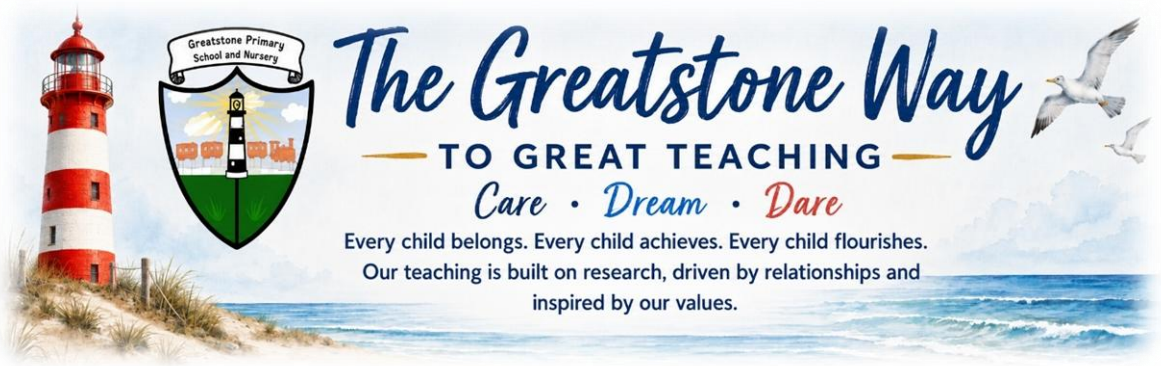

Science: The Greatstone Way Curriculum

Curriculum Intent

This document sets out the curriculum spine for Science from EYFS to Year 6, bringing together the Greatstone Way themes, whole-school enquiry questions, Developing Experts progression, National Curriculum requirements, Beach School, local coastal learning, working scientifically and authentic outcomes into one coherent curriculum.

"Understanding our world through curiosity, enquiry and discovery."

At Greatstone Primary School, we believe science should inspire children to become naturally curious about the world around them. Through practical enquiry, investigation and exploration, pupils develop secure scientific knowledge whilst learning to think and work like scientists.

Science is taught through the **Developing Experts curriculum**, ensuring carefully sequenced knowledge, ambitious vocabulary and progressive disciplinary thinking. Pupils do not simply learn scientific facts; they ask questions, observe carefully, identify patterns, carry out fair tests, analyse evidence, draw conclusions and communicate scientifically.

Our unique coastal location provides an exceptional outdoor laboratory. Through **Beach School**, fieldwork and practical investigations, children study living things, habitats, forces, materials, weather, Earth and space within authentic local contexts. Greatstone beach, Romney Marsh and the Kent coastline become places where scientific ideas are explored, tested and understood.

Scientific knowledge is deliberately sequenced from EYFS through to Year 6 so that substantive knowledge builds progressively whilst Working Scientifically skills become increasingly sophisticated. Scientific concepts are revisited repeatedly, enabling children to make meaningful connections between biology, chemistry, physics and Earth science.

Through memorable investigations, ambitious scientific enquiry and authentic problem-solving, pupils leave Greatstone with the knowledge, confidence and curiosity to understand the natural world and their responsibility within it.

Curriculum Design Principles for Science

The Science curriculum has been designed around eight key principles.

1. Full National Curriculum Coverage

The sequence provides complete coverage of the National Curriculum from EYFS through to Year 6. Children progressively develop secure understanding across the four scientific disciplines:

- Biology
- Chemistry
- Physics
- Earth and Space

Alongside these, **Working Scientifically** is explicitly taught and revisited throughout every year group so that pupils develop increasing independence as scientific thinkers.

2. Developing Experts Progression

Science follows the carefully sequenced **Developing Experts** curriculum.

Knowledge is deliberately organised so that:

- new learning builds upon prior knowledge;
- scientific vocabulary is explicitly taught and revisited;
- misconceptions are addressed through enquiry;
- retrieval strengthens long-term memory;
- concepts become increasingly complex across the primary years.

Rather than studying isolated topics, pupils revisit the "big ideas" of science, making meaningful connections across biology, chemistry, physics and Earth science as their understanding grows.

3. Knowledge-Rich and Vocabulary-Rich Science

Scientific knowledge is organised into carefully sequenced concepts.

Children learn:

- substantive scientific knowledge;
- ambitious scientific vocabulary;
- disciplinary knowledge through enquiry;
- how scientific ideas connect across topics.

Vocabulary is introduced in meaningful contexts, revisited regularly and applied through speaking, reading, writing and practical investigation.

Greatstone Way Themes

Science is planned around the six Greatstone Way themes, ensuring every unit contributes towards our wider curriculum vision while maintaining the integrity of the National Curriculum and Developing Experts progression.

Term	Theme	Whole-School Big Question	Science Focus
Autumn 1	ROOTS	Who are we and where do we belong?	Understanding ourselves, living things, habitats, materials and our place within the natural world.
Autumn 2	SURVIVORS	How do people overcome challenges and adapt?	Investigating adaptation, survival, forces, properties of materials and scientific problem-solving.
Spring 1	EXPLORERS	How does curiosity help us discover more?	Scientific enquiry, observation, Earth and Space, exploration and discovery.
Spring 2	INVENTORS	How do ideas change the world?	Scientific innovation, engineering, electricity, materials and technological development.
Summer 1	PROTECTORS	How can we care for people, places and our planet?	Sustainability, habitats, ecosystems, conservation and environmental science.
Summer 2	LEGACY	What difference will we leave behind?	Applying scientific understanding to improve lives, solve problems and shape the future.

Science Curriculum Sequence (EYFS–Year 6)

Year	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
EYFS	Seasons Food	Animals Insects and Invertebrates	Our Body	Weather and Seasons Materials	Plants	Senses
1	Seasonal changes	Animals including humans All About Me	Exploring Everyday Materials 1	Exploring Everyday Materials 2	Plants	Animals including humans- All about animals
2	Uses of Everyday Materials	Living things and their habitats	Living things and their habitats- Habitats around the world	Animals, including humans 1- Growth	Animals, including humans 2- Life cycles	Plants
3	Scientific Enquiry	Animals, including humans	Rocks	Forces and Magnets	Plants	Light
4	Animals including Humans	Living things and their habitats	Living things and their habitats- Conservation	States of matter	Sound	Electricity
5	Forces	Properties of Materials	Changes of Materials	Animals, including humans	Earth and Space	Living things and their habitats
6	Electricity	Light	Animals, including humans	Living things and their habitats	Evolution and inheritance	Looking after our Environment

Greatstone Primary Science Progression Map (Nursery–Year 6)

Year Group	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Nursery	**Seasons and Food** Observe seasonal change, healthy foods and harvest.	**Animals, Insects and Invertebrates** Explore living things and habitats.	**Our Body** Explore body parts, movement and healthy lifestyles.	**Weather, Seasons and Materials** Observe weather and investigate everyday materials.	**Plants** Plant, grow and care for living things.	**Senses** Use the five senses to investigate the world.
Reception	**Seasons and Food** Seasonal change, healthy eating and observation.	**Animals, Insects and Invertebrates** Compare animals and habitats.	**Our Body** Healthy bodies, growth and hygiene.	**Weather, Seasons and Materials** Weather patterns, floating, sinking and materials.	**Plants** Plant growth and life cycles.	**Senses** Scientific observation using all five senses.
Year 1	**Seasonal Changes** Observe weather and seasonal change throughout autumn.	**Animals including Humans – All About Me** Body parts, senses, healthy lifestyles and animal groups.	**Exploring Everyday Materials 1** Identify materials and describe their properties.	**Exploring Everyday Materials 2** Compare, test and select suitable materials.	**Plants** Identify plants, trees and plant parts.	**Animals including Humans – All About Animals** Compare animals, diets and habitats.
Year 2	**Uses of Everyday Materials** Suitability and changing materials.	**Living Things and their Habitats** Local habitats and food chains.	**Habitats Around the World** Compare habitats globally.	**Animals including Humans 1 – Growth** Growth, survival and healthy living.	**Animals including Humans 2 – Life Cycles** Life cycles and offspring.	**Plants** Seeds, bulbs and healthy plant growth.
Year 3	**Scientific Enquiry** Working scientifically and investigation skills.	**Animals including Humans** Nutrition, skeletons and muscles.	**Rocks** Rock types, fossils and soils.	**Forces and Magnets** Forces, friction and magnetic materials.	**Plants** Functions of plant parts and pollination.	**Light** Light, reflection and shadows.
Year 4	**Animals including Humans** Digestion, teeth and food chains.	**Living Things and their Habitats** Classification and habitats.	**Living Things and their Habitats – Conservation** Environmental change and conservation.	**States of Matter** Solids, liquids, gases and the water cycle.	**Sound** How sounds are made and travel.	**Electricity** Simple circuits and conductors.
Year 5	**Forces** Gravity, air resistance, water resistance and friction.	**Properties of Materials** Material properties and investigations.	**Changes of Materials** Reversible and irreversible changes.	**Animals including Humans** Human development and life processes.	**Earth and Space** The Solar System and Earth's movement.	**Living Things and their Habitats** Life cycles and reproduction.
Year 6	**Electricity** Complex circuits and electrical systems.	**Light** Reflection, refraction and how we see.	**Animals including Humans** The circulatory system and healthy lifestyles.	**Living Things and their Habitats** Classification and microorganisms.	**Evolution and Inheritance** Evolution, adaptation and natural selection.	**Looking After Our Environment** Sustainability, environmental science and global responsibility.

Progression of Scientific Knowledge

Discipline	EYFS	KS1	Lower KS2	Upper KS2
Biology	Seasons, food, animals, the human body, plants and the senses.	Animals including humans, plants and habitats.	Nutrition, skeletons, muscles, digestion, classification, habitats and conservation.	Human systems, reproduction, life cycles, classification, evolution, inheritance and environmental responsibility.
Chemistry	Explore and compare everyday materials using the senses.	Identify, compare and investigate everyday materials and their uses.	Rocks, soils and properties of materials.	Properties and changes of materials through scientific investigation.
Physics	Observe weather, seasons and simple changes in the environment.	Seasonal changes and simple investigations with materials.	Forces, magnets and light. Sound and electricity.	Forces, electricity, light, Earth and Space.
Earth & Environmental Science	Observe seasonal change, weather and local environments.	Seasonal observations and local habitats.	Conservation and the water cycle.	Earth and Space, evolution and environmental sustainability.

Knowledge & Skills Progression Map (Nursery–Year 6)

Year Group	Knowledge Progression (Substantive Knowledge)	Working Scientifically Progression (Disciplinary Knowledge)
Nursery	Explore seasons and food. Recognise common animals, insects and invertebrates. Name basic body parts. Explore weather, materials, plants and the five senses through play. Begin to understand that living things grow and need care.	Observe using all five senses. Notice similarities and differences. Explore natural objects through play. Ask simple questions. Sort and compare objects. Talk about observations using simple vocabulary.
Reception	Explain simple seasonal changes. Compare animals and habitats. Understand healthy bodies and healthy choices. Explore materials and simple properties. Understand how plants grow. Use scientific vocabulary to describe observations.	Observe carefully. Compare and classify objects. Make simple predictions. Carry out practical investigations. Record observations through drawings, photographs and discussion. Explain simple findings.
Year 1	Understand seasonal change across the year. Identify common animals and basic animal groups. Name body parts and the five senses. Identify everyday materials and describe their properties. Compare materials. Identify common plants and trees and describe their basic structure.	Ask simple scientific questions. Observe closely. Identify and classify. Carry out simple comparative tests. Record observations using pictures and tables. Use observations to answer questions. Communicate findings using scientific vocabulary.
Year 2	Explain why materials are suitable for different purposes. Understand habitats locally and globally. Describe animal growth and simple life cycles. Understand how plants grow from seeds and bulbs.	Compare and classify. Plan simple investigations. Measure using simple equipment. Record data accurately. Identify patterns. Explain findings using evidence. Begin suggesting improvements to investigations.
Year 3	Understand nutrition, skeletons and muscles. Identify different rocks and explain fossil formation. Explain magnetic forces and simple pushes and pulls. Describe functions of plant parts. Explain how light enables us to see.	Plan fair tests. Select equipment appropriately. Measure accurately. Gather and record data in tables and charts. Use evidence to explain observations. Identify patterns and relationships.
Year 4	Explain digestion and food chains. Classify living things. Understand conservation and environmental change. Explain solids, liquids and gases. Describe how sound travels. Construct simple electrical circuits.	Carry out comparative and fair tests independently. Record increasingly accurate measurements. Interpret data. Draw conclusions using evidence. Suggest improvements to investigations.
Year 5	Explain gravity, friction and air resistance. Describe material properties and chemical changes. Understand human development. Explain Earth's movement within the Solar System. Compare life cycles and reproduction.	Plan increasingly independent enquiries. Select appropriate scientific equipment. Control variables. Present data in graphs. Explain patterns using scientific knowledge. Evaluate methods and conclusions.
Year 6	Explain electrical circuits and components. Describe reflection and refraction. Understand the circulatory system. Classify living things using scientific systems. Explain evolution and inheritance. Understand environmental sustainability and human impact on the planet.	Independently plan and carry out scientific enquiries. Choose appropriate methods. Analyse complex data. Evaluate reliability and validity. Justify conclusions using scientific evidence. Communicate findings confidently using scientific language.

Progression of Scientific Understanding

Area of Science	Nursery & Reception	KS1	Lower KS2	Upper KS2
Animals including Humans	Recognise animals, body parts, healthy choices and senses.	Identify animals, classify simple groups, understand body parts and healthy lifestyles.	Explain nutrition, skeletons, muscles, digestion and food chains.	Understand human systems, growth, reproduction and health.
Plants	Observe plants growing and identify simple features.	Identify common plants and trees. Describe basic plant structure.	Explain functions of plant parts and pollination.	Explain reproduction and life cycles in plants.
Materials	Explore and compare materials using the senses.	Identify materials and compare properties. Investigate suitable uses.	Understand rocks and simple material properties.	Investigate material properties and reversible and irreversible changes.
Forces & Energy	Observe weather and simple movement through play.	Observe seasonal change and investigate materials.	Explain magnets, forces and light. Understand sound and electricity.	Explain gravity, Earth and Space, electricity and light in greater depth.
Living Things & Habitats	Explore animals and local habitats. Care for living things.	Describe habitats and simple food chains.	Classify living things and explain environmental change.	Understand classification systems, evolution, inheritance and biodiversity.
Earth & Environmental Science	Observe weather, seasons and the natural environment.	Observe seasonal change throughout the year.	Understand conservation and changes of state in nature.	Explain Earth and Space and understand sustainability and environmental responsibility.

Working Scientifically Progression

Skill	EYFS	Year 1–2	Year 3–4	Year 5–6
Observing	Explore using the senses.	Observe closely using simple equipment.	Make systematic observations.	Make precise observations over time.
Questioning	Ask simple questions about the world.	Ask scientific questions.	Develop investigable questions.	Pose increasingly complex scientific enquiries.
Predicting	Begin to say what might happen.	Make simple predictions.	Predict using scientific knowledge.	Justify predictions using evidence.
Investigating	Explore through play.	Carry out simple tests.	Plan fair tests.	Independently plan comparative and fair tests.
Measuring	Use simple comparisons.	Measure using non-standard and simple standard units.	Measure accurately using scientific equipment.	Select and use precise measuring equipment independently.
Recording	Draw and talk about observations.	Use pictures, labels and simple tables.	Use tables, bar charts and diagrams.	Use a range of graphs, tables and scientific diagrams appropriately.
Analysing	Talk about what happened.	Identify simple patterns.	Explain patterns using evidence.	Analyse data critically and identify anomalies.
Evaluating	Share ideas about discoveries.	Explain what was found out.	Suggest improvements to investigations.	Evaluate methods, reliability and validity of evidence.
Communicating	Use simple scientific words.	Explain findings using scientific vocabulary.	Present conclusions clearly.	Justify conclusions using scientific language and evidence.

EYFS SCIENCE OVERVIEW - NURSERY

Curriculum Element	Autumn 1 – ROOTS	Autumn 2 – SURVIVORS	Spring 1 – EXPLORERS	Spring 2 – INVENTORS	Summer 1 – PROTECTORS	Summer 2 – LEGACY
Greatstone Way Theme	ROOTS	SURVIVORS	EXPLORERS	INVENTORS	PROTECTORS	LEGACY
Whole-School Big Question	Who are we and where do we belong?	How do people overcome challenges and adapt?	How does curiosity help us discover more?	How do ideas change the world?	How can we care for people, places and our planet?	What difference will we leave behind?
Nursery Science Theme	**Seasons and Food**	**Animals, Insects and Invertebrates**	**Our Body**	**Weather, Seasons and Materials**	**Plants**	**Our Senses**
Nursery Big Question	What happens to food and nature as the seasons change?	What creatures live around us?	What can my amazing body do?	How does weather change the things around us?	How do plants grow?	How do my senses help me discover the world?
Scientific Learning	Seasonal changes, harvest, healthy foods, fruits and vegetables, exploring autumn	Animals, insects, worms, spiders, birds, habitats and caring for living things	Body parts, keeping healthy, growth, exercise, hygiene	Weather observations, seasonal change, exploring everyday materials, floating, sinking and changing materials	Seeds, bulbs, flowers, trees, growing plants and caring for living things	Sight, hearing, touch, smell and taste through practical investigations
Working Scientifically	Observe seasonal change. Compare foods. Sort natural objects.	Observe living things carefully. Compare animals. Ask questions.	Identify body parts. Compare similarities and differences.	Observe weather. Explore materials using the senses. Compare and group.	Observe change over time. Plant and care for seeds.	Use all five senses to investigate. Describe observations using vocabulary.
Beach School Learning	Autumn treasure hunt, seasonal foods, collecting natural objects	Minibeast hunt, bird watching, bug hotels	Nature movement trail, healthy body games	Weather station, puddle investigations, sand and water exploration	Planting seeds, caring for flowers, tree identification	Sensory trails, sound walks, texture hunt, smelling herbs and flowers
Greatstone & Local Links	Greatstone harvest, seasonal beach changes	Romney Marsh wildlife, coastal birds, beach insects	Outdoor physical play	Greatstone weather, wind, rain and beach materials	Coastal plants, dunes, wildflowers	Exploring Greatstone using all five senses
Scientific Vocabulary	season, autumn, food, fruit, vegetable, harvest, weather	animal, insect, bird, bug, worm, spider, habitat, living	body, head, arms, legs, eyes, ears, mouth, healthy	rain, wind, sun, cloud, snow, hot, cold, hard, soft, rough, smooth	seed, bulb, root, stem, leaf, flower, grow	sight, smell, hearing, taste, touch, senses, explore
High Quality Texts	*Oliver's Vegetables*, *Pumpkin Soup*, *The Leaf Thief*	*Mad About Minibeasts!*, *The Very Hungry Caterpillar*	*Funnybones*, *From Head to Toe*	*Maisy's Wonderful Weather Book*, *What is the Weather Today?*	*Jasper's Beanstalk*, *The Tiny Seed*	*Brown Bear, Brown Bear*, *We're Going on a Bear Hunt*
Memorable Experience	Harvest Investigation Day	Greatstone Mini Beast Safari	Healthy Me Week	Weather Explorers	Planting Week	Sensory Explorer Day
Authentic Outcome	Harvest Café	Nursery Nature Museum	Healthy Me Display	Weather Station	Nursery Garden	Sensory Discovery Museum

EYFS SCIENCE OVERVIEW - RECEPTION

Curriculum Element	Autumn 1 – ROOTS	Autumn 2 – SURVIVORS	Spring 1 – EXPLORERS	Spring 2 – INVENTORS	Summer 1 – PROTECTORS	Summer 2 – LEGACY
Greatstone Way Theme	ROOTS	SURVIVORS	EXPLORERS	INVENTORS	PROTECTORS	LEGACY
Whole-School Big Question	Who are we and where do we belong?	How do people overcome challenges and adapt?	How does curiosity help us discover more?	How do ideas change the world?	How can we care for people, places and our planet?	What difference will we leave behind?
Reception Science Theme	**Seasons and Food**	**Animals, Insects and Invertebrates**	**Our Body**	**Weather, Seasons and Materials**	**Plants**	**Our Senses**
Reception Big Question	How do seasons affect the food and nature around us?	How are animals alike and different?	How does my body help me live, learn and play?	How do weather and materials change our world?	What do plants need to grow well?	How do my senses help me investigate like a scientist?
Scientific Learning	Seasonal change, healthy eating, food origins, fruits, vegetables, observing autumn	Animal groups, insects, habitats, life cycles, caring for living things	Body systems appropriate for EYFS, healthy lifestyles, exercise, hygiene and growth	Daily weather observations, seasonal comparisons, materials, floating, sinking, waterproof and absorbent materials	Plant parts, growing seeds, life cycles, observing changes over time	Investigating using the five senses, making comparisons, recording observations
Working Scientifically	Observe carefully. Compare. Sort. Ask questions.	Observe over time. Identify similarities and differences.	Make observations. Record findings through drawings and discussion.	Carry out simple investigations. Predict and test.	Observe changes over time. Measure growth informally.	Use evidence from observations to explain discoveries.
Beach School Learning	Harvesting, seasonal walks, collecting natural materials	Habitat investigations, bird surveys, bug hunts	Healthy outdoor challenges	Weather station, floating and sinking at the beach, materials hunt	Growing vegetables and flowers, tree study	Sensory trails, sound mapping, texture and smell investigations
Greatstone & Local Links	Local produce, seasonal beach changes	Greatstone dunes, Romney Marsh wildlife	Active outdoor learning	Greatstone's coastal weather and natural materials	Coastal plants and conservation	Using the beach environment to explore the senses
Scientific Vocabulary	season, autumn, harvest, fruit, vegetable, healthy, weather	habitat, mammal, bird, insect, life cycle, living, survive	skeleton (introduced simply), muscles, healthy, exercise, hygiene, body	waterproof, absorbent, float, sink, material, weather, season	seed, root, stem, flower, leaf, grow, life cycle	observe, investigate, compare, predict, sight, hearing, smell, taste, touch

High Quality Texts	*Oliver's Vegetables*, *The Leaf Thief*, *Pumpkin Soup*	*The Very Hungry Caterpillar*, *Superworm*, *Yucky Worms*	*Funnybones*, *From Head to Toe*, *All About Me*	*Maisy's Wonderful Weather Book*, *Percy the Park Keeper*	*The Tiny Seed*, *Jasper's Beanstalk*, *Sam Plants a Sunflower*	*Brown Bear, Brown Bear*, *We're Going on a Bear Hunt*, *Look, Listen and Learn*
Memorable Experience	Harvest Investigation	Wildlife Explorer Week	Healthy Body Challenge	Weather Scientists	Growing Garden Project	Young Scientists Investigation Day
Authentic Outcome	Seasonal Food Café	Greatstone Wildlife Exhibition	Healthy Me Museum	Reception Weather Centre	School Garden Showcase	Reception Science Discovery Museum

YEAR 1 – Seasonal Changes - AUTUMN 1

How does our world change throughout the year and how do these changes help living things survive?

Section	Overview
Curriculum Rationale	This unit introduces children to seasonal change through first-hand observation and practical enquiry. Pupils observe weather patterns, changes in daylight, plants and animals across autumn while learning that seasons follow a repeating yearly cycle. Developing Experts investigations encourage children to observe over time, ask scientific questions and recognise patterns in the natural world. Through regular outdoor learning and Beach School, pupils develop curiosity about the environment while building the foundations for understanding climate, habitats and living things in later years.
The Greatstone Way	ROOTS → SURVIVORS – Children develop a strong sense of belonging by exploring the changing environment around Greatstone. They discover how plants, animals and humans adapt to seasonal changes in order to survive. Through repeated visits to the beach and school grounds they develop curiosity, resilience and appreciation for the natural world.
National Curriculum Coverage	• Observe changes across the four seasons. • Observe and describe weather associated with the seasons and how day length varies.
Developing Experts Knowledge Progression	Children begin by identifying the four seasons before focusing on autumn. They observe changes in weather, daylight, plants and animals before recognising that these changes happen in a repeating annual cycle. Pupils learn that careful observations over time help scientists identify patterns and explain seasonal change.
Curriculum Journey	Previous Learning: EYFS – Weather, Seasons, Nature Walks, Plants and Exploring the Natural World. Current Learning: Observe seasonal changes through regular investigations and outdoor learning. Next Learning: Year 2 – Living Things and their Habitats, Plants and Weather Patterns.
Scientific Enquiry Question	How can careful observations help us understand how our environment changes throughout the year?
Sticky Knowledge	There are four seasons. Autumn is one of the four seasons. Weather changes during autumn. Daylight becomes shorter as autumn progresses. Some trees lose their leaves. Animals prepare for winter in different ways. Scientists observe changes over time to identify patterns.
Working Scientifically	Observe over time. Compare observations. Measure. Record findings. Identify patterns. Ask questions. Use simple equipment.
Scientific Knowledge & Skills	Name the four seasons. Identify signs of autumn. Observe weather. Measure temperature. Record observations. Compare changes over time. Identify seasonal patterns.
Substantive Concepts	Seasons • Weather • Change • Environment • Time • Survival
Disciplinary Concepts	Observe • Measure • Compare • Record • Pattern • Question • Explain
Scientific Vocabulary	season, spring, summer, autumn, winter, weather, sunshine, rainfall, cloud, wind, temperature, frost, daylight, sunrise, sunset, leaves, buds, blossom, evergreen, deciduous, habitat, observe, pattern
Working Scientifically Vocabulary	observe, compare, measure, investigate, predict, pattern, evidence, record, results
Beach School & Outdoor Learning	Weekly weather observations. Seasonal beach walks. Collect autumn leaves, seeds and natural materials. Observe changing plants and coastal birds. Create seasonal nature journals. Compare the beach environment across the term.
Greatstone & Local Links	Observe autumn changes around Greatstone Beach, Romney Marsh and the school grounds. Monitor coastal weather, migrating birds and changing vegetation. Compare natural features found on the beach throughout autumn.
Cross-Curricular Links	Geography (weather and climate), Mathematics (measuring temperature and recording data), English (weather diaries), Art (observational drawing), PSHE (keeping safe in different weather), Computing (simple weather data handling).
High Quality Texts	*Tree: Seasons Come, Seasons Go*; *The Leaf Thief*; *One Snowy Night*; *After the Storm*; *We're Going on a Leaf Hunt*.
Significant Scientists & STEM Careers	Luke Howard (meteorology), John Dalton (weather science), meteorologist, climate scientist, conservation ranger, environmental scientist.
Memorable Hook	Greatstone Weather Station – Children become junior meteorologists by launching a class weather station and making daily observations to investigate how autumn changes the world around them.
Authentic Outcome	Greatstone Autumn Weather Exhibition – Children present weather journals, seasonal observations, scientific drawings and photographs explaining how autumn affects people, plants and animals.
Assessment End Point	Children identify the four seasons, describe typical autumn weather, explain how plants and animals change during autumn, recognise patterns in seasonal change and use observations collected over time as scientific evidence.

YEAR 1 AUTUMN 1 – 6 WEEK TEACHING SEQUENCE

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	Hook – Greatstone Weather Station	Seasons happen every year. Autumn is one of the four seasons.	Observe carefully.	Launch class weather station and record first observations.	Weather symbols, thermometer, rain gauge.	Beach weather walk.	Prior knowledge assessment.	Introduce scientific vocabulary and weather recording routines.
2	The Four Seasons	The year is divided into four seasons with different characteristics.	Compare observations.	Seasonal sorting investigation.	Seasonal photographs, sorting cards.	Seasonal scavenger hunt.	Correctly identify seasons.	Reinforce that weather changes daily as well as seasonally.
3	Autumn Weather	Autumn weather includes changes in temperature, rainfall and wind.	Measure and record.	Daily weather observations using simple equipment.	Thermometers, weather charts, windsocks.	Cloud spotting and wind investigation.	Accurate weather records.	Model careful observations using scientific vocabulary.
4	How Plants Change in Autumn	Plants change throughout autumn. Some trees lose their leaves.	Observe over time.	Leaf identification and comparison investigation.	Magnifiers, leaves, clipboards.	Collect leaves and seeds.	Scientific drawings and observations.	Compare evergreen and deciduous trees using local examples.
5	How Animals Prepare for Winter	Animals respond differently to seasonal change.	Identify patterns.	Match animals to seasonal behaviours.	Animal photographs, sorting cards.	Observe birds, insects and coastal wildlife.	Explain simple adaptations.	Use local wildlife such as gulls and squirrels where possible.
6	Young Meteorologists Showcase	Seasonal changes can be explained using evidence collected over time.	Present findings.	Present weather journals and seasonal investigations.	Journals, displays, photographs.	Final seasonal observation walk.	End-point assessment.	Encourage children to explain patterns using scientific vocabulary.

