The Science Curriculum at Barrow CE Primary

Science Intent

At Barrow CE Primary School, our Christian vision of **"Let Your Light Shine" (Matthew 5:16)** is central to our Science curriculum. We believe that science provides children with the opportunity to explore the wonder and complexity of God's world, developing curiosity, awe and a deeper understanding of the natural and human-made environments around them.

Our Science curriculum aims to build secure foundations of scientific knowledge through the key strands of Biology, Chemistry and Physics. As science continually shapes our lives and influences areas such as technology, energy and medicine, we believe all pupils should develop the knowledge, skills and confidence needed to understand the world around them and make informed choices about the future.

Through practical experiences and a wide range of scientific enquiries, children are encouraged to ask questions, explore possibilities, think critically and communicate their ideas with confidence. By nurturing curiosity, resilience and a willingness to investigate, we empower pupils to become independent learners who recognise the importance of science in the wider world and are inspired to use their talents to let their light shine.

Science Implementation

Our Science curriculum is carefully designed to develop both scientific knowledge and understanding alongside scientific enquiry skills. Through engaging, practical and enquiry-led learning, children are given opportunities to explore, investigate and discover, allowing every child to flourish and develop as a young scientist.

In the Early Years Foundation Stage (EYFS), Science is taught through the *Understanding the World* area of learning. Through play, exploration and first-hand experiences, children develop a sense of wonder about the world around them. They are encouraged to observe, ask questions, make predictions and investigate their own ideas, laying the foundations for future scientific learning.

From Years 1 to 6, Science is taught through an enquiry-based approach and, where appropriate, is linked to high-quality English texts to deepen understanding and provide meaningful contexts for learning. Learning sequences are carefully planned to build upon prior knowledge and skills, taking into account seasonal opportunities and ensuring progression throughout the school.

Children develop their understanding of scientific concepts through the key areas of Biology, Chemistry and Physics, including topics such as Living Things, Materials, Forces, Earth and Space and Animals including Humans. Subject-specific vocabulary is explicitly taught and embedded within lessons, enabling pupils to communicate their scientific understanding accurately and confidently.

Throughout their learning, pupils use a range of scientific enquiry skills to answer questions and develop their understanding:

- Making observations over time.
- Seeking patterns.
- Identifying, classifying and grouping.

- Carrying out comparative and fair tests.
- Researching using secondary sources.

Each lesson has a clear scientific focus, with knowledge and enquiry skills revisited and developed with increasing depth and challenge as children move through the curriculum. Practical investigations and hands-on experiences allow pupils to make discoveries, develop resilience when results do not go as expected and learn from their observations.

Assessment opportunities are carefully woven throughout each unit, enabling teachers to identify misconceptions, celebrate achievements and support children in taking the next steps in their learning. Lessons are appropriately adapted to provide support and challenge for all pupils, ensuring that every child has the opportunity to succeed and let their light shine.

In Key Stage 1, pupils are encouraged to be naturally curious, asking questions about the living and physical world they observe around them and using simple scientific enquiries to explore their ideas. In Key Stage 2, pupils deepen their scientific understanding by making increasingly careful observations, drawing upon prior learning, selecting appropriate methods of enquiry and using evidence to explain their conclusions.

Science Impact

The impact of our Science curriculum is evident in pupils who know more, remember more and can explain more about the scientific world around them. Children leave each unit with a secure understanding of key knowledge, scientific vocabulary and enquiry skills, enabling them to make meaningful connections between their learning and the world they live in.

Assessment of impact takes place through a range of approaches, including end-of-unit tasks, quizzes, written assessments, practical investigations and opportunities for pupils to communicate their scientific thinking. Regular Assessment for Learning (AFL), discussion and feedback support pupils in addressing misconceptions, reflecting on their progress and developing confidence in their abilities.

A consistent scientific environment across the school, where key vocabulary is displayed, spoken and celebrated, supports children in becoming confident communicators and thoughtful scientists. Through learning walks, book scrutiny, pupil voice and ongoing curriculum monitoring, the Science lead ensures that teaching remains high quality and continually develops to meet the needs of all learners.

By the time pupils leave Barrow CE Primary School, they will be curious, knowledgeable and confident scientists who understand the relevance of science in everyday life and the wider world. They will possess the enquiry skills, resilience and enthusiasm to continue exploring new ideas, making informed choices and using their knowledge and talents to let their light shine and make a positive difference in society.

