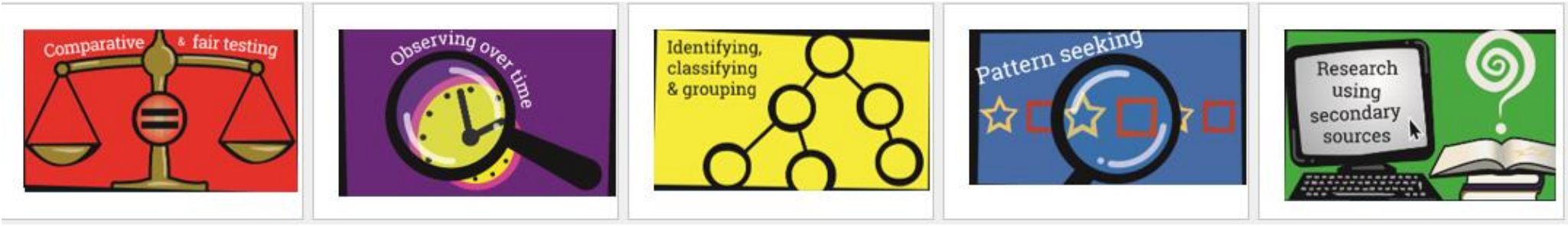
Kingfisher Hall
PRIMARY ACADEMY

Science knowledge and skills progression



Science National Curriculum Aims
The national curriculum for science aims to ensure that all pupils: • develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics • develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them • are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future

	Science
Intent	To enhance children's inquisitive nature and understand how science impacts our world and the future. Biology, chemistry and physics are sequenced and linked across the school with a focus on scientific enquiry. Children will develop a love of science and an ability to plan, observe, record, conclude and evaluate. From nursey to year six children will discover the wonders of science, develop scientific knowledge and conceptual understanding, be able to question, reason and make links to the world around them.

Characteristics of Scientists
• Great sense of excitement and curiosity about natural phenomena • The ability to think independently and raise questions about working scientifically and the knowledge and skills that it brings • Confidence and competence in the full range of practical skills, taking the initiative in, for example, planning and carrying out scientific investigations • Excellent scientific knowledge and understanding which is demonstrated in written and verbal explanations, solving challenging problems and reporting scientific findings • The ability to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes • Be familiar with, and use, technical terminology accurately and precisely, building up an extended specialist vocabulary • Apply their mathematical knowledge to their understanding of science, including collecting, presenting and analysing data

Curriculum sequence for Science

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
EYFS Year A	**Seasonal Changes** Explore natural materials – discuss changes and compare properties Explore the natural world and understand effect of changing seasons	***Science opportunities***	**Space** Compare materials and changes. Hands on exploration of materials with different properties. Identify light and dark, hot and cold. Begin to understand force. Explore the natural world around them – describe using senses to describe	***Science opportunities***	***Science opportunities***	**Under the Sea** Exploring scientific enquiry through hands on exploration of natural materials. Talk about what they see using a wide range of vocabulary. Recognise some environments that are different to where they live.
EYFS Year B	***Science opportunities***	***Science opportunities***	***Science opportunities***	**Here we go!** Knowing similarities and differences between the natural world and contrasting environments (exploring natural materials)	**In the garden** Begin to understand the needs to care for living things. Explore their surrounding natural world using the senses. Recognising some different environments and discuss seasonal changes.	**My World** Exploring scientific enquiry through knowledge and understanding of the World through an overall focus of history and geography
Year 1	**Seasonal Changes** Observing and describing changes / weather across the four seasons / day length.	**Everyday Materials** Classify, describe and compare everyday materials (wood, plastic, metal etc.)		**Plants** Identify and describe plants. Identify and name basic plant structure	**Plants** Identify and describe plants. Compare deciduous and evergreen.	**Animals Including Humans** The human body and senses – identify and name a variety of animals, their characteristics and diet
Year 2	**Animals Including Humans** Healthy humans: food, exercise, hygiene	**Animals Including Humans (pt 2)** Offspring into adults. Identify what animals need to survive.	**Everyday Materials** Identify and compare the suitability of materials. Discover how solid shapes can change.	**Plants** Observe and describe how seeds / bulbs grow and what plants need.		**Living Things and Their Habitats** Different habitats provide basic needs. Explore basic food chains. Classify alive, dead, never alive
Year 3	**Light** Shadows, reflected light, protection from sunlight, light sources, transparent / opaque.	**Rocks and Fossils** Classify and group rocks according properties.	**Rocks and fossils** Know how fossils are formed. Recognise soil formation	**Animals Including Humans** Identify the correct nutrition needed for animals and humans.	**Plants** Functions of parts of plants. Needs of varying plants. Plant life cycle. Water transportation.	**Forces & Magnets** Poles, magnetic field, magnetic materials, attract / repel, forces on different surfaces.

