Science

Understanding the World

EARLY YEARS (Reception) AND KEY STAGE 1

Thematic challenge questions for Early Years (Reception)

Termly challenge questions for Year 1 and Year 2

"Together everyone achieves more"

	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
RECEPTION	What do I know about me? What happens to the trees in autumn? Why is it always cold in winter?		Why is exercise important? Who are the famous characters in our fairy tales?		What do seeds need to grow? Are all mini beasts scary? Who can I ask for help?	
YEAR 1	**What can you tell me about our bodies?**	**Why is my local environment always changing?**	**Are all of the animals in the world the same?**	**How can Ted stay dry?**	**What parts make up our flowers?**	**Which plants will we find in our local area?**
Seasonal Changes	Why are there so many leaves on the ground?	Why does it get darker earlier in winter?	What are the signs of Spring?	What are the signs of Spring?	How do the seasons impact what we do?	What do you need to become the next weather reporter?
YEAR 2	**What do animals, including humans, need to survive?**	**Who are the great scientists and what did they discover?**	**How can we rebuild London to prevent another Great Fire?**	**Do all animals have the same habitat?**	**Is a human's life cycle the same as an animals'?**	**Why do plants thrive on Earth?**

Reception Thematic Challenge Questions across the year

What do I know about me?	Why are there so many leaves on the ground?	Why is it always cold in winter?
Why is exercise important?	Who are the famous characters in our fairy tales?	
What do seeds need to grow?	Are all mini beasts scary?	Who can I ask for help?

EYFS LINKS **Understanding the World**	**Content Knowledge**	**Substantive Knowledge End Points**
Expressive Arts and Design Creating with Materials ·Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function. ·Share their creations, explaining the process they have used. **The Natural World** ·Explore the natural world around them, making observations and drawing pictures of animals and plants. ·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. ·Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.	Where do I live? Who lives with me? Comparing myself to when I was a baby and now (growth). Comparing environment changes in the world. Changes in the world around us and comparing environments; home, school and local area. Comparing winter and autumn. Investigating frost/ice and water. Materials – which material will be strongest for the Three Pigs new roof? Floating and sinking/waterproofing How can we help the Gingerbread man across the river? What would happen if the Gingerbread Man really fell into the river? Planting seeds and growing plants Experimenting with removing the needs of a plant. Life cycle of a sunflower How can we sort the minibeasts into groups? What is special about an insect? The lifecycle of a chick/butterfly How do the Police keep us safe? Why do some people wear special clothes for work?	To identify and recall similarities and differences by appearance (hair colour, eye colour) and likes and dislikes To identify changes from baby to now To name the seasons and identify autumn To explain what happens in autumn – leaves change colour, fall off the trees, weather is cooler To recall autumn colours - red, yellow, orange, brown To compare shape/patterns of leaves – round, pointed, flat, bumpy **To understand and explain hibernation.** **To understand how animals keep warm in winter - fur, fat** **To describe weather in winter time - cold, icy, frosty, blizzard, snow, icicles** **To recall clothes that are worn in winter time - hats, scarves, boots, gloves** **To explain how ice melts when temperature increases** **To investigate and recall how ice needs to be kept cold to stay frozen.** To recognise strong/weak materials To follow a recipe to make a gingerbread man recognising the changes that occur in the baking process. To understand how when wet the gingerbread man will go soggy and begin to break. To understand how seeds need soil, air, water, sunlight to grow. To recall how to plant a seed. To identify and recognise changes as a seed grows – name the roots, shoot, stem, leaves To understand the life cycle of a butterfly – egg, caterpillar, chrysalis, butterfly Do sort minibeasts recognising those that have wings/no wings Have legs/no legs To understand how insects have six legs Insects bodies are made up of three parts – thorax, abdomen, head, insects have two antennae. To understand how special clothes are worn to protect workers – police uniform, fire-fighters wearing heat proof and waterproof clothing, clothing that keeps workers safe – reflective clothing for when it is dark enabling workers to be seen and safe.

	Can you design a new coat so the Police/Firefighter can be seen at night? What is special about the gloves and boots a firefighter has to wear?	**Key Vocabulary** When I was younger …. Now I have …. I have different …. I have the same …. Family, parents, grandparents, siblings, brother, sister, Autumn, cooler, change, shapes, patterns, Temperature, cold, freezing, snow, ice, icicle, blizzard, slippy, freezing, melt, warm clothes, hat, gloves, scarves, boots strong, weak, materials, bake, mix, dissolve, carnivore, hunt, prey seed, compost, water, sunlight, air, grow, seedling, shoot, root, leaves, stem, flowers ladybird, slug, bee, snail, spider, caterpillar, butterfly, ant, grasshopper, Predator, prey, hunt, habitat, wings, web, threads, chrysalis, life cycle, thorax, abdomen, species Help, assist, support, protect, safe, uniform, heatproof, waterproof,

