

Marriott Primary School Science Curriculum

Rationale for Science

At Marriott we provide a Science curriculum that leads to confident, independent learners who have a passion for learning and are able to adapt to the changing needs of the world. We want the children to work in ways which allows them to be collaborative as well as independent and build their resilience. We want children to have the ability to pose questions about how and why things happen in the world. It is vital that our learners understand how their bodies work and how to take care of them, how and why physical phenomena take place and how to use many chemicals safely. Children need to learn how to use tools accurately and safely that they may need within their daily life – eg thermometers, and electrical devices. We provide opportunities to complete practical experiments, to learn by doing, to observe carefully, to question results and to make conclusions. We hope to develop children’s curiosity in Science so that they will want to find out more about the world around them. We aim to equip children with a scientific vocabulary that prepares them for their future life and work. The curriculum allows children to revisit key skills and knowledge to allow them to build on their growing scientific understanding. We want them to understand how key scientific figures have contributed to the world and made improvements to our daily lives.

Pupil Strengths and Barriers to Learning

Strengths:

On entry to EYFS a few children usually from an EAL background come into school having had experiences of observing the natural world and talking about it with their parents. They will have had natural phenomena brought to their attention building a natural curiosity to discover.

Barriers:

For the majority of pupils at Marriott, the main barriers for the children are a lack of life experiences and practical exploration of the world. Many of the children will never have visited a farm, zoo, museum, beach, woodland. During discussions with the children, it is evident that there are a lack of books at home and conversations which refer to observations of what is happening in their home or the wider world. In all subjects, children demonstrate a limited vocabulary compared to other children in more affluent communities. When encouraging children to ask key questions, they lack the ability to relate new experiences to previous learning or life experiences. The majority of our parents do not have higher education qualifications and are nervous of supporting their children with academic work.

Goals for the children by the end of Year 6:

It is vital that children understand the role and importance that Science and Scientists play in our ever changing world. We want our pupils to love Science, to want to experiment and find out more. We strive to instil within the children a sense of wonder, enthusiasm for learning and to question the world around them and the role they can play within it. In today’s world, Scientists lead the way in solving problems. We want pupils to recognise that the impact Scientists have on the world is crucial – just recently they have worked on a vaccine

for Covid-19 which helps to save lives and protects society. Much is changing in our world and Scientists hold the key identifying key factors which impact on worldwide issues like climate change. We want our pupils to understand these issues and make life choices which can support our planet.

Research to support our curriculum development:

Our Curriculum for Science meets the requirements of the National Curriculum 2014. When considering the Key knowledge and concepts for each half term we have included information which is the most important elements that children should master. Bruce Wilkinson wrote about the theory of ‘mastering the minimum’ in his book *‘The Seven Laws of the Learner’ (2005)*. We have clearly identified this crucial knowledge in order that pupils master a minimum well rather than a vast amount poorly. We aim to make clear our learning intentions to pupils in our Knowledge Organisers for each unit in accordance with Mary Myatt’s book *The Curriculum: Gallimaufry to Coherence (2018)* which stated that there is potential in learning with the use of these. Knowledge organisers set out the important, useful and powerful knowledge on a topic on a single page (Kirby 2015). Each unit contains links to previous year groups that the learning builds upon so teacher are aware of the starting points of all the children. With this in mind we complete regular retrieval practice sessions so that pupils can revisit the key learning from their own and previous year groups in line with Barak Rosenshine’s *‘Principles of instruction: Research-based strategies That All Teachers Should Know (2012)*. We aim to build this knowledge year upon year so that we can close the gap for our disadvantaged learners in order that “knowledge becomes ‘sticky’ – the more you know the more you learn – which helps children gain a deeper understanding over time.” *Sean Halford (OFSTED 2015 – Date)*

Our 5 key themes for Science are:

Conflict/Contrast	Equality/ Inequality	Significance	Playing My Part	Success
<p>Examples include:</p> <ul style="list-style-type: none"> • Opposing forces • Relationship between predator & prey • Types of weather and seasons changing • Plants and animals obtaining their basic needs and the fight for themselves 	<p>Examples include:</p> <ul style="list-style-type: none"> • Natural selection and adaptation • Changes in materials and how they react • Habitats and how they provide for the plants and animals • Providing the correct balance for your body to be healthy 	<p>Examples include:</p> <ul style="list-style-type: none"> • Water cycle and how it provides all the worlds water • Physical phenomena like day / night • How we use scientific discoveries in our lives • Most important properties of materials 	<p>Examples include:</p> <ul style="list-style-type: none"> • Necessity for all parts of different processes to be present or it won’t work • People make choices to maintain a healthy life style • The role of scientists and their discoveries 	<p>Examples include:</p> <ul style="list-style-type: none"> • Scientific break trough’s • How science is used in everyday life to keep us safe – car mirrors etc • Bodies need to be provided with correct nutrients to be successful

Foundation Stage 1	Three and Four Year Olds
Autumn 1- Settling in all about me	
<p>Key Vocabulary Senses :Touch – hands, fingers, thumb See/sight – eyes Taste – mouth, tongue, teeth Smell – nose Soft, hard</p>	<p>C&L Understand why questions PSED Make healthy choices about food and drink, activity and tooth brushing UTW Has sense of their own family. Make connections between the features of their family and other families. Notice differences between people. Use all their senses in hands on exploration of natural materials.</p>
Autumn 2- Autumn 2 The Magic of 3 Celebrations	
<p>Key Vocabulary Autumn Season Leaves hibernate light</p>	<p>C&L Understand why questions UTW Has sense of their own family. Make connections between the features of their family and other families. Notice differences between people. Use all their senses in hands on exploration of natural materials.</p>

Spring 1- Winter /All Creatures Great and Small	
Key Vocabulary Melt, liquid, solid Sink, float Winter cold	C&L Understand why questions UTW Begin to make sense of their own life-story and family's history. Continue developing positive attitudes about the differences between people. Explore and talk about different forces they can feel. Talk about the differences between materials and changes they notice. Plant seeds and care for growing plants. Understand the key features of the life cycle of a plant and an animal.
Spring 2- Spring/All Creatures Great and Small	
Key Vocabulary Grow, change, baby, adult	C&L Understand why questions UTW Has sense of their own family. Make connections between the features of their family and other families. Notice differences between people. Use all their senses in hands on exploration of natural materials.
Summer 1- Where does my food come from?	
Key Vocabulary Fast slow Push pull	C&L Understand why questions UTW Begin to understand the need to respect and care for the natural environment and all living things. Explore collections of materials with similar and/or different properties. Explore how things work. Talk about what they see, using a wide vocabulary.