Whole Unit Resource List
Investigation Equipment
Thermometers
Rain gauge
Weather vane
Windsock
Magnifying glasses
Clipboards
Nature journals
Cameras/iPads
Weather symbols
Seasonal sorting cards
Consumables
Weather recording sheets
Seasonal photographs
Leaves
Seeds
Labels
Large paper
Coloured pencils
Beach School Resources
Nature journals
Binoculars
Bug viewers
Thermometers
Weather recording charts
Wind ribbons
Collection trays
Adaptive Teaching
Use real outdoor observations before photographs.
Provide visual weather symbols alongside scientific vocabulary.
Model weather observations before independent recording.
Use sentence stems to support scientific explanations.
Pair children during outdoor investigations.
Challenge higher attainers to identify patterns from observations collected across several weeks and begin making simple predictions.
Health & Safety
Check weather forecasts before all Beach School sessions.
Ensure children wear suitable outdoor clothing for changing weather conditions.
Reinforce safe behaviour around the beach, dunes and school grounds.
Wash hands after handling natural materials.
Supervise the use of thermometers and outdoor investigation equipment.

Common Misconception	Teaching Response
Seasons happen because the weather changes.	Explain that seasons follow a repeating yearly cycle and weather varies within each season.
It is always cold in autumn.	Use daily weather observations to show variation.
Trees die when they lose their leaves.	Explain the difference between deciduous and evergreen trees.
Animals disappear during winter.	Discuss migration, hibernation and other ways animals survive seasonal change.
Every day in one season has the same weather.	Compare daily weather records to identify natural variation.

Reflection Question	Purpose
What changes have you noticed in our environment since we began observing autumn?	Develop observation over time and pattern recognition.
Why do scientists collect weather information every day?	Understand how evidence is gathered over time.
How do plants and animals respond to seasonal changes?	Develop understanding of survival and adaptation.
What patterns did you discover in our weather records?	Encourage interpretation of scientific data.
How has Greatstone changed during autumn?	Strengthen connections between science and the local environment.
How has this learning helped answer our big question?	Consolidate understanding of seasonal change through scientific enquiry.

YEAR 1 - Animals Including Humans – All About Me – AUTUMN 2

How are humans and other animals similar and different, and what do we need to stay healthy?

Section	Overview
Curriculum Rationale	This unit develops children's understanding of themselves and other animals through practical investigation, observation and comparison. Building on EYFS learning about the human body and the five senses, pupils identify body parts, recognise common animals and classify them into simple groups. They investigate how humans use their senses to explore the world and begin to understand the importance of healthy eating, exercise and hygiene. Through Developing Experts enquiry, pupils learn to observe carefully, ask questions and use evidence to answer simple scientific questions.
The Greatstone Way	**ROOTS → SURVIVORS** – Children explore what makes them unique whilst recognising similarities with other humans and animals. They learn how animals survive by meeting their basic needs and begin to understand how healthy choices help humans thrive. Through Beach School they observe local wildlife and appreciate the importance of caring for living things.
National Curriculum Coverage	• Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. • Identify and name common animals that are carnivores, herbivores and omnivores. • Describe and compare the structure of common animals. • Identify, name, draw and label the basic parts of the human body. • Identify which body part is associated with each sense.
Developing Experts Knowledge Progression	Pupils identify humans as animals before investigating body parts and the five senses. They compare humans with other animals, classify animals into simple groups and investigate diets before learning how to keep themselves healthy through food, exercise, rest and hygiene.
Curriculum Journey	**Previous Learning:** EYFS – Our Body, Our Senses, Animals, Insects and Invertebrates. **Current Learning:** Identify, compare and classify animals while investigating the human body and healthy lifestyles. **Next Learning:** Year 2 – Animals including Humans (offspring, growth, survival and healthy living).
Scientific Enquiry Question	**How do our bodies help us survive and how are they similar to other animals?**
Sticky Knowledge	Humans are animals. Animals can be grouped into mammals, birds, fish, reptiles and amphibians. Animals eat different foods. Humans have five senses. Different body parts have different jobs. Healthy food, exercise, sleep and hygiene help us stay healthy.
Working Scientifically	Observe closely. Identify and classify. Compare similarities and differences. Gather simple evidence. Record observations. Answer scientific questions using observations.
Scientific Knowledge & Skills	Identify common animals. Group animals. Name body parts. Identify the five senses. Compare humans and animals. Understand healthy lifestyles.
Substantive Concepts	Animals • Humans • Body • Senses • Health • Survival
Disciplinary Concepts	Observe • Compare • Identify • Classify • Question • Record • Explain
Scientific Vocabulary	mammal, bird, fish, reptile, amphibian, carnivore, herbivore, omnivore, human, body, head, neck, arm, elbow, hand, fingers, leg, knee, foot, eyes, ears, nose, mouth, tongue, skin, sight, hearing, smell, taste, touch, healthy, exercise, hygiene
Working Scientifically Vocabulary	observe, compare, classify, identify, investigate, predict, evidence, record
Beach School & Outdoor Learning	Observe birds, insects and coastal wildlife. Compare animal body parts. Complete sensory walks using hearing, smell and touch. Investigate how animals survive in coastal habitats.
Greatstone & Local Links	Observe gulls, insects, worms, spiders and coastal birds around Greatstone. Compare pets, farm animals and local wildlife.
Cross-Curricular Links	PSHE (Healthy Me), PE (exercise), English (labelling and describing), Art (observational drawing), Geography (local habitats).
High Quality Texts	*Funnybones*; *We're Going on a Bear Hunt*; *What Makes Me a Me?*; *A First Book of the Human Body*; *Superworm*.
Significant Scientists & STEM Careers	Jane Goodall, Steve Irwin, veterinary surgeon, doctor, zoologist, wildlife ranger.
Memorable Hook	**Greatstone Wildlife Rescue Centre** – Children become wildlife experts helping identify mystery animals and investigate how humans and animals survive.
Authentic Outcome	**Young Zoologists Exhibition** – Children create an interactive class museum comparing humans and animals through models, labelled diagrams and classification activities.
Assessment End Point	Children identify and classify common animals, name body parts, explain the five senses and describe how healthy choices help humans survive and grow.

YEAR 1 AUTUMN 2 – 12 WEEK TEACHING SEQUENCE

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	Hook – Wildlife Rescue Centre	Humans are animals.	Observe carefully.	Identify mystery animals.	Animal models, photographs, sorting cards.	Wildlife spotting.	Prior knowledge.	Establish scientific vocabulary.
2	What is an animal?	Animals share common features.	Identify and compare.	Sort animals.	Classification cards.	Observe local wildlife.	Animal grouping.	Avoid "animals vs humans" language.
3	Animal groups	Animals belong to groups.	Classify.	Sort mammals, birds, fish, reptiles, amphibians.	Models, images.	Bird watching.	Correct classification.	Keep to common UK examples.
4	Carnivores, herbivores and omnivores	Animals eat different foods.	Observe patterns.	Sort diets.	Food cards.	Look for evidence of animal diets.	Explain choices.	Link beaks and teeth where appropriate.
5	The human body	Body parts have different functions.	Identify.	Label body.	Skeleton model.	Movement trail.	Correct vocabulary.	Use scientific names where appropriate.
6	Our five senses	Humans use senses to gather information.	Observe.	Sensory carousel.	Mystery boxes, sound pots.	Sensory walk.	Describe observations.	Emphasise all senses working together.
7	Sight and hearing investigation	Eyes and ears help us investigate safely.	Compare.	Sound hunt.	Blindfolds, instruments.	Listening trail.	Scientific observations.	Discuss safety.
8	Touch, smell and taste	Different senses give different information.	Investigate.	Texture investigation.	Feely bags, herbs.	Texture trail.	Use evidence.	Check allergies before tasting/smelling.
9	Keeping healthy	Food, sleep, exercise and hygiene keep us healthy.	Observe patterns.	Healthy choices sorting.	Food models.	Healthy walk.	Explain healthy choices.	Avoid labelling foods as "good" or "bad".
10	Comparing humans and animals	Humans share similarities with other animals.	Compare.	Venn diagrams.	Photographs.	Observe birds and insects.	Scientific explanations.	Discuss similarities before differences.
11	Young Zoologists Challenge	Apply learning.	Investigate.	Classification challenge.	Mixed resources.	Outdoor challenge.	End-point practical.	Independent application.
12	Exhibition	Communicate scientific understanding.	Explain.	Present findings.	Displays, labels.	Invite families.	Summative assessment.	Celebrate scientific vocabulary.

Whole Unit Resource List

Investigation Equipment

- Magnifying glasses
- Mirrors
- Animal models
- Skeleton model
- Body part labels
- Sound pots
- Feely bags
- Mystery boxes
- Classification hoops
- Clipboards
- iPads

Consumables

- Animal photographs
- Healthy food cards
- Venn diagrams
- Sorting cards
- Labels
- Large paper

Beach School Resources

- Bird identification cards
- Bug viewers
- Binoculars
- Nature journals

Adaptive Teaching

- Use real objects before pictures.
- Provide animal sorting mats with visual cues.
- Pre-teach vocabulary using images.
- Use paired discussion before recording.
- Offer tactile resources for SEND learners.
- Challenge higher attainers to justify classifications and identify exceptions.

Health & Safety

- Check allergies before sensory activities involving food, herbs or scented materials.
- Supervise all Beach School observations and remind children not to touch unfamiliar wildlife.
- Wash hands after handling natural objects or animal-related resources.
- Ensure any tasting activities follow school food hygiene procedures.

Common Misconception	Teaching Response
Humans are not animals.	Explain that humans are mammals and therefore animals.
All animals have four legs.	Compare fish, birds, insects and snakes.
All birds fly.	Use examples such as penguins and ostriches.
Senses work independently.	Demonstrate how several senses work together.
Healthy means eating only fruit and vegetables.	Reinforce the importance of a balanced lifestyle including exercise, sleep and hygiene.
Reflection Question	**Purpose**
How are you similar to other animals?	Develop understanding that humans are mammals.
Which sense helped you most today? Why?	Encourage children to recognise how scientists make observations.
Why do different animals eat different foods?	Develop understanding of survival and adaptation.
What helped you classify the animals correctly?	Reinforce evidence-based thinking.
How do healthy choices help us every day?	Connect scientific knowledge to everyday life.
How has this learning helped answer our big question?	Consolidate the unit's key scientific concepts.

YEAR 1 - Exploring Everyday Materials – SPRING

How can we identify, compare and choose the best materials for different purposes?

Section	Overview
Curriculum Rationale	This unit introduces children to the properties of everyday materials through practical exploration and investigation. Pupils identify common materials including wood, plastic, glass, metal, water and rock before investigating their observable properties. Through hands-on enquiry they compare materials, test suitability for different purposes and discover that objects are made from materials chosen because of their properties. Developing Experts investigations encourage pupils to ask questions, test ideas and use evidence to solve simple scientific problems.
The Greatstone Way	**EXPLORERS → INVENTORS** – Children become young scientists and engineers, exploring the materials found in their everyday environment before investigating how different materials solve problems. Beach School provides authentic opportunities to investigate natural and manufactured materials found around Greatstone, encouraging curiosity, creativity and innovation.
National Curriculum Coverage	• 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 everyday materials. • Compare and group materials on the basis of their simple physical properties.
Developing Experts Knowledge Progression	Pupils begin by recognising the difference between objects and materials. They identify common materials before investigating their observable properties. They compare materials through practical enquiry before deciding which materials are most suitable for different purposes. Finally, they apply their knowledge by designing and evaluating simple objects using appropriate materials.
Curriculum Journey	**Previous Learning:** EYFS – Materials, construction, natural objects and exploring the environment. **Current Learning:** Identify, compare and investigate everyday materials and their properties. **Next Learning:** Year 2 – Uses of Everyday Materials, changing the shape of materials and suitability for different uses.
Scientific Enquiry Question	How do the properties of materials help us decide what they are used for?
Sticky Knowledge	Objects are made from materials. Different materials have different properties. Materials can be hard, soft, rough, smooth, stretchy, stiff, shiny, dull, waterproof or absorbent. The properties of a material determine what it is used for. Scientists compare materials by observing and testing them.
Working Scientifically	Observe closely. Compare. Identify. Classify. Test. Measure. Record results. Explain findings using evidence.
Scientific Knowledge & Skills	Identify everyday materials. Distinguish between objects and materials. Describe material properties. Compare materials. Select suitable materials. Explain choices using evidence.
Substantive Concepts	Materials • Properties • Objects • Change • Suitability • Investigation
Disciplinary Concepts	Observe • Compare • Identify • Test • Classify • Record • Explain
Scientific Vocabulary	material, object, wood, plastic, glass, metal, rock, water, fabric, paper, card, rubber, brick, property, hard, soft, rough, smooth, shiny, dull, stretchy, stiff, bendy, waterproof, absorbent, transparent, opaque
Working Scientifically Vocabulary	observe, compare, classify, predict, investigate, evidence, test, record, results, conclusion
Beach School & Outdoor Learning	Hunt for natural and manufactured materials around the beach. Compare pebbles, shells, driftwood and sand. Investigate waterproof materials used in outdoor clothing. Build simple shelters using natural materials. Explore which materials float or sink in rock pools (using safe tubs rather than the sea).
Greatstone & Local Links	Compare materials used in beach huts, sea defences, playground equipment and local buildings. Investigate why different materials are chosen to withstand coastal weather conditions.
Cross-Curricular Links	Design Technology (choosing suitable materials), Art (textures and printing), Mathematics (sorting and classifying), English (descriptive vocabulary), Geography (natural and human-made materials), Computing (recording observations).
High Quality Texts	*The Three Little Pigs*; *Traction Man*; *Iggy Peck, Architect*; *Rosie's Walk*; *Not a Stick*.
Significant Scientists & STEM Careers	John McAdam, Stephanie Kwolek, material scientist, civil engineer, product designer, architect, construction engineer.
Memorable Hook	**Greatstone Materials Investigation Laboratory** – Children receive a mystery box of objects washed ashore and become materials detectives, identifying what each object is made from and explaining why.
Authentic Outcome	**Young Engineers Exhibition** – Children design and present an object made from carefully selected materials, explaining why each material is the most suitable for its purpose using scientific vocabulary.
Assessment End Point	Children identify common materials, describe their properties, distinguish between objects and materials, compare materials and explain why certain materials are used for particular purposes.

YEAR 1 SPRING – 12 WEEK TEACHING SEQUENCE

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	Hook – Materials Detectives	Objects are made from materials.	Observe carefully.	Mystery object investigation.	Mystery objects, feely bags.	Materials hunt.	Prior knowledge.	Introduce object vs material immediately.
2	Objects and Materials	Objects and materials are different.	Identify and compare.	Match objects to materials.	Everyday objects.	Identify outdoor objects.	Correct identification.	Reinforce one object can contain several materials.
3	Identifying Everyday Materials	Materials have names.	Observe and classify.	Material sorting.	Sorting trays, labels.	Natural vs manufactured hunt.	Material identification.	Use real objects wherever possible.
4	Hard or Soft?	Materials have different properties.	Compare.	Property carousel.	Samples of materials.	Compare natural textures.	Use vocabulary accurately.	Encourage descriptive language.
5	Rough, Smooth, Shiny or Dull?	Materials have observable properties.	Observe closely.	Texture investigation.	Magnifiers.	Beach texture trail.	Accurate observations.	Model scientific vocabulary.

6	Stretchy, Stiff and Flexible	Materials behave differently.	Test fairly.	Bending and stretching investigation.	Elastic, card, fabric.	Shelter-building materials.	Explain observations.	Discuss fair testing simply.
7	Waterproof or Absorbent?	Some materials let water through.	Investigate.	Waterproof testing.	Pipettes, trays, fabrics.	Outdoor waterproof challenge.	Record results.	Introduce prediction before testing.
8	Transparent or Opaque?	Light passes through some materials.	Compare.	Light investigation.	Torches, materials.	Sunlight observations.	Scientific explanations.	Introduce "transparent" carefully.
9	Choosing the Best Material	Materials are chosen for their properties.	Explain using evidence.	Material matching challenge.	Everyday objects.	Beach equipment investigation.	Justify choices.	Encourage reasoning.
10	Designing for a Purpose	Scientists and engineers choose suitable materials.	Plan and test.	Design a waterproof lunch bag or boat.	Mixed materials.	Natural shelter challenge.	Apply learning.	Allow investigation before building.
11	Young Engineers Investigation	Apply knowledge independently.	Investigate and evaluate.	Independent materials challenge.	Mixed resources.	Outdoor engineering challenge.	End-point practical assessment.	Look for scientific vocabulary independently.
12	Exhibition	Communicate scientific understanding.	Present evidence.	Young Engineers Showcase.	Displays and models.	Invite families outdoors.	Summative assessment.	Celebrate explanation using scientific evidence.

Whole Unit Resource List

Investigation Equipment

- Material samples
- Magnifying glasses
- Pipettes
- Water trays
- Torches
- Sorting hoops
- Clipboards
- Feely bags
- Elastic bands
- Fabric samples
- Plastic containers
- Wooden blocks
- Glass jars (teacher demonstration)
- Metal objects
- Rubber samples

Consumables

- Sorting cards
- Labels
- Recording sheets
- Prediction tables
- Large paper
- Sticky notes
- Construction materials

Beach School Resources

- Buckets
- Shells
- Pebbles
- Driftwood
- Sand samples
- Waterproof clothing
- Natural building materials
- Investigation clipboards

Adaptive Teaching

- Use real materials before photographs.
- Provide labelled sorting mats.
- Introduce one property at a time using concrete examples.
- Use paired talk before recording.
- Provide sentence stems using scientific vocabulary.
- Challenge higher attainers to justify choices using multiple properties and compare similarities and differences.

Health & Safety

- Supervise investigations using glass materials; use plastic alternatives wherever possible.
- Dry spillages immediately during waterproof testing.
- Check for splinters when using natural wood or driftwood.
- Ensure hands are washed after handling natural materials collected outdoors.
- Supervise outdoor investigations near the beach and avoid collecting hazardous objects.

Common Misconception	Teaching Response
Objects and materials are the same thing.	Use many examples showing one material can make different objects and one object may contain several materials.
Every shiny object is metal.	Compare plastic, foil and glass alongside metals.
Waterproof means nothing can ever get wet.	Test different materials and discuss evidence.
Hard means strong.	Compare hard but brittle materials with softer, stronger materials.
Natural materials are always better than manufactured materials.	Investigate why different materials are chosen for different purposes.

Reflection Questions with Purpose

Reflection Question	Purpose
How did you know what material an object was made from?	Develop careful observation and identification skills.
Which property was most useful when comparing materials?	Reinforce scientific vocabulary and comparative thinking.
Why do different objects need different materials?	Develop understanding of suitability and function.
What evidence helped you decide which material was best?	Encourage evidence-based scientific reasoning.
If you redesigned your object, would you choose different materials? Why?	Promote evaluation and application of scientific knowledge.
How has this learning helped answer our big question?	Consolidate understanding that the properties of materials determine their uses.

YEAR 1 - Plants– SUMMER 1

How can we identify plants and help them grow and survive?

Section	Overview
Curriculum Rationale	This unit introduces pupils to the variety and structure of common plants. Building on EYFS learning about growing, changing and the natural world, pupils identify and name common wild and garden plants, including deciduous and evergreen trees. They observe plants closely, compare similarities and differences and identify the basic structures of flowering plants and trees. Through Developing Experts enquiries, pupils use first-hand observation, classification, fieldwork and simple recording to build accurate scientific knowledge. The unit also prepares pupils for Year 2 learning about how seeds and bulbs grow and the conditions plants need to remain healthy.

The Greatstone Way	**PROTECTORS** – Children develop care and responsibility for the plants growing around Greatstone. Through Beach School and outdoor learning, they observe coastal plants, trees and wildflowers and consider how plants provide food, shelter and protection for living things. Pupils learn that recognising and caring for plants helps protect local habitats and the wider environment.
National Curriculum Coverage	• 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.
Developing Experts Knowledge Progression	Pupils begin by distinguishing plants from other living and non-living things. They identify and name common garden and wild plants before comparing deciduous and evergreen trees. Pupils then examine the structures of flowering plants and trees and use these observable features to identify and classify specimens. Finally, they apply their learning through a local plant survey and conservation-focused outcome.
Curriculum Journey	**Previous Learning:** EYFS – Plants, Growing and Changing, Seasons and the Natural World. **Current Learning:** Identify common plants and trees and describe their basic structures. **Next Learning:** Year 2 – observe how seeds and bulbs grow into mature plants and investigate what plants need to grow and stay healthy.
Scientific Enquiry Question	**How can careful observation help us identify and compare the plants growing around us?**
Sticky Knowledge	Plants are living things. Common plants can be identified by their flowers, leaves, stems and overall shape. Wild plants grow without being deliberately planted by people. Garden plants are usually planted and cared for. Trees may be deciduous or evergreen. Deciduous trees lose their leaves during part of the year. Evergreen trees keep leaves throughout the year. Flowering plants commonly have roots, stems, leaves and flowers. Trees have roots, a trunk, branches and leaves.
Working Scientifically	Ask simple questions. Observe closely. Identify and classify. Compare similarities and differences. Use simple equipment. Record observations through drawings, labels, photographs and tables. Use observations to answer questions.
Scientific Knowledge & Skills	Identify common wild and garden plants. Identify deciduous and evergreen trees. Name basic plant structures. Compare flowers, leaves, stems and trees. Use simple identification guides. Record observations accurately.
Substantive Concepts	Plants • Living Things • Structure • Growth • Habitats • Survival
Disciplinary Concepts	Observe • Identify • Compare • Classify • Record • Explain
Scientific Vocabulary	plant, wild plant, garden plant, tree, deciduous, evergreen, root, stem, trunk, branch, leaf, flower, petal, seed, fruit, bud, blossom
Working Scientifically Vocabulary	observe, identify, compare, classify, sort, record, label, evidence, question
Beach School & Outdoor Learning	Identify plants in the school grounds, dunes and safe coastal areas. Compare wild and planted species. Observe leaves, stems, flowers, grasses and shrubs. Complete repeated plant walks and create photographic records. Investigate how coastal plants help hold sand together and provide habitats for insects and other animals.
Greatstone & Local Links	Observe marram grass, coastal grasses, wildflowers, shrubs and trees around Greatstone. Compare plants growing in exposed, sheltered, dry and damp areas. Discuss why dune vegetation should not be trampled or removed and how plants help protect the coastline.
Cross-Curricular Links	Geography (local environment and fieldwork), Mathematics (sorting and tallying), English (labels and descriptions), Art (observational drawing), Computing (photography and simple data recording), PSHE (care and responsibility).
High Quality Texts	*A Seed Is Sleepy*; *Planting a Rainbow*; *The Tiny Seed*; *Tree: Seasons Come, Seasons Go*; *The Big Book of Blooms*.
Significant Scientists & STEM Careers	George Washington Carver, Maria Sibylla Merian, botanist, gardener, horticulturist, park ranger, conservation officer.
Memorable Hook	**The Greatstone Plant Rescue Mission** – Pupils receive photographs and samples from an overgrown mystery garden and become junior botanists responsible for identifying the plants, labelling their structures and deciding how they should be cared for.
Authentic Outcome	**Greatstone Plant Identification Trail** – Pupils create a simple labelled trail or field guide showing common plants and trees found around the school and local environment, alongside messages explaining how to protect them.
Assessment End Point	Pupils identify and name a range of common wild and garden plants, distinguish deciduous and evergreen trees, label the basic structures of flowering plants and trees and use observable features to explain how they identified a plant.

YEAR 1 SUMMER 1 – 6-WEEK TEACHING SEQUENCE - Plants

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	**Hook – The Greatstone Plant Rescue Mission**	Plants are living things and come in many different forms. Scientists identify plants by observing their features.	Ask simple questions, observe closely and compare.	Examine mystery plants, photographs and safe specimens. Sort examples into plant and not plant and generate questions.	Safe plant specimens, photographs, magnifiers, sorting hoops and enquiry cards.	Complete an initial plant walk and photograph different examples.	Assess prior knowledge of plants and plant parts.	Begin with first-hand observation. Avoid expecting pupils to identify species before securing the idea that plants are living things with recognisable structures.
2	**Wild and Garden Plants**	Wild plants grow without being deliberately planted, while garden plants are usually planted and cared for by people. Both may have roots, stems, leaves and flowers.	Identify, compare and classify.	Sort photographs and specimens into wild and garden plants and use simple guides to identify common examples.	Plant cards, field guides, photographs, magnifiers and classification mats.	Identify wild plants and planted species around the school and local environment.	Correctly identify and explain wild and garden groupings.	A plant species may grow wild in one place and be cultivated in another. Focus on the context in which it is growing rather than treating species as permanently wild or garden plants.
3	**The Parts of a Flowering Plant**	Common flowering plants have roots, a stem, leaves and flowers. These structures can vary in size, colour and shape.	Observe closely, identify and record.	Examine whole plants and create accurate labelled drawings. Compare roots, stems, leaves and flowers.	Potted plants, safe uprooted weeds where appropriate, hand lenses, labels and drawing sheets.	Observe flowering plants without picking protected or scarce specimens.	Label the main plant structures accurately.	Keep functions simple at this stage. Detailed functions and reproduction are taught later. Use real plants before diagrams.

4	**Trees and Their Structures**	Trees are plants with roots, a trunk, branches and leaves. Different trees can be identified by leaves, bark, shape, blossom or seeds.	Observe, compare and identify patterns.	Compare bark rubbings, leaf shapes and tree photographs. Create a simple tree identification record.	Tree photographs, leaves, wax crayons, paper, magnifiers and identification guides.	Identify and compare trees in the school grounds or nearby safe areas.	Identify tree structures and use evidence to compare trees.	Avoid damaging bark or branches. Collect only fallen leaves and seeds unless permission has been given.
5	**Deciduous and Evergreen Trees**	Deciduous trees lose their leaves during part of the year. Evergreen trees retain leaves throughout the year, although individual leaves are still replaced.	Compare, classify and use evidence.	Sort tree photographs and leaves into deciduous and evergreen groups. Compare leaf characteristics.	Leaf samples, tree cards, sorting hoops and seasonal photographs.	Identify possible deciduous and evergreen trees using field evidence.	Explain the difference using accurate vocabulary.	Avoid saying evergreen trees never lose leaves. Reinforce that they retain foliage overall while replacing leaves gradually.
6	**Greatstone Plant Identification Trail**	Plants can be identified and grouped using observable features. Protecting plants helps maintain habitats and biodiversity.	Apply knowledge, record, explain and communicate.	Complete a local plant survey and create identification signs, trail cards or a class field guide.	Survey sheets, field guides, cameras, card, labels and display resources.	Complete the final plant survey and identify ways to protect local vegetation.	End-point practical, oral and recorded assessment.	Assess scientific identification and use of evidence rather than artistic presentation. Reinforce that pupils should observe plants responsibly and avoid unnecessary picking.

Whole Unit Resource List

Investigation Equipment

- Hand lenses
- Magnifying glasses
- Sorting hoops and trays
- Clipboards
- Cameras or iPads
- Simple plant and tree identification guides
- Bug viewers for observing insects visiting plants
- Collection trays for fallen leaves and seeds
- Potted plants
- Safe whole plant specimens

Consumables

- Plant and tree photographs
- Wild and garden plant cards
- Labels
- Plant-part cards
- Drawing and recording sheets
- Leaf and tree classification mats
- Wax crayons and paper for bark rubbings
- Tally charts
- Large display paper
- Trail cards
- Sticky notes

Beach School Resources

- Weatherproof clipboards
- Local plant identification guides
- Magnifiers
- Nature journals
- Cameras
- Plant survey sheets
- Boundary markers
- Fallen leaf and seed collection trays
- Coastal plant photographs

Adaptive Teaching

- Begin with real plants and first-hand outdoor experiences before photographs or diagrams.
- Use large, clear specimens with easily visible structures.
- Pre-teach vocabulary using labelled photographs and physical gestures.
- Provide plant-part labels for matching before independent writing.
- Use colour-coded diagrams for roots, stems, leaves and flowers.
- Offer simple visual sorting mats for wild, garden, deciduous and evergreen plants.
- Revisit the same local plants across several lessons to strengthen recognition and retrieval.
- Use paired talk and oral rehearsal before recording observations.
- Allow pupils to record through photographs, matching, labelled drawings or oral explanations.
- Provide sentence stems such as **"I identified this plant because…"** and **"This tree is evergreen because…"**
- Challenge higher attainers to create their own simple identification questions and compare plants using more than one observable feature.