Barrow CE Science Curriculum Overview

Class	Autumn		Spring		Summer	
Acorn (Y1&Y2) Cycle A	**Everyday Materials** What is our school made of?	**Seasonal Changes** Autumn/Winter	**Animals including Humans** How can we group different animals?	**Seasonal Changes** Spring walk and weather	**Plants** Which plants and birds would we find in Barrow?	**Seasonal Changes** Spring/Summer
Acorn (Y1&Y2) Cycle B	**Biodiversity** What would we find on a minibeast hunt?	**Living Things and their Habitats** What is a habitat?	**Materials** How do we make use of materials?	**Animals including Humans** How do animals change as they grow?	**Plants** What do plants need in order to grow?	
Willow (Y3,4) Cycle A	**Animals including Humans (Yr3)** What do animals need in order to grow, to be strong and to be healthy?	**Light** How does light help us to see?	**Plants** What do plants need to grow well?	**Forces and Magnets** How do magnets work?	**Electricity** Watts in a circuit?	**Reduce, Reuse and Recycle** What are the 3Rs?
Willow (Y3,4,) Cycle B	**Animals including Humans (Yr4)** What happens to the food we eat?	**Sound** How does sound travel to our ear?	**Living things and their habitats** How can we group and organise living things?	**Rocks** What do rocks tell us about the way the earth was formed?	**States of matter – Solids Liquids, Gas** What's the matter?	**Scientists and Inventors**
Willow (Y5 &6) Cycle A	**Animals Including Humans (Yr6)** Why is our heart the most important pump that we own?	**Light** How do we see different colours?	**Living things and their habitats (Yr5)** Do all animals start off as an egg?	**Forces** What is gravity and how was it discovered?	**Properties and changes of materials** Are all changes permanent?	**Electricity** Why do some circuits work and others don't?
Willow (Y5&6) Cycle B	**Evolution and Inheritance** Have we always looked like this?		**Living things and their Habitats (Yr6)** Are you a survivor? Classification/Micro-organisms	**Earth and space** Will we ever send another human to the Moon?	**Animals including Humans (Yr5)** How different will you be when you are as old as your Grandparents?	**Scientists and Inventors** Who are the scientists who have had most impact on our science learning this year?

Class/Cycle	Term	Question	Topic	Key Knowledge	Working Scientifically	Vocabulary/ suggested texts
Acorn (Y1&Y2) Cycle A	Autumn 1	What is our school made of?	Everyday Materials	Key Knowledge • Distinguish between an object and the material from which it is made. • Describe the simple physical properties of everyday materials • Compare and group together a variety of everyday materials on the basis of their simple physical properties. • Know how materials can be changed by squashing, bending, twisting and stretching • Know why a material might or might not be used for a specific job. • Identify and name a range of materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard. • Understand the advantages and disadvantages of some common materials	See progression map below, plus: • Observing closely, identifying and classifying the uses of different materials, and recording their observations. • Performing simple tests to explore questions, for example: 'What is the best material for an umbrella? ...for lining a dog basket? ...for curtains? ...for a bookshelf? ...for a gymnast's leotard?'	Metal, plastic, wood, paper, glass, clay, rock, fabric, sand, hard, soft, rough, smooth, shiny, dull, magnetic, transparent, bendy, waterproof, strong Words and phrases for making comparisons e.g. the same as, different from, harder, smoother Texts 'Look inside things that go' by Usborne books 'The most magnificent thing' by Ashley Spires 'Look inside how things work' by Usborne books

Class/Cycle	Term	Question	Topic	Key Knowledge	Working Scientifically	Vocabulary/ suggested texts
Acorn (Y1&Y2) Cycle A	Autumn 2	Why are there so many leaves on the ground?	Seasonal Changes	• name the four seasons • name different types of weather • make observations about the weather • describe the weather associated with • each season • collect and record simple data • make simple observations about changes across the seasons	See progression map below plus • Asking simple scientific questions. • Using simple equipment to make observations. • Carrying out simple tests. • Identifying and classify things. • Explaining to others what I have found out. • Using simple data to answer questions	season summer winter autumn spring day daytime weather wind rain snow hail sleet fog sun hot warm cold <u>Texts</u> 'The Rabbit Problem' by Emily Gravett 'The Story Orchestra: Four Seasons' Jessica Courtney Tickle

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Acorn (Y1&Y2) Cycle A	Spring 1	How can we group different animals?	Animals including Humans	• Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. • Describe and compare the observable features of animals from a range of groups. • Name and identify animals that are herbivore, carnivore or omnivore. • Name and locate parts of the human body and begin to make suggestions about what some parts of the body do. • Name the five senses and the part of the body they are related to	See progression map below plus: • Children observe and identify animals in the world around them. With a support resource, they sort and classify them into simple groups. • Children make careful observations of animals in the same group and can use simple features to compare animals • Children use simple sorting diagrams to sort and classify objects (animals) into simple groups of their choice and are beginning to explain why they have sorted them this way	Reptiles Fish Amphibians Mammals Birds Herbivore Carnivore Omnivore Hearing, taste, sight, touch, smell <u>Texts</u> 'Bog Baby' by Jean Willis Giraffes can't dance by Giles Andreae The Gruffalo Norman the slug with the silly shell by Sue Hendra Where is the sheep green? By Mem Fox You be you by Linda Kranz The same but different too by Karl Newson