Summer 2 – Transport and Journeys	
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<p>Key Vocabulary Float, air, forces, push, pull Air, chemical, fizz, gas, force/s, push</p>	<p>C&L Understand why questions UTW Begin to understand the need to respect and care for the natural environment and all living things. Explore collections of materials with similar and/or different properties. Know that there are different countries in the world and talk about the differences they have experienced or seen in photos. Explore how things work. Talk about what they see, using a wide vocabulary.</p>
<p>Foundation Stage 2</p>	<p>Reception ELG</p>
<p>Autumn 1- All About Me/Superheroes</p>	
<p>Key Vocabulary Me Mum Dad Family Sister Brother Grandad Grandma Uncle Aunty</p>	<p>C&L Begin to ask questions. UTW Explore the natural world around them.</p>
<p>Autumn 2- <i>People who help us.</i></p>	
<p>Key Vocabulary ?????</p>	<p>C&L Begin to ask questions. learn and use new vocabulary. UTW Describe what they see, hear and feel whilst outside.</p>
<p>Spring 1 – <i>Traditional tales: Gingerbread Man and Jack and the Beanstalk.</i></p>	
<p>Key Vocabulary Beginning Middle End</p>	<p>C&L Describes events in some detail. Asks questions to find out more. UTW</p>

	Understand the effect of changing seasons on the natural world around them.
Spring 2- <i>Dinosaurs</i>	
Key Vocabulary ???	C&L Extends vocabulary and uses new vocabulary in different contexts. UTW Recognise some similarities and differences
Summer 1- = <i>New life.</i>	
Key Vocabulary Life cycle Baby Toddler Teenager Adult Naming stages of different animals e.g. butterfly, frog, flower (sunflower)	
Summer 2- <i>Ahoy there!</i>	
Key Vocabulary	Look closely at similarities and differences, patterns and change Know about similarities and differences in relation to objects, materials and living things.

Science Year 1

<p>Working Scientifically KS1 Working Scientifically Pupils will be taught to use the following practical scientific methods, processes and skills:</p> <ul style="list-style-type: none"> • WS1 asking simple questions and recognising that they can be answered in different ways • WS2 observing closely, using simple equipment and measurement
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- WS3 performing simple tests
- WS4 identifying and classifying
- WS5 using their observations and ideas to suggest answers to questions
- WS6 gathering, recording and communicating data and findings to help in answering questions.
- WS7 use scientific language and read and spell age-appropriate scientific vocabulary
- WS8 begin to notice patterns and relationships.

Question: How do we use our senses to explore the world? Can you taste a loud noise?

Focus Themes: Playing my part / Success

How the senses help us play our role in the world successfully.

The 4-6 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic

Autumn 1

Senses and Bodies

- Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.

WORKING SCIENTIFICALLY

Experiments to explore the different senses

- WS2 observing closely, using simple equipment
- WS5 using their observations and ideas to suggest answers to questions

Vocabulary:

(Preteach main body parts – arm/ leg/ head/shoulder/ear/nose/eye/ foot/hand)

See / smell /hear

Know names of 5 senses - Sight, hearing, taste, touch, smell

Know that we use our body parts to help us explore the world

Eyes to see

Nose to smell

Skin to touch

Mouth to taste

Ears to hear

Resources:

Developing Experts Year 1 – Animals including Humans – All about me!

Question: How can we group animals together by their characteristics?

Do can a tiger eat just plants?

Focus Themes: Inequality

How different animals can have different traits but they still survive

The 4-6 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic

Autumn 2

Animals Habitats and Classification

- 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

Vocabulary

Preteach – Animal / Plant

Fish, animal, bird

- Be able to name 1 animal for each group

- Fish, reptile, mammal, bird, amphibian

(salmon /snake / bear / eagle /frog)

- Animals are herbivores, carnivore or omnivore

<ul style="list-style-type: none"> describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) <p>WORKING SCIENTIFICALLY</p> <ul style="list-style-type: none"> WS4 identifying and classifying WS8 begin to notice patterns and relationships. 	<ul style="list-style-type: none"> Cows, giraffes, rabbits are herbivores Wolves, tigers, crocodiles are carnivores Some humans and bears are omnivores
<p>Resources: Developing Experts - Year 1 Animals including Humans – All about animals – lessons on identifying animal types and carnivores, herbivores.</p>	
<p>Question: How can we group together materials by their characteristics? How can we describe materials in different ways Why isn't a table made from jelly?</p>	
<p>Focus Themes: Significance / Success It is significant which materials have properties so that they can be successful for their job</p>	<p>The 4-6 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic</p>
<p>Spring 1/2 Everyday materials- Properties</p> <ul style="list-style-type: none"> Focus Spr 1 EM1 distinguish between an object and the material from which it is made Focus Spr 1 identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock Focus Spr 1 describe the simple physical properties of a variety of everyday materials Focus Spr 2 compare and group together a variety of everyday materials on the basis of their simple physical properties. <p>WORKING SCIENTIFICALLY Practical sorting activities / tests – eg which is magnetic</p> <ul style="list-style-type: none"> WS1 asking simple questions and recognising that they can be answered in different ways WS3 performing simple tests WS6 gathering, recording and communicating data and findings to help in answering questions WS4 identifying and classifying 	<p>Vocabulary: Wood glass paper water metal rock</p> <ul style="list-style-type: none"> name materials objects are made from using vocabulary above – table is made from metal and wood describe materials by their basic properties eg: hard soft – wood is hard, cotton wool is soft Group materials together by properties eg – magnetic Sort materials by property – hard soft etc Hard, soft, bendy, rough, smooth.
<p>Resources: Developing Experts Year 1 – Everyday Materials & Use of everyday materials</p>	

Question: Are all plants the same? Can an apple seed grow into a daisy?	
Focus Themes: Significance / Inequality Plants are important to every living thing – we eat them. Some plants are more useful than others.	The 4-6 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic
Summer 1 Plants <ul style="list-style-type: none"> 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. WORKING SCIENTIFICALLY Growing a bean <ul style="list-style-type: none"> WS2 observing closely, using simple equipment and measurement WS5 using their observations and ideas to suggest answers to questions 	Vocabulary: Recap of plant / animal Tree, flower Seed, root, stem, leaf, petal, <ul style="list-style-type: none"> Recognise that plants can be different Know some trees lose their leaves in Autumn Some trees keep leaves all the year around Know plants grow from seeds or bulbs Know main parts of a plant or tree - root, stem, leaf, petal trunk, branch.
Resources: Developing experts: Year 1 Introduction to plants	
Question: Can you describe the changes of the seasons? Does it snow in England in the summer?	
Focus Themes: Conflict / Success - conflict between different types of weather and how seasons help plants and animals be successful	The 4-6 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic
Summer 2 Weather and Seasons <ul style="list-style-type: none"> observe changes across the four seasons observe and describe weather associated with the seasons and how day length varies. WORKING SCIENTIFICALLY Observations throughout the year of weather / seasons <ul style="list-style-type: none"> WS1 asking simple questions and recognising that they can be answered in different ways WS8 begin to notice patterns and relationships. 	Vocabulary: day night sun moon <ul style="list-style-type: none"> Know there are 4 seasons – name them Spring, Summer, Autumn, Winter The days are shorter in winter and longer in summer The weather is usually cold in winter but hotter in spring/summer In spring most plants begin to grow, baby animals are born In Autumn some animals hibernate but wake up in spring.
Resources : Developing Experts Year 1 Seasonal changes	
Ongoing Skills: Look at weather/ temperature / seasons every week and notice changes	

Science Year 2

Working Scientifically

KS1

Pupils will be taught to use the following practical scientific methods, processes and skills:

- WS1 asking simple questions and recognising that they can be answered in different ways
- WS2 observing closely, using simple equipment and measurement
- WS3 performing simple tests
- WS4 identifying and classifying
- WS5 using their observations and ideas to suggest answers to questions
- WS6 gathering, recording and communicating data and findings to help in answering questions.
- WS7 use scientific language and read and spell age-appropriate scientific vocabulary
- WS8 begin to notice patterns and relationships.