Health & Safety

- Check plants for toxicity, thorns, irritants and allergens before pupils handle them.
- Avoid handling unknown plants, fungi, berries or seeds.
- Do not allow pupils to taste any plant material.
- Wash hands after handling plants, soil, leaves or seeds.
- Use commercially produced compost if plants are potted or replanted.
- Supervise the use of magnifiers and collection equipment.
- Collect only fallen leaves, flowers or seeds unless specific permission has been given.
- Avoid disturbing nests, insects or other wildlife using plants as habitats.
- Do not uproot wild plants during fieldwork.
- Stay on approved routes and avoid trampling dune vegetation.
- Follow established Beach School and outdoor-learning risk assessments.

Common Misconception	**Teaching Response**
Plants are not living because they do not move around.	Observe growth, changes and responses over time and compare plant needs with other living things.
Every plant has a visible flower.	Compare flowering plants with plants that are not currently flowering and other plant groups pupils may encounter.
Flowers and plants are separate things.	Show that a flower is one structure belonging to a flowering plant.
Roots are always visible above the ground.	Examine potted or safely uprooted plants to observe roots below the soil.
Every plant has a woody trunk.	Compare grasses, flowers, shrubs and trees.
Wild plants are weeds and are not useful.	Explore how wild plants provide food, shelter and habitats for wildlife.
Garden plants are always more attractive or important than wild plants.	Compare ecological roles and recognise value in both.
Deciduous trees are dead when they lose their leaves.	Use seasonal photographs and buds to show that the tree remains alive.
Evergreen trees never lose leaves.	Explain that leaves are replaced gradually rather than all at once.
All leaves are green and shaped the same way.	Compare leaves of different colours, sizes, edges and arrangements.
All trees can be identified from one leaf alone.	Use bark, shape, buds, seeds and other evidence alongside leaves.
Plants on the beach do not need protecting because they grow back.	Explain the role of roots and dune plants and how repeated trampling can damage habitats.

Reflection Question	Purpose
What evidence showed that your specimen was a plant?	Reinforce observation of living plant structures.
How did you decide whether a plant was wild or planted?	Develop classification using context and evidence.
Which plant structures could you identify?	Secure vocabulary for roots, stems, leaves and flowers.
How were the plants you observed similar and different?	Develop comparative observation.
Which features helped you identify a tree?	Encourage the use of multiple sources of evidence.
How is a deciduous tree different from an evergreen tree?	Consolidate accurate tree classification.
Why are roots important for plants growing near Greatstone Beach?	Connect plant structure with local coastal survival.
How do plants help protect other living things?	Link plant science with habitats and the **PROTECTORS** theme.
What should people do to protect plants around Greatstone?	Apply scientific knowledge to responsible local action.
How has this learning helped answer our big question?	Consolidate understanding that careful observation allows us to identify plants and that protecting them helps plants and their habitats survive.

YEAR 1 – Animals Including Humans – All About Animals - SUMMER 2

How can we identify and compare animals, and how can we help protect them for the future?

Section	Overview
Curriculum Rationale	This unit builds on pupils' Autumn learning about the human body and common animal groups by developing their knowledge of animal structures, diets and classification. Pupils identify and name a wider range of familiar animals, including fish, amphibians, reptiles, birds and mammals, before comparing their body structures and observable features. They classify animals as carnivores, herbivores or omnivores and consider how body parts help animals move, feed and survive. Through Developing Experts enquiry, pupils observe closely, compare, identify, classify and record findings using scientific vocabulary. The unit consolidates the Year 1 Animals Including Humans programme of study while encouraging care and responsibility for local wildlife.
The Greatstone Way	**LEGACY** – Children recognise that animals are an important part of the natural world and that people have a responsibility to protect them and their habitats. Through Beach School, pupils observe local wildlife carefully and respectfully, considering how their actions can help ensure animals continue to thrive for future generations.
National Curriculum Coverage	• 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. • Identify, name, draw and label the basic parts of the human body and say which part is associated with each sense, revisited where relevant for comparison.
Developing Experts Knowledge Progression	Pupils begin by revisiting the characteristics shared by animals and the five main vertebrate groups introduced earlier in Year 1. They identify and classify common animals before comparing body coverings, limbs, movement and feeding structures. Pupils then investigate animal diets and classify animals as carnivores, herbivores or omnivores. Finally, they apply their learning by creating an identification resource and explaining how animals can be protected.
Curriculum Journey	**Previous Learning:** EYFS – Animals, insects and the natural world; Year 1 Autumn 2 – humans as animals, common animal groups, body parts, senses and healthy living. **Current Learning:** Identify, compare and classify common animals according to group, structure and diet. **Next Learning:** Year 2 – Living Things and Their Habitats, food chains, animal growth, life cycles and survival needs.
Scientific Enquiry Question	**How can careful observation help us identify, compare and classify animals?**
Sticky Knowledge	Animals are living things. Common vertebrate groups include mammals, birds, fish, reptiles and amphibians. Animals have body structures suited to the way they move, feed and survive. Mammals usually have hair or fur. Birds have feathers, wings and beaks. Fish have fins and gills. Reptiles usually have dry scales. Amphibians usually have moist skin and spend part of their lives in water. Carnivores eat other animals, herbivores eat plants and omnivores eat both plants and animals.
Working Scientifically	Ask simple questions. Observe closely. Identify and classify. Compare similarities and differences. Use simple identification guides. Record findings through drawings, labels, photographs and sorting tables. Use observations to answer questions.
Scientific Knowledge & Skills	Identify common animals. Classify animals into major groups. Describe and compare body structures. Identify carnivores, herbivores and omnivores. Use observable evidence to justify classifications.
Substantive Concepts	Animals • Structure • Classification • Diet • Movement • Survival • Habitats
Disciplinary Concepts	Observe • Identify • Compare • Classify • Record • Explain
Scientific Vocabulary	animal, mammal, bird, fish, reptile, amphibian, pet, wild animal, fur, hair, feathers, scales, skin, wings, beak, fins, gills, tail, claws, paws, hooves, carnivore, herbivore, omnivore, predator, prey
Working Scientifically Vocabulary	observe, identify, compare, classify, sort, record, evidence, question, explain
Beach School & Outdoor Learning	Observe birds, insects, worms, spiders and other safe wildlife around the school and coast. Compare movement, body coverings and feeding behaviours. Use binoculars and identification guides. Search for indirect evidence such as tracks, feathers, nests, shells or feeding marks without disturbing animals or habitats.
Greatstone & Local Links	Observe gulls, shorebirds, insects, worms, spiders and other animals found around Greatstone Beach, the dunes and school grounds. Compare local wildlife with familiar pets and animals from other habitats. Discuss how litter, habitat damage and disturbance can affect animals.
Cross-Curricular Links	Geography (local and world habitats), Mathematics (sorting, tallying and pictograms), English (animal descriptions and information texts), Art (observational drawing), Computing (digital identification and recording), PSHE (care and responsibility).
High Quality Texts	*Superworm*; *The Gruffalo*; *A First Book of Animals*; *The Big Book of Beasts*; *The Big Book of the Blue*; age-appropriate animal identification texts.
Significant Scientists & STEM Careers	Jane Goodall, David Attenborough, Steve Irwin, zoologist, veterinary surgeon, marine biologist, wildlife ranger, animal keeper.
Memorable Hook	**The Greatstone Animal Identification Agency** – Pupils receive photographs, footprints, feathers, shells and feeding clues from a series of mystery animals. They become young zoologists responsible for identifying each animal and explaining the evidence supporting their decisions.
Authentic Outcome	**Greatstone Young Zoologists Field Guide** – Pupils create an identification guide or interactive exhibition comparing common animals by group, body structure and diet, alongside advice explaining how local wildlife should be protected.

Assessment End Point	Pupils identify and name common mammals, birds, fish, reptiles and amphibians, compare their observable structures, classify animals as carnivores, herbivores or omnivores and justify their decisions using simple scientific evidence.

YEAR 1 SUMMER 2 – 6-WEEK TEACHING SEQUENCE - Animals Including Humans – All About Animals

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	**Hook – The Greatstone Animal Identification Agency**	Animals are living things with observable features that help scientists identify and group them.	Ask simple questions, observe closely and compare.	Examine mystery animal evidence, including photographs, footprints, feathers, shells and body-part clues. Suggest possible identifications.	Animal photographs, footprint cards, feathers, replica shells, magnifiers, sorting hoops and enquiry packs.	Complete an initial wildlife observation walk and record animals or evidence of animals.	Assess prior understanding of animal groups and features.	Revisit Autumn 2 learning without immediately giving group names. Encourage pupils to explain what they can see before classifying.
2	**Mammals and Birds**	Mammals usually have hair or fur and feed milk to their young. Birds have feathers, wings and beaks. Both groups contain animals with different shapes, sizes and ways of moving.	Observe, compare, identify and classify.	Sort familiar and unfamiliar mammals and birds using photographs and models. Compare body coverings, limbs and movement.	Animal models, photographs, feathers, fur samples or replicas, sorting mats and identification guides.	Observe local birds and search for safe evidence such as feathers, nests or footprints.	Correctly identify mammals and birds and explain the evidence used.	Not all birds fly, and some mammals live in water or can fly. Avoid classifying animals by movement or habitat alone.
3	**Fish, Reptiles and Amphibians**	Fish have fins and gills and live in water. Reptiles usually have dry scales. Amphibians usually have moist skin and live in water and on land during different life stages.	Compare, classify and record similarities and differences.	Examine images and models and create a comparison chart for fish, reptiles and amphibians.	Animal cards, models, scales and skin photographs, hoops and comparison sheets.	Discuss fish and marine animals associated with the local coast and compare them with reptiles and amphibians.	Identify and classify unfamiliar examples using observable features.	Whales and dolphins are mammals, not fish. Avoid teaching that every animal living in water belongs to the fish group.
4	**Comparing Animal Bodies and Movement**	Animals have different body parts and coverings that support movement and survival. Limbs may include legs, wings or fins. Animals may walk, run, swim, fly, crawl or slither.	Observe carefully, compare and identify patterns.	Compare animal structures and match body parts to movement. Complete a simple movement investigation or model challenge.	Animal movement cards, models, photographs, body-part labels and recording tables.	Observe how local birds, insects and other animals move through coastal habitats.	Describe and compare at least two animals using scientific vocabulary.	Avoid suggesting that one body part has only one function. Encourage comparison of similarities before differences.
5	**What Do Animals Eat?**	Carnivores eat other animals, herbivores eat plants and omnivores eat both. Teeth, beaks and other feeding structures can provide clues about diet.	Classify, identify patterns and explain using evidence.	Sort animals and food cards into carnivore, herbivore and omnivore groups. Match feeding structures to possible diets.	Animal diet cards, food cards, skull or tooth images, beak photographs and sorting hoops.	Look for safe evidence of feeding, such as pecked seeds, chewed leaves or bird activity.	Classify animal diets and explain choices using evidence.	Avoid presenting diet groups as rigid when animals have varied diets. At Year 1, use clear common examples while acknowledging that real diets can be complex.
6	**Greatstone Young Zoologists Field Guide**	Animals can be identified and grouped using body structure, covering, movement and diet. Protecting habitats helps animals survive.	Apply knowledge, classify, record, explain and communicate.	Complete an animal-identification challenge and create a field-guide page or exhibition display for a chosen animal.	Identification guides, photographs, templates, labels, display materials and assessment cards.	Complete a final wildlife survey and identify actions that protect local animals and habitats.	End-point practical, oral and recorded assessment.	Assess scientific accuracy, classification and explanation rather than artistic presentation. Revisit the big question explicitly.

Whole Unit Resource List

Investigation Equipment

- Animal models
- Hand lenses
- Magnifying glasses
- Binoculars
- Sorting hoops and trays
- Clipboards
- Cameras or iPads
- Animal identification guides
- Replica footprints, shells and skulls
- Safe feathers or photographic alternatives
- Bug viewers for brief observation

Consumables

- Animal group cards
- Body-covering cards
- Animal diet cards
- Food cards
- Footprint and movement cards
- Comparison tables
- Classification mats
- Field-guide templates
- Labels
- Recording sheets
- Large display paper
- Sticky notes

Beach School Resources

- Weatherproof clipboards
- Binoculars
- Local bird and wildlife identification guides
- Nature journals
- Bug viewers
- Cameras
- Wildlife survey sheets
- Footprint and track guides
- Coastal animal photographs
- Boundary markers

Adaptive Teaching

- Revisit familiar pets and local animals before introducing less familiar examples.
- Use real observations, models and high-quality photographs before written descriptions.
- Colour-code the five main animal groups consistently.
- Provide classification mats showing key features for each group.
- Introduce one animal group at a time before comparing several groups.
- Use tactile or replica examples of feathers, fur, scales and shells where appropriate.
- Provide sentence stems such as **“This animal is a bird because…”** and **“It is an omnivore because…”**
- Allow pupils to record through matching, sorting, labelled diagrams, photographs or oral explanations.
- Use paired talk before independent classification.

- Revisit the same animals across lessons to strengthen retrieval and vocabulary.
- Challenge higher attainers to classify unfamiliar animals, identify exceptions and justify classifications using more than one characteristic.

Health & Safety

- Supervise all outdoor wildlife observations closely.
- Do not allow pupils to touch unfamiliar, injured or dead animals.
- Observe animals without chasing, trapping or disturbing them.
- Keep living invertebrates in viewers for the shortest possible time and return them to the exact place where they were found.
- Do not disturb nests, eggs, burrows or protected habitats.
- Use clean replica specimens or photographs rather than unsafe animal remains.
- Check feathers, shells and natural materials for contamination or sharp edges before use.
- Wash hands after outdoor learning or handling natural materials.
- Ensure binoculars and magnifiers are used safely and never directed at the Sun.
- Follow established Beach School risk assessments, boundaries and coastal safety procedures.

Common Misconception	Teaching Response
Humans are separate from animals.	Revisit that humans are mammals and share characteristics with other animals.
Every animal has four legs.	Compare birds, fish, snakes, insects and humans.
Every animal that flies is a bird.	Compare birds with bats and flying insects.
All birds can fly.	Use penguins, ostriches and other flightless birds as contrasting examples.
Every animal living in water is a fish.	Compare fish with whales, dolphins, seals, amphibians and marine reptiles.
Frogs are reptiles.	Compare moist amphibian skin and life stages with the dry scales of reptiles.
Mammals always live on land.	Use whales, dolphins and seals as examples of aquatic mammals.
Carnivores eat only meat at every meal.	Explain that the classification describes the main type of food eaten and that real diets may vary.
Herbivores eat only grass.	Compare leaves, fruits, seeds, roots and other plant materials.
Omnivores eat everything.	Explain that omnivores eat both plant and animal material, but not necessarily every kind of food.
Bigger animals are always predators.	Compare predators and prey of different sizes.
Wild animals are dangerous and pets are safe.	Emphasise respectful observation and explain that any animal may behave unpredictably.
Animals live wherever they choose.	Explain that habitats must provide food, water, shelter and suitable conditions.

Reflection Question	Purpose
Which features helped you identify the animal?	Develop identification based on observable scientific evidence.
How is a mammal similar to and different from a bird?	Strengthen comparative thinking and vocabulary.
Why is a dolphin a mammal rather than a fish?	Address classification based on characteristics rather than habitat.
How do an animal's body parts help it move?	Connect structure with movement and survival.
What evidence helped you decide what an animal eats?	Develop classification using diet and feeding structures.
How are carnivores, herbivores and omnivores different?	Consolidate accurate dietary vocabulary.
Which local animals did we observe around Greatstone?	Connect classroom knowledge with first-hand fieldwork.
How can we observe animals without disturbing them?	Develop responsible scientific fieldwork and care.
What can people do to protect animals and their habitats?	Apply knowledge through the **LEGACY** theme.
How has this learning helped answer our big question?	Consolidate understanding that animals can be identified and compared using their structures, group characteristics and diets, and that protecting habitats helps them survive into the future.

YEAR 2 - Uses of Everyday Materials – AUTUMN 1

How do the properties of materials help us choose the best material for different jobs?

Section	Overview
Curriculum Rationale	This unit builds on Year 1 learning about identifying and describing materials by investigating how materials can be changed and why they are chosen for particular purposes. Pupils explore the properties of everyday materials through practical testing before discovering that materials can be bent, squashed, twisted and stretched. They investigate which materials are most suitable for different uses and begin to understand how scientists and engineers select materials because of their properties. Through Developing Experts enquiries, pupils develop fair testing, careful observation and evidence-based reasoning.
The Greatstone Way	**ROOTS → SURVIVORS** – Children investigate how people have used different materials to solve problems throughout history and in their local community. They explore natural and manufactured materials found around Greatstone and discover how choosing the right material helps people survive challenging weather and environments. Through Beach School they investigate materials used along the coastline and begin thinking like engineers and designers.
National Curriculum Coverage	• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.
Developing Experts Knowledge Progression	Pupils revisit common materials before investigating their properties through comparative testing. They discover that different materials are chosen because they are suitable for particular purposes before investigating how some materials can change shape. Finally, they apply their understanding by designing solutions using the most suitable materials.

Curriculum Journey	**Previous Learning:** Year 1 – Everyday Materials (identifying materials and their properties). **Current Learning:** Compare materials, investigate suitability and explore how materials change shape. **Next Learning:** Year 4 – States of Matter and Year 5 – Properties and Changes of Materials.
Scientific Enquiry Question	How can we test materials to discover which ones are best for different purposes?
Sticky Knowledge	Different materials have different properties. Materials are chosen because they are suitable for particular jobs. Some materials bend, squash, twist or stretch more easily than others. Scientists compare materials by carrying out fair tests. Evidence helps us decide which material is most suitable.
Working Scientifically	Observe closely. Compare. Carry out comparative tests. Measure. Record results. Identify patterns. Explain conclusions using evidence.
Scientific Knowledge & Skills	Compare materials. Test suitability. Describe material properties. Investigate changing shape. Conduct simple fair tests. Explain findings using scientific evidence.
Substantive Concepts	Materials • Properties • Suitability • Change • Forces • Investigation
Disciplinary Concepts	Observe • Compare • Test • Measure • Record • Conclude • Explain
Scientific Vocabulary	material, property, wood, plastic, metal, glass, brick, rock, paper, cardboard, rubber, fabric, waterproof, absorbent, flexible, rigid, strong, weak, transparent, opaque, bend, squash, twist, stretch, suitable, compare
Working Scientifically Vocabulary	fair test, observe, compare, predict, investigate, variable, evidence, results, conclusion, record
Beach School & Outdoor Learning	Investigate natural and man-made materials found around the beach. Test waterproof materials used in outdoor clothing. Compare materials used for beach huts, sea defences and playground equipment. Build shelters using different natural materials and investigate which materials withstand wind and water best.
Greatstone & Local Links	Investigate materials used in sea walls, groynes, beach huts, coastal paths and local buildings. Explore why particular materials have been selected to withstand coastal weather conditions.
Cross-Curricular Links	Design Technology (designing products), Mathematics (measuring and recording results), English (scientific explanations), Geography (natural and human environments), Art (texture and sculpture), Computing (recording and presenting data).
High Quality Texts	*The Three Little Pigs*; *Iggy Peck, Architect*; *Rosie Revere, Engineer*; *The Most Magnificent Thing*; *Traction Man*.
Significant Scientists & STEM Careers	Stephanie Kwolek, John McAdam, Isambard Kingdom Brunel, materials scientist, structural engineer, civil engineer, architect, product designer.
Memorable Hook	**Greatstone Engineering Challenge** – Children receive a mystery box of damaged seaside equipment and become engineers tasked with choosing the most suitable materials to repair and improve each object.
Authentic Outcome	**Young Engineers Showcase** – Children design and build a product using carefully selected materials before presenting scientific evidence explaining why each material was chosen.
Assessment End Point	Children compare materials, explain why materials are suitable for different purposes, investigate how materials change shape and use evidence from comparative testing to justify their conclusions.

YEAR 2 AUTUMN 1 – 6 WEEK TEACHING SEQUENCE

Uses of Everyday Materials

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	Hook – Greatstone Engineering Challenge	Materials are chosen because they have different properties.	Observe and predict.	Investigate mystery seaside objects.	Everyday objects, mystery box.	Materials hunt around school grounds.	Prior knowledge assessment.	Revisit Year 1 materials vocabulary.
2	Which Material is Best?	Different materials are suitable for different purposes.	Compare materials.	Test materials used for cups, umbrellas and windows.	Material samples.	Identify materials used outdoors.	Explain choices.	Encourage scientific reasoning.
3	Waterproof or Absorbent?	Some materials let water pass through while others do not.	Carry out comparative tests.	Waterproof investigation.	Pipettes, trays, fabrics.	Test waterproof outdoor clothing.	Record results accurately.	Introduce fair testing.
4	Strong, Flexible or Rigid?	Materials have different strengths and flexibility.	Measure and compare.	Bend, twist and stretch investigation.	Elastic, card, plastic, wire.	Shelter-building challenge.	Explain observations.	Focus on one variable at a time.
5	Can Materials Change Shape?	Some materials change shape more easily than others.	Observe patterns.	Squashing, twisting and stretching investigation.	Clay, sponge, rubber, foil.	Natural material investigations.	Identify changes.	Reinforce that not all changes are permanent.
6	Young Engineers Challenge	Evidence helps us choose suitable materials.	Plan, test and evaluate.	Design and build a simple product using suitable materials.	Mixed construction materials.	Outdoor engineering challenge.	End-point practical assessment.	Encourage independent scientific explanations.

Whole Unit Resource List

Investigation Equipment

- Material samples
- Magnifying glasses
- Pipettes
- Water trays
- Force meters (demonstration)
- Clipboards
- Sorting hoops
- Measuring rulers
- Elastic bands
- Construction materials

Consumables

- Prediction sheets
- Investigation recording sheets
- Labels
- Cardboard
- Paper
- Fabric
- Foil
- Plastic sheets
- Masking tape

Beach School Resources

- Driftwood
- Pebbles
- Shells
- Waterproof clothing
- Buckets
- Tarpaulins
- Natural building materials
- Investigation clipboards

Adaptive Teaching

- Begin with revisiting Year 1 material names using real objects.
- Provide visual property word mats.
- Model comparative testing before independent investigations.
- Use structured recording frames for fair tests.
- Support vocabulary through paired discussion and practical demonstrations.
- Challenge higher attainers to explain why several materials may be suitable for one purpose and justify the best choice using evidence.

Health & Safety

- Supervise all investigations involving bending or stretching materials.
- Use plastic rather than glass where possible.
- Dry spillages immediately during waterproof investigations.
- Check natural materials for sharp edges or splinters before Beach School activities.
- Ensure children wear appropriate outdoor clothing during coastal investigations.

Common Misconception	Teaching Response
One material is always the best.	Compare different materials for different purposes to show suitability depends on the job.
Waterproof means completely indestructible.	Demonstrate that waterproof only describes how a material reacts to water.
Flexible materials are weak.	Compare strong flexible materials such as rubber with rigid but brittle materials.
If a material bends it has permanently changed.	Explore temporary and permanent changes through practical investigations.
All objects are made from only one material.	Investigate everyday objects made from multiple materials.

Reflection Question	Purpose
How did your investigation help you decide which material was best?	Develop evidence-based scientific thinking.
Which material surprised you most during testing? Why?	Encourage reflection on enquiry outcomes.
Why do engineers test materials before building something?	Link classroom investigations to real-world STEM careers.
What made your investigation a fair test?	Reinforce understanding of comparative testing.
Which material would you choose if you redesigned your product? Why?	Promote evaluation and application of learning.
How has this learning helped answer our big question?	Consolidate understanding that materials are chosen because of their properties and suitability.

YEAR 2- Living Things and Their Habitats and Habitats Around the World – SPRING

How do habitats around the world help living things survive, and why are they all different?

Section	Overview
Curriculum Rationale	This extended unit builds on pupils' understanding of living things by exploring habitats first within the local environment before widening their knowledge to habitats around the world. Children investigate how habitats provide animals and plants with everything they need to survive before comparing environments such as woodlands, deserts, oceans, rainforests, polar regions and grasslands. Through practical enquiry they identify living things, investigate microhabitats, construct simple food chains and discover how animals are adapted to different environments. Developing Experts investigations develop observation, classification, comparison and evidence-based reasoning while encouraging curiosity about biodiversity and conservation.
The Greatstone Way	**EXPLORERS → INVENTORS –** Children begin as habitat explorers in Greatstone before becoming global scientists investigating diverse ecosystems around the world. Through Beach School they explore the rich coastal habitats surrounding the school before comparing these with habitats on other continents. They develop respect for biodiversity and understand how everyone has a responsibility to protect living things and their environments.
National Curriculum Coverage	• 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 their basic needs. • Identify and name a variety of plants and animals in habitats, including microhabitats. • Describe how animals obtain their food from plants and other animals using simple food chains and identify different sources of food.
Developing Experts Knowledge Progression	Pupils first identify living, dead and never alive before investigating local habitats and microhabitats. They explore how habitats provide food, water, shelter and space before learning about simple food chains. They then compare habitats around the world, discovering how animals and plants are suited to different environments. Finally, they consider how humans can protect habitats both locally and globally.
Curriculum Journey	**Previous Learning:** EYFS – Plants, Animals, Minibeasts and Seasonal Change. **Current Learning:** Explore local habitats before comparing habitats around the world and investigating biodiversity. **Next Learning:** Year 4 – Living Things and Their Habitats (classification, ecosystems and environmental change).
Scientific Enquiry Question	How do different habitats meet the needs of living things, and how are they connected?
Sticky Knowledge	Living things need food, water, shelter, air and space. Habitats provide these needs. Different habitats support different plants and animals. Microhabitats are very small habitats. Animals are suited to the habitats in which they live. Food chains show feeding relationships. Humans have a responsibility to care for habitats around the world.
Working Scientifically	Observe closely. Identify and classify. Compare habitats. Gather and record evidence. Recognise patterns. Construct simple food chains. Explain findings.
Scientific Knowledge & Skills	Identify living, dead and never alive. Explore habitats and microhabitats. Identify plants and animals. Compare habitats. Construct food chains. Explain how living things depend upon habitats.
Substantive Concepts	Living Things • Habitats • Adaptation • Biodiversity • Food Chains • Survival • Environment
Disciplinary Concepts	Observe • Compare • Identify • Classify • Record • Explain • Predict
Scientific Vocabulary	living, dead, never alive, habitat, microhabitat, survive, shelter, food, water, air, woodland, coast, pond, ocean, rainforest, desert, Arctic, grassland, food chain, producer, consumer, predator, prey, adaptation, environment
Working Scientifically Vocabulary	observe, identify, classify, compare, investigate, predict, evidence, record, pattern, conclusion
Beach School & Outdoor Learning	Investigate coastal habitats, dunes, rock pools and school grounds. Carry out biodiversity surveys, identify microhabitats and compare habitats over time. Construct local food chains and compare them with those found around the world.
Greatstone & Local Links	Explore Greatstone Beach, Romney Marsh and school habitats. Observe coastal birds, insects, plants and marine life. Compare these habitats with deserts, rainforests, polar regions and oceans studied during the second half of the unit. Discuss local conservation work protecting Kent's coastline.
Cross-Curricular Links	Geography (continents, climates and environments), English (information texts), Mathematics (data collection and pictograms), Art (observational drawing), PSHE (caring for the environment), Computing (recording biodiversity data).
High Quality Texts	*Somebody Swallowed Stanley*; *A First Book of Nature*; *Mad About Minibeasts!*; *The Great Kapok Tree*; *Yucky Worms*.

Significant Scientists & STEM Careers	David Attenborough, Jane Goodall, Rachel Carson, ecologist, marine biologist, conservation ranger, wildlife photographer, zoologist.
Memorable Hook	**Greatstone Habitat Expedition** – Children become wildlife explorers after receiving a challenge from conservation scientists to investigate local habitats before comparing them with habitats across the world.
Authentic Outcome	**World Habitats Museum** – Children create an interactive exhibition comparing habitats around the world through models, food chains, scientific explanations and conservation advice.
Assessment End Point	Children identify living things and habitats, explain how habitats meet the needs of plants and animals, compare habitats around the world, construct simple food chains and explain why protecting habitats is important.

