. Do mammals lay eggs?	Know that in most mammals a fertilised egg develops in the womb into an embryo and is then born and fed on milk before it is weaned onto the food that is adapted to eat; it then develops to maturity in a period called adolescence after which it can reproduce and the cycle can begin again. Know that in amphibians a fertilised egg develops into an embryo and then hatches into a tadpole; the tadpole develops adult characteristics, metamorphoses into the adult form after which it can reproduce and the cycle can begin again. Know that in many insects a fertilised egg develops into wingless feeding form called a larva; the larva feeds then later become a pupa with a protective cocoon; inside this cocoon, the pupa metamorphoses into the adult butterfly after which it can reproduce and the cycle can begin again. Know that in birds a fertilised egg hatches in a nest and is fed by its parents until it is ready to fly; it then leaves the nest and grows into an adult after which it can reproduce and the cycle can begin again. <u>Vocabulary</u> <u>Tier 2:</u> male, female, pregnancy, mammal, reptile, amphibian, insect, bird, plant <u>Tier 3:</u> sexual, asexual, fertilisation, cell, reproduction, pollination, gestation, metamorphosis, egg, embryo

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Year 6

<table>
<tr><th colspan="2">Year 6 Autumn Term - Light</th></tr>
<tr><td colspan="2">These objectives were met before in Year 3.</td></tr>
<tr><td>National Curriculum Objectives</td><td>Key Knowledge and vocabulary</td></tr>
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Recognise that light appears to travel in straight lines.
Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye.
Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.
Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

<u>Big Questions:</u>

How does light travel? How does light move?
How and why are shadows distorted? Why do shadows change?

</td><td>
<u>Key Concepts</u>
KC1
<u>Revision</u>
Light (Year 3)

Recognise that he/she needs 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 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 changes.

<u>New Learning</u>
Know that translucent objects allow some light to pass through, but some of the light changes direction as it passes through the object; this means that something seen through a translucent object is not clearly defined.
Know that white light comprises all the colours of light.
Know why the shape of a shadow will match the shape of an object.
Know that when light reflects off an object, the angle of incidence is equal to the angle of reflection.
<u>Vocabulary</u>
<u>Tier 2:</u> shadow, light, colour, reflect, visible, straight, ray, beam, energy
<u>Tier 3:</u> filter, absorb, refract, spectrum, wavelength, prism, lens, angle, incidence, wave, photon
</td></tr>
</table>

The Big Ideas for Science

Year 6 Autumn Term - Electricity

These objectives were met before in Year 4.

National Curriculum Objectives	Key Knowledge and vocabulary
• Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. • Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. • Use recognised symbols when representing a simple circuit in a diagram. **Big Questions:** 1. What is electricity? 2. How can an electrical circuit be modified? How can an electrical circuit be changed? 3. How do the components in a circuit affect each other? How do the parts of a circuit work together?	Key Concepts KC1 & KC5 Revision **Electricity (Year 4)** • Identify common appliances that run on electricity. • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. • Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. • Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp light in a simple series circuit. • Recognise some common conductors and insulators, and associate metals with being good conductors. New Learning Know that voltage is a measure of the power of a cell to produce electricity; it is a measure of the 'push' of electric current. Know that as the number and voltage of cells in a circuit increases, the brightness of a bulb or the volume of a buzzer will increase (though too high a voltage may 'blow' the bulb or buzzer) Know how to draw simple circuit diagrams. Know the recognized symbols for a battery, bulb, motor, buzzer and wire. Know how to predict whether components will function in a given circuit, depending on whether or not the circuit is complete; whether or not a switch is in an on or off position; and whether or not there is a cell to provide electrical current to the circuit. Vocabulary Tier 2: electricity, current, cell, bulb, wire, wire, brightness, loudness, motor, buzzer Tier 3: alternating current, direct current, circuit, voltage