Year 1 Challenge Questions – AUTUMN TERM

What can you tell me about your bodies? **Why is my local environment always changing?**

NATIONAL CURRICULUM LINKS **Science**	**Content Knowledge**	**Substantive Knowledge End Points**
Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. Name some parts of the body that cannot be seen. **Seasonal Changes** Observe changes across the four seasons. Observe and describe weather **Working Scientifically.** Asking simple questions and recognising they can be answered in different ways observing deeply, using simple equipment performing simple tests identifying and classifying using their ideas and observations to suggest answers to questions gathering and recording data to help in answering questions	What are the names of the different body parts? Can you name some of the internal body parts? What are senses? How many senses do we have? How do our senses work? How can we find out? What happened when someone does not have all five senses? Can you explore your sense of smell? Can you explore your sense of taste? Can you explore your sense of hearing? Can you explore your sense of sight and touch? Why are there so many leaves on the ground in Autumn? What are the four seasons and when do they happen? Why does it get cold in winter? What are the characteristic of spring? Why don't we need to wear so many clothes in summer?	To know the different parts of the body that I can see (external) To know some parts of the body that can't be seen (internal) To know differences between living and non-living things. To identify the main parts of the human body and link them to their senses – eyes to see, ears to hear To name the four seasons and recognise changes in weather. I know the names and characteristics of each season I know about the weather associated with each season I know about and observe the changes in the seasons. I know some the more familiar symbols associated with weather maps **Key Vocabulary** ears, eyes, nose, mouth, arms, legs, head, skull, stomach, heart, fingers, toes, feet, hands etc. senses – see, hear, smell, touch, taste. Autumn, leaves, weather, weather related vocab, seasons, length, daylight, night, deciduous and evergreen, temperature.

Year 2 Challenge Questions – AUTUMN TERM

What do animals, including humans, need to survive? **Who are the great scientist and what did they discover?**

NATIONAL CURRICULUM LINKS **Science**	**Content Knowledge**	**Substantive Knowledge End Points**
Notice that animals, including humans, have offspring, which grow into adults Find out about and describe the basic needs of animals, including humans for survival (water, food and air); *Describe the importance for humans of exercise, eating the right amount of different types of food, and hygiene. Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, rock, brick, paper and cardboard for particular uses; **Working Scientifically** asking simple questions and recognising they can be answered in different ways observing deeply, using simple equipment performing simple tests identifying and classifying using their ideas and observations to suggest answers to questions gathering and recording data to help in answering questions	What do humans need to survive? What can I east to maintain a healthy lifestyle? How will an astronaut get what they need in space? What do astronauts do to keep healthy? Exercise/sleep/nutrition/hygiene Can you design a healthy meal? How do I look after my teeth? What is a scientist? What do they do? Who is Louis Pasteur and what did he discover? Who is Charles Macintosh and what did he invent? Who is John Dunlop and what did he discover? Who are the remarkable women of Science? Science of the future…What is wind power? What is renewable energy? Who discovered it? Why is it important? Look at wind turbines – where have you seen them? Can the children think of ways to make our school more energy efficient?	I can write questions about things I would like to discover (how do astronauts breathe? how do you eat in space?) I can say the basic needs of a human (air, food, water - sleep, shelter, exercise) I know the basic food groups - protein, carbohydrate, fats, sugars, dairy. I can describe a healthy diet-a mixture of protein, carbohydrates, a little sugar and fat. I know some foods are grown locally and others come from different countries (apples, strawberries, potatoes are grown in the UK, limes, ranges, bananas come from overseas) To name and discuss famous scientists and their accomplishments To know the work of Louis Pasteur and its importance on modern day life To know the work of Charles Macintosh and the importance of waterproof materials To know the work of John Dunlop and how the materials used impacted vehicles To know about the importance of renewable energy **Key Vocabulary** air balanced diet carbohydrate dairy diet exercise fats food fruit hygiene nutrition protein shelter survival vegetables water Scientist, Experiment, Germs, Waterproof, Vehicle, Wheels, Rubber, Renewable, Energy, Wind turbines.