YEAR 2 SPRING – 12 WEEK TEACHING SEQUENCE - Living Things and Their Habitats – Habitats Around the World

Part 1 – Local Habitats (Weeks 1–6)

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	Hook – Greatstone Habitat Expedition	Living things depend on habitats.	Observe carefully.	Habitat treasure hunt.	Habitat photographs, sorting cards.	Explore school grounds.	Prior knowledge.	Introduce scientific vocabulary.
2	Living, Dead or Never Alive?	Living things have common characteristics.	Identify and classify.	Sort natural objects.	Natural collections.	Beach object hunt.	Accurate classification.	Reinforce that dead things were once alive.
3	Exploring Local Habitats	Habitats provide food, water, shelter and space.	Compare habitats.	Habitat survey.	Identification guides.	Coastal habitat walk.	Identify habitats correctly.	Use Greatstone examples.
4	Microhabitats	Small habitats support many living things.	Observe closely.	Log and leaf litter investigation.	Magnifiers, bug viewers.	Minibeast hunt.	Record observations.	Replace habitats carefully.
5	Food Chains	Plants and animals depend on one another.	Identify patterns.	Construct simple food chains.	Food chain cards.	Coastal food chain investigation.	Correct food chains.	Always begin with plants.
6	End of Part 1 Investigation	Habitats support biodiversity.	Explain using evidence.	Habitat comparison challenge.	Mixed resources.	Biodiversity survey.	Mid-unit assessment.	Consolidate local habitat learning.

Part 2 – Habitats Around the World (Weeks 7–12)

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School Connection	Assessment	Teacher Notes
7	Comparing World Habitats	Habitats around the world are different.	Compare.	Habitat sorting investigation.	World habitat cards.	Compare Greatstone with deserts and rainforests.	Identify habitats.	Link to Geography learning.
8	Desert and Rainforest Habitats	Animals are suited to different environments.	Observe patterns.	Animal adaptation matching.	Animal models.	Compare climate to Greatstone.	Explain adaptations.	Avoid introducing evolution.
9	Polar and Ocean Habitats	Habitats provide different survival conditions.	Compare evidence.	Blubber investigation.	Fat gloves, ice water.	Compare oceans with local coast.	Scientific explanations.	Emphasise insulation.
10	Grasslands and Woodlands	Different habitats support different biodiversity.	Identify similarities and differences.	Habitat comparison charts.	Habitat photographs.	Compare woodland to coastal habitats.	Explain differences.	Introduce biodiversity vocabulary.
11	Caring for Habitats	Humans affect habitats positively and negatively.	Gather evidence.	Conservation challenge.	Images, case studies.	Beach litter survey.	Apply learning.	Promote stewardship.
12	World Habitats Museum	Scientific understanding can be communicated using evidence.	Present findings.	Museum exhibition.	Displays, models, food chains.	Invite families.		

Whole Unit Resource List

Investigation Equipment

- Magnifying glasses
- Bug viewers
- Clipboards
- Habitat identification guides
- Collection trays
- Pooters (teacher demonstration only)
- Thermometers
- Cameras/iPads
- Food chain cards
- Sorting hoops

Consumables

- Recording sheets
- Identification keys
- Habitat survey sheets
- Labels
- Large paper
- String quadrats
- Tally charts

Beach School Resources

- Bug pots
- Binoculars
- Nature journals
- Identification charts
- Collection trays
- Quadrats
- Gloves
- Litter pickers

Adaptive Teaching

- Begin with real experiences before introducing scientific terminology.
- Use picture vocabulary cards throughout investigations.
- Model habitat observations before independent recording.
- Provide simple food chain templates with arrows.
- Pair pupils during habitat investigations.
- Challenge higher attainers to explain how changing one part of a habitat affects the whole food chain and identify multiple feeding relationships.

Health & Safety

- Wash hands thoroughly after handling soil, leaves or natural materials.
- Do not allow children to handle unknown plants or wildlife.
- Return logs, stones and other habitat features carefully after investigations.
- Supervise all Beach School and coastal activities closely.
- Wear gloves during habitat improvement or litter-picking activities.
- Remind children to respect wildlife and minimise disturbance.

YEAR 2- Animals Including Humans – Growth and Life Cycles – SPRING

How do animals, including humans, grow, change and survive throughout their lives?

Section	Overview
Curriculum Rationale	This extended unit develops children's understanding of how animals, including humans, grow, develop and survive. Pupils begin by investigating the basic needs of animals before exploring healthy lifestyles, growth and development from offspring to adulthood. They then study the life cycles of a range of animals, comparing similarities and differences between mammals, birds, amphibians and insects. Through Developing Experts enquiries, children observe change over time, compare life cycles and use evidence to explain how living things grow, reproduce and survive.
The Greatstone Way	**EXPLORERS → INVENTORS** – Children become life scientists, exploring how living things grow and change both locally and globally. Through Beach School they observe wildlife at different stages of development, investigate habitats that support young animals and understand how healthy choices help humans thrive. They develop curiosity about the diversity of life and the importance of caring for living things throughout their life cycles.
National Curriculum Coverage	• 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 amounts of different types of food and hygiene.
Developing Experts Knowledge Progression	Pupils first investigate what animals need to survive before learning that offspring grow into adults. They explore healthy lifestyles through practical investigations before extending their understanding by comparing complete life cycles of different animals. Finally, pupils explain how life cycles enable species to continue and how healthy choices support growth and survival.
Curriculum Journey	**Previous Learning:** Year 1 – Animals Including Humans (body parts, senses and animal groups). **Current Learning:** Growth, healthy living and animal life cycles. **Next Learning:** Year 5 – Animals Including Humans (human development) and Year 6 – Evolution and Inheritance.
Scientific Enquiry Question	How do animals, including humans, grow, change and survive throughout their lives?
Sticky Knowledge	All animals need food, water and air to survive. Animals have offspring that grow into adults. Humans need healthy food, exercise, sleep and hygiene. Different animals have different life cycles. Every life cycle includes growth and reproduction. Living things change as they grow. Scientists observe changes over time to understand growth and development.
Working Scientifically	Observe over time. Compare. Identify patterns. Gather evidence. Record observations. Interpret results. Explain findings using evidence.
Scientific Knowledge & Skills	Describe basic needs for survival. Explain healthy lifestyles. Compare offspring and adults. Sequence life cycles. Identify similarities and differences between animal life cycles. Explain growth and development.
Substantive Concepts	Animals • Humans • Growth • Development • Life Cycles • Survival • Health
Disciplinary Concepts	Observe • Compare • Identify • Record • Explain • Evaluate • Pattern
Scientific Vocabulary	offspring, baby, child, juvenile, adult, survive, growth, development, life cycle, hatchling, chick, tadpole, froglet, caterpillar, chrysalis, butterfly, reproduce, healthy, hygiene, exercise, balanced diet, nutrition, germ
Working Scientifically Vocabulary	observe, compare, investigate, record, evidence, results, conclusion, pattern, sequence
Beach School & Outdoor Learning	Observe birds, insects, worms and coastal wildlife at different stages of development. Investigate habitats that support young animals. Carry out pulse investigations before and after exercise. Observe seasonal changes affecting breeding and growth. Search for insect life cycles beneath logs, in grasses and around wildflowers.
Greatstone & Local Links	Observe gulls, insects, spiders, butterflies and coastal birds around Greatstone. Compare the life cycles of local wildlife with animals from around the world. Explore healthy lifestyles through beach walks and outdoor physical activities.
Cross-Curricular Links	PSHE (Healthy Me), PE (fitness), Mathematics (measuring and recording), English (scientific explanation writing), Geography (habitats), Computing (data recording).
High Quality Texts	*The Very Hungry Caterpillar*; *Oliver's Vegetables*; *A Butterfly is Patient*; *Amazing Animal Babies*; *A First Book of the Human Body*.
Significant Scientists & STEM Careers	Jane Goodall, David Attenborough, Florence Nightingale, Louis Pasteur, zoologist, paediatrician, nurse, vet, conservation biologist, wildlife ranger.
Memorable Hook	**The Greatstone Life Laboratory** – Children become life scientists after discovering mysterious eggs, cocoons and young animals. They investigate how living things grow, survive and complete their life cycles.
Authentic Outcome	**Life Cycles Discovery Museum** – Children create an interactive exhibition explaining growth, healthy living and the life cycles of animals using scientific models, diagrams and investigations.
Assessment End Point	Children explain how animals, including humans, grow and survive, describe healthy lifestyles, compare life cycles of different animals and use scientific evidence to explain how living things change throughout their lives.

YEAR 2 SPRING – 12 WEEK TEACHING SEQUENCE

Animals Including Humans Part 1 – Growth and Healthy Living (Weeks 1–6)

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	Hook – Greatstone Life Laboratory	All animals need food, water and air to survive.	Observe carefully.	Survival needs investigation.	Animal photographs, sorting cards.	Observe local wildlife meeting basic needs.	Prior knowledge.	Revisit Year 1 learning.
2	Growing from Young to Adult	Animals have offspring that grow into adults.	Compare.	Match offspring to adults.	Life-stage cards.	Observe young wildlife if possible.	Correct sequencing.	Introduce growth vocabulary.
3	Healthy Eating	Different foods help our bodies grow and stay healthy.	Identify patterns.	Healthy meal investigation.	Food models.	Healthy outdoor picnic investigation.	Explain food choices.	Reinforce balanced diets.
4	Exercise and Keeping Active	Exercise helps our bodies stay healthy.	Measure and compare.	Pulse investigation.	Timers, recording sheets.	Beach fitness trail.	Record results.	Introduce simple data handling.

5	Hygiene and Disease Prevention	Hygiene helps keep us healthy.	Observe changes.	Glitter germ investigation.	Soap, glitter, UV gel.	Outdoor hygiene routines.	Explain importance of hygiene.	Link to Louis Pasteur.
6	Healthy Living Challenge	Healthy choices support growth and survival.	Explain using evidence.	Design a Healthy Living Guide.	Posters and resources.	Outdoor health trail.	Mid-unit assessment.	Consolidate growth learning.

Part 2 – Animal Life Cycles (Weeks 7–12)

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
7	What is a Life Cycle?	All animals have life cycles.	Observe over time.	Sequence life cycles.	Life cycle cards.	Observe insects outdoors.	Correct sequencing.	Introduce life cycle vocabulary.
8	Mammals and Birds	Mammals and birds grow differently but follow life cycles.	Compare.	Compare growth photographs.	Animal photographs.	Observe local birds.	Explain similarities and differences.	Link to local wildlife.
9	Amphibian Life Cycles	Frogs undergo significant changes during development.	Observe changes.	Frog life cycle sequencing.	Models and diagrams.	Pond habitat discussion.	Describe stages.	Introduce metamorphosis simply.
10	Insect Life Cycles	Some insects undergo complete metamorphosis.	Compare.	Butterfly life cycle investigation.	Butterfly models.	Search for insects and larvae.	Sequence correctly.	Compare insects with mammals.
11	Comparing Life Cycles	Animals grow and reproduce in different ways.	Identify patterns.	Venn diagram comparison.	Mixed life cycle resources.	Compare coastal wildlife.	Independent explanations.	Focus on similarities and differences.
12	Life Cycles Discovery Museum	Growth and life cycles help species survive.	Present findings.	Museum exhibition.	Displays, models, diagrams.	Invite families.	Summative assessment.	Celebrate scientific vocabulary and enquiry.

Whole Unit Resource List

Investigation Equipment

- Animal life cycle models
- Offspring and adult matching cards
- Food models
- Pulse timers
- Stopwatches
- Magnifying glasses
- Clipboards
- Butterfly and frog life cycle models
- Sorting hoops
- UV handwashing kit or glitter

Consumables

- Healthy eating plates
- Recording sheets
- Food packaging
- Poster paper
- Life cycle sequencing cards
- Labels
- Coloured pencils
- Sticky notes

Beach School Resources

- Nature journals
- Binoculars
- Bug viewers
- Wildlife identification guides
- Activity cones
- Water bottles
- Outdoor fitness equipment
- Magnifiers

Adaptive Teaching

- Begin with children's own experiences of growing before introducing animal life cycles.
- Use real photographs and models before diagrams.
- Provide visual sequencing cards to support understanding of life stages.
- Model pulse-taking and healthy lifestyle investigations.
- Use sentence stems and vocabulary mats during scientific discussions.
- Challenge higher attainers to compare multiple life cycles, identify patterns and explain why different reproductive strategies help animals survive.

Health & Safety

- Check allergies before food investigations.
- Ensure hygienic procedures are followed during practical activities.
- Supervise physical activities and allow rest and hydration.
- Wash hands after handling natural materials or observing wildlife.
- Return any living creatures safely to their habitats after observation.
- Follow normal Beach School risk assessments for outdoor learning.

Common Misconception	Teaching Response
All baby animals look like miniature adults.	Compare mammals, birds, amphibians and insects to show different stages of development.
Every animal has the same life cycle.	Compare several contrasting life cycles using diagrams and models.
Healthy eating alone keeps us healthy.	Reinforce the importance of exercise, sleep and hygiene alongside a balanced diet.
Frogs and butterflies are born as miniature adults.	Use life cycle models to demonstrate metamorphosis.
Life cycles end when animals become adults.	Explain that adulthood includes reproduction, beginning the next generation.

Reflection Question	Purpose
What do all animals need to survive?	Reinforce the concept of basic survival needs.
How are humans similar to other animals as they grow?	Develop understanding of shared biological processes.
Which animal life cycle surprised you the most? Why?	Encourage comparison and scientific curiosity.
What evidence helped you compare different life cycles?	Promote evidence-based reasoning.
Why is staying healthy important throughout our lives?	Connect science learning to everyday life.
How has this learning helped answer our big question?	Consolidate understanding that all animals grow, develop and reproduce through life cycles, while healthy choices support growth and survival throughout life.

YEAR 2 - Plants – SUMMER 2

What do plants need to grow well, and how can we care for them so they continue to thrive?

Section	Overview
Curriculum Rationale	This unit builds on pupils' Year 1 understanding of common plants and their basic structures by investigating how seeds and bulbs grow into mature plants. Pupils observe germination and growth over time, investigate the conditions plants need to stay healthy and compare the effects of changing water, light and temperature. Through Developing Experts enquiry, children make predictions, carry out comparative tests, measure growth and use evidence to explain what plants need. The unit strengthens pupils' understanding of living things while developing responsibility for caring for plants and the local environment.
The Greatstone Way	**PROTECTORS → LEGACY** – Children explore their responsibility for protecting plants and the habitats they support. They investigate how healthy plants contribute to the local environment and consider how planting, caring for green spaces and protecting coastal vegetation can create a positive legacy for future generations. Beach School provides authentic opportunities to observe plant growth, compare coastal conditions and contribute to environmental improvement.
National Curriculum Coverage	• Observe and describe how seeds and bulbs grow into mature plants. • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.
Developing Experts Knowledge Progression	Pupils begin by revisiting the parts and basic needs of plants before examining seeds and bulbs. They observe germination and plant growth over time, then investigate how water, light and temperature affect growth. Finally, they apply their learning by planning how to care for plants and improve a local growing area.
Curriculum Journey	**Previous Learning:** EYFS – Growing and Changing; Year 1 – identifying common plants, trees and plant structures. **Current Learning:** Observe how seeds and bulbs grow and investigate the conditions plants need to grow and remain healthy. **Next Learning:** Year 3 – Plants, including functions of plant parts, water transportation, pollination and seed dispersal.
Scientific Enquiry Question	How can we investigate what plants need to grow and stay healthy?
Sticky Knowledge	Seeds and bulbs can grow into mature plants. Germination is the beginning of a seed's growth. Plants need water, light and a suitable temperature to grow and stay healthy. Different plants grow at different rates. Roots usually grow downwards and shoots grow upwards. Scientists observe and measure plants over time to identify patterns.
Working Scientifically	Observe over time. Ask questions. Make predictions. Carry out comparative tests. Measure using standard units. Record results. Identify patterns. Draw conclusions using evidence.
Scientific Knowledge & Skills	Identify seeds and bulbs. Describe germination. Sequence plant growth. Measure plant growth. Investigate the effects of water, light and temperature. Explain how to keep plants healthy.
Substantive Concepts	Plants • Growth • Germination • Survival • Environment • Life Processes
Disciplinary Concepts	Observe • Predict • Compare • Measure • Record • Pattern • Conclude
Scientific Vocabulary	plant, seed, bulb, mature plant, germination, seedling, shoot, root, stem, leaf, flower, water, light, temperature, warmth, healthy, growth, soil, nutrient
Working Scientifically Vocabulary	observe, predict, investigate, comparative test, measure, centimetre, record, results, evidence, pattern, conclusion
Beach School & Outdoor Learning	Observe coastal plants, grasses and wildflowers over time. Compare plants growing in sheltered and exposed areas. Investigate how wind, salt, water and sunlight affect coastal vegetation. Plant and care for suitable flowers or grasses in the school grounds. Create repeated photographic records of plant growth.
Greatstone & Local Links	Observe plants growing in the dunes, along the beach edge and around Romney Marsh. Investigate how marram grass and other coastal plants survive in exposed conditions. Consider how plants help stabilise dunes and provide shelter and food for local wildlife.
Cross-Curricular Links	Mathematics (measuring and graphing growth), English (instructions and observation diaries), Geography (local environments), Design and Technology (creating planters), Art (botanical drawing), PSHE (responsibility and care), Computing (photographic records and simple data presentation).
High Quality Texts	*A Seed Is Sleepy*; *The Tiny Seed*; *The Extraordinary Gardener*; *Jack and the Beanstalk*; *It Starts with a Seed*.
Significant Scientists & STEM Careers	George Washington Carver, Maria Sibylla Merian, botanist, horticulturist, gardener, plant scientist, conservation officer, agricultural scientist.
Memorable Hook	**The Greatstone Growing Challenge** – Children receive a collection of mystery seeds and bulbs with a request to discover what each needs to grow successfully. They become plant scientists responsible for designing and monitoring a growing investigation.
Authentic Outcome	**Greatstone Growing Garden and Plant Science Showcase** – Children create a class growing area and present plant diaries, measurements, investigation results and care guides explaining how to help plants thrive.
Assessment End Point	Children explain how seeds and bulbs grow into mature plants, describe the conditions plants need to grow and stay healthy, measure and record changes over time and use evidence from comparative investigations to explain their conclusions.

YEAR 2 SUMMER 2 – 6 WEEK TEACHING SEQUENCE - Plants

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	Hook – The Greatstone Growing Challenge	Seeds and bulbs are structures from which new plants can grow.	Observe, identify and ask questions.	Examine and sort mystery seeds and bulbs by observable features.	Seeds, bulbs, hand lenses, sorting trays, photographs.	Search for seeds, fruits and signs of new plant growth.	Assess prior understanding of plant parts and growth.	Avoid suggesting that bulbs are large seeds. Establish a long-term observation routine.
2	How Do Seeds and Bulbs Begin to Grow?	Germination is the beginning of growth. Roots and shoots emerge as a plant develops.	Observe over time and sequence change.	Set up bean germination bags and plant bulbs or fast-growing seeds.	Beans, clear bags or jars, cotton wool, bulbs, compost, pots.	Observe young plants and compare stages of growth.	Sequence germination accurately.	Not all seeds germinate at the same rate. Use repeated photographs and drawings.
3	Does a Plant Need Water?	Plants need an appropriate amount of water to grow and remain healthy.	Predict and carry out a comparative test.	Grow similar seedlings with no water, an appropriate amount and too much water.	Similar seedlings, measuring cylinders, trays, labels.	Compare plants in dry and damp areas.	Explain the effect of different amounts of water.	Keep all other conditions as similar as possible. Avoid teaching that more water is always better.

4	Does a Plant Need Light?	Plants need light to grow and stay healthy. Lack of light affects their colour and strength.	Compare, measure and record.	Place similar plants in light and darkness, then compare height, colour and strength.	Similar plants, boxes or cupboards, rulers, recording tables.	Compare plants growing in open and shaded locations.	Use observations as evidence.	Plants may initially grow taller in darkness but become pale and weak. Height alone does not indicate health.
5	What Temperature Helps Plants Grow?	Plants need a suitable temperature; conditions that are too cold or too hot can limit growth.	Carry out a comparative test and identify patterns.	Compare identical seeds or plants in warmer and cooler safe locations.	Seeds or seedlings, pots, thermometers, rulers, labels.	Compare sheltered and exposed growing areas.	Explain patterns across the investigations.	Use only safe classroom temperature differences. Keep water, light and seed type consistent.
6	Plant Scientists' Showcase	Healthy plant growth depends on water, light and a suitable temperature.	Interpret results, conclude and communicate.	Complete a plant-care challenge and present investigation findings.	Plant diaries, graphs, photographs, display materials, care-guide templates.	Plant or improve a suitable school or Beach School growing area.	End-point practical and written assessment.	Require pupils to refer to evidence rather than repeat memorised statements. Revisit the big question.

Whole Unit Resource List

Investigation Equipment

- Hand lenses
- Rulers marked in centimetres
- Thermometers
- Measuring cylinders or cups
- Pipettes
- Clear jars or germination bags
- Plant pots and trays
- Clipboards
- Cameras or iPads
- Sorting hoops or trays
- Labels and plant markers

Consumables

- A variety of seeds
- A variety of bulbs
- Beans
- Cotton wool or paper towels
- Compost
- Plant pots
- Water
- Recording sheets
- Plant diaries
- Graph paper
- Large display paper
- Card and labels

Beach School Resources

- Plant identification guides
- Magnifying glasses
- Nature journals
- Quadrats
- Rulers
- Thermometers
- Cameras
- Gloves
- Suitable native or wildlife-friendly seeds, where approved

Adaptive Teaching

- Revisit Year 1 plant structures using real plants before beginning investigations.
- Use large, easy-to-handle seeds and bulbs for close observation.
- Provide visual sequencing cards showing germination and growth.
- Use photographs, symbols and sentence stems in plant diaries.
- Assign pupils practical roles such as measuring, watering, photographing and recording.
- Use pre-drawn tables for pupils who need support organising results.
- Allow oral explanations, labelled diagrams or photographs as alternatives to extended writing.
- Challenge higher attainers to identify variables, explain anomalies and compare the relative importance of different growing conditions.

Health & Safety

- Check for allergies or sensitivities to seeds, bulbs, compost and plants.
- Use commercially supplied compost rather than soil containing animal waste or unknown contaminants.
- Wash hands after handling plants, seeds, bulbs and compost.
- Do not taste any seeds, bulbs, leaves or other plant materials.
- Check that plants and bulbs used are non-toxic and appropriate for school use.
- Clean water spillages promptly to prevent slips.
- Use only safe temperature differences; do not place plants or pupils near heaters or other hazardous heat sources.
- Supervise Beach School planting and observations and follow established outdoor-learning risk assessments.

Common Misconception	Teaching Response
Seeds and bulbs are the same.	Compare their structures directly and explain that both can grow into plants but are different plant structures.
A seed is not alive.	Explain that a seed contains a living young plant in a dormant state and can begin growing when conditions are suitable.
Plants get their food from soil.	At this stage, clarify that soil provides support, water and some nutrients; avoid suggesting that soil is plant food.
The tallest plant is always the healthiest.	Compare colour, stem strength, leaf condition and overall development as well as height.
Plants need sunlight before they can germinate.	Demonstrate that many seeds can begin germinating without light but need light to continue growing healthily.
More water always makes plants grow better.	Compare plants receiving no water, an appropriate amount and excessive water.
All plants need exactly the same conditions.	Compare different plants and explain that their preferred amounts of water, light and warmth can vary.

Reflection Question	Purpose
What changes did you observe as your seed or bulb began to grow?	Develop accurate observation over time and sequencing of germination.
What evidence shows that plants need water?	Reinforce the use of comparative-test results to support conclusions.
How did growing in darkness affect the plant?	Develop understanding that healthy growth involves more than an increase in height.
What did you keep the same to make your investigation fair?	Reinforce early understanding of variables and comparative testing.
Which condition had the greatest effect on your plant, and what is your evidence?	Encourage interpretation and justification using recorded results.
How can caring for plants improve Greatstone for people and wildlife?	Connect scientific knowledge with environmental responsibility and the PROTECTORS theme.
What could we plant now that would leave a positive legacy?	Apply learning to meaningful action and the LEGACY theme.
How has this learning helped answer our big question?	Consolidate understanding of germination, growth and the conditions needed for plants to thrive.

YEAR 3 - Scientific Enquiry – Thinking and Working Like a Scientist – AUTUMN 1

How do scientists ask questions, investigate ideas and use evidence to explain the world around them?

Section	Overview
Curriculum Rationale	This unit establishes the scientific enquiry knowledge and routines pupils will use throughout Key Stage 2. Building on Key Stage 1 experiences of observing, comparing, identifying and carrying out simple tests, pupils learn how scientists ask relevant questions, make predictions, plan enquiries, identify variables, measure accurately and record results systematically. Through a series of practical Developing Experts investigations, pupils explore different types of scientific enquiry and learn that reliable conclusions must be supported by evidence. The unit develops independence, curiosity and confidence while creating consistent expectations for practical science across Year 3.
The Greatstone Way	**ROOTS → SURVIVORS** – Children establish themselves as members of a scientific learning community, developing the routines, vocabulary and collaborative behaviours needed for successful enquiry. They learn that scientists persevere when investigations do not go as expected, adapt methods and use mistakes to improve their thinking. Beach School provides an authentic environment for asking questions, collecting evidence and investigating the changing natural world.
National Curriculum Coverage	During Years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills: • Ask relevant questions and use different types of scientific enquiries to answer them. • Set up simple practical enquiries, comparative tests and fair tests. • Make systematic and careful observations and, where appropriate, take accurate measurements using standard units and a range of equipment. • Gather, record, classify and present data in a variety of ways to help answer questions. • Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables. • Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. • Use results to draw simple conclusions, make new predictions, suggest improvements and raise further questions. • Identify differences, similarities or changes related to simple scientific ideas and processes. • Use straightforward scientific evidence to answer questions or support findings.
Developing Experts Knowledge Progression	Pupils begin by exploring what scientists do and the different ways scientific questions can be answered. They distinguish between observations and measurements, develop questions and predictions and learn how to plan comparative and fair tests. They then practise selecting equipment, recording results, identifying patterns and drawing conclusions. Finally, they evaluate enquiry methods and apply the full scientific process independently to a local or Beach School investigation.
Curriculum Journey	**Previous Learning:** Key Stage 1 – asking simple questions, observing closely, identifying and classifying, carrying out simple tests and recording findings. **Current Learning:** Plan, conduct, record and evaluate increasingly systematic scientific enquiries. **Next Learning:** Apply enquiry skills independently across Year 3 units, including Animals Including Humans, Rocks, Forces and Magnets, Plants and Light.
Scientific Enquiry Question	How can we plan and carry out an investigation that produces useful and trustworthy evidence?
Sticky Knowledge	Scientists ask questions that can be investigated. Different questions require different types of enquiry. A prediction is what we think may happen, supported by a reason. In a fair test, one variable is changed while other important conditions are kept the same. Measurements should use standard units. Results can be organised in tables, charts and diagrams. Conclusions explain what the evidence shows. Scientists evaluate methods and suggest improvements.
Working Scientifically	Ask relevant questions. Make predictions. Plan enquiries. Identify variables. Choose equipment. Measure accurately. Observe systematically. Record and present data. Identify patterns. Draw conclusions. Evaluate methods. Ask further questions.
Scientific Knowledge & Skills	Recognise different types of enquiry. Distinguish questions from predictions. Plan comparative and fair tests. Use standard units and equipment. Record results in tables and charts. Interpret evidence. Draw conclusions and suggest improvements.
Substantive Concepts	Evidence • Measurement • Change • Pattern • Comparison • Reliability
Disciplinary Concepts	Question • Predict • Observe • Measure • Test • Record • Analyse • Conclude • Evaluate
Scientific Vocabulary	scientist, enquiry, evidence, observation, measurement, method, equipment, variable, fair test, comparative test, pattern seeking, research, classification, change over time, result, conclusion, accuracy, reliability
Working Scientifically Vocabulary	question, predict, reason, observe, measure, standard unit, variable, change, control, record, table, bar chart, diagram, result, evidence, pattern, conclusion, evaluate, improve
Beach School & Outdoor Learning	Generate scientific questions about the beach and dunes. Carry out pattern-seeking and comparative enquiries involving wind, temperature, shadows, pebbles, plants or microhabitats. Practise using thermometers, rulers, quadrats and identification guides. Record evidence using tables, diagrams, photographs and field notes.
Greatstone & Local Links	Use Greatstone Beach, the dunes, school grounds and Romney Marsh as settings for authentic enquiry. Investigate questions such as whether pebble size changes across the beach, which areas are most sheltered, where plants grow most successfully or how conditions differ between exposed and protected locations.
Cross-Curricular Links	Mathematics (measurement, tables and bar charts), English (questions, explanations and reports), Computing (data recording and presentation), Geography (fieldwork and local environments), PSHE (collaboration and resilience).
High Quality Texts	*Ada Twist, Scientist*; *Izzy Gizmo*; *The Most Magnificent Thing*; *Rosie Revere, Engineer*; age-appropriate scientific enquiry and experiment texts.
Significant Scientists & STEM Careers	Ibn al-Haytham, Mary Anning, George Washington Carver, laboratory scientist, field scientist, environmental scientist, marine biologist, meteorologist, science technician.
Memorable Hook	**The Greatstone Science Investigation Agency** – Pupils receive a collection of unexplained objects, observations and local scientific questions. They become trainee scientists responsible for deciding how each mystery could be investigated and what evidence would be needed.
Authentic Outcome	**Greatstone Young Scientists Conference** – Pupils plan and carry out an independent local enquiry before presenting their question, method, results, conclusion and suggested improvements to an audience.
Assessment End Point	Pupils ask an investigable question, make a reasoned prediction, plan and conduct a simple enquiry, select appropriate equipment, record results clearly, identify patterns, draw an evidence-based conclusion and suggest how the investigation could be improved.