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Acorn (Y1&Y2) Cycle A	Spring 2	What do we see on a spring walk?	Seasonal Changes Spring Walk and Weather	• Observe and describe weather associated with the seasons and how day length varies. • Observe changes across the four seasons. • Observing closely using simple equipment. To identify seasonal changes. • Know about the type of weather in each season	See progression map below plus: • Pupils should ask people questions and use simple secondary sources to find answers. • They should use simple measurements and equipment (for example, hand lenses, egg timers) to gather data, carry out simple tests, record simple data, and talk about what they have found out and how they found it out. • With help, they should record and communicate their findings in a range of ways and begin to use simple scientific language.	Seasons, spring, summer, plant, tree, flower, leaf, blossom, bud, seedling, insect, bee, butterfly, bird, weather, wind, sun, cloud, warm, cold. <u>Texts</u> 'The Growing Story' by Ruth Krauss 'What can you see in Summer' by Sian Smith 'I Wish You More' by Amy Krouse Rosenthal

Class/Cycle	Term	Question	Topic	Key Knowledge	Working Scientifically	Vocabulary/ suggested texts
Acorn (Y1&Y2) Cycle A	Summer 1	Which plants and birds would we find in Barrow?	Plants	• Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees • Identify and describe the basic structure of a variety of common flowering plants, including trees • Know and explain how seeds and bulbs grow into plants. • Know what plants need in order to grow and stay healthy (water, light & suitable temperature). • Identify and name plants and animals in a range of habitats. • Recognise some seeds and associate them with trees, e.g., horse chestnut. • Know which animals are woodland creatures	See progression map below plus: • Observing closely, perhaps using magnifying glasses, and comparing and contrasting familiar plants. • Describing how they were able to identify and group them, and drawing diagrams showing the parts of different plants including trees. • Pupils might keep records of how plants have changed over time, for example the leaves falling off a plant and buds opening; and compare and contrast what they have found out about different plants.	Common, Wild plants, Garden plants, Deciduous, Evergreen, Plant, Leaf, Root, Leaves, Bud, Flower Blossom, Petal, Stem Fruit, Vegetable, Bulb, Seed <u>Texts</u> 'The Wonky Donkey' by Craig Smith 'A Seed in Need' by Saviour Pirotta 'Harry the Happy Mouse' by N.G.K. 'Flower Fairies of the Summer' by Cicely Mary Barker

Class/Cycle	Term	Question	Topic	Key Knowledge	Working Scientifically	Vocabulary/ suggested texts
Acorn (Y1&Y2) Cycle A	Summer 2	What's the weather like in each of the four seasons?	Seasonal Changes	• describe how things change between seasons. • describe what happens in summer and how to stay safe in the sun. • Compare the four seasons	• Observe and describe weather associated with the season and how day length varies • Observing closely using simple equipment. • Gathering and recording data to help in answering questions. • To use data to suggest answers about how daylight hours vary.	Seasons, spring, summer, weather, daylight

Class/Cycle	Term	Question	Topic	Key Knowledge	Working Scientifically	Vocabulary/ suggested texts
Acorn (Y1&Y2) Cycle B	Autumn 1	What would we find on a minibeast hunt?	Biodiversity	• identify and name a variety of minibeasts and their habitats. • explain the importance of bees and pollination. • Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain • describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. • To describe the importance of worms for healthy soil. • explain the importance and needs of minibeasts and microhabitats.	• observe the natural world around them by making careful observations, using simple equipment. • gather and record data in a variety of ways to help in answering questions, such as simple tables. • begin to draw simple conclusions. • use simple secondary sources to find answers.	Minibeast, decomposer, invertebrate, predator, pollinator, habitat, microhabitat, biodiversity, Ecosystem, depend, food chain,

Class/Cycle	Term	Question	Topic	Key Knowledge	Working Scientifically	Vocabulary/ suggested texts
Acorn (Y1&Y2) Cycle B,	Spring 2	How do animals change as they grow?	Animals including Humans	• Identify and match several animal offspring and their adult forms. • Describe the main characteristics of the offspring found in different animal groups. • Describe the main stages of at least two different animal life cycles and start to compare them • Identify several ways that humans grow and develop through each life cycle stage. • Name the three basic needs of all animals to survive. • Describe the specific needs of a given animal • Describe the effects of exercise and its importance for the human body • Identify several foods according to the basic food groups • Talk about the importance of a balanced diet. Explain how to be hygienic and why this is important	See progression map below plus: • Children to conduct a survey to see how many children eat at least one piece of fruit each day and which is the most popular fruit. Observing, asking questions about what humans need to stay healthy	Offspring, grow, adults, survival, water, food, air, exercise hygiene, nutrition, reproduce, egg, chick, chicken ,caterpillar, pupa, butterfly, spawn tadpole frog, lamb sheep baby, toddler, child, teenager adult <u>Texts</u> 'Growing and Changing: All about Life Cycles'by Ruth Owen 'Monkey Puzzle' by Julia Donaldson 'Animal Babies' Martin Jenkins and Jane McGuinness 'Tad' Benji Davies