				Skeletons and muscles for support, protection and movement.		
Year 4		**Living Things and Their Habitats** Classification keys to group a range of living things. Recognise local and wider environments and know how these can change over time; proposing a threat to the habitat of living things.	**Animals Including Humans** Functions of: digestive system; teeth. Know prey, predators & producers	**States of Matter** Solids, liquids, gases. Change of state: heated / cooled. Water cycle, evaporation, condensation	**Electricity** Identify electrical appliances, components, conductors & insulators. Construct simple circuits.	**Sound** Sound vibrations. Patterns in pitch, volume and strength of vibration.
Year 5	**Materials** Comparing and grouping, dissolving and separation.	**Materials** Reversible and irreversible changes	**Forces** Gravity. Air and water resistance. Friction. Create mechanisms – varying level of force – levers and pulleys		**Earth and Space** Movement of Earth, planets, moon, sun. Earth rotation – night and day.	**Animals Including Humans** Human development: birth to old age **Living Things and Their Habitats** Plant and animal reproduction. Differences in life cycles.
Year 6	**Living Things and Their Habitats** Classify groups according to characteristics, plants, micro-organisms, animals	**Electricity** Varying voltage. Know how components function. Use symbols for circuit diagram.	**Evolution & Inheritance** Know how living things have changed over time – fossils as evidence. Compare offspring to parents. Adaptation to suit environment.	**Animals Including Humans** Circulatory system. Impact of diet, exercise, drugs and lifestyle. journey of nutrients and water.		**Light** Know how light travels. Light reflection Shadows. Understand how we see objects.

EYFS: Year A Autumn 2
Learning journey: Winter

	Disciplinary knowledge			
	Planning	Observing & measuring	Gathering & recording data	Reporting, presenting, communicating & evaluating findings
Links to Development Matters: **Understanding the World** **ELG: Natural World** The natural world (Understand some important processes and changes in the natural world including the seasons and changing states of matter) Nursery • Use the senses in hands on exploration of natural materials • Explore collections of materials with similar and/or different properties • Talk about what they see, using a wide vocabulary • Talk about the differences between materials and the changes they notice Reception • Explore the natural world around them (observing and interacting with natural processes) • Describe what they see, hear feel whilst outside • Understand the effect of changing seasons on the natural world around them	To ask how and why questions (Nursery) To be interested in how things work To have an idea of what might happen (Reception)	To make comparisons between different features (Reception) To discover similarities and differences (Nursery) To explore change (Nursery and Reception)	Children to take photographs to sequence (Nursery) Children to draw pictures of their observations (Reception) Children to be given opportunities to talk about what they have seen (recordings)	Children make comments about what they have heard and ask questions to clarify their understanding. (Nursery) They offer explanations for why things might happen, making use of new vocabulary. (Reception)
Substantive knowledge Nursery • To know that winter is a season • To know that ice can melt to water Reception • To know that melting requires a source of heat • To understand the seasonal features of winter • To know that in order to speed up the melting process, more heat is required.				
Prior Knowledge • Understanding the name of the four seasons				

Possible Enquiry Areas	
Nursery • What do you notice has happened to the trees? • How do you feel standing outside? (refer to senses) • What is the weather like today?	Reception • What is ice? Why is the water dripping? • Can you think of a gentle way to save the trapped penguins in ice? • Is there a quicker way to melt the ice? What will happen if we add hot water?

Key Vocabulary:
Nursery: day, morning, day, night, moon, sun, melt, hot, warm, ice, penguin
Reception: break, drip, smash, change, Seasons, winter, summer, spring, Autumn

EYFS: Year A Spring 1
Learning journey: space

Disciplinary knowledge

Planning	Observing & measuring	Gathering & recording data	Reporting, presenting, communicating & evaluating findings
To ask how and why questions (Nursery) To be interested in how things work To have an idea of what might happen (Reception)	To make comparisons between different features (Reception) To discover similarities and differences (Nursery) To explore change (Nursery and Reception)	Children to take photographs to sequence (Nursery) Children to draw pictures of their observations (Reception) Children to be given opportunities to talk about what they have seen (recordings)	Children make comments about what they have heard and ask questions to clarify their understanding. (Nursery) They offer explanations for why things might happen, making use of new vocabulary. (Reception)

Links to Development Matters: **Understanding the World**

ELG: Natural World 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 own experiences and what has been read in class

Nursery
- Use all their senses in hands-on exploration of natural materials.
- Talk about what they see, using a wide vocabulary.

Reception
- Recognise some environments that are different from the one in which they live.
- Comments and asks questions about aspect of their familiar world such as the place where they live or natural world

Substantive knowledge

Nursery
- To know you can find rocks on the moon
- To know that an astronaut can travel to space using a rocket

Reception
- To know there are other planets in our solar system
- To know that scientists are trying to find out if there is life on mars
- To know an astronaut needs to wear a space suit to travel to space
- To know that Mars is a rocky planet
- To know Mars is a cold planet

Prior Knowledge
- To be able to name some occupations
- Can talk about their own immediate environment and how environments might vary from one another

Possible Enquiry Areas

Nursery
- What do you notice in this picture?
- What items can you see? (Photo)
- What do you notice about the items in the space box? How do they feel?
- Can you drive a car to space? Why not?
- Why is a space suit important to wear to space?