YEAR 3 AUTUMN 1 – 6 WEEK TEACHING SEQUENCE
Scientific Enquiry – Thinking and Working Like a Scientist

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	Hook – The Greatstone Science Investigation Agency	Scientists ask questions, collect evidence and use it to develop explanations. Scientific questions can be investigated in different ways.	Ask relevant questions and observe carefully.	Investigate a series of mystery objects or scientific phenomena and generate questions that could be tested.	Mystery objects, magnifiers, photographs, magnets, torches, trays.	Generate questions about the beach, dunes, plants, weather and natural objects.	Assess pupils' ability to distinguish scientific questions from general questions.	Introduce the idea that science is a process rather than a collection of facts. Accept a wide range of questions, then refine them into investigable forms.
2	Different Types of Scientific Enquiry	Scientific questions can be answered through observing over time, pattern seeking, identifying and classifying, research, comparative testing or fair testing.	Select an appropriate enquiry type.	Rotate through short enquiry stations and match each question to the most suitable method.	Enquiry-type cards, natural objects, sorting hoops, timers, rulers, reference materials.	Classify beach finds or conduct a short pattern-seeking investigation.	Pupils explain why a particular enquiry type fits a question.	Avoid presenting fair testing as the only valid scientific method. Use examples from forthcoming Year 3 units.
3	Questions, Predictions and Variables	A prediction states what may happen and should include a scientific reason. In a fair test, one variable is changed while other relevant conditions are controlled.	Predict, identify variables and plan a fair test.	Plan and carry out a simple investigation such as how ramp height affects the distance travelled by a toy car.	Ramps, toy cars, metre sticks, tape, planning frames.	Investigate how wind protection affects the movement of a lightweight object in controlled outdoor conditions.	Identify the changed, measured and controlled variables.	Use accessible language alongside terminology: what we change, what we measure and what we keep the same.
4	Observing and Measuring Accurately	Scientists make systematic observations and use standard units so results can be compared. Equipment must be selected and used appropriately.	Measure carefully and repeat observations.	Measurement carousel using length, temperature, time and volume.	Rulers, metre sticks, thermometers, stopwatches, measuring cylinders, scales.	Measure temperature, wind effects, plant height or pebble size in selected locations.	Accuracy in reading scales and recording units.	Explicitly teach how to read scales from the correct angle and record units every time. Discuss why repeated measurements may improve reliability.
5	Recording Results and Drawing Conclusions	Results can be organised in tables, bar charts, labelled diagrams and written observations. Conclusions explain patterns using evidence.	Record, present, analyse and conclude.	Complete a comparative investigation, organise results and create an appropriate chart or diagram.	Investigation materials, table templates, graph paper, rulers, clipboards.	Complete a local comparative study, such as conditions in exposed and sheltered locations.	Pupils identify a pattern and write an evidence-based conclusion.	Distinguish clearly between a result and a conclusion. Require reference to actual observations or measurements.
6	Independent Young Scientists Enquiry	A complete enquiry includes a question, prediction, method, evidence, conclusion and evaluation. Scientists suggest improvements and further questions.	Plan, conduct, evaluate and communicate independently.	Small groups complete an enquiry chosen from a structured set of local scientific questions.	Mixed investigation equipment, planning sheets, recording materials, presentation resources.	Conduct the enquiry in the school grounds or Beach School environment where appropriate.	End-point assessment through practical work and presentation.	Assess the scientific thinking, not the success of the predicted outcome. Ensure pupils identify at least one realistic improvement or further question.

Whole Unit Resource List

Investigation Equipment

- Magnifying glasses
- Rulers and metre sticks
- Tape measures
- Thermometers
- Stopwatches and timers
- Measuring cylinders and jugs
- Balancing scales or digital scales
- Sorting hoops and trays
- Toy cars and ramps
- Torches
- Magnets
- Clipboards
- Cameras or iPads
- Quadrats
- Identification guides

Consumables

- Enquiry question cards
- Prediction and planning sheets
- Variable cards
- Investigation recording tables
- Graph paper
- Sticky notes
- Labels
- Large presentation paper
- Masking tape
- String
- Paper and card
- Lightweight objects for wind investigations

Beach School Resources

- Field notebooks
- Quadrats
- Thermometers
- Rulers and tape measures
- Wind ribbons or windsocks
- Pebble and shell identification materials
- Plant identification guides
- Collection trays
- Cameras
- Weatherproof clipboards

Adaptive Teaching

- Begin with practical experiences before introducing formal enquiry terminology.
- Use consistent symbols for question, prediction, method, result and conclusion.
- Provide visual enquiry-type cards and worked examples.
- Teach variables using the accessible prompts: **change, measure and keep the same**.
- Use partially completed planning frames and recording tables where needed.
- Allow pupils to record observations through labelled drawings, photographs, oral explanations or short written notes.
- Pair pupils strategically for equipment use and measurement.
- Rehearse conclusions orally before written recording.
- Challenge higher attainers to identify limitations, consider reliability, justify equipment choices and suggest further questions arising from results.

Health & Safety

- Complete an appropriate risk assessment for every practical and outdoor enquiry.
- Demonstrate the correct use of measuring equipment before pupils work independently.
- Use plastic measuring equipment instead of glass wherever possible.
- Clean water or other spillages immediately.
- Check natural materials for sharp edges, contamination or allergens before handling.

- Ensure pupils wash their hands after handling natural materials, soil or wildlife-related objects.
- Set clear physical boundaries for Beach School and school-ground investigations.
- Check weather and tidal conditions before coastal fieldwork.
- Ensure pupils wear suitable clothing and footwear for outdoor conditions.
- Do not allow pupils to taste unknown substances or handle unfamiliar plants or animals.

Common Misconception	Teaching Response
Every scientific investigation must be a fair test.	Teach and revisit the full range of enquiry types, including observation over time, classification, research and pattern seeking.
A prediction is a guess.	Require pupils to give a scientific reason using prior knowledge or observations.
An incorrect prediction means the investigation failed.	Emphasise that evidence is valuable whether or not it supports the prediction.
A fair test means everything stays the same.	Explain that one factor is deliberately changed, one is measured and relevant others are kept the same.
Results and conclusions are the same.	Model results as the recorded evidence and conclusions as explanations of what that evidence shows.
One measurement is always enough.	Compare repeated measurements and discuss how repetition can reveal anomalies and improve confidence.
The person with the expected result has carried out the best investigation.	Assess careful methods, accurate evidence and honest conclusions rather than whether results match expectations.

Reflection Questions with Purpose

Reflection Question	Purpose
What made your question scientifically investigable?	Reinforce the difference between broad questions and questions that can be answered using evidence.
Which type of enquiry was most appropriate, and why?	Develop purposeful selection of scientific methods.
What did you change, measure and keep the same?	Consolidate understanding of variables in comparative and fair testing.
How did you make your observations or measurements accurate?	Encourage reflection on equipment choice, scale reading and systematic methods.
What pattern did you identify in your results?	Develop interpretation rather than simple description of evidence.
Does your evidence support your prediction? How do you know?	Reinforce that conclusions must be grounded in results.
What would you improve if you repeated the enquiry?	Develop evaluation and understanding of reliability.
What new question did your investigation raise?	Show that scientific enquiry often leads to further investigation.
How did your group show resilience when the investigation did not go as planned?	Connect scientific problem-solving with the **SURVIVORS** theme.
How has this learning helped answer our big question?	Consolidate understanding of how scientists use questions, methods and evidence to explain the world.

YEAR 3 - Animals Including Humans – Nutrition, Skeletons and Muscles – AUTUMN 2

How do nutrition, skeletons and muscles help animals, including humans, grow, move and survive?

Section	Overview
Curriculum Rationale	This unit builds on pupils' Key Stage 1 understanding of animals' basic needs, healthy lifestyles and growth. Pupils develop a more detailed understanding of nutrition by learning that animals cannot make their own food and must obtain nutrition from what they eat. They explore the main food groups and consider how a balanced diet supports growth, energy and health. Pupils then investigate the human skeleton, compare skeletons across different animals and examine how bones, joints and muscles work together to support, protect and enable movement. Through Developing Experts enquiry, pupils classify, compare, observe patterns, construct models and use evidence to explain how body structures support survival.
The Greatstone Way	**ROOTS → SURVIVORS** – Children explore the shared needs and body structures that connect humans with other animals. They learn how nutrition, strong skeletons and healthy muscles support survival, movement and wellbeing. Through practical challenges, outdoor movement and Beach School investigations, pupils develop resilience, collaboration and responsibility for caring for their bodies.
National Curriculum Coverage	• Identify that animals, including humans, need the right types and amount of nutrition and that they cannot make their own food; they get nutrition from what they eat. • Identify that humans and some other animals have skeletons and muscles for support, protection and movement.
Developing Experts Knowledge Progression	Pupils begin by revisiting the basic needs of animals before learning that animals obtain nutrition from food. They explore food groups, nutrients and balanced diets before investigating the human skeleton and the functions of bones. Pupils compare the skeletons of different animals and classify them as vertebrates or invertebrates. They then investigate joints and muscles, applying their understanding to explain how bones and muscles work together to produce movement.
Curriculum Journey	**Previous Learning:** Year 1 – body parts, senses and animal groups; Year 2 – basic survival needs, growth, healthy eating, exercise and hygiene. **Current Learning:** Nutrition, balanced diets, skeletons, joints and muscles. **Next Learning:** Year 4 – digestion and teeth; Year 5 – human development; Year 6 – circulation, diet, exercise and lifestyle.
Scientific Enquiry Question	How can we use evidence to explain how food, bones and muscles help animals survive and move?
Sticky Knowledge	Animals cannot make their own food and obtain nutrition from what they eat. Different foods provide different nutrients. A balanced diet contains appropriate amounts from different food groups. Skeletons support the body, protect organs and help movement. Some animals have internal skeletons, some have external skeletons and some have no hard skeleton. Muscles contract and relax to move bones at joints.
Working Scientifically	Ask relevant questions. Classify and compare. Make careful observations. Use models. Gather and record data. Identify patterns. Draw conclusions. Use evidence to explain findings.
Scientific Knowledge & Skills	Explain why animals need nutrition. Identify food groups and construct balanced meals. Name major bones. Explain the functions of skeletons. Compare animal skeletons. Distinguish vertebrates and invertebrates. Explain how muscles and joints enable movement.
Substantive Concepts	Animals • Humans • Nutrition • Skeletons • Muscles • Movement • Health • Survival
Disciplinary Concepts	Observe • Compare • Classify • Model • Record • Analyse • Explain • Conclude
Scientific Vocabulary	nutrition, nutrient, balanced diet, carbohydrate, protein, fat, vitamin, mineral, fibre, water, energy, skeleton, bone, skull, spine, rib cage, pelvis, limb, joint, muscle, tendon, support, protection, movement, vertebrate, invertebrate, endoskeleton, exoskeleton

Working Scientifically Vocabulary	question, predict, observe, compare, classify, identify, model, record, evidence, pattern, result, conclusion
Beach School & Outdoor Learning	Complete movement investigations involving running, jumping, balancing and throwing. Observe how muscles and joints work during Beach School challenges. Compare evidence of vertebrates and invertebrates found in coastal habitats. Investigate the foods eaten by local animals and construct simple nutrition or feeding profiles for coastal species.
Greatstone & Local Links	Observe gulls, marine birds, insects, worms, crabs and other coastal animals around Greatstone. Compare animals with internal skeletons, external skeletons and soft bodies. Explore how local wildlife obtains food and how body structures support movement across sand, water and exposed coastal habitats.
Cross-Curricular Links	PE (movement and fitness), PSHE (healthy lifestyles), Mathematics (tables, charts and food data), English (scientific explanations), Design and Technology (healthy food choices and model-making), Computing (recording and presenting findings).
High Quality Texts	*Funnybones*; *The Human Body Book*; *Inside Your Outside!*; *The Story of Food*; age-appropriate texts about skeletons, muscles and nutrition.
Significant Scientists & STEM Careers	Marie Curie, Wilhelm Röntgen, Dr Mae Jemison, nutritionist, radiographer, physiotherapist, orthopaedic surgeon, sports scientist, dietitian, zoologist.
Memorable Hook	**The Greatstone Body Investigation Centre** – Pupils receive a collection of X-rays, food samples, animal images and movement challenges. They become body scientists tasked with explaining how nutrition, bones and muscles help humans and other animals survive.
Authentic Outcome	**Healthy Bodies and Animal Movement Exhibition** – Pupils create an interactive exhibition featuring balanced diet advice, labelled skeleton models, animal classifications and demonstrations showing how muscles and joints enable movement.
Assessment End Point	Pupils explain why animals need nutrition, identify the components of a balanced diet, describe the functions of a skeleton, compare different animal skeletons and explain how muscles, bones and joints work together to produce movement.

YEAR 3 AUTUMN 2 – 6 WEEK TEACHING SEQUENCE
Animals Including Humans – Nutrition, Skeletons and Muscles

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	Hook – The Greatstone Body Investigation Centre	Animals need food for energy, growth, repair and health. Unlike plants, animals cannot make their own food.	Ask questions, observe and classify.	Investigate mystery food packages and animal diets. Sort foods by their likely contribution to the body.	Food packaging, food models, animal diet cards, sorting hoops.	Observe or research what local coastal animals eat.	Assess prior understanding of healthy eating and animal needs.	Revisit Year 2 learning but introduce the more precise idea of nutrition. Avoid describing foods simply as healthy or unhealthy.
2	Nutrients and a Balanced Diet	Different food groups provide different nutrients. A balanced diet contains suitable amounts of different foods.	Classify, compare and use secondary evidence.	Analyse example meals and design balanced meals for people with different activity needs.	Food-group cards, packaging labels, meal plates, information sheets.	Plan a balanced Beach School meal or snack for an active day outdoors.	Explain why a meal is balanced using nutrient vocabulary.	Keep nutritional detail age-appropriate. Emphasise proportion, variety and balance rather than restriction.
3	The Human Skeleton	The human skeleton supports the body, protects internal organs and enables movement. Major bones have specific names and locations.	Observe, identify and construct models.	Assemble and label a human skeleton before testing which structures protect model organs.	Skeleton model, bone labels, X-ray images, protective containers, modelling materials.	Complete a support-and-protection challenge using natural or construction materials.	Name major bones and explain at least three functions of the skeleton.	Focus on skull, spine, rib cage, pelvis and limb bones. Clarify that bones are living tissue.
4	Comparing Animal Skeletons	Animals have different skeletal structures. Vertebrates have backbones; invertebrates do not. Some animals have endoskeletons or exoskeletons.	Compare, classify and identify patterns.	Classify animal images and specimens by skeletal type. Construct a simple identification key.	Animal images, shells, model skeletons, classification cards, branching-key templates.	Compare birds, crabs, insects, worms and other coastal animals.	Accurate classification supported by observable evidence.	Avoid teaching that all invertebrates have exoskeletons. Worms and jellyfish do not have a hard skeleton.
5	Joints, Muscles and Movement	Joints allow bones to move. Muscles contract and relax, working in pairs to move bones.	Use models, observe systematically and record.	Build a working arm model and investigate which joints and muscles are used in different movements.	Cardboard bones, split pins, elastic bands, string, joint diagrams, movement recording sheets.	Movement trail involving bending, balancing, throwing and climbing.	Explain how muscles and bones work together at a joint.	Use accessible language alongside contract and relax. Clarify that muscles pull rather than push bones.
6	Healthy Bodies Challenge and Exhibition	Nutrition, skeletons and muscles work together to support health, movement and survival.	Apply knowledge, explain with evidence and communicate findings.	Complete a body-science challenge and prepare an exhibition explaining diet, skeletons and movement.	Mixed investigation resources, models, displays, assessment tasks.	Complete an outdoor animal-movement challenge and compare human movement with local animals.	End-point practical, oral and written assessment.	Assess pupils' ability to connect the three strands rather than recall isolated facts. Revisit the big question explicitly.

Whole Unit Resource List
Investigation Equipment
- Human skeleton model
- Animal skeleton models or photographs
- X-ray images
- Magnifying glasses
- Sorting hoops and trays
- Model internal organs
- Cardboard arm-model materials
- Split pins
- Elastic bands and string
- Clipboards
- Stopwatches
- Measuring tapes
- Cameras or iPads

Consumables
- Food packaging and labels
- Food-group cards
- Balanced meal templates
- Animal diet cards
- Bone labels

- Skeleton diagrams
- Classification cards
- Branching-key templates
- Recording sheets
- Large paper
- Cardboard
- Sticky notes
- Display labels

Beach School Resources

- Wildlife identification guides
- Binoculars
- Bug viewers
- Shell and exoskeleton samples
- Nature journals
- Movement-course equipment
- Cones and markers
- Weatherproof clipboards
- Cameras
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Adaptive Teaching

- Revisit Key Stage 1 healthy-living knowledge before introducing nutrients.
- Use real food packaging and visual food-group prompts.
- Provide labelled skeleton diagrams and detachable bone labels.
- Use physical movement and pupils' own bodies before introducing diagrams of joints and muscles.
- Provide animal classification mats with visual cues.
- Use sentence stems such as: **"The skeleton helps by…"** and **"This animal is a vertebrate because…"**
- Allow pupils to demonstrate understanding through models, oral explanations, labelled diagrams or practical classification.
- Pair pupils strategically during model-making and movement investigations.
- Challenge higher attainers to compare the advantages and limitations of endoskeletons and exoskeletons and explain how diet supports muscle and bone health.

Health & Safety

- Check food allergies before handling food packaging or carrying out any tasting activity.
- Follow school food-hygiene procedures if edible ingredients are used.
- Ensure pupils wash their hands after handling shared food containers or natural materials.
- Use clean, safe shells or replica specimens rather than decomposing animal remains.
- Supervise the use of split pins, scissors and elastic bands during model construction.
- Establish safe spacing for movement investigations.
- Adapt physical activities for pupils with medical, mobility or sensory needs.
- Follow normal Beach School risk assessments and check outdoor surfaces before movement challenges.

Common Misconception	Teaching Response
Animals make their own food in the same way as plants.	Reinforce that animals obtain nutrition by eating plants or other animals.
One food contains everything the body needs.	Compare food groups and demonstrate why variety and balance are important.
Carbohydrates and fats are always unhealthy.	Explain that the body needs appropriate amounts of both for energy and other functions.
The skeleton is a collection of dead, dry bones.	Explain that bones are living tissues supplied with blood and capable of growth and repair.
The skeleton only helps us stand up.	Investigate support, protection and movement separately.
All animals have bones inside their bodies.	Compare endoskeletons, exoskeletons and animals without hard skeletons.
All invertebrates have exoskeletons.	Use worms, jellyfish and slugs as contrasting examples.
Muscles push bones to make them move.	Demonstrate that muscles contract and pull on bones through tendons.
One muscle works alone to move a limb.	Model how muscles commonly work in opposing pairs.

Reflection Question	Purpose
Why can animals not survive without obtaining food?	Reinforce that animals depend on food for nutrition and cannot make their own food.
What makes a diet balanced rather than simply healthy?	Develop understanding of variety, proportion and appropriate amounts.
How does the skeleton support and protect the body?	Consolidate the distinct functions of the skeleton.
What evidence helped you classify an animal as a vertebrate or invertebrate?	Encourage classification based on observable or researched evidence.
How are an endoskeleton and an exoskeleton similar and different?	Develop comparative thinking and precise scientific language.
What happens to your muscles when you bend and straighten your arm?	Reinforce the relationship between muscles, joints and bones.
Which bones and joints did you use during the Beach School movement challenge?	Apply anatomical knowledge to pupils' own movement.
How do nutrition, bones and muscles work together to keep us healthy?	Encourage pupils to connect the three parts of the unit.
How did your group respond when a model or investigation did not work at first?	Connect perseverance and problem-solving with the **SURVIVORS** theme.
How has this learning helped answer our big question?	Consolidate understanding of how nutrition, skeletons and muscles support growth, movement and survival.

YEAR 3 - Rocks – SPRING 1

How can we investigate rocks to discover how they are formed and why they are useful?

Section	Overview
Curriculum Rationale	This unit introduces pupils to the fascinating world of rocks by investigating their appearance, properties and uses. Building on children's experiences of natural materials in Key Stage 1, pupils identify and compare different rocks before investigating how fossils are formed and why soils are essential for plant growth. Through Developing Experts enquiries, pupils observe, compare, classify and carry out practical investigations to understand that rocks have different properties because they are formed in different ways. The unit develops pupils' ability to use evidence to identify, classify and explain the relationship between rock properties and their uses.
The Greatstone Way	**EXPLORERS → INVENTORS** – Children become geologists exploring the natural world beneath their feet. They investigate the rocks found around Greatstone and compare them with rocks from across Britain and the world. Through Beach School they explore coastal geology, investigate erosion and appreciate how rocks, soils and fossils help us understand Earth's history and shape the environment we live in.

National Curriculum Coverage	• Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. • Describe in simple terms how fossils are formed when things that have lived are trapped within rock. • Recognise that soils are made from rocks and organic matter.
Developing Experts Knowledge Progression	Pupils begin by identifying and comparing rocks using observable properties. They investigate hardness, permeability and texture before learning how rocks are used for different purposes. They explore how fossils provide evidence of prehistoric life before investigating soil formation and the importance of soil for living things.
Curriculum Journey	**Previous Learning:** Year 1 – Everyday Materials; Year 2 – Uses of Everyday Materials. **Current Learning:** Compare rocks, investigate their properties, understand fossil formation and explore soils. **Next Learning:** Year 5 – Properties and Changes of Materials; Year 6 – Evolution and Inheritance (using fossils as evidence).
Scientific Enquiry Question	How can we investigate rocks to discover how they formed and what they can tell us about Earth?
Sticky Knowledge	Rocks have different properties including hardness, texture and permeability. Different rocks are used for different purposes because of their properties. Fossils are the preserved remains or traces of living things trapped in rock. Soil is made from weathered rock and organic matter. Different soils support different types of plant growth.
Working Scientifically	Observe closely. Compare. Classify. Carry out comparative tests. Measure. Record observations. Identify patterns. Draw conclusions using evidence.
Scientific Knowledge & Skills	Identify and classify rocks. Describe rock properties. Compare rocks using evidence. Explain fossil formation. Investigate soils. Explain how rock properties affect their uses.
Substantive Concepts	Rocks • Fossils • Soils • Materials • Earth • Change
Disciplinary Concepts	Observe • Compare • Classify • Test • Measure • Record • Explain • Conclude
Scientific Vocabulary	rock, stone, igneous, sedimentary, metamorphic, crystal, grain, texture, hard, soft, rough, smooth, permeable, impermeable, fossil, palaeontologist, soil, organic matter, weathering, erosion, sediment
Working Scientifically Vocabulary	observe, compare, classify, investigate, comparative test, measure, evidence, record, pattern, conclusion
Beach School & Outdoor Learning	Investigate rocks, pebbles and sediments found on Greatstone Beach. Compare rock sizes, textures and shapes. Explore erosion by observing how waves affect rocks and pebbles. Examine soils in different locations around the school and beach. Carry out permeability investigations using sand and soil samples.
Greatstone & Local Links	Explore the shingle beach at Greatstone, comparing pebbles of different sizes and textures. Investigate why the coastline contains shingle rather than sand in some areas. Observe how coastal erosion changes rocks over time. Compare local soils with those found inland around Romney Marsh.
Cross-Curricular Links	Geography (physical processes, coasts), Mathematics (measuring, classification, tables), English (scientific reports), Art (observational drawing), Computing (recording and presenting data).
High Quality Texts	*Stone Girl Bone Girl*; *Fossil Hunter*; *If You Find a Rock*; *The Pebble in My Pocket*; *DK Rocks and Minerals*.
Significant Scientists & STEM Careers	Mary Anning, William Smith, James Hutton, geologist, palaeontologist, quarry engineer, environmental scientist, archaeologist.
Memorable Hook	**The Greatstone Geology Investigation** – Children receive a collection of mystery rocks and fossils discovered on the beach and become geologists investigating where they came from and what they can tell us about Earth's past.
Authentic Outcome	**Greatstone Geology Museum** – Pupils create a museum exhibition displaying classified rocks, fossil investigations and soil studies with scientific explanations describing how rocks are formed and why they are important.
Assessment End Point	Pupils classify rocks using observable properties, explain why different rocks are used for different purposes, describe how fossils form and explain that soils are made from rocks and organic matter.

YEAR 3 SPRING 1 – 6 WEEK TEACHING SEQUENCE - Rocks

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	Hook – Greatstone Geology Investigation	Rocks have different appearances and properties.	Observe carefully and ask questions.	Explore mystery rocks and predict how they may have formed.	Rock collections, magnifiers, mystery bags, sorting trays.	Collect and observe beach pebbles.	Prior knowledge assessment.	Encourage observation before introducing scientific names.
2	Comparing and Classifying Rocks	Rocks can be grouped using observable properties.	Compare and classify.	Sort rocks by texture, colour, grain and hardness.	Rock samples, identification charts, magnifiers.	Compare beach pebbles with building stones.	Accurate classification.	Focus on evidence rather than guessing rock names.
3	Investigating Rock Properties	Different rocks have different physical properties.	Carry out comparative tests.	Hardness and permeability investigations.	Water trays, droppers, nails, hand lenses, rock samples.	Compare how beach rocks absorb water.	Record results accurately.	Introduce comparative testing and repeat measurements where appropriate.
4	Fossils – Evidence from the Past	Fossils are formed when living things become trapped in rock over millions of years.	Observe and interpret evidence.	Create fossil impressions and examine fossil specimens.	Fossil samples, clay, shells, plaster (optional), photographs.	Search for shell evidence and compare with fossils.	Explain fossil formation.	Avoid suggesting fossils form quickly. Reinforce the timescale involved.
5	Investigating Soil	Soil is made from weathered rock and organic matter. Different soils have different properties.	Compare and observe.	Compare soil samples and investigate water drainage.	Soil samples, sieves, magnifiers, water trays.	Compare dune, school and garden soils.	Explain differences between soils.	Reinforce the link between rocks, weathering and soil formation.
6	Greatstone Geology Museum	Rocks, fossils and soils provide evidence about Earth's history.	Explain findings using evidence.	Create museum displays and present investigations.	Rock collections, fossils, displays, recording sheets.	Create a coastal geology trail.	End-point assessment.	Encourage pupils to justify classifications and conclusions using evidence collected throughout the unit.

Whole Unit Resource List

Investigation Equipment

- Rock samples

- Fossil specimens or replicas
- Soil samples
- Magnifying glasses
- Hand lenses
- Water trays
- Pipettes
- Sieves
- Clipboards
- Measuring rulers
- Cameras or iPads
- Sorting trays

Consumables

- Clay
- Shells
- Plaster of Paris (optional)
- Investigation sheets
- Rock identification cards
- Soil labels
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- Large paper
- Sticky notes
- Display labels

Beach School Resources

- Collection trays
- Magnifiers
- Buckets
- Identification guides
- Nature journals
- Soil sampling containers
- Pebble sorting trays
- Cameras

Adaptive Teaching

- Use real rocks before introducing scientific classifications.
- Provide vocabulary mats with photographs.
- Model classification using one property at a time before comparing multiple properties.
- Provide partially completed comparison tables where appropriate.
- Allow pupils to record observations through drawings, photographs or oral explanations.
- Pair pupils strategically during comparative investigations.
- Challenge higher attainers to explain why different rock properties make them suitable for particular uses and identify evidence of weathering.