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Acorn (Y1&Y2) Cycle B	Summer	What do plants need to stay healthy?	Plants Twinkl Unit Yr2 What plants need to stay healthy	• Suggest what they think a plant needs to grow and stay healthy. • Dissect and observe a seed, explaining which parts will grow into a plant and which part is its food. • Order the life cycle of a plant and begin to explain what happens at each stage. • Explain that plants need water, light and a suitable temperature to grow and stay healthy. • Explain what happens if a plant does not get everything it needs.	See progression map below plus: • Pupils might work scientifically by: observing closely, perhaps using magnifying glasses, and comparing and contrasting familiar plants: • describing how they were able to identify and group them, and drawing diagrams showing the parts of different plants including trees • Pupils might keep records of how plants have changed over time, for example the leaves falling off a plant and buds opening; and compare and contrast what they have found out about different plants.	wild plants, garden plants deciduous, evergreen, leaf root, bud, flowers, blossom petals, root stem, tree, trunk, branches, fruit vegetables, bulb, seed water, light, suitable temperature, germination reproduction, grow <u>Texts</u> Jack and the Beanstalk Stuck Oliver Jeffries Each Peach Pear Plum Janet and Alan Ahlberg The Giving Tree Shel Silverston
Willow Year 3&4 Cycle A	Autumn 1	What do we need to grow, be strong and stay healthy?	Animals including Humans (Yr3)	• Know about the importance of a nutritious, balanced diet • Know how nutrients, water and oxygen are transported within animals and humans • Know about the skeletal and muscular system of a human	• Identifying and grouping animals with and without skeletons and observing and comparing their movement • Exploring ideas about what would happen if humans did not have skeletons.	Nutrition, vitamins, minerals, fat protein, carbohydrates, fibre, water, skeletons, support, protection, skull brain ribs heart lungs movement joint muscles pull contract relax diet

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Willow Year 3&4 Cycle A	Autumn 2	How does light help us see?	Light	• We need light to be able to see things • Light travels in a straight line • When light hits an object, it is reflected (bounces off) If this then hits our eyes, we can see the object • Some surfaces and materials reflect light well and can be very useful • A shadow is formed when light is blocked by an opaque object. • Pupils control the amount of light entering the eye.	See progression map below plus: • Investigate which surfaces reflect light • Use a mirror to reflect light and explain how it works • Investigate which materials best block light and would be best for curtains for a baby's bedroom. • Find patterns when investigating how shadows change size	Light, light source, dark, reflection, reflect, reflective, ray, pupil, retina, shadow, opaque, translucent transparent,
Willow (Y3/4) Cycle A	Spring 1	What do plants need to thrive in our local environment?	Plants	• name the different parts of flowering plants and explain their jobs. • That plants require air, light, water, nutrients from soil, and room to grow in order to thrive • Explain the way in which water is transported within plants • Identify and name different parts of a flower Describe the different stages in the life cycle of a flowering plant.	• set up an investigation to find out what plants need to grow well, record observations and present results using scientific language. • Investigate the way water is transported within a plant by observing the transport of food colouring through a flower stem • Explore the parts of a flower using dissection and observation.	Roots, stem, leaves, flowers, nutrients, evaporation, fertilization, petal, stamen, carpel, sepal, pollination, pollinator, germination, seed dispersal, <u>Texts</u> 'The Promise' by Nicola Davies 'Night Gardener' by Fan Brothers

Class/Cycle	Term	Question	Topic	Key Knowledge	Working Scientifically	Vocabulary/ suggested texts
Willow Year 3&4 Cycle A	Spring 2	How do magnets work?	Forces and Magnets	• Identify the type of force required to carry out an action. • Know that different surfaces create different amounts of friction • Explain that magnets produce an invisible • pulling force. • Identify magnetic materials. • Identify different types of magnet. • Know that like poles repel and opposite poles attract	See progression map below, plus: • Investigate the force of friction produced by different surfaces. • Investigate the strength of different magnets • Construct a bar chart of their results. • Explain their predictions and conclusions using key words or prompts.	Forces, friction, surface, magnet, magnetic, magnetic field, poles, repel, attract

Class/Cycle	Term	Question	Topic	Key Knowledge	Working Scientifically	Vocabulary/ suggested texts
Willow Year 3&4 Cycle A	Summer 1	Watts in a Circuit?	Electricity	• define what an electrical appliance is and identify those that are mains or battery powered. • identify different circuit components and explain what they do. • build series circuits, identifying and explaining whether they are complete or incomplete. • explain what electrical conductors and insulators are and give several examples of these. • identify several different switches and explain how switches work in a circuit. • apply their knowledge of electricity to different situations.	See progression map below plus: . group and classify things (appliances) and record their findings using labelled diagrams. • use a range of (electrical) equipment and record findings using labelled diagrams. • make predictions, use a range of(electrical) equipment and draw simple conclusions from their results. • With some guidance, decide how to set up a simple practical enquiry, make predictions and draw simple conclusions from their results. • report and present their results and conclusions to others in oral forms. • use straightforward scientific evidence to answer questions and identify similarities, differences, patterns and changes relating to simple scientific ideas and processes	Electricity, appliances, battery, circuit, mains electricity, electrical conductor, electrical insulator, cell, bulb, buzzer, wires, motor, switch