Year 1 Challenge Questions – SPRING TERM

Are all of the animals in our world the same? **What are the signs of Spring?** **How can Ted stay dry??**

NATIONAL CURRICULUM LINKS **Science**	**Content Knowledge**	**Substantive Knowledge End Points**
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, including pets. Able to 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. **Working Scientifically.** Asking simple questions and recognising they can be answered in different ways observing deeply, using simple equipment performing simple tests identifying and classifying using their ideas and observations to suggest answers to questions gathering and recording data to help in answering questions.	What is a wild animal? Why would it not be sensible for all animals to live in England? How can we sort animals into different groups? How are humans different from most animals? Humans are reptiles. Do you agree or disagree? Convince me! All humans are omnivores? Do you agree or disagree prove it! Survey. What is a material? What materials can we use to keep Ted warm? Warmth experiment. What material would make a good house for Ted to live in? Focus on material properties – experiment exploring whether things bend/stretch etc. What uses do glass, wood, plastic and rocks have in building a house for Ted? Experiment with their properties. What should Ted's bed be made of? Explore soft/hard materials. How can Ted stay dry in the rain and safe in the sunlight? Waterproof experiment – have different materials and test whether they are waterproof. What sort of home would you build for Ted?	To identify and label a variety of common animals (Arctic and Antarctic). To identify and name a variety of common animals that are carnivores, omnivores and herbivores. To classify animals by what they eat (carnivore, omnivore, herbivore). To identify which materials are suitable for living conditions To identify different properties of various materials To apply their knowledge of materials to plan and build

Key Vocabulary

Carnivores and associated animals, herbivores and associated animals, omnivores and associated animals, meat and plants, blubber, Arctic and Antarctica, animal body parts, senses vocab.	Range of different materials, Wood, Plastic, Glass, Paper, Water, Metal, Rock, Hard, Soft, Bendy, Rough, Smooth, heated, melted, frozen, solid, liquid, brick, paper, fabrics, elastic, foil, vocab relating to senses, float, sink.

Year 2 Challenge Questions – SPRING TERM

How can we rebuild London to prevent another Great Fire? **Do all animals have the same habitat?**

NATIONAL CURRICULUM LINKS **Science**	**Content Knowledge**	**Substantive Knowledge End Points**
Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, rock, brick, 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. 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 microhabitats. Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. **Working Scientifically** asking simple questions and recognising they can be answered in different ways observing deeply, using simple equipment performing simple tests identifying and classifying using their ideas and observations to suggest answers to questions gathering and recording data to help in answering questions.	What materials is our school made from? What were the majority of buildings in the Great Fire made from? Why did the fire in London spread so quickly? Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, rock, brick, paper and cardboard for particular uses. Which materials would be best for a house? Explore houses in local area – what are they made from? How could we rebuild London? Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, rock, brick, paper and cardboard for particular uses; "All materials can be stretched." Prove it! To find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. How can we rebuild London to prevent another Great Fire? Children to design a city plan to rebuild London, explaining their choices of materials. Convince me -which is the most effective material and why? What is a habitat? Explore different habitats – match the animal to the habitat they think it's from. Look at examples. How do animals adapt to a habitat? Explore adaptation – how have some animals adapted in their adapt to survive? How is an ocean habitat different to a land habitat? Explore the key features of an ocean habitat vs. a land habitat – what are some similarities and differences? How do polar bears survive in the Arctic? How does a polar bear survive in the chilly Arctic? How have they adapted? What do they eat? Could they live elsewhere? How do animals get their food?	I can group materials into those that are natural and others that are man made. I can explain how materials are useful in different circumstances. I know that materials have different properties and understand how these determine how they are used. I know can investigate how to change the shape of some materials. I can recognise how properties of a material can cause something to happen - smooth - causes things to speed up, rough, bumpy will cause things to slow down. To know what a habitat is and how they differ for different species To know about how animals can adapt to meet their needs To know the difference between an ocean and land habitat To know how animals hunt for food to meet their basic needs **Key Vocabulary**

	Explore food chains and how animals eat other animals. Explore the names of each stage. Children to complete diagram of a food chain, with a predator on top. Why do animals need different habitats? Compare different habitats and explore how animals have different needs.	absorbent bend fabric Man made natural opaque properties purpose recyclable rough shiny smooth transparent translucent twist unsuitable waterproof	Animal Habitat Adaptation Ocean Land Food groups Hibernation Food chain Energy Predator Producer Consumer Decomposer