Question: How do people stay alive? Can humans stay alive without drinks?

Focus Themes: Success / Playing my part

How we need basic things to survive and how we can make choices to be healthy.

The 4-6 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic

Autumn 1 Links to Yr 1 – Senses / bodies

Animals including their basic needs

- find out about and describe the basic needs of animals, including humans, for survival (water, food and air)
- describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.

WORKING SCIENTIFICALLY

Observing plants and animals

- WS1 asking simple questions and recognising that they can be answered in different ways
- WS8 begin to notice patterns and relationships.

Vocabulary
water, air, food
Healthy unhealthy

- Humans and animals need food, air and water to survive
- If you do not have any one of, air, food or water you won't survive
- It is important to exercise regularly, keep clean and eat the right types of food to stay healthy.
- It can be unhealthy if you don't exercise, wash regularly and eat different food groups

Resources Developing Experts Year 2 – Animals including Humans – Diet and Health.

Question: Are spoons always made from metal? Would a paper spoon work? What about a paper plate?

Focus themes: significance inequality

The 4-6 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic

<p>Significance of different objects made from different materials to make them fit for their purpose.</p>	
<p>Autumn 2 Links – Yr 1 Materials Materials</p> <ul style="list-style-type: none"> • 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. <p>WORKING SCIENTIFICALLY Carry out different experiments for materials – eg which is waterproof / investigate which materials can be changed by squashing</p> <ul style="list-style-type: none"> • WS3 performing simple tests • WS4 identifying and classifying <p>WS6 gathering, recording and communicating data and findings to help in answering questions</p>	<p>Vocabulary Preteach material names and basic properties from Yr1 Squash, bend, twist, stretch</p> <ul style="list-style-type: none"> • Sort and identify materials that are: Flexible, shiny, dull, waterproof, opaque, transparent • Objects can be made from different materials that make them suitable for their use • Spoons can be plastic, metal, wooden • Plastic spoons don't scratch things so are suitable for cooking and young children. • Metal spoons are strong but can get hot if cooking • Wooden spoons don't usually get hot when cooking • Some solids can be changed by: - objects are made from materials to suit their purpose Squashing – paper, plasticine Bending – wire, string Twisting – paper, ribbon, foil Stretching – elastic band
<p>Resources Developing Experts Year 2- Everyday Materials</p>	
<p>Question: Can plants grow in the dark?</p>	
<p>Focus Themes: Conflict / Inequality Conflict between plants to survive – trees block light etc There can be inequality when a plants needs aren't met.</p>	<p>The 4-6 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic</p>
<p>Spring 1 – Links Yr 1 - plants Plants</p> <ul style="list-style-type: none"> • 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. <p>WORKING SCIENTIFICALLY Experiments with different plants eg cress</p>	<p>Vocabulary Preteach – Plants parts from Yr 1 Seed Bulb, shoot Water, light, temperature, Growth</p> <ul style="list-style-type: none"> • Plants grow from seeds or bulbs • They grow roots then shoots or stems and then leaves

<ul style="list-style-type: none"> • WS1 asking simple questions and recognising that they can be answered in different ways • WS3 performing simple tests • WS5 using their observations and ideas to suggest answers to questions • WS6 gathering, recording and communicating data and findings to help in answering questions 	<ul style="list-style-type: none"> • Some plants have flowers or fruit • Plants need to be watered to grow • They need sunlight to grow to be healthy • They need a warm temperature to grow • Plants do not grow much in winter because it is cold but begin to grow in spring when the weather gets warmer.
Resources Developing Experts Year 2: Plants Growth and Care	
Question: Why do different types of birds live in different places in the world? Can a penguin survive in the desert?	
Focus Themes: Success / Significance Animals are successful in their own habitat. Animals have significant features to help them survive	The 4-6 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic
Spring 2 - Links Yr 1 – Animal Habitats Living things- Habitats <ul style="list-style-type: none"> • identify that most living things live in habitats to which they are suited • 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 WORKING SCIENTIFICALLY Looking at animals and plants in forest school <ul style="list-style-type: none"> • WS4 identifying and classifying • WS5 using their observations and ideas to suggest answers to questions 	Vocabulary Habitat Arctic, desert, woodland, pond <ul style="list-style-type: none"> • Animals live in places called habitats that they are suited to • Some Penguins have thick coats, large webbed feet so they live in the artic where it is very cold and snowy • Ducks have waterproof feathers and webbed feet so they live near water. • Vultures scavenge for food so they live in the desert where some animals die and give food. • Name plants and animals for different habitats Artic – polar bear / penguin Desert – vulture/ lizard /cactus Woodland - mice / squirrels / trees / insects Pond – fish / frogs / lilies,/pond weed
Resources Developing Experts Year 2 – Living things and their habitats – Lesson on Microhabitats Living things and Habitats around the world.	
Question: How do animals get food? Do they eat each other?	
Focus Themes: Conflict Conflict between animals in order to survive – predator / prey	The 4-6 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic
Summer 1	Vocabulary:

<p>Foodchains describe how animals obtain their food from plants and other animals understand a simple food chain, and identify and name different sources of food. WORKING SCIENTIFICALLY Make simple food chains / sort animals</p> <ul style="list-style-type: none"> • WS4 identifying and classifying <p>WS8 begin to notice patterns and relationships.</p>	<p>Preteach: Herbivore, carnivore, omnivore from Yr1 Food chain, predator, prey, green plant</p> <ul style="list-style-type: none"> • Animals get food by eating plants or other animals • Know a simple food chain has a plant, an animals eating the plant and then a predator eating that animal • Make / order a simple food chain correctly • Eg: grass, slug, hedgehog • Food chains always begin with a plant
<p>Resources: Developing experts: Year 2 Living things and their habitats - Learn about food Chains lesson</p>	
<p>Twinkl: Science: Living Things and Their Habitats: Food Chains Year 2 Lesson 6</p>	
<p>Question – Do animals and their offspring always look the same? What is a frog’s baby?</p>	
<p>Focus Themes: Success – how different animals succeed using their lifecycles.</p>	<p>The 4-6 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic</p>
<p>Summer 2 Lifecycles notice that animals, including humans, have offspring which grow into adults explore and compare the differences between things that are living, dead, and things that have never been alive WORKING SCIENTIFICALLY Watch frog spawn in the pond /</p> <ul style="list-style-type: none"> • WS1 asking simple questions and recognising that they can be answered in different ways • WS2 observing closely, • WS5 using their observations and ideas to suggest answers to questions 	<p>Vocabulary Adult, baby, offspring, change, Living dead</p> <ul style="list-style-type: none"> • Some animals have offspring that look very similar just much smaller -Humans / babies Cats / kittens Cows / calfs • Some animals have offspring that look nothing like them - frog/tadpole butterfly caterpillar • Things like animals, trees, humans are living because they need food and water to survive. • Living things move and have babies • Objects like stones, computers are dead - they don’t move or need food and they can’t have babies • Some dead things were alive – eg wood was a tree
<p>Resources developing Experts Year 2 Animals including humans Growth – Lessons Reproduction and growth , life cycle of a frog and butterfly Year 2 living things and their habitats – Explore differences between living, dead and have never been alive</p>	

Science Year 3

<p>Lower KS2 Working Scientifically Pupils will be taught to use the following practical scientific methods, processes and skills:</p> <ul style="list-style-type: none"> • WS1 making decisions, asking relevant questions and using different types of scientific enquiries to answer them

- WS2 setting up simple practical enquiries, comparative and fair tests
- WS3 making systematic and careful observations using notes and simple tables
- WS4 taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- WS5 gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- WS6 recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- WS7 reporting on findings from enquiries, using relevant scientific language, including oral and written explanations, displays or presentations of results and conclusions
- WS8 using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- WS9 identifying differences, patterns, similarities or changes related to simple scientific ideas and processes
- WS10 using straightforward scientific evidence to answer questions or to support their findings.
- WS11 begin to look for naturally occurring patterns and relationships
- WS12 recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations.