Class/Cycle	Term	Question	Topic	Key Knowledge	Working Scientifically	Vocabulary/ suggested texts
Willow Year 3&4 Cycle A	Summer 2	What are the 3Rs?	Reduce. Reuse and Recycle	• To know that the amount of waste produced around the world is increasing. • Waste comes in many different forms and includes food, packaging, clothing, single-use items and electronics • Waste can contribute to many different environmental issues including pollution, use of non-renewable resources, habitat loss and climate change through the production of greenhouse gases • Litter and pollution can be dangerous for humans and biodiversity. • A carbon footprint is the measure of carbon emissions that are released from daily activities. Following the 3Rs – reducing waste, reusing items and recycling – can help lower your carbon footprint	See progression map below plus: • Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions, e.g. examining the waste produced from a typical lunchbox. • To plan and set up a simple comparative test for plant growth • To make recommendations to reduce our carbon footprint. • To analyse rainfall data and use it to answer a scientific question. • To use results from a comparative test to draw conclusions	Waste, biodegradable, sustainable, landfill, reduce, reuse, recycle, decompose, biodiversity, pollution, renewable, non-renewable, greenhouse gas, greenhouse effect, climate change,, carbon footprint.

Class/Cycle	Term	Question	Topic	Key Knowledge	Working Scientifically	Vocabulary/ suggested texts
Willow (Yr 5&6) Cycle A	Autumn 1	Why is our heart the most important pump that we own?	Animals including Humans (Yr 6)	• Identify and name the main parts of the human circulatory system • Know the function of the heart, blood vessels and blood • Know the impact of diet, exercise, drugs and lifestyle on health • Know the ways in which nutrients and water are transported in animals, including humans	See progression map below plus: • Explore the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health. • Set up an investigation to find out about the impact of exercise on the body. • To be able to record, report and present results appropriately	circulatory system heart, blood, blood vessels, pumps oxygen carbon dioxide, lungs, nutrients, water, diet exercise, nutrition drugs, lifestyle Texts Pig Heart Boy by Malorie Blackman
Willow (Yr 5&6) Cycle A	Autumn 2	How do we see different colours?	Light	• Know how light travels • Know and demonstrate how we see objects • Know why shadows have the same shape as the object that casts them • Know how simple optical instruments work e.g. periscope, telescope, binoculars, mirror, magnifying glass etc.	See progression map below plus: • investigate how refraction changes the direction in which light travels. • design and make a periscope and using the idea that light appears to travel in straight lines to explain how it works. • investigate how light enables us to see colours. • investigate the relationship between light sources, objects and shadows by using shadow puppets	reflect, reflection, Light source, object, shadow, mirror, ray periscope, rainbow, filter, opaque, translucent, transparent, refraction, visible spectrum, prism Texts Link to play scripts where shadow puppets can be created to act them out

Class/Cycle	Term	Question	Topic	Key Knowledge	Working Scientifically	Vocabulary/ suggested texts
Willow (Yr 5&6) Cycle A	Spring 1	Do all animals start off as an egg?	Living Things and Their Habitats (Yr 5)	• Know the life cycle of different living things e.g. mammal, amphibian, insect and bird • Know the differences between different life cycles • Know the process of reproduction in plants • Know the process of reproduction in animals	See progression map below plus: • observe and compare the life cycles of plants and animals in their local environment with other plants and animals around the world (in the rainforest, in the oceans, in desert areas and in prehistoric times), • ask pertinent questions and suggest reasons for similarities and differences.	Life cycle Mammal Amphibian Insect Bird David Attenborough Jane Goodall Sexual reproduction Asexual reproduction Prehistoric Similarities Differences
Willow (Yr 5&6) Cycle A	Spring 2	What is gravity and how was it discovered?	Forces	• Know what gravity is and its impact on our lives • Identify and know the effect of air and water resistance • Identify and know the effect of friction • Explain how levers, pulleys and gears allow a smaller force to have a greater effect	• Explore falling paper cones or cup-cake cases, and design and make a variety of parachutes, • Carry out fair tests to determine which designs are the most effective. • Explore resistance in water by making and testing boats of different shapes. • Design and make artefacts that use simple levers, pulleys, gears and/or springs and explore their effects.	Gravity, air resistance Water resistance Friction, surface, force Effect, move, accelerate Decelerate, stop change direction, brake mechanism, pulley gear spring theory of gravitation Galileo Galilei Isaac Newton <u>Texts</u> 'The Man Who Walked Between the Towers' by Mordicai Gerstein