Health & Safety

- Check rock samples for sharp edges before handling.
- Supervise hardness investigations carefully and avoid excessive force.
- Wash hands after handling soil samples.
- Ensure soil samples are free from animal waste or hazardous materials.
- Supervise Beach School investigations on uneven ground and near the coastline.
- Follow normal coastal and Beach School risk assessments.

Common Misconception	Teaching Response
All rocks are the same.	Compare rocks with different textures, hardness and permeability.
Rocks and stones are different scientific materials.	Explain that "rock" is the scientific term, while "stone" is often used informally.
Fossils are simply old bones.	Show that fossils can include shells, plants, footprints and other preserved remains or traces.
Fossils form quickly after an animal dies.	Reinforce that fossil formation usually takes millions of years.
Soil is only dirt.	Investigate soil closely to identify rock fragments, organic matter, air and water.
All soils are the same.	Compare different local soil samples and investigate their properties.

Reflection Question	Purpose
Which rock properties helped you classify your samples?	Develop evidence-based classification skills.
Why are different rocks used for different purposes?	Connect physical properties with real-life applications.
What evidence tells us that fossils belonged to living things?	Reinforce fossils as evidence of the past.
How is soil connected to rocks?	Develop understanding of weathering and soil formation.
How has the Greatstone coastline helped us learn about rocks and erosion?	Connect classroom learning to the local environment.
What investigation gave you the strongest scientific evidence? Why?	Encourage evaluation of enquiry methods.
How might rocks and soils continue to change over time?	Develop understanding of long-term Earth processes.
How has this learning helped answer our big question?	Consolidate understanding that rocks, fossils and soils provide evidence about Earth's formation, history and the environment around us.

YEAR 3 - Forces and Magnets – SPRING 2

How do forces and magnets make objects move, stop and change direction?

Section	Overview
Curriculum Rationale	This unit develops pupils' understanding of forces through practical investigation. Building on everyday experiences of pushing, pulling and movement, pupils compare how objects move across different surfaces before exploring friction as a force that can slow movement. They then investigate magnets, discovering that magnetic forces can act at a distance and that magnets have two poles which can attract or repel. Through Developing Experts enquiries, pupils ask questions, make predictions, carry out comparative and fair tests, record measurements and use evidence to explain patterns.
The Greatstone Way	**EXPLORERS → INVENTORS** – Children become physical scientists and engineers, exploring how forces affect movement before using magnetic forces to solve practical problems. Through Beach School they investigate movement across sand, shingle and smooth surfaces, explore how wind and friction affect objects and design simple magnetic inventions.
National Curriculum Coverage	• Compare how things move on different surfaces. • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Observe how magnets attract or repel each other and attract some materials but not others. • Compare and group together a variety of everyday materials according to whether they are attracted to a magnet.

	• Describe magnets as having two poles. • Predict whether two magnets will attract or repel each other, depending on which poles are facing.
Developing Experts Knowledge Progression	Pupils begin by identifying pushes and pulls before comparing movement across different surfaces. They investigate friction and consider how it can be useful or problematic. Pupils then explore magnetic and non-magnetic materials, discover that magnetic forces can act without contact and investigate attraction, repulsion and magnetic poles. Finally, they apply their understanding through an engineering challenge.
Curriculum Journey	**Previous Learning:** Key Stage 1 – observing movement, comparing materials and carrying out simple tests. **Current Learning:** Contact forces, friction, magnetic forces, magnetic materials and poles. **Next Learning:** Year 5 – Forces, including gravity, air resistance, water resistance, friction, levers, pulleys and gears.
Scientific Enquiry Question	How can we investigate forces and magnets to explain and control movement?
Sticky Knowledge	A force is a push or a pull. Some forces require contact between objects. Friction acts between surfaces and can slow movement. Objects move differently on different surfaces. Magnets can act at a distance. Magnets attract some metals, but not all metals. Every magnet has a north pole and a south pole. Opposite poles attract and matching poles repel.
Working Scientifically	Ask questions. Make predictions. Set up comparative and fair tests. Measure distance and time. Observe patterns. Classify materials. Record results. Draw conclusions. Use evidence to explain findings.
Scientific Knowledge & Skills	Identify pushes and pulls. Compare movement on surfaces. Explain friction simply. Identify magnetic materials. Describe attraction and repulsion. Identify magnetic poles. Predict interactions between magnets.
Substantive Concepts	Forces • Movement • Friction • Magnetism • Materials • Energy
Disciplinary Concepts	Observe • Predict • Compare • Test • Measure • Classify • Record • Conclude
Scientific Vocabulary	force, push, pull, movement, motion, surface, friction, contact force, magnetic force, magnet, magnetic, non-magnetic, attract, repel, pole, north pole, south pole, distance
Working Scientifically Vocabulary	question, predict, variable, fair test, comparative test, measure, centimetre, metre, second, observe, classify, result, evidence, pattern, conclusion
Beach School & Outdoor Learning	Compare movement across sand, shingle, grass and smoother surfaces. Investigate how friction affects wheeled objects. Observe the effects of wind as a force. Search safely for magnetic and non-magnetic manufactured objects using supervised collections rather than sweeping magnets through unknown beach debris. Design outdoor magnetic retrieval or movement challenges.
Greatstone & Local Links	Investigate how bicycles, buggies and wheeled equipment move across the beach, paths and school grounds. Explore why different footwear and tyres are suited to sand, shingle and hard surfaces. Consider how forces affect boats, kites, windsocks and objects exposed to coastal wind.
Cross-Curricular Links	Design and Technology (mechanisms and magnetic products), Mathematics (measuring distance and time, tables and charts), English (scientific explanations), Computing (recording data), PE (movement and forces), Geography (coastal wind and surfaces).
High Quality Texts	*The Iron Man*; *Mr Archimedes' Bath*; *Oscar and the Cricket*; *Magnets Push, Magnets Pull*; age-appropriate books about forces and inventions.
Significant Scientists & STEM Careers	William Gilbert, Michael Faraday, Isaac Newton, mechanical engineer, automotive engineer, physicist, product designer, robotics engineer, transport engineer.
Memorable Hook	**The Greatstone Forces Laboratory** – Pupils receive a series of movement and magnetic mysteries, including vehicles that travel different distances, objects hidden inside sealed containers and magnets that appear to move without touching. They become forces investigators responsible for explaining each phenomenon.
Authentic Outcome	**Greatstone Magnetic Inventions Fair** – Pupils design, test and present a simple product or game that uses friction or magnetic forces, explaining how the forces control movement.
Assessment End Point	Pupils explain that forces are pushes or pulls, compare movement on different surfaces, describe the effect of friction, identify magnetic materials and accurately predict attraction or repulsion between magnetic poles.

YEAR 3 SPRING 2 – 6 WEEK TEACHING SEQUENCE - Forces and Magnets

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	Hook – The Greatstone Forces Laboratory	A force is a push or pull that can make an object start moving, stop, speed up, slow down or change direction.	Ask questions, observe and identify forces.	Complete a forces carousel involving rolling, sliding, pulling, pushing and changing direction.	Toy vehicles, balls, ramps, elastic bands, string, trays.	Identify pushes, pulls and movement caused by wind during an outdoor forces walk.	Assess prior understanding through explanations of what caused movement.	Avoid implying that moving objects always need a continuing force. Focus initially on observable changes in movement.
2	Moving on Different Surfaces	The same object can move differently depending on the surface. Rough and smooth surfaces affect movement.	Predict, carry out a comparative test and measure distance.	Release identical vehicles from the same ramp onto different surfaces and measure distance travelled.	Ramps, identical vehicles, carpet, wood, plastic, fabric, metre sticks.	Compare movement over sand, shingle, grass and a hard path.	Record measurements and identify the surface on which the object travelled furthest.	Keep ramp height, vehicle and starting position the same. Introduce variables using change, measure and keep the same.
3	Friction – Helpful or Unhelpful?	Friction is a contact force between surfaces. It can slow movement and can also provide grip.	Measure, compare and identify patterns.	Investigate how different shoe soles or materials affect grip on an inclined surface.	Boards or ramps, material samples, blocks, force meters if available, recording sheets.	Explore which footwear or tyre textures would work best on sand and shingle.	Explain how evidence shows friction can be useful and problematic.	Keep explanations age-appropriate. Friction does not simply exist on rough surfaces; it acts whenever surfaces move or try to move against one another.
4	Which Materials Are Magnetic?	Magnets attract some materials, particularly iron and steel, but not all metals. Magnetic forces can act at a distance.	Predict, test and classify materials.	Test a range of objects and group them as magnetic or non-magnetic. Investigate whether a magnet can act through paper, card, fabric or water.	Bar magnets, horseshoe magnets, material samples, trays, paper, fabric, shallow water containers.	Test a pre-selected safe collection of beach-related objects and materials.	Accurate classification supported by test results.	Do not allow pupils to conclude that all metals are magnetic. Include aluminium, copper or brass examples where available.

5	Magnetic Poles – Attraction and Repulsion	Every magnet has a north and south pole. Opposite poles attract; matching poles repel.	Predict, observe patterns and explain.	Mark and test magnet poles, then create a table of pole combinations and outcomes.	Bar magnets with poles marked, ring magnets, magnetic cars, recording tables.	Complete a magnetic movement or retrieval challenge outdoors.	Predict attraction or repulsion accurately and explain the rule.	Magnets do not need to touch to exert a force. Make sure pupils test all four pole combinations systematically.
6	Magnetic Inventions Challenge	Forces can be deliberately used to control movement and solve problems.	Plan, test, improve, evaluate and communicate.	Design and make a magnetic game, retrieval device or moving model, then explain how friction, attraction or repulsion affects it.	Magnets, card, paper clips, toy vehicles, string, construction materials, planning sheets.	Trial inventions outdoors or create a Beach School magnetic rescue challenge.	End-point practical, oral and written assessment.	Assess scientific explanation and purposeful testing rather than decorative quality. Require pupils to suggest one evidence-based improvement.

Whole Unit Resource List

Investigation Equipment

- Bar magnets
- Horseshoe magnets
- Ring magnets
- Magnetic wands
- Compasses, where appropriate
- Toy vehicles
- Balls
- Ramps and boards
- Metre sticks and rulers
- Stopwatches
- Force meters, if available
- Sorting hoops and trays
- Clipboards
- Cameras or iPads

Consumables

- Paper clips
- Iron or steel objects
- Aluminium foil and aluminium objects
- Copper or brass samples
- Wood, plastic, rubber, fabric, paper and card
- String
- Elastic bands
- Sandpaper
- Smooth plastic sheets
- Carpet and fabric samples
- Investigation tables
- Graph paper
- Labels
- Construction card
- Masking tape
- Sticky tack

Beach School Resources

- Wheeled equipment
- Surface-marking cones
- Metre tapes
- Wind ribbons or windsocks
- Weatherproof clipboards
- Pre-selected safe material collections
- Magnetic retrieval resources
- Buckets and trays
- Cameras

Adaptive Teaching

- Begin with pupils physically experiencing pushes, pulls and changes in movement.
- Use arrows and diagrams to show the direction of forces.
- Teach variables using the prompts **change, measure and keep the same**.
- Provide pre-drawn result tables and visual property cards.
- Use large, clearly marked magnets before smaller or unlabelled examples.
- Allow pupils to demonstrate predictions physically before recording them.
- Support explanations with sentence stems such as: **“The object moved further because…”** and **“These poles will… because…”**
- Reduce the number of materials tested where working memory or recording presents a barrier.
- Challenge higher attainers to explain anomalous results, consider whether tests were reliable and compare how friction can be increased or reduced for different purposes.

Health & Safety

- Keep magnets away from electronic devices, magnetic storage cards, hearing aids and other medical equipment.
- Check whether any pupil or adult uses a medical device that could be affected by magnets and follow specific medical guidance.
- Do not use very small or high-strength magnets that could be swallowed or trap fingers.
- Count magnets before and after activities and supervise their use closely.
- Establish safe launch zones for ramps, vehicles and moving objects.
- Ensure ramps and boards are stable before use.
- Supervise the use of force meters, elastic bands and stretched materials.
- Clean water spillages immediately when investigating magnetic forces through water.
- Use only pre-selected safe objects during outdoor magnetic investigations; do not sweep magnets through unknown beach debris.
- Follow established Beach School risk assessments and check surfaces and weather conditions before movement activities.

Misconception	Teaching Response
A force is something an object contains.	Describe a force as a push or pull acting between objects.
Objects only move while someone is pushing them.	Show that an object can continue moving after the push has ended, although friction may slow it.
Smooth surfaces have no friction.	Compare smooth surfaces and explain that friction may be lower but is still present.
Friction is always harmful.	Explore how friction provides grip for walking, tyres and brakes.
All metals are magnetic.	Test iron or steel alongside aluminium, copper and brass.
Magnets attract every object.	Classify a wide range of magnetic and non-magnetic materials.
The whole magnet attracts in exactly the same way.	Investigate the poles and observe that magnetic effects are usually strongest near them.
North poles always attract.	Test pole combinations and establish that opposite poles attract while matching poles repel.
Magnets must touch objects to affect them.	Demonstrate attraction or repulsion through air and through thin non-magnetic materials.
A larger magnet is always stronger.	Compare magnets carefully and explain that size alone does not determine magnetic strength.

Reflection Question	Purpose
What force caused the object to start, stop or change direction?	Reinforce identification of pushes, pulls and their effects.
How did the surface affect the distance travelled?	Develop understanding of the relationship between surfaces, friction and movement.
What did you keep the same to make your surface investigation fair?	Consolidate understanding of variables and fair testing.
When is friction helpful, and when might we want to reduce it?	Apply the concept of friction to real-life situations.
What evidence showed that magnetic force can act at a distance?	Reinforce the distinction between contact and non-contact forces.
How did you decide whether a material was magnetic?	Encourage classification based on practical evidence rather than appearance.

What pattern did you find when different magnet poles faced each other?	Consolidate the rules of attraction and repulsion.
How did forces control the movement in your invention?	Require pupils to apply scientific knowledge to a practical design.
What would you change if you tested your invention again?	Develop evaluation and evidence-based improvement.
How has this learning helped answer our big question?	Consolidate understanding of how contact forces, friction and magnetism affect and control movement.

YEAR 3 - Plants – SUMMER 1

How do the different parts of a plant work together to help it grow, reproduce and survive?

Section	Overview
Curriculum Rationale	This unit builds on pupils' previous learning about plant growth in Key Stage 1 and Year 2 by investigating the functions of each part of a flowering plant. Pupils explore how roots, stems, leaves and flowers work together to support growth and reproduction. Through practical investigations they examine water transportation, investigate the conditions plants need to thrive and discover how pollination, seed formation and seed dispersal ensure the survival of plant species. Developing Experts enquiries encourage pupils to ask scientific questions, carry out comparative investigations, observe change over time and explain plant life processes using evidence.
The Greatstone Way	**PROTECTORS → LEGACY** – Children develop an understanding of the important role plants play in supporting all life on Earth. Through Beach School and local fieldwork they investigate the rich plant life found around Greatstone and learn how protecting plants protects habitats, wildlife and the environment. They explore how planting today creates a positive legacy for future generations.
National Curriculum Coverage	• Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. • Explore the requirements of plants for life and growth (air, light, water, nutrients from soil and room to grow) and how they vary from plant to plant. • Investigate the way in which water is transported within plants. • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.
Developing Experts Knowledge Progression	Pupils begin by identifying the parts of flowering plants before investigating the function of each structure. They investigate plant requirements through comparative testing before exploring water transport using practical experiments. Finally, pupils study pollination, seed formation and seed dispersal before explaining the complete life cycle of flowering plants.
Curriculum Journey	**Previous Learning:** EYFS – Growing and Changing; Year 1 – Common Plants; Year 2 – Germination and Plant Growth. **Current Learning:** Plant structure, functions, water transport, pollination and seed dispersal. **Next Learning:** Year 5 – Plant reproduction within Life Cycles; Year 6 – Evolution and adaptation through seed dispersal.
Scientific Enquiry Question	**How do the different parts of a flowering plant work together to help it survive and reproduce?**
Sticky Knowledge	Roots anchor plants and absorb water and nutrients. Stems support plants and transport water. Leaves make food for the plant using sunlight. Flowers are responsible for reproduction. Plants need water, light, air, nutrients and space to grow. Water is transported through stems to leaves. Pollination leads to seed formation. Seeds are dispersed in different ways to help new plants grow.
Working Scientifically	Observe over time. Carry out comparative and fair tests. Measure accurately. Record observations. Identify patterns. Use models. Draw conclusions using evidence.
Scientific Knowledge & Skills	Identify plant structures. Explain plant functions. Investigate plant requirements. Observe water transport. Describe pollination. Explain seed formation and seed dispersal.
Substantive Concepts	Plants • Growth • Transport • Reproduction • Life Cycles • Adaptation
Disciplinary Concepts	Observe • Compare • Measure • Test • Record • Explain • Conclude
Scientific Vocabulary	root, stem, trunk, leaf, flower, petal, pollen, pollination, nectar, stigma, anther, ovary, seed, fruit, germination, nutrient, transport, absorb, disperse, reproduction
Working Scientifically Vocabulary	observe, compare, measure, predict, investigate, variable, evidence, record, results, conclusion, pattern
Beach School & Outdoor Learning	Identify flowering plants around Greatstone. Investigate roots and stems of local plants. Observe pollinating insects visiting flowers. Compare plants growing in different coastal conditions. Collect and classify seeds before investigating different methods of seed dispersal. Plant wildflowers to support local pollinators.
Greatstone & Local Links	Explore marram grass, wildflowers, coastal shrubs and dune vegetation. Observe how coastal plants survive windy, dry and sandy environments. Investigate the importance of dune vegetation in preventing erosion and supporting wildlife. Explore local wildflower planting and conservation projects.
Cross-Curricular Links	Geography (coastal environments), Mathematics (measuring growth and recording results), English (scientific explanations), Art (botanical drawing), Design Technology (gardening), Computing (data logging and photography).
High Quality Texts	*The Extraordinary Gardener*; *The Tiny Seed*; *A Seed Is Sleepy*; *Planting a Rainbow*; *The Big Book of Blooms*.
Significant Scientists & STEM Careers	Joseph Banks, Jan Ingenhousz, George Washington Carver, botanist, horticulturalist, ecologist, conservation officer, environmental scientist.
Memorable Hook	**The Greatstone Botanical Research Centre** – Children discover a collection of mystery plants that appear to be struggling to survive. They become botanists investigating what each plant needs and how its different parts help it grow and reproduce.
Authentic Outcome	**Greatstone Pollinator Garden** – Children design and help create a wildlife-friendly planting area supported by scientific explanations, plant life-cycle displays and investigations showing how plants survive and reproduce.
Assessment End Point	Pupils identify and explain the functions of each part of a flowering plant, investigate plant requirements, explain water transport, describe pollination and seed dispersal, and use evidence from investigations to explain how plants survive and reproduce.

YEAR 3 SUMMER 1 – 6 WEEK TEACHING SEQUENCE - Plants

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	**Hook – Greatstone Botanical Research Centre**	Flowering plants have different parts with specific functions.	Observe closely and identify structures.	Dissect flowering plants and label roots, stems, leaves and flowers.	Fresh flowers, magnifiers, identification sheets.	Identify local flowering plants.	Prior knowledge assessment.	Introduce scientific vocabulary before discussing functions.

2	**What Does Each Part Do?**	Roots, stems, leaves and flowers each have different functions.	Compare and classify.	Investigate roots, stems and leaves from different plants.	Plant specimens, diagrams, magnifiers.	Compare coastal plants.	Explain plant functions.	Reinforce that each structure has more than one role.
3	**What Do Plants Need?**	Plants require water, light, nutrients, air and space.	Carry out a comparative test.	Investigate one growing condition while controlling others.	Seedlings, rulers, pots, labels.	Compare plants growing in different habitats.	Explain investigation results.	Only change one variable.
4	**How Does Water Travel Through Plants?**	Water moves through stems to leaves and flowers.	Observe over time.	Celery or white flower dye investigation.	Celery, food colouring, jars.	Observe stems of local plants.	Record observations.	Introduce transport as a process rather than naming xylem.
5	**Flowers, Pollination and Seeds**	Flowers help plants reproduce through pollination and seed formation.	Identify patterns.	Observe flowers and investigate pollinators.	Flowers, insect photographs, videos.	Pollinator survey.	Explain pollination.	Keep explanations simple and age appropriate.
6	**How Are Seeds Dispersed?**	Seeds are dispersed in different ways to help new plants grow.	Compare and explain.	Seed dispersal investigation and design challenge.	Seed collections, fans, water trays.	Collect local seeds and classify dispersal methods.	End-point assessment.	Link dispersal to survival and adaptation.

Whole Unit Resource List

Investigation Equipment

- Hand lenses
- Magnifying glasses
- Microscopes (optional)
- Fresh flowering plants
- Celery stalks
- White carnations (optional)
- Food colouring
- Measuring cylinders
- Rulers
- Clipboards
- Cameras or iPads
- Seed collections

Consumables

- Seedlings
- Compost
- Plant pots
- Labels
- Recording sheets
- Flower diagrams
- Wildflower seeds
- Sticky notes
- Display materials

Beach School Resources

- Plant identification guides
- Magnifiers
- Nature journals
- Quadrats
- Cameras
- Wildflower seeds
- Collection trays
- Gloves

Adaptive Teaching

- Use real plants before diagrams wherever possible.
- Introduce vocabulary through labelled photographs and real specimens.
- Model plant dissections before independent work.
- Provide sequencing cards for pollination and seed dispersal.
- Use structured recording frames during comparative investigations.
- Allow pupils to explain ideas verbally before writing.
- Challenge higher attainers to explain how plant structures work together as one complete system and compare different methods of seed dispersal.

Health & Safety

- Check for allergies to flowers, pollen and plant materials before investigations.
- Ensure pupils wash hands after handling plants and compost.
- Use commercially produced compost free from harmful contaminants.
- Supervise the use of scissors during flower dissections.
- Ensure food colouring is handled carefully to avoid staining.
- Follow Beach School risk assessments during outdoor investigations.
- Avoid contact with unknown or potentially harmful plants

Common Misconception	Teaching Response
Plants take in food through their roots.	Explain that roots absorb water and nutrients while leaves make food for the plant.
Flowers are only decorative.	Investigate their role in reproduction and seed formation.
Plants only need water to survive.	Compare investigations showing the importance of light, air, nutrients and space.
Water stays inside the roots.	Demonstrate transport through coloured water investigations.
Seeds always fall straight to the ground.	Compare different methods of seed dispersal including wind, animals and water.
Pollination and seed dispersal are the same process.	Use diagrams to distinguish pollination (before seeds form) from seed dispersal (after seeds form).

Reflection Question	Purpose
Why does each part of a plant have a different job?	Develop understanding of plant structure and function.
What evidence showed that plants need more than just water?	Reinforce conclusions from comparative investigations.
How did the coloured water investigation help explain transport?	Connect practical enquiry to plant processes.
Why are pollinators important for flowering plants?	Develop understanding of reproduction and biodiversity.
Which seed dispersal method do you think is most effective? Why?	Encourage comparison using scientific evidence.
How do plants help protect habitats around Greatstone?	Link science to local environmental stewardship and the **PROTECTORS** theme.
What legacy could we leave by planting more wildflowers?	Connect learning to the **LEGACY** theme and environmental responsibility.
How has this learning helped answer our big question?	Consolidate understanding that all parts of a flowering plant work together to support growth, reproduction and survival.

YEAR 3 – Light – SUMMER 2

How does light help us see the world and how can we use it safely?

Section	Overview
Curriculum Rationale	This unit introduces pupils to the scientific concept of light and how it enables us to see. Building on children's everyday experiences of light and darkness, pupils investigate different light sources before discovering that darkness is the absence of light. Through practical investigations they explore how light is reflected from surfaces, why shadows are formed and how the size of a shadow changes. Developing Experts enquiries encourage pupils to ask questions, make predictions, carry out comparative investigations and use evidence to explain how light behaves. The unit also promotes safe behaviours when working with sunlight and other bright light sources.
The Greatstone Way	**PROTECTORS → LEGACY** – Children become light scientists investigating one of the most important forms of energy in our world. Through Beach School they observe changing shadows, explore natural and artificial light around Greatstone and learn how to protect their eyes when working outdoors. They consider how light supports life on Earth and how understanding light has improved safety, communication and technology.
National Curriculum Coverage	• Recognise that they need light in order to see things and that dark is the absence of light. • Notice that light is reflected from surfaces. • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. • Recognise that shadows are formed when the light from a light source is blocked by an opaque object. • Find patterns in the way that the size of shadows change.
Developing Experts Knowledge Progression	Pupils begin by identifying natural and artificial light sources before investigating why we need light to see. They explore reflection using different materials before learning about staying safe in sunlight. Pupils then investigate how shadows are formed and how they change throughout the day before applying their knowledge through practical investigations and engineering challenges.
Curriculum Journey	**Previous Learning:** EYFS – Day and Night; Year 1 – Seasonal Changes (day length); Year 2 – observing changes in the environment. **Current Learning:** Light sources, reflection, shadows and light safety. **Next Learning:** Year 6 – Light travelling in straight lines, reflection and how we see objects.
Scientific Enquiry Question	**How can we investigate light to explain how we see and why shadows change?**
Sticky Knowledge	Light is needed to see. Darkness is the absence of light. The Sun is our main natural light source. Light reflects from many surfaces. Smooth, shiny surfaces reflect more light than rough surfaces. Looking directly at the Sun can damage our eyes. Shadows are formed when light is blocked by opaque objects. Shadow size changes when the position of the light source or object changes.
Working Scientifically	Ask questions. Make predictions. Carry out comparative investigations. Observe over time. Measure. Record results. Identify patterns. Draw conclusions using evidence.
Scientific Knowledge & Skills	Identify light sources. Explain why light is needed to see. Investigate reflection. Explain light safety. Describe shadow formation. Investigate how shadows change.
Substantive Concepts	Light • Reflection • Shadows • Energy • Observation • Safety
Disciplinary Concepts	Observe • Predict • Compare • Measure • Record • Pattern • Explain
Scientific Vocabulary	light, light source, natural, artificial, dark, darkness, reflection, reflective, opaque, translucent, transparent, shadow, block, sunlight, surface, beam
Working Scientifically Vocabulary	observe, compare, predict, investigate, measure, evidence, record, results, pattern, conclusion
Beach School & Outdoor Learning	Observe shadows throughout the day. Compare natural and artificial light sources. Investigate reflective materials used in outdoor clothing and safety equipment. Create shadow art and sundials. Explore how light changes in different weather conditions and investigate how coastal environments reflect sunlight.
Greatstone & Local Links	Investigate sunlight reflecting from the sea, beach and windows. Observe changing shadows on the beach and school grounds. Explore why lighthouses, reflective clothing and beach safety signs are important along the Kent coastline. Discuss the role of the Greatstone Lighthouse in helping ships navigate safely.
Cross-Curricular Links	Mathematics (measuring shadows), Art (shadow drawing and silhouettes), Geography (weather and the Sun), Design Technology (shadow puppets), Computing (photography and time-lapse), PSHE (sun safety).
High Quality Texts	*The Owl Who Was Afraid of the Dark*; *Oscar and the Bird*; *What's Light?*; *Can You See in the Dark?*
Significant Scientists & STEM Careers	Ibn al-Haytham, Isaac Newton, Thomas Edison, lighthouse engineer, lighting engineer, photographer, optometrist, physicist.
Memorable Hook	**The Greatstone Lighthouse Mystery** – Children receive an urgent message from the Greatstone Lighthouse asking for help to explain how light keeps people safe. They become light scientists investigating how light travels, reflects and creates shadows.
Authentic Outcome	**Festival of Light Exhibition** – Pupils create interactive displays explaining light sources, reflection, shadows and sun safety through investigations, shadow demonstrations and lighthouse models.
Assessment End Point	Pupils explain why light is needed to see, identify light sources, describe reflection, explain how shadows form and change, and use evidence from investigations to explain their conclusions while demonstrating an understanding of sun safety.