The Big Ideas for Science

Year 6 Spring Term - Evolution and Inheritance	
These objectives were met before in Year 4.	
National Curriculum Objectives	Key Knowledge and vocabulary
• 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. **Big Questions:** 1. Why are offspring not identical to their parents? Why do children look different to their parents? 2. How are species adapted to their environment? How do creatures change to suit where they live? 3. How do theories of evolution develop? How can we see evolution? 4. How can fossils teach us about the past? What can we learn from fossils?	Key Concepts KC3 Revision **Living things and their habitats (Year 4)** • Recognise that environments can change and that this can sometimes pose dangers and have an impact on living things. New Learning Know that living things change over time and that this gradual change is called evolution. Know that natural selection is the cause of this change; natural selection works as across a species there is natural variation within a species; there is also competition to survive and reproduce and that members of a species with advantageous characteristics survive and reproduce - these characteristics are passed down to their offspring; members of a species with less advantageous characteristics do not survive and reproduce – these characteristics are not passed down to offspring. Know that offspring are varied and are not identical to their parents. Know that Charles Darwin posited this theory of evolution by natural selection. Know that the gradual change of species over millions of years can be observed by looking at examples of fossils. Vocabulary Tier 2: parent, baby, environment, habitat, plants, animals, living things Tier 3: evolution, adaptation, inherited traits, inheritance, adaptive traits, natural selection, DNA, genes, variation, offspring, fossil, fossilisation

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Year 6 Summer Term – Living things and their habitats	
These objectives were met before in Year 4.	
National Curriculum Objectives	Key Knowledge and vocabulary
• 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. **Big Questions:** 1. Why is classification useful? (L1&2) Why do we sort living things? 2. How can different species be classified? How can we sort living things?	Key Concepts KC2 & KC3 Revision **Living things and their habitats (Year 4)** • 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. New Learning Know that there are three types of micro-organism: viruses, fungi and bacteria; of these three, viruses are often not really considered to be alive by many scientists mainly because they don't have the 'machinery' to reproduce inside them. Know that an arthropod is an invertebrate with a hard, external skeleton and jointed limbs. Know that insects are a type of arthropod; their bodies consist of six legs, a head, a thorax and an abdomen; most insects also have a pair of antennae and a pair of wings. Know that an arachnid (e.g. spider) is a type of arthropod with eight legs and no antennae or wings. Know that a crustacean is a type of arthropod with two pairs of antennae (e.g. woodlouse). Know that a myriapod is an arthropod with a flat and long or cylindrical body and many legs (e.g. centipede). Vocabulary Tier 2: kingdom, class, order, species, family, flowering, non-flowering Tier 3: classification, domain, genus, characteristics, vertebrates, invertebrates, microorganism, organism

Year 6 Spring Term – Animals, including humans	
These objectives were met before in Year 2 and Year 3.	
National Curriculum Objectives	Key Knowledge and vocabulary
• 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.	Key Concepts KC4 & KC5 Revision **Animals, including humans (Year 2)** • Describe the importance for humans of exercise, eating the right amounts of different types of food and hygiene. **Animals, including humans (Year 3)** • 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.

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• Describe the ways in which nutrients and water are transported within animals, including humans **Big Questions:** 1. What are the main parts of the human circulatory system? 2. How does the heart function? 3. Why is blood important to our body? 4. How does exercise impact our heart? How does exercise affect our hearts?	New Learning Know that the heart and lungs are organs protected by the ribcage. Know that blood travels around the body transporting nutrients that have been absorbed into the bloodstream from digestion; blood also carries oxygen around the body which is used to power the body; this use of oxygen to create energy is called respiration. Know that the heart beats, pumping blood around the body and that blood vessels carry the blood; arteries carry blood away from the heart; veins carry blood towards the heart; capillaries are tiny blood vessels that connect arteries and veins. Know that the heart is composed of four chambers: two atria and two ventricles; the aorta is the largest artery in the body and most major arteries branch off from it. Know that when we exercise, our heart beats more frequently so that the oxygen that is used around the body can be replenished; it returns to a resting heart rate afterwards; fitter people tend to have lower resting heart rates. Know that drugs are chemicals that have an impact on the natural chemicals in a person's; know that drugs can be harmful or helpful, depending on what they are and how they are used; know that all drugs can be harmful if overused. Know that paracetamol and aspirin are examples of drugs that can be helpful as a painkiller. Know that cannabis and cocaine are examples of illegal drugs that can have serious negative effects. Know that alcohol and tobacco are examples of drugs that are legal to adults but that can have serious negative effects, such as liver disease and lung disease, respectively. Vocabulary Tier 2: blood, heart, diet, exercise, drugs, lifestyle, nutrients, muscles Tier 3: circulatory system, vein, artery, aorta, superior vena cava, inferior vena cava, left ventricle, right ventricle, left atrium, right atrium, blood vessels, capillaries, blood cells