Class/Cycle	Term	Question	Topic	Key Knowledge	Working Scientifically	Vocabulary/ suggested texts
Willow (Yr 5&6) Cycle A	Summer 1	Are all changes permanent?	Properties and changes of Materials.	• Compare and group materials based on their properties (e.g. hardness, solubility, transparency, conductivity, [electrical & thermal], and response to magnets • Know and explain how a material dissolves to form a solution • Know and show how to recover a substance from a solution • Know and demonstrate how some materials can be separated (e.g. through filtering, sieving and evaporating) • Know and demonstrate that some changes are reversible and some are not • Know how some changes result in the formation of a new material and that this is usually irreversible	• compare materials according to their properties. • compare and group together everyday materials on the basis of their thermal conductivity by investigating thermal conductors and insulators • To compare and group together everyday materials on the basis of their solubility by investigating dissolving. • use different processes to separate mixtures of materials. • identify and explain irreversible chemical changes	Materials, solids, liquids, gases, melting, freezing, evaporating, condensing, conductor, insulator, transparancy
Willow (Y3,4,5 &6) Cycle A	Summer 2	Why do some circuits work and others don't?	Electricity	• explain how our understanding of electricity has changed over time • draw circuit diagrams using the correct symbols and label the voltage correctly;	• Plan and conduct an investigation of the relationship between wire length and the brightness of bulbs or the loudness of buzzers • decide how to report their findings; • make new predictions based on the previous results; • Select an appropriate scientific enquiry.	Circuit, symbol, cell, battery, current, amps, voltage, resistance, electrons, motor, buzzer, switch

Class/Cycle	Term	Question	Topic	Key Knowledge	Working Scientifically	Vocabulary/ suggested texts
Willow (Yr 3&4) Cycle B	Autumn 1	What happens to the food we eat?	Animals including Humans (Yr3)	• Identify and name the parts of the human digestive system • Know the functions of the organs in the human digestive system • Identify and know the different types of human teeth • Know the functions of different human teeth • Use and construct food chains to identify producers, predators and prey	See progression map below plus: • Comparing the teeth of carnivores and herbivores, and suggesting reasons for differences; • Finding out what damages teeth and how to look after them. • Draw and discuss their ideas about the digestive system and compare them with models or images.	Mouth Tongue Oesophagus Salivary glands Teeth Large intestine Small intestine Pancreas Liver Stomach Swallow Chew Rectum Colon Anus Incisors Canines Pre molars Molars Digestion Carnivores Herbivores Plaque Fluoride Root Dentine Enamel Gums Calcium Texts The Incredible Book Eating Boy by Oliver Jeffers
Willow (Yr3&4) Cycle B	Autumn 2	How does sound travel to our ear?	Sound	• 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. •	Build instruments out of every day equipment, including elastic bands and pots, twanging rulers and beans in pots. They change the length and width of elastic bands and the length of the ruler to see what difference that makes to the sounds	Vibrate Vibration Air Medium Hear Sound Volume Pitch Faint High Low Loud Quiet String Percussion Insulate Text: The Pied Piper of Hamlin by Michael Morpurgo

Class/Cycle	Term	Question	Topic	Key Knowledge	Working Scientifically	Vocabulary/ suggested texts
Willow (Y3,4) Cycle B	Spring 1	How can we group and organise living things?	Living things and their Habitats (Yr4)	• recognise that living things can be grouped in a variety of ways • identify vertebrates by observing their similarities and differences. • recognise positive and negative changes to the local environment. • describe environmental dangers to endangered species	• explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment by generating questions to sort vertebrates in a classification key • create a classification key. • show the characteristics of living things in a table and a key • present my findings orally and in writing.	Organisms, life processes, respiration, sensitivity, reproduction, excretion, nutrition, habitat, environment, endangered species, extinct, classification, vertebrates, invertebrates, specimen, characteristics
Willow (Yr 3&4) Cycle B	Spring 2	What do rocks tell us about the way the Earth was formed?	Rocks	• Compare and group rocks based on their appearance and physical properties, giving reasons • Know how soil is made and how fossils are formed • Know about and explain the difference between sedimentary, metamorphic and igneous rock	See progression map below plus: • using a hand lens to help them to identify and classify rocks according to whether they have grains or crystals, • design and carry out fair tests using acid test,,water test, hardness test to identify and classify rock samples • Use rock identification key • Research and discuss the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed.	Slate Marble Chalk Granite Sand Clay Rock Stone Pebble Texture Sedimentary Igneous Fossil Soil Organic matter <u>Texts</u> 'The Street beneath my feet' by Charlote Guillain

Class/Cycle	Term	Question	Topic	Key Knowledge	Working Scientifically	Vocabulary/ suggested texts
Willow (Yr3&4) Cycle B	Summer 1	What's the matter?	States of Matter Solids, Liquids, Gases	• 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. • Know the temperature at which materials change state •	• Setting up experiments and investigations associated with changing state. • Exploring the effect of temperature on substances such as chocolate, butter, cream • Exploring Non-Newtonian liquids such as custard to find out how this material acts like a liquid until force is applied	Solids, Liquids, Gases Water vapour Droplets Particles Boiling, melting, freezing point Melt Freeze Evaporate Condense Precipitation Texts 'The Mystery of the Melting Snowman' by Florence Parry Heide
Willow (Yr3&4) Cycle B	Summer 2	Who are the scientists who have had most impact on our science learning this year?	Scientists and inventors	• To find out about the way new plants arrived in our country. • To explain how Marie Curie's work on x-rays helps us identify bones • explain how George Washington Carver helped farmers to grow crops • explore William Smith's principle of fossil succession to explain how fossils can be used to find the age of rocks. • describe what Inge Lehmann discovered about the Earth's core.	• Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • To investigate how images change in concave and convex mirrors.	Seismology, geology, botanist, magma, concave, convex, x-rays