Question: How can humans and animals move?	Can I survive just by eating vegetables?
Focus Themes: Playing My Part Inequality Understanding my role in eating a balanced diet and when my diet isn't balanced it leads to inequality in the body	Around 6 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic
<p>Autumn 1</p> <p>Animals- Skeletons and nutrition – Link Yr 2 Animals + Basic needs</p> <ul style="list-style-type: none"> • 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 animals have skeletons and muscles for support, protection and movement <p>WORKING SCIENTIFICALLY sort and group animals from skeletons / use bar charts for nutrition</p> <ul style="list-style-type: none"> • recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables 	<p>Vocabulary: Nutrition, balanced diet bones, muscles, skeleton,</p> <ul style="list-style-type: none"> • Know humans and animals cannot make their own food • Know different food groups – carbohydrates, protein, dairy, fats and fruit/ Vegetables and name at least 1 item from each (bread/pasta, meat/ fish, milk/cheese, oil/butter, apples/ peas) • Know a balanced diet contains all of these food groups • Humans and animals can move because of their bones and muscles • Humans and some animals have skeletons to support their bodies and protect them from harm. • Some animals have their skeleton outside their body called an exoskeleton

Resources: Developing Experts – Year 3 Animals including Humans – what makes us.	
Question: Where do seeds come from? Can we find our own or must we buy them?	
Focus Themes: Conflict Success Conflict between different plants trying to grow and how they succeed in spreading seeds.	Around 6 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic
Autumn 2 Plants- Seed dispersal – Link Yr 2 plants <ul style="list-style-type: none"> 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. WORKING SCIENTIFICALLY Observe what happens to flowers with coloured water <ul style="list-style-type: none"> WS1 making decisions, asking relevant questions and using different types of scientific enquiries to answer them WS2 setting up simple practical enquiries, comparative and fair tests WS3 making systematic and careful observations using notes and simple tables 	Vocabulary: Preteach plant parts from KS1 – root / stem / leaf / flower Nutrients, transportation, Reproduction Germination, pollination, seed dispersal <ul style="list-style-type: none"> Plants need water, sunlight, air, nutrients and warmth to survive and they make their own food. The roots anchor the plant and transport nutrients and water The leaves make food for the plant The stem supports the plant and transports water to plant The flower attracts insects to help with pollination Water is transported through the roots and stem to the plant Know the life cycle of a flowering plant – germination, plant growth with leaves and flowers, pollination, seed dispersal.
Resources Developing Experts – Year 3 Plants Life Cycles	
Question: Where does soil come from? What are fossils?	
Focus Themes: Significance Importance of fossils and how they help us learn about life in the past	Around 6 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic
Spring 1 Rocks – Link Yr 2 Materials <ul style="list-style-type: none"> compare and group together different kinds of rocks on the basis of appearance and simple physical properties describe in simple terms how fossils are formed when things that have lived are trapped within rock 	Vocabulary: Preteach hard / soft from KS1 Fossil, formation, soil, rock Sedimentary, igneous, metamorphic

<p>○ recognise that soils are made from rocks and organic matter.</p> <p>WORKING SCIENTIFICALLY Investigate rocks / group – test for durability and permeability Make soil??????</p> <ul style="list-style-type: none"> identifying differences, patterns, similarities or changes related to simple scientific ideas and processes using straightforward scientific evidence to answer questions or to support their findings. 	<ul style="list-style-type: none"> There are different types of rocks and they can be sorted by how they look. Some rocks let water through but some don't (permeable / impermeable) Some rocks are durable – eg marble some are not - eg chalk Soil is made from rocks and organic matter Fossils are formed when an animal dies and gets covered in a layer of rock. Over time more and more layers of rock cover the fossil and only the bones of the animal remain. Sediment enters the space where the bones have been to make a fossil. Over time the rock erodes so the fossil can be seen.
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Resources Developing Experts – Year 3 Rocks

Question: What can you see when there is absolutely no light? Can we see in the dark?

<p>Focus Themes: Significance Importance of light within the world</p>	<p>Around 6 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic</p>
<p>Spring 2 Light Link Yr 2 materials recognise that they need light in order to see things and that dark is the absence of light notice that light is reflected from surfaces recognise that light from the sun can be dangerous and that there are ways to protect their eyes recognise that shadows are formed when the light from a light source is blocked by a solid object find patterns in the way that the size of shadows change.</p> <p>WORKING SCIENTIFICALLY Investigate a shadow during a sunny day 9am – 3pm – draw positions</p> <ul style="list-style-type: none"> WS1 making decisions, asking relevant questions and using different types of scientific enquiries to answer them 	<p>Vocabulary: Preteach / Recap transparent, opaque, light, dark</p> <p>Light source Reflective, reflection, mirror, Shadow</p> <ul style="list-style-type: none"> Name light sources – sun, lamps, torch, candles – not moon Know darkness is when there is no light We need a source of light to be able to see Light can be reflected from some surfaces – eg metals The sun is harmful to human eyes so we should not look directly at it. A shadow is formed when light is blocked by an object Know that shadows change during the day – Explain how a shadow is large at the beginning of the day and on one side of an object, its gets smaller towards the middle of the

<ul style="list-style-type: none"> • WS2 setting up simple practical enquiries, comparative and fair tests • WS3 making systematic and careful observations using notes and simple tables • WS4 taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • identifying differences, patterns, similarities or changes related to simple scientific ideas and processes 	<p>day and towards the end of the day it gets larger again and is on the opposite side of the object</p>
<p>Resources Developing Experts – Year 3 Light</p>	
<p>Question: Why do my hands get hot when I rub them together? Can you push or pull a lorry?</p>	
<p>Focus Themes: Conflict Success Conflict between forces acting on each other and success of forces like friction which can help us</p>	<p>Around 6 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic</p>
<p>Summer 1 Forces inc Magnets – Link Yr 2 Materials</p> <ul style="list-style-type: none"> • compare how things move on different surfaces • notice that some forces need contact between two objects, but magnetic forces can act at a distance <p>WORKING SCIENTIFICALLY Car ramps – which surface can the car move best on</p> <ul style="list-style-type: none"> • WS2 setting up simple practical enquiries, comparative and fair tests • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • reporting on findings from enquiries, using relevant scientific language, including oral and written explanations, displays or presentations of results and conclusions • begin to look for naturally occurring patterns and relationships 	<p>Vocabulary: Force, push, pull, friction act (on an object) change</p> <ul style="list-style-type: none"> • A force is a push or a pull acting on an object • A force can change an object – eg twisting or squashing something • A force can make something start or stop • Friction is the force that acts when two objects move • Friction can be useful – eg grips on shoes to stop us slipping • Examples of friction – car tyres grip the road / ice skates are smooth so there is no friction and skaters can glide. • Rougher surfaces have greater friction.
<p>Resources: Developing Experts – Forces and Magnets Lesson Compare how things move on different surfaces Twinkl Forces and Magnets Yr3</p>	
<p>Question: Are all metals magnetic? Does a sweet stick to a magnet?</p>	