YEAR 3 SUMMER 2 – 6 WEEK TEACHING SEQUENCE - Light

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	**Hook – The Greatstone Lighthouse Mystery**	Light is needed for us to see. Darkness is the absence of light.	Observe and ask questions.	Identify natural and artificial light sources and investigate seeing in light and dark conditions.	Torches, lamps, photographs, sorting cards.	Identify light sources around the school grounds.	Prior knowledge assessment.	Reinforce that eyes need light reflected from objects to see them.
2	**How Does Light Help Us See?**	Light travels from a source and reflects from objects into our eyes.	Observe and compare.	Investigate seeing objects with different amounts of light.	Torches, boxes, objects, mirrors.	Compare bright and shaded areas outdoors.	Explain why some objects are easier to see.	Avoid introducing complex ideas about light rays at this stage.

3	**Reflecting Light**	Light reflects from many surfaces. Smooth, shiny surfaces reflect more light.	Carry out comparative tests.	Investigate reflective and non-reflective materials.	Mirrors, foil, paper, fabric, plastic, torches.	Investigate reflective clothing and road signs.	Identify the most reflective materials.	Use safe torch investigations only. Never use mirrors to reflect sunlight.
4	**Staying Safe in the Sun**	Sunlight can damage our eyes. We must protect ourselves.	Gather evidence and explain.	Investigate UV protection and compare sunglasses, hats and shade.	Sunglasses, hats, UV beads (if available), photographs.	Create shaded areas and compare temperatures.	Explain safe choices.	Repeatedly reinforce never looking directly at the Sun.
5	**How Are Shadows Made?**	Shadows form when opaque objects block light.	Predict, measure and observe.	Investigate shadows using torches and different objects.	Torches, opaque, translucent and transparent materials, rulers.	Shadow investigation outdoors.	Explain shadow formation.	Compare transparent, translucent and opaque materials.
6	**Why Do Shadows Change?**	Shadow size changes when the position of the light source or object changes.	Measure, record and identify patterns.	Shadow investigation using torches and outdoor sunlight.	Torches, metre sticks, chalk, rulers.	Create a simple sundial and observe shadows across the day.	End-point assessment.	Link changing shadows to the movement of the Earth relative to the Sun in simple terms. Focus on observed patterns rather than detailed astronomy.

Whole Unit Resource List

Investigation Equipment

- Torches
- Mirrors
- Magnifying glasses
- Metre sticks
- Rulers
- Chalk
- Clipboards
- Cameras or iPads
- UV beads (optional)
- Shadow sticks
- Opaque, translucent and transparent materials

Consumables

- Aluminium foil
- Tissue paper
- Card
- Acetate sheets
- Fabric samples
- Investigation recording sheets
- Shadow templates
- Display materials
- Labels

Beach School Resources

- Shadow sticks
- Chalk
- Reflective safety clothing
- Binoculars
- Nature journals
- Weatherproof clipboards
- Cameras
- Sundial template

Adaptive Teaching

- Begin with practical experiences in light and dark environments before introducing scientific explanations.
- Use real objects and demonstrations to show reflection.
- Provide vocabulary cards with photographs of transparent, translucent and opaque materials.
- Model investigations before independent practical work.
- Use structured recording tables and shadow diagrams.
- Allow pupils to explain observations verbally before writing conclusions.
- Challenge higher attainers to explain why some surfaces reflect more light than others and predict how changing variables affects shadow size.

Health & Safety

- **Never allow pupils to look directly at the Sun**, even when wearing sunglasses.
- Never use mirrors or magnifying glasses to reflect or concentrate sunlight.
- Use torches rather than lasers for classroom investigations.
- Ensure electrical equipment is checked before use.
- Keep walkways clear when working in darkened classrooms.
- Supervise all outdoor investigations carefully.
- Encourage hats, sunscreen and appropriate hydration during sunny Beach School sessions.
- Follow all Beach School and outdoor-learning risk assessments.

Common Misconception	Teaching Response
Darkness is a type of light.	Demonstrate that darkness is simply the absence of light.
Our eyes produce light so we can see.	Reinforce that light must enter our eyes after reflecting from objects.
The Moon produces its own light.	Explain that the Moon reflects sunlight.
All shiny objects are mirrors.	Compare reflective surfaces with mirrors and discuss differences.
Transparent objects make dark shadows.	Compare transparent, translucent and opaque materials.
Shadows are objects.	Reinforce that shadows are areas where light is blocked.
Shadow size depends only on the object's size.	Investigate how moving the light source changes shadow size.
Sunglasses make it safe to look directly at the Sun.	Reinforce that **nothing** makes it safe to look directly at the Sun.

Reflection Question	Purpose
Why do we need light to see?	Reinforce the relationship between light and vision.
Which materials reflected the most light? What evidence supports your answer?	Develop evidence-based explanations.
Why is it dangerous to look directly at the Sun?	Promote understanding of sun safety.
How did your investigation show how shadows are formed?	Connect practical enquiry with scientific concepts.
What pattern did you notice when you changed the position of the light source?	Encourage identification of patterns through investigation.
How does the Greatstone Lighthouse help people stay safe?	Link learning to the local environment and real-world applications.

How can understanding light help protect people in everyday life?	Connect science to the **PROTECTORS** theme.
How has this learning helped answer our big question?	Consolidate understanding that light enables us to see, reflects from surfaces, creates shadows and can be used safely to benefit people and communities.

YEAR 4 - Animals Including Humans – Teeth, Digestion and Food Chains – AUTUMN 1

How do teeth and the digestive system help animals obtain and use food to survive?

Section	Overview
Curriculum Rationale	This unit builds on pupils' Year 3 understanding of nutrition, skeletons and muscles by exploring how food is broken down and used by the body. Pupils investigate the different types and functions of human teeth, learn how to care for them and compare teeth across animals with different diets. They then follow the journey of food through the digestive system, identifying the main organs and explaining their functions. Finally, pupils construct and interpret food chains, recognising producers, predators and prey. Through Developing Experts enquiry, pupils use models, comparative tests, careful observation and evidence-based explanations to understand how animals obtain, process and depend upon food.
The Greatstone Way	**ROOTS → SURVIVORS** – Children explore the body systems and feeding relationships that connect humans with other animals. They learn how teeth, digestion and food chains support survival and how healthy choices protect their bodies. Through Beach School they investigate coastal food chains, compare the feeding structures of local wildlife and consider how changes to one part of an ecosystem can affect many living things.
National Curriculum Coverage	• Describe the simple functions of the basic parts of the digestive system in humans. • Identify the different types of teeth in humans and their simple functions. • Construct and interpret a variety of food chains, identifying producers, predators and prey.
Developing Experts Knowledge Progression	Pupils begin by revisiting nutrition and the need for food before identifying the different types of human teeth and their functions. They compare animal teeth and diets, investigate tooth decay and learn how teeth can be protected. Pupils then trace food through the digestive system, using models to explain the role of each organ. Finally, they construct and interpret food chains and apply their learning to local coastal ecosystems.
Curriculum Journey	**Previous Learning:** Year 2 – healthy eating and survival needs; Year 3 – nutrition, skeletons and muscles. **Current Learning:** Teeth, tooth care, digestion and food chains. **Next Learning:** Year 5 – life cycles and human development; Year 6 – the circulatory system, nutrient transport and the impact of lifestyle.
Scientific Enquiry Question	**How can we use evidence and models to explain how animals obtain, break down and use food?**
Sticky Knowledge	Humans have incisors, canines, premolars and molars with different functions. Teeth begin the process of digestion by cutting, tearing and grinding food. Tooth decay is caused when bacteria use sugars and produce acids that damage enamel. The digestive system includes the mouth, oesophagus, stomach, small intestine, large intestine and rectum. Food chains begin with producers. Predators hunt other animals and prey are animals that are eaten.
Working Scientifically	Ask questions. Make predictions. Carry out comparative tests. Observe carefully. Use models. Record findings. Identify patterns. Draw conclusions. Use scientific evidence to explain ideas.
Scientific Knowledge & Skills	Identify and describe types of teeth. Explain tooth functions and care. Compare animal teeth and diets. Name digestive organs. Describe the journey of food. Construct and interpret food chains. Identify producers, predators and prey.
Substantive Concepts	Animals • Humans • Teeth • Digestion • Nutrition • Food Chains • Survival • Interdependence
Disciplinary Concepts	Observe • Compare • Model • Test • Record • Interpret • Explain • Conclude
Scientific Vocabulary	digestion, digestive system, mouth, teeth, saliva, oesophagus, stomach, small intestine, large intestine, rectum, anus, nutrient, absorb, incisors, canines, premolars, molars, enamel, decay, bacteria, producer, consumer, predator, prey, food chain
Working Scientifically Vocabulary	question, predict, observe, compare, classify, model, investigate, comparative test, variable, evidence, result, pattern, conclusion
Beach School & Outdoor Learning	Construct food chains using coastal plants and animals. Observe feeding behaviours in gulls, insects and other local wildlife. Compare shells, beaks and feeding structures as adaptations for obtaining food. Carry out an outdoor food-chain trail showing how energy and nutrients move through a habitat.
Greatstone & Local Links	Explore food chains involving coastal grasses, insects, worms, crabs, small fish and seabirds. Consider how litter, pollution or changes in habitat can affect feeding relationships. Compare the feeding structures of local birds and marine animals with human teeth.
Cross-Curricular Links	PSHE (oral hygiene and healthy choices), Design and Technology (healthy food), English (explanation texts), Mathematics (tables and comparative data), Geography (ecosystems), Computing (presenting food chains and enquiry results).
High Quality Texts	*Gut Garden*; *The Story of the Human Body*; *The Great Food Chain*; *Open Wide: What's Inside?*; age-appropriate texts about digestion and teeth.
Significant Scientists & STEM Careers	William Beaumont, Ivan Pavlov, Pierre Fauchard, dentist, dental hygienist, gastroenterologist, dietitian, zoologist, ecologist.
Memorable Hook	**The Greatstone Digestion Investigation Centre** – Pupils receive a mystery meal, dental X-rays and a damaged food-chain diagram. They become human biologists and ecologists tasked with discovering what happens to food after it enters the body and how animals depend on one another for survival.
Authentic Outcome	**Healthy Bodies and Coastal Food Chains Exhibition** – Pupils create interactive digestive-system models, tooth-care advice and local food-chain displays explaining how animals obtain and process food.
Assessment End Point	Pupils identify the different types of human teeth and explain their functions, describe how to care for teeth, name and explain the main parts of the digestive system and construct food chains identifying producers, predators and prey.

YEAR 4 AUTUMN 1 – 6 WEEK TEACHING SEQUENCE - Animals Including Humans – Teeth, Digestion and Food Chains

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	**Hook – The Greatstone Digestion**	Animals need food for energy, growth and repair. Teeth and	Ask questions, observe and use prior knowledge.	Examine a mystery meal, dental images and digestive-system clues. Generate questions about	Food images, dental X-rays, torso model,	Observe local animals feeding and generate questions about how	Prior knowledge assessment.	Revisit Year 3 nutrition without repeating the whole unit. Establish that digestion changes

	Investigation Centre	the digestive system help the body process food.		what happens to food inside the body.	organ cards, mystery evidence packs.	they obtain and process food.		food so nutrients can be absorbed.
2	**Types of Teeth and Their Functions**	Humans have incisors, canines, premolars and molars. Their shapes suit cutting, tearing, crushing and grinding.	Observe, compare and classify.	Examine tooth models and match tooth shape to function. Test tools that imitate different tooth actions on safe food substitutes.	Tooth models, mirrors, dental diagrams, tongs, scissors, mashers, soft modelling materials.	Compare bird beaks, shells and feeding structures with the functions of teeth.	Identify and explain the function of each tooth type.	Avoid suggesting that human canines are used in exactly the same way as those of carnivores. Focus on shape and function.
3	**Animal Teeth, Diet and Tooth Care**	Animals' teeth are linked to diet. Tooth decay can be reduced through brushing, limiting frequent sugary foods and visiting the dentist.	Compare, classify and carry out a comparative test.	Compare animal skulls or images, then investigate the effect of different liquids on eggshell as a model for enamel.	Skull images or replicas, diet cards, eggshells, cups, water, milk, sugary drinks, toothbrushes.	Classify local animals by feeding type and compare beaks or mouthparts.	Explain links between tooth structure, diet and tooth care.	State clearly that eggshell is only a model and is not identical to enamel. The investigation shows patterns, not real-time human tooth decay.
4	**The Journey of Food**	Food moves through the mouth, oesophagus, stomach, small intestine, large intestine, rectum and anus. Each part has a simple function.	Use models, sequence and explain.	Build a large digestive-system model and sequence organ cards. Use a practical model to represent chewing, stomach mixing and movement through the intestines.	Torso model, organ cards, zip bags, crackers or cereal, water, tights, trays, cups.	Complete a human-sized digestive journey trail outdoors.	Correctly sequence and explain the main digestive organs.	Ensure the practical model is described as a representation. Avoid teaching that digestion happens only in the stomach.
5	**Absorption and Waste**	Digested nutrients are absorbed mainly through the small intestine. Water is absorbed in the large intestine and remaining waste leaves the body.	Model, observe patterns and interpret evidence.	Use mesh, tubing or absorbent materials to model nutrient and water absorption. Annotate the digestive journey.	Mesh or tights, tubing, sponges, coloured water, digestive diagrams, labels.	Link digestion to the needs of active animals observed outdoors.	Explain where nutrients and water are absorbed and what happens to waste.	Keep explanations age appropriate. Avoid unnecessary detail about enzymes or cellular processes.
6	**Coastal Food Chains and Exhibition**	Food chains begin with producers and show feeding relationships. Consumers include predators and prey. Changes to one organism can affect the rest of the chain.	Construct, interpret, explain and communicate.	Build and compare several food chains, complete a missing-link challenge and create exhibition displays.	Organism cards, arrows, local habitat images, string, display materials.	Construct Greatstone coastal food chains and complete an outdoor food-chain trail.	End-point practical, oral and written assessment.	Ensure arrows show the direction of feeding or energy transfer from the food to the consumer. Use more than one example to avoid fixed misconceptions.

Whole Unit Resource List

Investigation Equipment

- Human torso or digestive-system model
- Tooth models
- Dental mirrors for supervised observation
- Animal skull replicas or clear photographs
- Hand lenses
- Sorting hoops
- Measuring cups
- Trays
- Zip-seal bags
- Mesh, tights or tubing for digestion models
- Clipboards
- Cameras or iPads

Consumables

- Tooth and organ labels
- Dental X-ray images
- Eggshells or hard-boiled eggs
- Water, milk and selected sugary or acidic drinks
- Toothbrushes
- Crackers, bread or cereal for modelling
- Plastic cups
- String
- Food-chain cards
- Large paper
- Sticky notes
- Recording sheets
- Display labels

Beach School Resources

- Wildlife identification guides
- Binoculars
- Bug viewers
- Shell and beak images
- Coastal organism cards
- String or rope for food-chain trails
- Nature journals
- Weatherproof clipboards
- Cameras

Adaptive Teaching

- Revisit Year 3 nutrition vocabulary before introducing digestion.
- Use real models, large diagrams and physical sequencing activities.
- Provide colour-coded tooth and digestive-organ labels.
- Use gesture and role play to represent cutting, tearing, grinding, mixing, absorbing and removing waste.
- Provide partially completed digestive-system diagrams and food-chain templates.
- Support scientific explanations with sentence stems such as **"The function of the ___ is…"** and **"The arrow points from ___ to ___ because…"**
- Allow pupils to demonstrate learning through models, oral explanation, labelled diagrams or practical classification.
- Reduce the number of digestive organs or food-chain organisms presented at one time where necessary.
- Challenge higher attainers to compare animal dentition, explain limitations of digestion models and predict the impact of changing one population in a food chain.

Health & Safety

- Check allergies and dietary requirements before using any food-related materials.
- Do not allow pupils to eat materials used in digestion investigations.
- Wash hands before and after handling food, eggshells or shared practical resources.
- Use hard-boiled eggs or cleaned eggshells rather than raw eggs where possible.
- Clean spillages immediately.
- Use mirrors carefully and avoid sharing items that contact the mouth.
- Ensure all dental observation is visual only; pupils should not place shared objects in their mouths.
- Supervise scissors, mashers and other tools used to model tooth functions.
- Dispose of food mixtures promptly and hygienically.
- Follow established Beach School risk assessments and avoid handling animal remains, unknown waste or unsafe beach debris.

Common Misconception	Teaching Response

All teeth perform the same job.	Compare tooth shapes and model cutting, tearing and grinding functions.
Humans have the same teeth as carnivores.	Compare human dentition with specialist carnivore and herbivore teeth.
Sugar instantly creates holes in teeth.	Explain that bacteria use sugars and produce acids that damage enamel over time.
Brushing alone means diet does not matter.	Reinforce the combined importance of brushing, sensible food choices and dental care.
Digestion happens only in the stomach.	Sequence the entire digestive system and explain each organ's contribution.
Food travels through the lungs or kidneys.	Use a body model to establish the correct route through the digestive tract.
Nutrients are absorbed in the stomach.	Explain that most absorption occurs in the small intestine.
The large intestine is larger because it is longer.	Clarify that it is wider but shorter than the small intestine.
Food chains show where animals live.	Explain that they show feeding relationships.
The arrow points towards what is eaten.	Model that the arrow points from the food to the animal that consumes it.
Every animal is either only a predator or only prey.	Use examples of animals that can be both, depending on the food chain.

Reflection Question	Purpose
How does the shape of each tooth help it perform its function?	Develop understanding of structure and function.
What evidence links an animal's teeth to its diet?	Encourage classification and reasoning from evidence.
What did the eggshell investigation suggest about protecting teeth?	Connect comparative-test evidence with oral-health choices while recognising the model's limitations.
Why does digestion involve more than the stomach?	Consolidate understanding of the complete digestive system.
Where are nutrients and water absorbed, and why are they important?	Reinforce the functions of the small and large intestines.
What does the direction of an arrow in a food chain show?	Secure accurate interpretation of feeding relationships.
What might happen if one organism disappeared from a coastal food chain?	Develop understanding of interdependence and environmental change.
How do teeth, digestion and food chains all contribute to survival?	Connect the unit's three scientific strands.
How can caring for our teeth help us remain healthy and resilient?	Link scientific knowledge to the **SURVIVORS** theme.
How has this learning helped answer our big question?	Consolidate understanding of how animals obtain, break down and depend upon food to survive.

YEAR 4 - Living Things and Their Habitats – Classification and Conservation – AUTUMN 2 AND SPRING 1

How can we classify living things and use scientific evidence to protect the habitats on which they depend?

Section	Overview
Curriculum Rationale	This extended unit develops pupils' understanding of the diversity of living things and the environments in which they survive. During Autumn 2, pupils investigate how organisms can be grouped according to shared characteristics. They classify plants and animals, distinguish between vertebrates and invertebrates and develop their ability to use and construct classification keys. During Spring 1, pupils apply this knowledge to investigate biodiversity, environmental change and conservation. They explore how natural processes and human activity can alter habitats and sometimes pose dangers to living things. Through Developing Experts enquiries, fieldwork and Beach School investigations, pupils observe, classify, survey, record data and use evidence to propose meaningful conservation actions.
The Greatstone Way	**SURVIVORS → EXPLORERS** – During Autumn 2, children investigate the characteristics that enable different organisms to survive within their environments. They recognise that living things depend upon suitable habitats and that environmental change can create challenges. During Spring 1, pupils become environmental explorers, gathering evidence about biodiversity around Greatstone and investigating how people can protect and improve habitats. They develop resilience, curiosity, collaboration and responsibility for the natural world.
National Curriculum Coverage	• 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.
Developing Experts Knowledge Progression	Pupils begin by revisiting the characteristics of living things and considering how organisms can be grouped in different ways. They classify animals and plants using observable features before learning to use and construct branching classification keys. Pupils then investigate biodiversity within local habitats, explore natural and human causes of environmental change and evaluate conservation strategies. The unit culminates in pupils using scientific evidence to propose and carry out an action that supports local biodiversity.
Curriculum Journey	**Previous Learning:** Year 2 – Living Things and Their Habitats, including living, dead and never alive, habitats, microhabitats, food chains and habitats around the world. **Current Learning:** Group and classify living things, use classification keys, investigate biodiversity and explain how environmental change affects organisms. **Next Learning:** Year 5 – Living Things and Their Habitats, including the life cycles and reproduction of plants and animals; Year 6 – classification using more detailed characteristics, adaptation and evolution.
Scientific Enquiry Question	**How can classification and fieldwork evidence help scientists understand and protect living things?**
Sticky Knowledge	Living things can be grouped according to shared characteristics. Animals can be divided into vertebrates and invertebrates. Vertebrates include mammals, birds, fish, amphibians and reptiles. Invertebrates can be grouped in several ways, including insects, arachnids, molluscs, annelids and crustaceans. Plants can be grouped as flowering or non-flowering plants. Classification keys use a sequence of questions to identify organisms. Biodiversity is the variety of living things found in an area. Environments can change naturally or because of human activity. Environmental change can benefit some organisms but endanger others. Conservation protects living things and their habitats.
Working Scientifically	Ask relevant questions. Make systematic observations. Identify and classify. Use and construct classification keys. Carry out fieldwork. Use quadrats and surveys. Gather, record and present data. Identify patterns. Use evidence to draw conclusions. Evaluate environmental change and conservation actions.
Scientific Knowledge & Skills	Group organisms using observable characteristics. Classify vertebrates and invertebrates. Group flowering and non-flowering plants. Use and create branching keys. Identify organisms in local habitats. Compare biodiversity between habitats. Explain natural and human environmental change. Evaluate and propose conservation actions.
Substantive Concepts	Living Things • Classification • Habitats • Biodiversity • Interdependence • Environmental Change • Conservation

Disciplinary Concepts	Observe • Compare • Classify • Survey • Record • Analyse • Interpret • Explain • Evaluate
Scientific Vocabulary	organism, living thing, classify, classification, characteristic, vertebrate, invertebrate, mammal, bird, fish, amphibian, reptile, insect, arachnid, mollusc, annelid, crustacean, flowering plant, non-flowering plant, classification key, branching key, habitat, biodiversity, environment, environmental change, conservation, endangered, extinct, pollution
Working Scientifically Vocabulary	question, observe, identify, classify, compare, key, survey, quadrat, sample, data, table, bar chart, evidence, pattern, result, conclusion, evaluate
Beach School & Outdoor Learning	Identify and classify plants and animals within the beach, dunes and school grounds. Construct classification keys for local organisms and natural specimens. Carry out repeated biodiversity surveys using quadrats, tally charts and photographic evidence. Investigate dune vegetation, coastal birds and invertebrates. Complete litter, pollution and habitat-condition surveys before planning practical conservation actions.
Greatstone & Local Links	Investigate biodiversity across Greatstone Beach, the dunes, school grounds and Romney Marsh. Classify coastal grasses, flowering plants, birds, insects, arachnids, molluscs, annelids and crustaceans. Explore how tourism, litter, pollution, trampling, erosion, flooding and changing weather conditions affect local habitats. Consider the role of dune vegetation and local conservation work in protecting the coastline and its wildlife.
Cross-Curricular Links	Geography (environments, fieldwork and coastal change), Mathematics (tally charts, tables and bar charts), English (reports and persuasive conservation proposals), Computing (data collection and presentation), Art (scientific illustration), PSHE (environmental responsibility and community action).
High Quality Texts	*The Lost Words*; *Wildlife in Your Garden*; *The Variety of Life*; *The Great Kapok Tree*; *One World*; age-appropriate identification guides and conservation texts.
Significant Scientists & STEM Careers	Carl Linnaeus, Maria Sibylla Merian, Rachel Carson, Jane Goodall, David Attenborough, taxonomist, ecologist, conservation scientist, marine biologist, environmental officer, wildlife ranger.
Memorable Hook	**The Greatstone Biodiversity Investigation** – Pupils receive reports of unidentified organisms and changes to habitats around Greatstone. They become environmental scientists responsible for classifying local wildlife, investigating habitat conditions and deciding what action is needed to protect biodiversity.
Authentic Outcome	**Greatstone Biodiversity and Conservation Action Plan** – Pupils create a local classification guide and biodiversity report before presenting an evidence-based conservation proposal. Where appropriate, they carry out a practical improvement such as creating wildlife shelters, planting approved native species or improving a school habitat.
Assessment End Point	Pupils group living things using observable characteristics, use and construct classification keys, classify common plants and animals, interpret biodiversity survey data and explain how environmental change may affect living things. They use scientific evidence to justify an appropriate conservation action.

YEAR 4 AUTUMN 2 AND SPRING 1 – 12-WEEK TEACHING SEQUENCE

Living Things and Their Habitats – Classification and Conservation -Part 1: Autumn 2 – Classification and Local Habitats

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	**Hook – The Greatstone Biodiversity Investigation**	Living things have characteristics that scientists use to identify and group them. Organisms may be grouped in different ways depending on the question being asked.	Ask relevant questions, observe closely and identify similarities and differences.	Examine mystery organism images, models and specimens. Devise possible groupings and justify the criteria used.	Organism photographs, models, safe specimens, magnifiers, sorting hoops and investigation packs.	Complete an initial biodiversity walk and photograph or record organisms found in different areas.	Assess prior understanding of habitats, animal groups and classification.	Emphasise that more than one grouping may be valid when the criteria are clear. Classification should be based on evidence rather than personal preference.
2	**Classifying Vertebrates**	Vertebrates have backbones. The five main vertebrate groups are mammals, birds, fish, amphibians and reptiles, each with distinguishing characteristics.	Compare, classify and record evidence in tables.	Classify vertebrate images using body covering, reproduction, breathing and habitat information.	Vertebrate cards, skeleton images, classification tables and reference materials.	Observe and classify local birds and other vertebrates using identification guides.	Pupils classify unfamiliar vertebrates and justify decisions using characteristics.	Avoid relying on habitat alone. For example, not every animal living in water is a fish. Use clear exceptions to test reasoning.
3	**Classifying Invertebrates**	Invertebrates do not have backbones. Major groups include insects, arachnids, molluscs, annelids and crustaceans. Different groups have distinctive body structures.	Observe carefully, identify patterns and classify.	Use magnifiers and photographs to compare body segments, legs, shells and other observable characteristics.	Bug viewers, magnifiers, replica specimens, photographs and classification mats.	Conduct a carefully supervised invertebrate survey in microhabitats, returning organisms safely.	Accurate classification based on body structure.	Do not imply that all invertebrates are insects. Teach a manageable number of contrasting groups using local examples.
4	**Classifying Plants**	Plants can be grouped in different ways. Flowering plants produce flowers and seeds; non-flowering plants include mosses and ferns. Trees can also be grouped as deciduous or evergreen.	Observe, compare, classify and make labelled drawings.	Examine a range of leaves and plant photographs. Group plants using observable characteristics and construct a simple plant classification table.	Plant samples, photographs, hand lenses, leaf guides and sorting trays.	Identify flowering and non-flowering plants and compare deciduous and evergreen species.	Pupils explain the criteria used to classify selected plants.	Avoid using only flowers, as plants may not be flowering during the visit. Use leaves, stems and reproductive structures where visible.
5	**Using Classification Keys**	A classification key uses a sequence of questions with two possible answers to identify an organism. Questions must refer to clear, observable characteristics.	Use branching keys, interpret information and check identifications.	Follow prepared keys to identify familiar and unfamiliar plants, animals or invented organisms.	Published keys, organism cards, specimens, whiteboards and key templates.	Use a simple field key to identify selected local plants, shells or invertebrates.	Pupils identify organisms accurately and explain their route through the key.	Model precise questions. Avoid subjective criteria such as “Is it beautiful?” or temporary features such as “Is it moving?”
6	**Creating a Greatstone Classification Guide**	Effective classification keys separate organisms systematically using increasingly specific characteristics.	Construct, test, refine and communicate a classification key.	Create and peer-test a branching key for a collection of local organisms or safe beach finds.	Local organism cards, shell photographs, branching-key templates and presentation materials.	Test classification keys using organisms or photographic records from fieldwork.	Mid-unit assessment: create and explain an accurate classification key.	Require pupils to test their key with another group and revise questions where organisms cannot be identified reliably.