Reception
- Can you live on Mars? Why not?
- Can you live on the sun? Why not?
- What is special about planet Earth?
- What can you find in space?

Key Vocabulary:

Nursery: Space, planet, Earth, Mars, Sun, astronaut, stars, rocket, sand, zoom, planet

Reception: spaceship, space rover, blast, 5,4,3,2,1 BLAST OFF, alien, spaceman, universe, Mars, Mercury, Venus

Year 2: Autumn 1 (Part 1)
Animals including Humans

Scientific skills			
Planning	Observing & measuring	Gathering & recording data	Reporting, presenting, communicating & evaluating findings

National Curriculum Links:

- Understanding the importance of exercise and nutrition for humans, hygiene

Knowledge (based on NC content)

- Know the basic food groups and list items that belong to such food groups
- Know what humans need to stay healthy
- Understand the importance for humans to exercise
- All animals and humans, have the basic needs of feeding, drinking and breathing to survive.
- To grow into healthy adults, children also need the right amounts and types of food and exercise.
- Know that good hygiene is important in preventing infections and illnesses.

Prior Knowledge

identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans)
• Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans)

Planning	Observing & measuring	Gathering & recording data	Reporting, presenting, communicating & evaluating findings
Explore the world around them and raise their own simple questions Experience different types of scientific enquiries including practical activities Asking simple questions and recognising that they can be answered in different ways	Use simple features to compare objects, materials and living things (with support) to sort and group Observe closely using simple equipment (with support) Observe changes over time	Ask people questions and use simple secondary sources to find answers Use simple measurements and equipment to gather data Record simple data	With support, begin to notice patterns and relationships Use their observations and ideas to suggest answers to questions Talk about what they have found out and how they found it out With support, begin to record and communicate findings in a range of ways Begin to use simple scientific language

Key Vocabulary:

Balanced, diet, fat, sugars, starch, vegetable, meat, fish, air, exercise, grains, beans, breathing, heartbeat, bread, rice, pasta, hygiene, germs, disease dairy, nuts, lifestyle, activity, heart, medicine, water, food

Possible Enquiry Questions:

Identifying and Classifying	How could we group different types of foods?
Pattern Seeking	Which exercise gets our heart pumping the most?
Observing Over Time	How much food and drink do I have over a week?
Research	What food do you need in a healthy diet and why?
Comparative Test	Do bananas make us run faster?

Year 4: Living Things and Their Habitats Autumn 2	Scientific skills			
	Planning	Observing & measuring	Gathering & recording data	Reporting, presenting, communicating & evaluating findings
National Curriculum Links: • 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 **Knowledge (based on NC content)** • Know that local habitats change throughout the year • Know what an organism is and how they may be grouped including a wider selection of animals and flowering/non-flowering plants from our local area • Know what a vertebrate and invertebrate is • Know the names of living things that are classified as vertebrates /invertebrates • Explain how classification keys help group living things in the local area (forty hall) • Know and identify the positive effects of nature reserves, garden ponds and the negative effects of population and development, litter or deforestation using our woodland walk as an example. **Prior Knowledge** • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants) • Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants) • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals including humans) • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 – Animals, including humans) • Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 - Living things and their habitats)	Explore the world around them and raise their own simple questions (considering prior knowledge) Experience different types of scientific enquiries, including practical activities, using a range of resources and self-planning how to answer enquiry questions. Set up simple practical enquiries, comparative and fair tests, deciding how to set it up Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations	Make systematic and careful observations Choose which observations to make, the length of observations and type of equipment that may be used Look for patterns and relationships Take accurate measurements using standard units Learn how to use a range of equipment incl. data loggers/ thermometers	Decide what data to collect to identify patterns and relationships Collect and record data from own observations and measurements in a variety of ways (notes, bar charts, tables, labelled diagrams, keys)	With support, look for changes, patterns, draw simple conclusions and answer questions, similarities and differences in data Use relevant simple scientific language to discuss ideas and communicate findings in ways that are appropriate for different audiences, including oral and written explanations, displays, presentations, results and conclusions Identify new questions arising from the data, making predictions for new values within/beyond the data they have collected Use evidence to support or contradict a prediction. Finding ways to improve the experiment

Key Vocabulary:
Habitats, classification key, vertebrates, invertebrates, environment, organism, population, pollution, deforestation, biome, vegetation, variation, positive/negative impact, dominant, region, environmental anemometer, fungus, barometer, mould, classification, environment, habitat, human impact, positive, negative, migrate, hibernate

Possible Enquiry Questions:	
Identifying and Classifying	Can we use the classification keys to identify all the animals in our local area?
Pattern Seeking	Is there a pattern in the habitats of vertebrates and invertebrates? How has the use of insecticides affected bee population?
Observing Over Time	How does the variety of invertebrates on the school field change over the year?
Research	How have habitats been affected by housing developments?
Comparative Test	Which type of habitat (forest, pond, or grassland) supports the greatest variety of plant and animal life?