<p>Focus Themes: Conflict – between magnetic poles and objects which magnets attract or repel</p>	<p>Around 6 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic</p>
<p>Summer 2 Magnets</p> <ul style="list-style-type: none"> notice that 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. <p>WORKING SCIENTIFICALLY Experiments with magnets – how can they attract/ repel each other Can they work through different surfaces etc</p> <ul style="list-style-type: none"> WS2 setting up simple practical enquiries, comparative and fair tests reporting on findings from enquiries, using relevant scientific language, 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, patterns, similarities or changes related to simple scientific ideas and processes 	<p>Vocabulary: Force magnet, magnetic, pole Attract, repel</p> <ul style="list-style-type: none"> Magnets attract only magnetic materials – some but not all metals Magnet can attract and repel each other Magnets have 2 poles North and South If the magnets attract each other the poles are different If the magnets repel each other the poles are the same Magnetic force can act through objects eg paper – magnets used to hold up notices.
<p>Resources: Developing Experts – Year 3 Forces and Magnets</p>	

Science Year 4

National Curriculum objectives: In this unit, children will be taught to:

Lower KS2 Working Scientifically

Pupils will be taught to use the following practical scientific methods, processes and skills:

- WS1 making decisions, asking relevant questions and using different types of scientific enquiries to answer them
- WS2 setting up simple practical enquiries, comparative and fair tests
- WS3 making systematic and careful observations using notes and simple tables
- WS4 taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- WS5 gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- WS6 recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- WS7 reporting on findings from enquiries, using relevant scientific language, including oral and written explanations, displays or presentations of results and conclusions
- WS8 using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- WS9 identifying differences, patterns, similarities or changes related to simple scientific ideas and processes
- WS10 using straightforward scientific evidence to answer questions or to support their findings.
- WS11 begin to look for naturally occurring patterns and relationships
- WS12 recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations.

Question: What happens to food after it is eaten? How can you find out how long it takes humans to digest food?

Focus Themes: Playing My Part

Understanding how systems in our body play a part in different functions

Around 8 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic

Autumn 1

The Digestive system and Teeth – [Link Yr 3 Nutrition / Yr 2 Animals basic needs](#)

- 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

WORKING SCIENTIFICALLY

investigate different soft drinks and their effect on teeth (using egg shells)

- making decisions, asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests

Vocabulary:

Digestive system: Mouth, tongue, teeth, stomach, intestine
Incisor, canine, molar

- The digestive systems breaks down food, removes nutrients the body needs and removes waste.
- Food is chewed in the mouth, travels down the oesophagus to the stomach where it is mixed with digestive juices which start to break it down
- It passes into the small intestine where nutrients are passed into the blood. Enzymes from the pancreas and bile from the liver help this process.
- Finally, in the large intestine water is removed and waste is stored before being excreted

<ul style="list-style-type: none"> • making systematic and careful observations using notes and simple tables • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions 	<p>Types of teeth</p> <ul style="list-style-type: none"> • Incisor teeth (at the front of the mouth) are used for biting • Canine teeth (4 pointed teeth) rip and tear • Molar teeth (at the back of the mouth) chew and grind
<p>Resources: Developing Experts – Year 4 Animals including humans – food and digestion</p>	
<p>Question: Where does water come from?</p>	
<p>Focus Themes: Significance Significance of the water cycle in providing the world with water</p>	<p>Around 8 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic</p>
<p>Autumn 2 States of Matter – Link Yr 2 materials</p> <ul style="list-style-type: none"> • explore a variety of everyday materials and develop simple descriptions of the states of matter • 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. <p>WORKING SCIENTIFICALLY Using Thermometers to find temperature What happens to puddles? Does gas weigh anything?</p> <ul style="list-style-type: none"> • taking accurate measurements using standard units, using a range of equipment, including thermometers • using straightforward scientific evidence to answer questions or to support their findings. 	<p>Vocabulary: Solid, liquid, gas, particles Evaporation, condensation, heating, freezing Thermometer temperature</p> <p>Identify and group solids, liquids and gases Measure temperature using a thermometer Some substances can change state when heated or cooled Water has 3 states – solid as ice / liquid as drink / gas as steam Identify instances when evaporation and condensation take place – steam from a kettle / steamed up windows of car The water cycle uses evaporation and condensation to re-use water in the world Explain clothes dry quicker on hot days because the heat speeds up evaporation.</p>

<ul style="list-style-type: none"> • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions 	
Resources Developing Experts – Year 4 States of matter	
Question: Are insulators as important as conductors? Why can I touch wires safely when they have electricity travelling through them.	
Focus Themes: Significance Importance of using electricity safely and	Around 8 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic
<p>Spring 1 & 2</p> <p>Electricity</p> <ul style="list-style-type: none"> • identify common appliances that run on electricity • construct a simple series circuit, identifying/naming its basic parts, including cell, wire, bulb, switch and buzzer • use their circuits to create simple devices • draw the circuit as a pictorial representation (not necessarily using conventional circuit symbols) • <u>about precautions for working safely with electricity.</u> • identify whether or not a lamp will light in a simple series circuit/ • 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 <p>WORKING SCIENTIFICALLY</p> <p>Build a simple circuit / work out problems</p> <p>Make own switch</p> <ul style="list-style-type: none"> • setting up simple practical enquiries, comparative and fair tests • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables 	<p>Vocabulary:</p> <p>Electricity - mains & battery power</p> <p>Bulb, battery, wire, switch</p> <p>Complete circuit</p> <p>Conductor and insulator</p> <p>Name 5 appliances that use electricity – eg washer, computer, phone, hairdryer, fridge.</p> <p>There are 2 kinds of electricity – mains and battery (battery generally used for portable</p> <p>For a bulb to light up the circuit must be complete to allow the electricity to flow around it.</p> <p>Breaks in the circuit stop the bulb from lighting.</p> <p>It is important to be safe when using electricity</p> <ul style="list-style-type: none"> - never put fingers or other things in sockets - do not touch electric objects with water - do not touch bare wires - do not go into or climb on electricity stations <p>Conductors allow electricity to pass through – eg metal wires</p> <p>Insulators stop electricity passing through – eg plastic</p>

<ul style="list-style-type: none"> recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. 	
Resources Developing Experts – Year 4 Electricity	
Question: Can deaf people play instruments? How? Can you see sound?	
Focus Themes: Significance and playing my part Significance of how sounds are made and travel. How our ears play a huge role in hearing.	Around 8 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic
<p>Summer 1</p> <p>Sound</p> <ul style="list-style-type: none"> 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. <p>WORKING SCIENTIFICALLY</p> <p>Make an instrument / investigate pitch</p> <ul style="list-style-type: none"> setting up simple practical enquiries, comparative and fair tests making systematic and careful observations using notes using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions 	<p>Vocabulary:</p> <p>Vibration wave pitch</p> <p>Volume fainter ear</p> <ul style="list-style-type: none"> Sound is a vibration. Sound can travel through objects – eg knocking on door, hearing under water in bath Stronger vibrations produce a louder sound Shorter objects produce high sounds – eg xylophone bars / elastic bands. Longer objects produce low pitch sounds Sounds get fainter when you move further away from the source
Resources Developing experts Year 4 Sound	
Question: How can a snake and a cow be the same and different?	