Class/Cycle	Term	Question	Topic	Key Knowledge	Working Scientifically	Vocabulary/ suggested texts
Willow (Yr5 &6) Cycle B	Autumn	Have we always looked like this	Evolution and Inheritance	• recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago • recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.	• Compare how some living things are adapted to survive in extreme conditions, for example: cactuses, penguins and camels. They might analyse the advantages and disadvantages of specific adaptations, such as being on two feet rather than four, having a long or a short beak, having gills or lungs, tendrils on climbing plants, brightly coloured and scented flowers	evolution suited/ suitable adapted/ adaptation offspring characteristics vary/ variation inherit/ inheritance fossil <u>Texts</u> Wonder by R.J. Palaccio
Willow (Yr5&6) Cycle B	Spring 1	Are you a survivor?	Living Things and their Habitats (Yr6)	• Sort and group animals based on their features, using examples as a guide. • Describe Carl Linnaeus and his development of his classification system. • Place animals into given groups based on certain characteristics. • Name types of microorganism.	See progression map below plus: • Design a creature with a specific set of characteristics, using prompts and a word grid • Set up an investigation into harmful microorganisms	micro-organisms plants animal classification classify Carl Linnaeus

Class/Cycle	Term	Question	Topic	Key Knowledge	Working Scientifically	Vocabulary/ suggested texts
Willow (Yr 5 &6) Cycle B	Spring 2	Will we ever send another human to the Moon?	Earth and Space	• Describe the movement of the Earth and other planets relative to the sun in the solar system. • Describe the movement of the Moon relative to the Earth • Describe the sun, Earth and moon as approximately spherical bodies. • Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.	See progression map below plus • Create a Moon Diary and ask children to sketch the shape of the moon visible each day over one month so they can see the pattern over time. • Using fruit to model the Solar System as a way of looking at the relative sizes of the planets and their distance from the Sun.	Earth, Sun, Moon Planets, Star Solar system Mercury, Venus Mars Jupiter, Saturn, Uranus, Neptune Pluto, Dwarf planet Rotate, Orbit Axis Celestial body, Spherical, Sphere, Day Night, Light Heat Eclipse, Satellite Universe <u>Texts</u> 'Cosmic' by Frank Cottrell-Boyce 'Where We Once Stood' Christopher Riley
Willow (Yr 5 &6) Cycle B	Summer 1	How different will you be when you are as old as your Grandparents?	Animals including Humans (Yr 5)	• Order the stages of human development. • Demonstrate understanding of how babies grow in height. • Describe the main changes that occur during puberty. • Explain the main changes that take place in old age.	• recording data and results of increasing complexity, using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs; • reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations	Fertilisation Prenatal Infancy Childhood Adolescence Early adulthood Middle adulthood Late adulthood Gestation Sexual reproduction Asexual reproduction Puberty Menstruation Life expectancy <u>Texts</u> The Nowhere Emporium by Ross Mackenzie

Class/Cycle	Term	Question	Topic	Key Knowledge	Working Scientifically	Vocabulary/ suggested texts
Willow (Yr 5 &6) Cycle B	Summer 2	Who are the scientists who have had impact on our science learning this year?	Scientisits and Inventors	• To understand Stephen Hawking's theories about black holes • To give reasons for classifying plants and animals based on specific characteristics in the context of Libbie Hyman's work on classifying vertebrates and invertebrates • To recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function in the context of exploring Marie Maynard Daly's findings on diet and circulatory system health • To understand the life of Mary Leakey and her work about fossils.	• To report and present findings from enquiries, including causal relationships, in oral and written forms such as displays and other presentations in the context of Stephen Hawking and his findings on black holes. • To record data using scatter graphs in the context of Fleming's discovery of penicillin.	Astrophysicist, black holes, classification, invertebrates, cholesterol, evolution, hominins

Barrow CE Primary School Skills Progression – Working Scientifically

Pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of relevant scientific content.

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Ask questions	Demonstrate curiosity about the world around them.	Ask simple questions stimulated by their exploration of their world.	Ask simple questions about their experiences and observations and with support use these observations to suggest ways to discover an answer or solve a problem, recognising that some can be answered in a variety of ways.	Within a group, suggest relevant questions that can be explored further using different types of scientific enquiry.	Ask relevant questions that can be answered by the appropriate scientific enquiry, research or experiment.	Refine a scientific question so that it can be investigated, choosing an appropriate type of scientific enquiry to provide the best evidence.	Recognise scientific questions which do not yet have definitive answers and use a range of scientific enquiries to explore possible answers.

	EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Make predictions	With support or prompting, talk about what they think might happen based on their own experiences.	Respond to suggestions to connect what has been observed with possible further actions or observations.	Use their observations and ideas to make predictions. Use understanding of what has been observed or own experience to predict outcomes of further actions or observations.	Use straightforward scientific evidence to make predictions. With support, use results, observations or own experience to prompt new questions and predictions for a further test.	Use straightforward scientific evidence to make further predictions. Use results to make predictions for new values and raise further questions.	Recognise when scientific evidence supports an idea or not and use this to support predictions. Use test results to prompt new questions and make predictions for setting up further tests.	Identify scientific evidence that has been used to support or refute ideas or arguments and use this to support predictions. Use test results to make predictions for setting up further comparative and fair tests.

Decide how to carry out an enquiry.	Respond to prompts to say what happened to objects, living things or events	Perform simple tests to explore a question or idea suggested to them, with support.	Identify things to measure or observe that are relevant to the questions or ideas they are investigating using a simple test. Suggest a practical way of how to find things out, or collect data to answer a question or idea they are investigating.	Plan and carry out simple practical enquiries, comparative and fair tests relevant to the questions or ideas they are investigating, with support.	Plan and carry out simple practical enquiries, comparative and fair tests relevant to the questions or ideas they are investigating. Identify one or more control variables from those provided when conducting a fair test.	Plan enquiries, deciding when it is appropriate to carry out a fair test or another type of practical enquiry from a range suggested. Identify one or more control variables in investigations when conducting a fair test.	Recognise significant variables in investigations, selecting the most suitable to investigate. Controlling variables where appropriate. Recognise which type of practical enquiry is most appropriate to the question or idea being investigated, before planning and carrying out the enquiry.

Take measurements	Use senses and simple equipment to explore the world around them, e.g. binoculars and magnifying glasses.	Observe objects, living things, events and the world around them closely, using their senses and simple equipment. Make measurements using non-standard units of measure.	Observe closely and use equipment provided for observation and measuring correctly. Make measurements using non-standard and standard units of measure.	Use a range of equipment for measuring and observing, including thermometers and data loggers. Take simple, accurate measurements and/or careful observations using whole number standard units relevant to questions or ideas under investigation.	Make systematic and careful observations of objects, living things and events. Choose from a range of provided, appropriate equipment for measuring and observing, including thermometers and data loggers. Take accurate measurements using more complex standard units and parts of units.	Take measurements using a range of scientific equipment with increasing accuracy and precision, identifying the ranges and intervals used. With support, recognise that some measurements and observations may need to be repeated.	Correctly choose and use appropriate equipment to support observation and data collection with increasing accuracy. Decide whether it is appropriate to repeat observations or measurements and explain how this impacts on data collection.

Record data	Talk to an adult about what has been found/found out.	Present evidence they have collected in simple templates provided for them to help in answering questions. Draw or photograph evidence and label with support.	Gather and record data in appropriate ways with increasing independence to help in answering questions.	Gather and present evidence and data using simple scientific language and vocabulary as writing, drawings, labelled diagrams and displays and through computing, keys, bar charts or tables (using ranges and intervals chosen for them), to help in answering questions.	Gather and present simple scientific data in a variety of ways as Year 3, including tables and bar charts where intervals and ranges are agreed through discussion, to help in answering questions.	Select appropriate ways of gathering and presenting scientific data through models, writing, drawings, displays, computing, tables or graphs (choosing appropriate ranges and intervals). Use correct scientific symbols where appropriate in recording.	Decide on the most appropriate formats to present sets of scientific data, such as using line graphs for continuous variables. Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.

Present data	Talk to an adult about what has been found/found out	Present findings in simple templates provided for them or orally. Draw or photograph evidence and label with support.	Report on and record findings as drawings, photographs, labelled diagrams, orally, as displays or in simple prepared tables or charts.	Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions with support/as a group. Record findings using simple scientific language, drawings, labelled diagrams, bar charts and tables with support/as a group.	Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables.	Present findings in written form, displays and other presentations including orally, explaining results and conclusions drawn from results. Identify causal relationships in reporting outcomes where appropriate.	Report and present findings from enquiries, including conclusions, causal relationships and explanations of results in oral and written form, such as displays and other presentations.
Answer questions using data	With support, explain why some things occur.	Respond to suggestions to connect what has been observed with possible further actions or observations.	Use understanding of what has been observed or own experience/ideas to answer questions.	Use straightforward scientific evidence and results of enquiries to answer questions.	Use results to answer questions	Use results to answer questions.	Use results to answer questions.

Draw conclusions	With support, talk about what they have found out or what they think might happen next/ change based on their own experiences.	Use their ideas to suggest answers to questions. Say what has changed when observing objects, living things or events.	Respond to suggestions to identify some evidence needed to answer a question.	Say whether what happened was what they expected, acknowledging any unexpected outcomes.	Identify and use straightforward scientific evidence to support and explain their findings.	Recognise when scientific evidence is for or against an argument.	Provide straightforward explanations for differences in repeated measurements or observations.
Evaluate their enquiry.				Use results of enquiries to consider whether they meet predictions and explain why.	Use results to suggest improvements.	Recognise that the test may need improvements to improve reliability.	Compare their results with others and give reasons why they may be different.