Year 1 Challenge Questions – SUMMER TERM

What parts make up our flowers? **Which plants will we find in our local area?**

NATIONAL CURRICULUM LINKS **Science**	**Content Knowledge**	**Substantive Knowledge End Points**
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**. Asking simple questions and recognising they can be answered in different ways observing deeply, using simple equipment performing simple tests identifying and classifying using their ideas and observations to suggest answers to questions gathering and recording data to help in answering questions	What parts make up our flowers? Have parts of a flower cut up – can children reorder? Do we know the names? Label and name the parts Additionally: children to plant flower in the garden and observe its growth. What is the role of each part of a plant? Children role play different parts / growth How does water travel through a plant? Put food dye into celery/plant – explore how it travels upwards. What is each part of the plant like? Go into school garden/local area – find some plants and bring back to class. Children to dissect plants – what do the different parts look like? What parts make up a tree? Explore tree parts and their role – have parts have mixed, can children put them in the correct order? How are trees different to flowers? Explore the structure of trees – how are they different/similar to flowers? Comparison table. What is a flowering plant? Name, identify and sort plants Look at a range of common flowering plants Flower hunt? Walk around the local area, how many different flower types do we have near our school? Take photographs / tick off on sheet What environment do some flowers need to grow? 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 What trees do we have in the local area? Name, identify and explain the characteristics of deciduous and evergreen trees – visit to Grange Park to identify trees.	Know and name a variety of common wild and garden plants. Know and name the petals, stem, leaves and root of a plant. Know the names of the birds in our school grounds. To name the petals, stem, leaf ,bulb, flower, seed, stem and root of a plant. To identify and name a range of common plants and trees. To recognise evergreen and deciduous trees. To name trunk, branches and root of tree. To name part of a flowering plant and describe them. To name the four seasons and recognise changes in weather. To observe and describe how day length varies. **Key Vocabulary** Common, wild plants, garden plants, deciduous, evergreen, trunk, branches, leaf, root, fruit, vegetables, bulb, seed, plant, leaves, bud, flowers, blossom, petals Common, wild plants, garden plants, deciduous, evergreen, trunk, branches, leaf, root, fruit, vegetables, bulb, seed, plant, leaves, bud, flowers, blossom, petals, pistol. Weather reporter, weather vocabulary

	Which plants and animals would we find around school? Leave trap of food in garden with a camera/iPad – record to see which animals are in the garden. Visit Grange Park and identify plants and animals that you can see – children can tick off plants/animals. What can we do to try and attract birds/insects to our school garden? Plant sunflower and monitor. Has it attracted more insects/animals to our garden?		

Year 2 Challenge Questions – SUMMER TERM

Is a human's life cycle the same as an animals'? **Why do plants thrive on Earth?**

NATIONAL CURRICULUM LINKS **Science**	**Content Knowledge**	**Substantive Knowledge End Points**
Notice that animals, including humans, have offspring which grow into adult Find out about and describe the basic needs of animals, including humans, for survival (air, food, water) Describe the importance for humans of exercise, eating the right amount of different types of food and hygiene. Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy observe and describe how seeds and bulbs grow into mature plants. Working Scientifically. Asking simple questions and recognising they can be answered in different ways observing deeply, using simple equipment performing simple tests identifying and classifying using their ideas and observations to suggest answers to questions gathering and recording data to help in answering questions	What is a living thing? Explore things that are living, once living and things that have never lived. Children to look at different animals/plants/objects and tick whether they were living, once living or never lived. What is the life cycle of a human? Explore different stages of our life: baby/toddler/child/teenager/adult/elderly. Cut and stick pictures and write descriptions for each stage. Baby photos from parents? Explore growth. Do animals have offspring like humans? Match offspring photos to adult animal. Explore offspring and the life cycles of different animals. What is the life cycle of a frog? Explore the life cycle of a frog – explore each stage and children to create diagram. Could order frogspawn? What is the life cycle of a chicken? Explore the life cycle of a chicken – explore each stage. Make comparison to frog life cycle – how is it different? Similar? How can humans stay healthy to ensure a long life? Explore basic needs for humans: diet, exercise, sleep, personal hygiene etc. "Chickens have the same life cycle as a human." Prove it! What do plants need to survive? Study what plants need to survive – water, light and a suitable temperature Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy Which plant will grow the healthiest?	To know the difference between something that is living, once living and never living. To know the life cycle of a human and the key characteristics of each stage. To know that animals have offspring that resemble the adult. To know the difference between a life cycle of an animal vs a human. To know the importance of staying healthy to prolong life. To know the main factors that plants need to survive To evaluate and discuss which conditions are the most important for a plants survival To know the difference between a seed and a bulb, including the life cycle **Key Vocabulary** Living thing Organism Alive Dead Once living Never living Life cycle Human Animal Offspring Healthy Balanced diet Exercise Sleep Personal hygiene Seed Bulb Water Light Temperature Warmth Sun Conditions Soil Life cycle

	Conditions experiment – plant cress seeds and observe their growth over time. Children to write out experiment including methodology, prediction and a table of results. Conditions: - one plant with normal conditions - one plant with no water - one plant with no light - one plant with no warmth - one plant with no soil How can we make this plant healthy? Children to become 'plant doctors' – bring in some plants that are lacking water/light/warmth etc. Can children identify what is wrong and give feedback to help it grow properly? Observe the change. What is a bulb? Show things that grow from bulb. Children to plant a bulb in garden and to observe stages as it grows and comes out of dormancy. What is the life cycle of a bulb? Explore life cycle of bulb and have children complete diagram – how are they different to a seed? What is the difference between a bulb and a seed? Children to explain and list main differences of a seed and bulb with examples. Why do plants thrive on Earth? Answer challenge question – what conditions on Earth make it suitable for plants to grow?		