<p>Focus Themes: Conflict Inequality – conflict in food chains and between humans and living things in world - Inequality – humans are making the balance within the world unequal</p>	<p>Around 8 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic</p>
<p>Summer 2 Living Things & Habitats – Link Yr 3 seed dispersal / Yr 2 Habitats</p> <ul style="list-style-type: none"> 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 to living things. construct and interpret a variety of food chains, identifying producers, predators and prey. <p>WORKING SCIENTIFICALLY Botanical Gardens – habitats</p> <ul style="list-style-type: none"> gathering, recording, classifying and presenting data in a variety of ways to help in answering questions identifying differences, patterns, similarities or changes related to simple scientific ideas and processes begin to look for naturally occurring patterns and relationships recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. 	<p>Vocabulary: Pre teach / Recap – herbivore / carnivore / omnivore Mammal / fish / bird / reptile/ amphibians</p> <p>Vertebrate, invertebrate Habitat, environment, Food chain, producer, consumer, predator and prey</p> <ul style="list-style-type: none"> Group living things in different ways according to characteristics Eg – vertebrate – snake / cow / human and invertebrate – worm, spider, muscle Use a classification key to identify animals Devise yes and no questions to differentiate and identify animals to devise own key Humans are changing the world/ environment and can cause danger to animals which live in it – eg global warming / plastic in oceans Know food chains begin with producers (green plants) which are eaten by herbivore (consumer) followed by a carnivore / omnivore Understand animals can sometimes be predator and prey Eg – hedgehog eats slugs (predator) fox eats hedgehog (prey) <p>Construct food chains using above knowledge</p>
<p>Resources: Developing Experts – Year 4 – Living Things and their habitats</p>	

Science Year 5

Year 5 and 6 Working Scientifically

Pupils will be taught to use the following practical scientific methods, processes and skills:

- WS1 planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- WS2 taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- WS3 recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- WS4 using test results to make predictions to set up further comparative and fair tests
- WS5 reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- WS6 identifying scientific evidence that has been used to support or refute ideas or arguments.
- WS7 explore and talk about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically.
- WS8 recognise that scientific ideas change and develop over time.
- WS9 draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.
- WS10 Pupils should read, spell and pronounce scientific vocabulary correctly.

Question: Why do astronauts float in space? Why does a ball fall to the ground?

Focus Themes: Success Inequality

Between different forces and how it effects daily life

Around 10 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic

Autumn 1

Forces – Link Yr 3 Forces / Magnets

- explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
- identify the effects of air resistance, water resistance and friction, that act between moving surfaces
- recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.
- explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall.
- explore the effects of friction on movement and find out how it slows or stops moving objects.

Vocabulary

Recap – force, push, pull,

Friction, gravity, air resistance, water resistance, upthrust, Newton, force meter, gear, pulley, mechanism

- A force makes a change – direction/ shape
- Force meters are used to measure forces
- The unit of measurement is Newtons –N
- Gravity pulls objects down towards the earth – objects fall
- Friction is a force which slows and stops objects
- Air resistance is a force which can slow objects down like parachutes
- Water resistance needs to be small for swimmers / boats to move through water.

<ul style="list-style-type: none"> • <u>find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.</u> <p>WORKING SCIENTIFICALLY Practical investigations with forces:</p> <ul style="list-style-type: none"> • Using a force meter to measure weight of objects • height of a ramp with car going down (how far does the car travel) make a boat how much can it hold before sinking • height a parachute/sycamore seed is dropped from – how long does it take to fall • 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 	<ul style="list-style-type: none"> • Forces can help us in our daily life – tyres on cars / smooth surfaces to move quickly • Forces can hinder our daily life - surfaces we move over – its harder to ride you bike on grass • Gears and pulleys mean we can use a small force to give a greater effect.
<p>Resources: Developing Experts – Year 5 Forces</p>	
<p>Question: Why do humans take 18 years to become adults? How will my body change as I become a teenager?</p>	
<p>Focus Themes: Equality – how we change and grow and the fact that it happens to everyone but experiences are different</p>	<p>Around 10 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic</p>
<p>Autumn 2 Animals inc Human Changes to Old Age – Link Year 2 Life Cycles</p> <ul style="list-style-type: none"> • describe the changes as humans develop to old age. • <u>draw a timeline to indicate stages in the growth and development of humans.</u> • <u>learn about the changes experienced in puberty.</u> <p>WORKING SCIENTIFICALLY Investigate different gestation times recorded in graphs/ tables</p> <ul style="list-style-type: none"> • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs 	<p>Vocabulary Foetus, womb, gestation, baby, toddler, adolescent, adult Elderly, puberty, development</p> <ul style="list-style-type: none"> • Know human needs for survival – food, water, air • Humans need a balanced diet with enough nutrition to stay healthy • Know the human life cycle - baby / toddler / child / adolescent / adult • Name change between each stage <p>babies drink milk and can't do much for themselves toddler learn to walk and talk Children grow and learn how to do more things Adolescent – go through puberty in preparation for adulthood</p>

<ul style="list-style-type: none"> reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations 	<p>Adult – stop growing in size – height etc Old age – adults start to slow down and body gradually stops working properly</p> <ul style="list-style-type: none"> Bodies change in puberty: Both boys and girls get hair underarms/ pubic area / begin to sweat Girls, grow breasts/ start periods Boys - voice breaks, facial hair, penis growth Know human gestation time is 40 week or nine months Other animals have longer or shorter gestations – Mouse 20 days/ elephant 95 weeks
<p>Resources: Developing Experts – Year 5 Humans including animals - The Human Life Cycle</p>	
<p>Question: Where does sugar go when its dissolved in water? Do we need insulators as much as conductors?</p>	
<p>Focus Themes: Significance Inequality Importance of process like dissolving in solving problems in the world and inequality between materials which interact</p>	<p>Around 10 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic</p>
<p>Spring 1 & 2 Properties and Changes of Materials – Link Yr4 states of matter / Yr 2 Materials</p> <ul style="list-style-type: none"> compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic demonstrate that dissolving, mixing and changes of state are reversible changes explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, 	<p>Vocabulary Preteach – transparent, opaque, solid, liquid, gas, evaporation condensation Hardness, solubility, transparency, thermal insulator/ conductor Electrical insulator/ conductor reversible, irreversible dissolve, soluble/ insoluble sieve, filter, separate, magnetic,</p> <ul style="list-style-type: none"> Identify solids, liquids and gases and their properties (Yr4) Names and explain changes of state – evaporation and condensation Know we can add solids to liquids to dissolve Some substances dissolve – they are soluble – sugar, salt Some substances don't dissolve – they are insoluble – sand, crisps A substance can be recovered from its solution by evaporation – this is the reverse of dissolving

<p>including changes associated with burning and the action of acid on bicarbonate of soda.</p> <ul style="list-style-type: none"> • <u>explore reversible changes, including, evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes.</u> • <u>explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example, vinegar with bicarbonate of soda.</u> <p>WORKING SCIENTIFICALLY Various investigations with materials:</p> <ul style="list-style-type: none"> • Which solids dissolve? • Test hardness of different rocks • Materials which conduct heat/ electricity • Can you separate a mixture of sand stones water • Make a volcano using vinegar and bicarb of soda • 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 • using test results to make predictions to set up further comparative and fair tests • draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings 	<ul style="list-style-type: none"> • Group materials that are different hardnesses – eg hard/ soft rocks • Identify reversible and irreversible changes – eg water melts / freezes. Cooked eggs/ cakes / toast • Name thermal conductors/ insulators – metal/ wood • Name electrical conductors / insulator – metal/ plastic • Some materials attract to magnets some do not – some metals / paper • Solids and liquids can be separated using sieving and filtering – eg food cooked in water • Know why certain materials are used for certain purposes according to properties – eg wooden spoons for cooking. • Know new materials can be formed when making changes – eg vinegar and bicarbonate of soda (volcano)
<p>Resources: Developing Experts – Year 5 Spring 1 Properties of materials Spring 2 Changes of materials</p>	
<p>Question: Does the sun ever move? Why don't we sense motion on earth if the earth spins?</p>	
<p>Focus Themes: Conflict Playing My Part Recognising how the movement of the earth plays a role in life</p>	<p>Around 10 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic</p>
<p>Summer 1 Earth and Space</p> <ul style="list-style-type: none"> • describe the movement of the Earth, and other planets, relative to the Sun in the solar system 	<p>Vocabulary Preteach day/ night Sun, moon, earth, axis, rotation, spherical, orbit</p> <ul style="list-style-type: none"> • Name different light sources – sun/ candle etc

<ul style="list-style-type: none"> • 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. • <u>learn that the Sun is a star at the centre of our solar system and that it has eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a ‘dwarf planet’ in 2006).</u> • <u>understand that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones).</u> <p>WORKING SCIENTIFICALLY</p> <ul style="list-style-type: none"> • Use children to demonstrate how the earth spins and we have day and night • Independent research of planets 	<ul style="list-style-type: none"> • Darkness is the absence of light • Planet earth is part of our solar system • There are 9 planets which orbit the sun <p>Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto</p> <ul style="list-style-type: none"> • Earth, moon, sun are approx. spherical • The planets orbit the sun – the sun does not move across the sky • The earth spins on its axis every 24 hours • When the earth spins on its axis we get day and night – day when we face the sun and night when we face away from it • a moon is a celestial body orbiting a planet – some planets have more than 1 moon. Earth has 1 moon which orbits every 28 days
<p>Resources: Developing Experts Year 5 Earth and Space – Describe the movement of Earth, Describe the planets on our solar system, Learn about Gravitational force, Different phases of the moon. Twinkl Year 5 Earth and Space</p>	
<p>Question: What are similarities and differences between, human, plant and animal life cycles?</p>	
<p>Focus Themes: Conflict Playing My Part – conflict between different plants and animals to reproduce and understanding how we as mammals play our part.</p>	<p>Around 10 key pieces of knowledge or concepts/vocabulary the children must know by the end of this topic</p>
<p>Summer 2 Living Things and Their Habitats Link Yr 3 plants</p> <ul style="list-style-type: none"> • 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. • <u>raise questions about their local environment throughout the year.</u> 	<p>Vocabulary Reproduction, life cycle, mammal, amphibian, fish, bird, reptile, offspring</p> <ul style="list-style-type: none"> • Know different types of groups of animals have different life cycles • Mammal grow young inside and suckle with milk • Birds lay eggs which they incubate and they hatch • Amphibians like frogs lay eggs in the form of frog spawn which change into tadpoles then frogs • Reptiles lay eggs – which they bury

- find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall.
- find out about different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals.

WORKING SCIENTIFICALLY

Cut flowers up to see the parts – stigma/ stamen / ovary/ pollen (daffodils have great ovaries after they have died down – you can see eggs)

- explore and talk about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically.
- Pupils should read, spell and pronounce scientific vocabulary correctly.

- Plant reproduction takes place through pollination where the pollen is transferred from the stamen of one plant to the stigma of another.
- The pollen travels inside the female parts of the flower to the ovary where the egg is fertilised and a seed is produced
- Seeds are dispersed via different methods wind / animal / water
- Know there different kinds of reproduction in plants and animals – sexual and asexual (bacteria & some worms / dandelions/ strawberries)

Resources: Developing Experts – Year 5 – Studying Living Things

Year 5 and 6 Working Scientifically

- Use the following practical scientific methods, processes and skills:
- WS1 planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- WS2 taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- WS3 recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- WS4 using test results to make predictions to set up further comparative and fair tests
- WS5 reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- WS6 identifying scientific evidence that has been used to support or refute ideas or arguments.
- WS7 explore and talk about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically.
- WS8 recognise that scientific ideas change and develop over time.
- WS9 draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.
- WS10 Pupils should read, spell and pronounce scientific vocabulary correctly.

Question: How and why do mirrors help us in everyday life? How do submarines spy on people?

Focus Themes: Significance Success

importance of light reflecting and how we use it to successfully drive cars etc

Around 12 key pieces of knowledge or concepts/vocabulary children must know by the end of this topic

Autumn 1

Light – Link Yr 3 light

- 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.

Vocabulary:

Pre- teach Transparent Opaque

Light, reflection, reflect, shadow formation, orbit, sun, periscope, rainbow travels straight line,

- Name light sources – sun, candle etc
- Darkness is the absence of light
- Shadows are formed when an opaque object blocks the sun's light
- Shadows change during the day as the earth spins
- earth orbits sun so day and night occurs – misconception sun moves across sky

<ul style="list-style-type: none"> • <u>work scientifically by: deciding where to place rear-view mirrors on cars; designing and making a periscope and using the idea that light appears to travel in straight lines to explain how it works.</u> • <u>look at a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters (they do not need to explain why these phenomena occur)</u> <p>WORKING SCIENTIFICALLY Make a periscope to see objects from under tables / round corner Make measurements of shadow length during day</p> <ul style="list-style-type: none"> • 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 • draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings 	<ul style="list-style-type: none"> • light travels in straight lines • we see things – light travels from source to object to eye • Objects are seen when they either give out or reflect light to the eye • Use key idea light travels in a straight line explain why shadows are the same shape as the object that makes them • Reflection -mirrors can be used to see images eg rear view and wing on cars / periscopes • Name different phenomena related to light eg – rainbows / colours in soap bubbles
Resources: Developing Experts – Year 6 Light plus extra resources for mirrors and reflections	
Question: How do scientists draw circuits? How can you make lights brighter?	
<p>Focus Themes: Equality Conflict How circuits can show inequality by battery numbers and solve problems when circuits don't work.</p>	<p>Around 12 key pieces of knowledge or concepts/vocabulary children must know by the end of this topic</p>
<p>Autumn 2 Electricity – Link Yr 4 Electricity</p> <ul style="list-style-type: none"> • 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. 	<p>Vocabulary: Cell/ battery, wire, bulb, buzzer, switch – know symbols too Circuit, circuit diagram, series, parallel circuit, conductor, insulator, volts</p> <ul style="list-style-type: none"> • Electricity comes from mains or battery • Plastic insulates against electricity but metal conducts it • A complete circuit is needed to allow electricity to flow around it

<ul style="list-style-type: none"> • <u>construct simple series circuits, to help them to answer questions about what happens when they try different components, for example, switches, bulbs, buzzers and motors.</u> • <u>learn how to represent a simple circuit in a diagram using recognised symbols.</u> <p>WORKING SCIENTIFICALLY Practical investigations with circuits</p> <ul style="list-style-type: none"> • Make the bulbs brighter / dimmer • Add switches in different places to turn bulbs on off independently • Fault find and fix circuits • Make a burglar alarm • 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 degree of trust in results, in oral and written forms such as displays and other presentations • draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings 	<ul style="list-style-type: none"> • Represent circuit components as symbols (battery/ wire/ bulb/ switch/ buzzer) • Draw circuits as scientific diagrams using symbols • Explain how increasing number of batteries (voltage) effects brightness of bulbs to make them brighter • Explain adding more bulbs to the same amount of batteries will make the bulbs dimmer • Investigate series circuits adding more bulbs or batteries to explain the effect. • Position switches in circuits to operate devices correctly • Identify and solve simple faults within circuits – eg bulb not connected properly, batteries wrong way round or a break in the circuit.
<p>Resources: Developing Experts – Year 6 Electricity</p>	
<p>Question: What is a species? Are all vertebrates the same – eg frog and a lion?</p>	
<p>Focus Themes: Significance Playing My Part Importance of scientists grouping and classifying animals and plants And how humans fit into groups.</p>	<p>Around 12 key pieces of knowledge or concepts/vocabulary children must know by the end of this topic</p>
<p>Spring 1 Living Things and Their Habitats - Link Yr 5 Habitats</p> <ul style="list-style-type: none"> • describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals 	<p>Vocabulary: Pretech -carnivore / omnivore / herbivore producer, consumer, predator, prey</p> <p>Classification, groups, sub divide, similarities, differences, observable vertebrate, invertebrate, micro organisms</p> <ul style="list-style-type: none"> • Animals can be classified into groups according to characteristics

<ul style="list-style-type: none"> • give reasons for classifying plants and animals based on specific characteristics. • <u>know that broad groupings, such as micro-organisms, plants and animals can be subdivided.</u> • <u>should classify animals into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals).</u> • <u>find out about significance of the work of scientists such as Carl Linnaeus, a pioneer of classification.</u> <p>WORKING SCIENTIFICALLY Sort animals in a variety of ways Identify animals from keys/ classification charts Make own key/ classification chart Investigate mould on bread kept in different places</p> <p>recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs identifying scientific evidence that has been used to support or refute ideas or arguments Pupils should read, spell and pronounce scientific vocabulary correctly.</p>	<ul style="list-style-type: none"> • The main groups are mammals, birds, amphibians, fish, reptiles, micro organisms • Use classification keys to identify animals and plants • Know groups can be sub divided into smaller groups for different species – eg arthropods, plants which make seeds and those that do not • Recognise observable similarities and differences in groups – eg birds have feathers but not all fly. Reptiles are cold blooded but some have legs some do not • Explain how and why animal/ plants have been grouped and classified • Classify animals into vertebrates and invertebrates
Resources: Developing Experts – Year 6 Living things and their habitats	
Spring 2 – consolidation of subject knowledge	
Question: How do we know about creatures who lived on earth millions of years ago? Did humans evolve from apes?	
Focus Themes: Conflict Playing My Part Conflict which leads to natural selection and how humans play a role in passing on characteristics.	Around 12 key pieces of knowledge or concepts/vocabulary children must know by the end of this topic
Summer 1 Evolution and Inheritance – Link Yr 5 Changes to Humans <ul style="list-style-type: none"> • recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago 	Vocabulary: Fossil, formation, adapt, adaptation, evolution, natural selection, characteristics, offspring, vary reproduction, genetics, theory Fossil formation from Yr3 –

- 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.
- be introduced to the idea that characteristics are passed from parents to their offspring, i.e. different breeds of dogs, and what happens when, for example, labradors are crossed with poodles.
- appreciate that variation in offspring over time can make animals more or less able to survive in particular environments, for example, by exploring how giraffes' necks got longer.
- find out about the work of palaeontologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution.

WORKING SCIENTIFICALLY

Practical exploration – eye colour in family/ tongue rolling

Mary Anning – curiosities – were fossils

Theories of evolution – religious v scientific

- recognise that scientific ideas change and develop over time.
- explore and talk about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically.
- draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings

- Fossils are formed when an animal dies and gets covered in a layer of rock.
- Over time more and more layers of rock cover the fossil and only the bones of the animal remain.
- Sediment enters the space where the bones have been to make a fossil.
- Over time the rock erodes so the fossil can be seen.
- Know fossils provide scientific evidence of living things from millions of years ago
- Know living things change and evolve over time
- Know living things produce off spring which may not be identical to them – eg frogs / butterflies
- Know some traits / characteristics are passed down from parents – eg eye colour / tongue rolling
- If you can roll your tongue that means one of your parents can. If both parents cant roll their tongues children won't either
- Plants and animals change and adapt to their environment eg In the artic a brown fox would be easily seen so some foxes developed white fur.
- Know what evolution, natural selection and variation means
- Re the fox – the ones with white fur survived and were more successful so the characteristic was passed to offspring
- Know plants and animals change over time to adapt to their environments - the changes make them more successful

Resources: Developing Experts – Year 6 Evolution and inheritance

Question: How do humans get oxygen they need? How does your heart beat?

Focus Themes: Success Conflict – Human body cannot succeed in any way without heart. Conflict between staying healthy and not

Around 12 key pieces of knowledge or concepts/vocabulary children must know by the end of this topic

The Circulatory System – Link Skeletons / Yr 4 Digestion

Vocabulary:

Circulation, circulatory system, heart, blood, lungs, artery, vein , Oxygenated blood, deoxygenated blood, pulse, respiration

- identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood
- recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function
- describe the ways in which nutrients and water are transported within animals, including humans.
- explore questions to understand how the circulatory system enables the body to function.
- learn how to keep their bodies healthy and how their bodies might be damaged – including how some drugs and other substances can be harmful to the human body.
- explore the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health.

WORKING SCIENTIFICALLY

Practical experiment with exercise and pulse rate – record with line graph

- **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**
- **draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings**

- Systems in the body carry out different functions – digestive – takes nutrients from food and skeletal protects organs and helps movements,
- The circulatory system:
- The heart pumps blood around the body each time it beats can be felt by measuring your pulse in your wrist or neck (you can feel your heart beating by playing you hand on your chest)
- transports oxygenated blood from the lungs to the body
- returns deoxygenated to the heart so it can be pumped to the lungs to be oxygenated.
- Arteries take blood away from the heart and veins take it to the heart.
- The heart has 2 sides one to pump deoxygenated blood to the lungs and one to pump oxygenated blood that has returned from the lungs to the body.
- Nutrients are transported around the body in the blood vessels
- Explain positive and negative affects diet, exercise, drugs and lifestyle can have on the body
- Recognise negative / positive effects of alcohol
- Investigate the effect of exercise on pulse rate – pulse increases when you exercise.

Resources: Developing Experts Year 6 – The heart and health

Red = Working Scientifically Green = links to previous topics and learning Underlined – Non statutory guidance