Part 2: Spring 1 – Environmental Change and Conservation

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
7	**What Is Biodiversity?**	Biodiversity is the variety of living things within an area. Different habitats support different communities of organisms.	Plan and conduct surveys, sample using quadrats and record data systematically.	Compare the variety and abundance of organisms in two school habitats using the same survey method.	Quadrats, tally sheets, identification guides, clipboards and cameras.	Compare biodiversity in selected dune, grass, shingle or sheltered habitats where access is safe.	Pupils interpret survey evidence and explain which habitat appeared more biodiverse.	Explain that a short survey provides a sample rather than a complete count. Keep sampling methods consistent across locations.
8	**How Environments Change Naturally**	Environments change through seasonal variation, weather, erosion, flooding, succession and other natural processes. These changes can benefit some organisms and disadvantage others.	Observe change over time, compare evidence and identify patterns.	Compare photographs, maps or field observations of a habitat at different times. Identify changes and possible natural causes.	Before-and-after images, maps, seasonal records, weather data and observation sheets.	Observe evidence of wind, tides, erosion, deposition and seasonal change along the coast.	Explain a natural environmental change and its possible effects on organisms.	Avoid presenting every environmental change as harmful. Some species benefit while others may lose resources or shelter.
9	**Human Impact on Habitats**	Human activity can change habitats through pollution, litter, land development, trampling, resource use and habitat destruction. Human actions can also improve habitats.	Gather and classify evidence, record data and draw conclusions.	Complete a school or local environmental-impact survey, categorising evidence as positive or negative.	Survey sheets, maps, photographs, tally charts, gloves and litter-picking equipment.	Conduct a beach-litter or trampling survey without handling unsafe materials.	Use survey findings to explain how people affect a local habitat.	Maintain a balanced approach. Include habitat restoration, responsible access, waste reduction and conservation alongside negative impacts.
10	**When Living Things Are in Danger**	Environmental change can reduce food, water, shelter and breeding sites. Species may become endangered, while extinct species no longer exist.	Use secondary sources, interpret evidence and explain cause and effect.	Investigate local and global species case studies and construct cause-and-effect diagrams.	Species case-study cards, habitat maps, population information and research materials.	Explore the needs of selected protected coastal birds, plants or other locally relevant species.	Explain how habitat change can endanger a species using evidence.	Keep the focus on habitats and environmental change rather than introducing detailed evolution. Clearly distinguish endangered from extinct.
11	**Conservation in Action**	Conservation involves protecting, restoring and managing habitats and species. Actions should respond to evidence about what a habitat needs.	Compare solutions, evaluate evidence and plan an intervention.	Evaluate possible actions such as native planting, reducing disturbance, creating shelters, improving waste management or supplying suitable resources.	Conservation case studies, design materials, site plans, natural materials and evaluation criteria.	Audit an agreed area and design a realistic conservation improvement for Greatstone or the school grounds.	Justify a conservation action using biodiversity and habitat evidence.	Avoid token actions that do not meet a genuine habitat need. Check proposals against site management, safeguarding and ecological guidance.
12	**Greatstone Conservation Conference and Action**	Scientists use classification, survey data and environmental evidence to make conservation decisions. Conservation actions should be monitored to evaluate their impact.	Present findings, justify conclusions, evaluate limitations and ask further questions.	Produce and present a classification guide, biodiversity report and conservation proposal. Carry out an approved practical action where appropriate.	Survey data, keys, charts, reports, display materials and approved conservation resources.	Present findings outdoors or complete an agreed habitat improvement activity.	Summative assessment through the report, presentation and individual scientific explanation.	Assess the accuracy of classification, interpretation of evidence and strength of justification. Establish how the conservation action could be monitored over time.

Whole Unit Resource List

Investigation Equipment

- Hand lenses and magnifying glasses
- Bug viewers
- Quadrats
- Binoculars
- Clipboards
- Cameras or iPads
- Sorting hoops and trays
- Identification guides
- Classification keys
- Measuring tapes
- Thermometers, where habitat conditions are compared
- Light meters or simple light-level apps, where available
- Collection trays for safe, non-living specimens

Consumables

- Plant and animal classification cards
- Vertebrate and invertebrate sorting resources
- Flowering and non-flowering plant cards
- Branching-key templates
- Biodiversity tally sheets
- Quadrat recording sheets
- Habitat maps
- Environmental-impact survey forms
- Species case-study cards
- Graph paper
- Large presentation paper
- Labels and sticky notes
- String and markers
- Approved native seeds or habitat materials, where appropriate

Beach School Resources

- Weatherproof clipboards
- Local wildlife and plant identification guides
- Binoculars
- Bug viewers
- Quadrats
- Nature journals
- Cameras
- Gloves
- Litter pickers and buckets
- Boundary markers
- Shell and coastal-organism identification cards
- Approved conservation materials

Adaptive Teaching

- Begin with direct observation and familiar organisms before introducing formal classification terminology.
- Use clear photographs, models and safe specimens alongside written descriptions.
- Colour-code the main vertebrate, invertebrate and plant groups.
- Provide classification mats listing key observable characteristics.
- Model branching keys physically, with pupils following different routes around the room.
- Offer partially completed keys before pupils construct their own independently.

- Use symbol-supported fieldwork sheets and reduce the number of organisms where needed.
- Allocate clear group roles during surveys, such as identifier, counter, recorder and photographer.
- Allow pupils to record through annotated photographs, diagrams, oral explanations or short written conclusions.
- Provide sentence stems such as **"I classified this organism as… because…"** and **"The evidence suggests this habitat…"**
- Revisit the same organisms across several lessons to strengthen vocabulary and retrieval.
- Challenge higher attainers to refine ambiguous classification questions, identify limitations in survey methods and compare the likely effectiveness of different conservation strategies.

Health & Safety

- Complete site-specific risk assessments before school-ground or Beach School fieldwork.
- Check weather, tides and beach conditions before coastal investigations.
- Establish clear boundaries and adult supervision arrangements.
- Do not allow pupils to touch unknown plants, fungi, animal remains or hazardous beach debris.
- Use photographs rather than collecting protected, living or potentially unsafe organisms.
- Handle living invertebrates for the shortest possible time and return them carefully to the exact habitat in which they were found.
- Replace logs, stones and leaf litter gently after observation.
- Wash hands after handling soil, plants, shells or investigation equipment.
- Wear gloves and use litter pickers during litter surveys.
- Do not allow pupils to pick up glass, metal, needles, animal waste or unidentified objects.
- Check conservation materials and plants for toxicity, allergens and ecological suitability.
- Obtain relevant approval before planting, constructing habitats or altering any school or coastal area.
- Avoid disturbing nests, burrows, dune vegetation or protected habitats

Common Misconception	Teaching Response
Living things can only be grouped in one correct way.	Demonstrate that classifications may vary according to purpose, while the criteria used must remain clear and scientifically valid.
Every animal without visible bones is an invertebrate with an exoskeleton.	Compare insects and crustaceans with worms, slugs and jellyfish to show that not all invertebrates have hard external skeletons.
Every animal living in water is a fish.	Compare fish with mammals, reptiles, birds, amphibians and invertebrates that also use aquatic habitats.
Spiders are insects.	Compare numbers of legs, body sections and antennae in insects and arachnids.
Every green organism is a plant.	Use age-appropriate examples to show that colour alone is not a reliable classification characteristic.
Classification keys describe every feature of an organism.	Explain that keys use selected characteristics to distinguish one organism from another.
Biodiversity means the total number of individual organisms.	Clarify that biodiversity concerns the variety of different living things, not simply abundance.
A habitat with the most organisms is automatically the healthiest.	Consider species variety, habitat quality and the limitations of a short survey.
Environmental change is always caused by humans.	Compare seasonal change, storms, erosion and flooding with pollution, development and trampling.
Environmental change affects every organism in the same way.	Use examples showing that some organisms benefit while others are disadvantaged.
Endangered and extinct mean the same thing.	Reinforce that endangered species still survive but are at risk, whereas extinct species no longer exist.
Conservation means preventing all change.	Explain that conservation may involve managing change, restoring habitats and balancing the needs of wildlife and people.
Any bug hotel, bird feeder or planting project will improve biodiversity.	Require pupils to identify a genuine habitat need and select an appropriate, safe response.

Reflection Question	Purpose
Which characteristics were most useful when grouping the organisms?	Develop classification based on relevant, observable evidence.
Could the same organisms be grouped in another scientifically valid way?	Reinforce that classification depends on clearly stated criteria and purpose.
What evidence shows that an animal is a vertebrate or an invertebrate?	Consolidate understanding of body structure and scientific justification.
Why was one question in your classification key more effective than another?	Encourage evaluation of clarity, objectivity and usefulness.
How did testing your key help you improve it?	Develop refinement and evaluation within scientific enquiry.
What did the biodiversity survey reveal about the habitats we studied?	Encourage interpretation of fieldwork data rather than simple data collection.
What were the limitations of our survey?	Develop understanding of sampling, reliability and the effect of time and conditions.
Which environmental changes were natural and which were caused by people?	Strengthen cause-and-effect reasoning.
How might the same environmental change benefit one organism but endanger another?	Develop understanding of complex habitat relationships.
Which conservation action is best supported by our evidence?	Promote evidence-based environmental decision-making.
How could we find out whether our conservation action has been successful?	Introduce monitoring and evaluation over time.
How do living things survive when their environments change?	Connect scientific knowledge with the **SURVIVORS** theme.
How did fieldwork help us explore questions that could not be answered in the classroom alone?	Connect practical enquiry with the **EXPLORERS** theme.
How has this learning helped answer our big question?	Consolidate understanding that classification helps scientists recognise biodiversity and that fieldwork evidence supports effective habitat conservation.

YEAR 4 - States of Matter – SPRING 2

How can materials change state, and how does the water cycle depend on these changes?

Section	Overview
Curriculum Rationale	This unit develops pupils' understanding of materials by introducing solids, liquids and gases as states of matter. Building on Key Stage 1 work about everyday materials and Year 3 investigations into rocks, pupils compare and group materials according to their state and use a simple particle model to explain their properties. They investigate how heating and cooling can cause materials to melt, freeze, evaporate and condense, and learn that different substances change state at different temperatures. Pupils then apply this knowledge to explain the water cycle. Through Developing Experts enquiries, pupils observe changes over time, measure temperature, carry out comparative tests, record data and use evidence to explain reversible changes.
The Greatstone Way	**EXPLORERS** → **INVENTORS** – Children explore materials that may look familiar but behave in surprising ways. They investigate changes of state through careful observation, measurement and model-making before applying their learning to explain natural processes such as evaporation, condensation, clouds and rainfall. Beach School provides authentic opportunities to investigate water, temperature, drying and the movement of water through the coastal environment.

National Curriculum Coverage	• 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. • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.
Developing Experts Knowledge Progression	Pupils begin by comparing solids, liquids and gases using observable properties and a simple particle model. They investigate melting and freezing before exploring evaporation and condensation. Pupils measure temperature and consider why different materials change state at different temperatures. They then investigate factors affecting evaporation and apply their understanding to construct and explain the water cycle.
Curriculum Journey	**Previous Learning:** Year 1 – Everyday Materials; Year 2 – Uses of Everyday Materials; Year 3 – Rocks and material properties. **Current Learning:** Solids, liquids and gases; heating and cooling; melting, freezing, evaporation, condensation and the water cycle. **Next Learning:** Year 5 – Properties and Changes of Materials, including dissolving, separation and reversible and irreversible changes.
Scientific Enquiry Question	**How can observations, measurements and models help us explain changes between solids, liquids and gases?**
Sticky Knowledge	Materials can be solids, liquids or gases. Solids keep their shape and volume. Liquids keep their volume but take the shape of their container. Gases spread out to fill the available space. Heating can cause melting and evaporation. Cooling can cause condensation and freezing. The melting point of ice and freezing point of water is 0°C under normal conditions. Water boils at approximately 100°C under normal conditions. Evaporation can happen below boiling point and occurs more quickly when temperature is higher. The water cycle involves evaporation, condensation, precipitation and collection.
Working Scientifically	Ask relevant questions. Make predictions. Set up comparative and fair tests. Observe changes over time. Measure temperature accurately. Record data in tables and graphs. Identify patterns. Use models. Draw evidence-based conclusions.
Scientific Knowledge & Skills	Classify materials as solids, liquids or gases. Describe their properties using a particle model. Explain melting, freezing, evaporation and condensation. Measure temperature in degrees Celsius. Investigate factors affecting evaporation. Explain the water cycle using changes of state.
Substantive Concepts	Materials • States of Matter • Particles • Temperature • Change • Water Cycle
Disciplinary Concepts	Observe • Compare • Classify • Measure • Test • Model • Record • Explain • Conclude
Scientific Vocabulary	state of matter, solid, liquid, gas, particle, material, property, volume, shape, flow, compress, temperature, degrees Celsius, thermometer, heat, cool, melting, melting point, freezing, freezing point, evaporation, condensation, boiling, boiling point, water vapour, precipitation, collection, water cycle
Working Scientifically Vocabulary	question, predict, variable, fair test, comparative test, observe, measure, temperature, data, table, line graph, pattern, evidence, result, conclusion, evaluate
Beach School & Outdoor Learning	Identify examples of solids, liquids and gases within the coastal environment. Investigate puddles and wet surfaces drying over time. Compare evaporation in sunny, shaded, sheltered and exposed locations. Observe condensation on cold containers outdoors. Explore where water collects and how it moves through sand, soil, drains and the wider coastal environment.
Greatstone & Local Links	Investigate the sea as liquid water, water vapour in the air and ice or frost as solid water. Explore how sunlight, wind and temperature affect drying at Greatstone Beach. Consider the role of evaporation, cloud formation and rainfall within the coastal water cycle and Romney Marsh environment.
Cross-Curricular Links	Geography (weather, climate and the water cycle), Mathematics (temperature, tables and line graphs), English (scientific explanations), Computing (data logging and presentation), Design and Technology (insulation and material choice), Art (water-cycle models and diagrams).
High Quality Texts	*Once Upon a Raindrop*; *The Rhythm of the Rain*; *Water Is Water*; *A Drop in the Ocean*; age-appropriate texts about materials, weather and the water cycle.
Significant Scientists & STEM Careers	Anders Celsius, Daniel Fahrenheit, John Dalton, meteorologist, materials scientist, hydrologist, environmental scientist, chemical engineer, water-treatment engineer.
Memorable Hook	**The Greatstone Matter Mystery Laboratory** – Pupils receive ice, water, balloons, sealed containers and photographs of changing coastal conditions. They become materials scientists responsible for explaining how the same substance can appear in different states and how water moves through the environment.
Authentic Outcome	**Greatstone Water and Weather Laboratory** – Pupils create interactive models and scientific explanations demonstrating the three states of matter, changes of state and the coastal water cycle. They present findings from evaporation and temperature investigations.
Assessment End Point	Pupils classify materials as solids, liquids or gases and explain their properties using a simple particle model. They describe melting, freezing, evaporation and condensation, interpret temperature data, explain how temperature affects evaporation and apply their understanding to the water cycle.

YEAR 4 SPRING 2 – 6-WEEK TEACHING SEQUENCE - States of Matter

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	**Hook – The Greatstone Matter Mystery Laboratory**	Materials can be grouped as solids, liquids or gases according to their properties. Some materials are more difficult to classify than others.	Ask questions, observe, compare and classify.	Investigate mystery materials and sort them as solids, liquids or gases, justifying each decision.	Ice, water, balloons, sealed syringes, containers, sand, flour, gel, photographs and sorting hoops.	Identify solids, liquids and gases within the coastal environment.	Assess prior knowledge and pupils' ability to justify classifications.	Granular solids such as sand and flour can be poured but remain solids because each grain retains its shape. Use sealed containers for gases because most gases cannot be seen directly.
2	**How Do Solids, Liquids and Gases Behave?**	Solids keep their shape and volume. Liquids keep their volume but change shape to	Make systematic observations, use	Compare how solids, liquids and air behave in containers. Use sealed syringes to compare	Containers of different shapes, water, blocks, balloons, sealed	Compare the behaviour of dry sand, wet sand,	Explain differences using both observable	The particle model is a representation. Pupils should not conclude that particles

		fit a container. Gases spread out to fill the available space and can be compressed more easily.	models and compare properties.	compressibility and role-play particle arrangements.	syringes and particle cards.	seawater and air-filled objects.	properties and a simple particle model.	change size when a material changes state.
3	**Melting and Freezing**	Heating can cause a solid to melt into a liquid. Cooling can cause a liquid to freeze into a solid. Different materials have different melting points.	Predict, measure temperature, observe over time and record data.	Measure the temperature of melting ice and compare how selected safe solids soften or melt when warmed. Observe water freezing through prepared time-lapse evidence or a teacher-led demonstration.	Ice, thermometers, insulated cups, timers, chocolate or butter in sealed containers, water and recording tables.	Observe frost or ice where seasonally available, or investigate how ice melts in different outdoor locations.	Interpret a temperature record and explain melting and freezing as changes of state.	Avoid direct pupil use of boiling water. Ice may remain at approximately 0°C while melting. Do not assume every solid melts safely within classroom temperatures.
4	**Evaporation and Condensation**	Evaporation changes a liquid into a gas at the surface and can happen below boiling point. Condensation changes a gas into a liquid when water vapour cools.	Observe changes over time, compare, measure and explain.	Compare water loss from identical containers in different conditions. Observe condensation forming on the outside of a cold container.	Identical shallow containers, measured water, balances or measuring cylinders, cold cans or cups, ice and recording sheets.	Compare wet materials drying in sunny, shaded, sheltered and exposed areas.	Explain evaporation and condensation using evidence from observations.	Water on the outside of a cold container comes from water vapour in the surrounding air, not from water leaking through the container.
5	**What Affects the Rate of Evaporation?**	Evaporation occurs more quickly at higher temperatures. Surface area and air movement can also affect the rate, but one variable should be investigated at a time.	Plan and conduct a fair test, control variables, measure and identify patterns.	Investigate how temperature affects evaporation using equal volumes of water in safely controlled warmer and cooler locations. Record changes in volume or mass.	Identical containers, measuring cylinders, balances where available, thermometers, timers and fair-test planning sheets.	Compare evaporation in warmer and cooler or exposed and sheltered locations, while keeping the chosen test focused on one variable.	Draw an evidence-based conclusion and evaluate the fairness of the test.	The National Curriculum emphasis is the link between evaporation rate and temperature. Surface area or airflow may be explored separately, but not changed simultaneously.
6	**The Water Cycle and Greatstone Water Laboratory**	The water cycle is driven by the Sun. Water evaporates, condenses into clouds, falls as precipitation and collects before the cycle repeats. Water changes state but is continually recycled.	Apply knowledge, construct models, interpret evidence and communicate conclusions.	Construct a working water-cycle model or sealed water-cycle bag and present an explanation linking each stage to a change of state.	Clear bags or containers, water, lamps where appropriate, ice, water-cycle cards, diagrams and display materials.	Trace how water may evaporate from the sea, form clouds, fall as precipitation and collect around Greatstone and Romney Marsh.	End-point practical, oral and written assessment.	Clouds are made of tiny liquid water droplets or ice crystals, not invisible water vapour. Avoid implying that water follows one simple circular route at a fixed speed.

Whole Unit Resource List

Investigation Equipment

- Thermometers
- Measuring cylinders and jugs
- Digital balances, where available
- Timers and stopwatches
- Identical shallow containers
- Containers of different shapes
- Transparent cups and jars
- Sealed syringes without needles
- Balloons
- Insulated cups
- Ice trays
- Clipboards
- Cameras or iPads
- Data loggers, where available

Consumables

- Ice
- Water
- Balloons
- Sand
- Flour or salt
- Gel or other difficult-to-classify materials
- Chocolate or butter in sealed containers
- Clear plastic bags
- Paper towels or fabric squares
- Particle-model cards
- Recording tables
- Graph paper
- Water-cycle cards
- Large display paper
- Labels and sticky notes

Beach School Resources

- Weatherproof clipboards
- Thermometers
- Measuring cylinders
- Identical trays or containers
- Fabric squares for drying investigations
- Chalk or boundary markers
- Timers
- Cameras
- Weather observation sheets
- Simple weather instruments

Adaptive Teaching

- Begin with observable properties before introducing the particle model.
- Use real materials, transparent containers and physical demonstrations.
- Represent particles with counters, pupils or large visual cards.
- Use consistent diagrams for solids, liquids and gases.
- Provide classification prompts such as **shape**, **volume**, **flow** and **fills its container**.
- Pre-teach changes-of-state vocabulary using paired opposites: **melt–freeze** and **evaporate–condense**.
- Use sequencing cards and arrows to support explanations of reversible changes.
- Provide partially completed tables, graphs and water-cycle diagrams where needed.
- Allow pupils to record through annotated diagrams, photographs, oral explanations or practical demonstrations.
- Assign structured group roles during investigations, including thermometer reader, timer, recorder and equipment manager.
- Challenge higher attainers to explain anomalies, evaluate limitations of particle models and distinguish boiling from evaporation using evidence.

Health & Safety

- Do not allow pupils to handle boiling water or exposed heating elements.
- Use teacher-prepared warm water and safe indirect heating methods where warming is required.
- Check the temperature of all materials before pupil handling.
- Keep electrical equipment and lamps away from water.
- Supervise the use of thermometers and check for damage before and after use.
- Use spirit-free or digital thermometers rather than mercury thermometers.
- Clean water spillages immediately to prevent slips.
- Check allergies before using foods such as chocolate or butter and do not allow pupils to eat investigation materials.
- Ensure balloons are used under supervision and consider latex allergies.

- Do not seal or heat rigid containers in ways that allow pressure to build.
- Use syringes without needles and prevent pupils from directing compressed air towards faces.
- Follow established Beach School risk assessments and ensure pupils wear suitable clothing for outdoor temperature investigations.

Common Misconception	Teaching Response
Any material that can be poured is a liquid.	Compare water with sand, flour or rice and show that each solid particle keeps its own shape.
Soft solids are liquids.	Compare gel, sponge, clay and fabric with liquids using shape and volume criteria.
Gases have no mass and are “nothing.”	Use an inflated and uninflated balloon comparison to show that air occupies space and adds mass.
Gas particles float only at the top of a container.	Model gas particles spreading throughout all available space.
Particles in solids do not move at all.	Explain simply that particles vibrate in fixed positions.
Particles themselves melt or expand into liquid particles.	Reinforce that the same particles are rearranged and move differently; they do not change identity or size.
Ice is a different substance from water.	Demonstrate reversible changes between solid water and liquid water.
Melting and dissolving are the same process.	Compare ice melting with salt dissolving and clarify that dissolving forms a solution rather than a new state of the solute.
Evaporation only happens when water boils.	Observe water evaporating at ordinary temperatures.
Water disappears during evaporation.	Explain that liquid water becomes invisible water vapour in the air.
Condensation comes from inside a cold container.	Use a sealed cold container to show that water vapour from the air condenses on its outside surface.
Clouds are made from water vapour.	Explain that clouds are visible because they contain tiny liquid droplets or ice crystals.
The water cycle has a fixed beginning and end.	Present it as a continuous set of connected processes with multiple possible pathways.

Reflection Question	Purpose
Which properties helped you decide whether a material was a solid, liquid or gas?	Develop evidence-based classification using shape, volume and behaviour.
Why is sand a solid even though it can be poured?	Address the distinction between granular solids and liquids.
How did the syringe investigation show a difference between liquids and gases?	Reinforce differences in compressibility and particle spacing.
What evidence showed that melting and freezing are reversible changes?	Develop understanding that the same material can change state and change back.
How is evaporation different from boiling?	Secure understanding that evaporation occurs at the surface and below boiling point.
Where did the water on the outside of the cold container come from?	Address the key misconception about condensation.
What did you change, measure and keep the same in the evaporation test?	Consolidate fair-testing skills and variable control.
What pattern did you find between temperature and evaporation?	Require interpretation of data rather than recall.
How do evaporation and condensation connect the sea, clouds and rainfall around Greatstone?	Apply changes of state to the local coastal water cycle.
How useful was the particle model for explaining what happened?	Encourage evaluation of scientific models.
How did curiosity help you investigate materials that behaved unexpectedly?	Connect enquiry with the **EXPLORERS** theme.
How could understanding changes of state help people invent useful technologies?	Connect scientific knowledge with the **INVENTORS** theme.
How has this learning helped answer our big question?	Consolidate understanding that heating and cooling cause changes between states and that evaporation and condensation drive the water cycle.

YEAR 4 - Sound – SUMMER 1

How are sounds made, how do they travel, and how can we use sound to improve our world?

Section	Overview
Curriculum Rationale	This unit develops pupils' understanding of sound by investigating how vibrations create sounds and how these vibrations travel through solids, liquids and gases to reach our ears. Building on children's everyday experiences of hearing, pupils investigate how sounds are produced using a range of instruments before exploring pitch and volume through practical enquiry. They discover how distance affects the sounds we hear and investigate ways of reducing or increasing sound. Through Developing Experts enquiries, pupils ask scientific questions, carry out comparative investigations, measure, observe patterns and use evidence to explain how sound behaves.
The Greatstone Way	**PROTECTORS → LEGACY** – Children become acoustic scientists exploring how sound connects people with the world around them. Through Beach School they investigate natural and human-made sounds around Greatstone, exploring how sound helps animals survive and how people can protect their hearing. Pupils consider how scientific understanding of sound has led to inventions that improve communication, safety and quality of life.
National Curriculum Coverage	• 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.
Developing Experts Knowledge Progression	Pupils begin by investigating how sounds are produced through vibration before exploring how vibrations travel through solids, liquids and gases. They investigate how pitch changes with the size and tension of vibrating objects before exploring how volume depends upon vibration strength. Finally, pupils investigate how distance affects sound and apply their understanding to solve real-world problems involving communication and noise reduction.
Curriculum Journey	**Previous Learning:** EYFS – listening and responding to sounds; Year 1 – identifying sounds using the senses; Year 2 – observing everyday materials and movement. **Current Learning:** Vibrations, sound travel, pitch, volume and hearing. **Next Learning:** Year 6 – Light and Electricity (energy transfer) and KS3 – sound waves, frequency and amplitude.
Scientific Enquiry Question	**How can we investigate vibrations to explain how sounds are produced and heard?**

Sticky Knowledge	Sounds are produced when objects vibrate. Vibrations travel through solids, liquids and gases to our ears. Sound cannot travel through a vacuum. The size, length and tension of vibrating objects affect pitch. Stronger vibrations produce louder sounds. Sounds become quieter as the distance from the sound source increases. Ears detect vibrations and send signals to the brain. Excessively loud sounds can damage hearing.
Working Scientifically	Ask questions. Make predictions. Observe carefully. Carry out comparative and fair tests. Measure. Record data. Identify patterns. Draw conclusions using evidence.
Scientific Knowledge & Skills	Explain how sounds are made. Identify vibrations. Describe how sound travels. Investigate pitch and volume. Explain how distance affects sound. Apply understanding to solve practical problems.
Substantive Concepts	Sound • Vibrations • Energy • Hearing • Pitch • Volume
Disciplinary Concepts	Observe • Compare • Measure • Test • Record • Identify Patterns • Explain • Conclude
Scientific Vocabulary	sound, vibration, vibrate, sound source, medium, solid, liquid, gas, ear, eardrum, pitch, high pitch, low pitch, volume, loud, quiet, distance, absorb, insulation
Working Scientifically Vocabulary	observe, compare, predict, investigate, fair test, variable, measure, evidence, result, pattern, conclusion, evaluate
Beach School & Outdoor Learning	Complete sound walks to identify natural and human-made sounds. Compare sounds travelling across open beach, dunes and woodland. Investigate echoes where appropriate. Explore how coastal birds use sound to communicate. Measure how sound changes over distance and investigate materials that absorb or reflect sound.
Greatstone & Local Links	Investigate waves crashing on the beach, seabird calls, wind through dune grasses and traffic sounds around Greatstone. Explore why lifeboats, warning sirens, foghorns and emergency services rely on sound. Consider how excessive visitor noise affects wildlife along the coastline.
Cross-Curricular Links	Music (pitch, rhythm and instruments), Mathematics (measuring distance and recording data), English (scientific explanations), Design Technology (soundproofing investigations), Computing (data logging and sound recording).
High Quality Texts	*Oscar and the Bat*; *The Listening Walk*; *See Inside How Things Work*; *The Story of Sound*; age-appropriate texts about hearing and sound.
Significant Scientists & STEM Careers	Alexander Graham Bell, Thomas Edison, Robert Boyle, acoustic engineer, audiologist, sound engineer, hearing scientist, music technician.
Memorable Hook	**The Greatstone Sound Laboratory** – Pupils receive mysterious recordings from around Greatstone and become acoustic scientists investigating how the sounds were made, how they travelled and why some are louder or higher than others.
Authentic Outcome	**Greatstone Sound Science Museum** – Pupils design interactive investigations and demonstrations explaining vibrations, pitch, volume and hearing. They present practical solutions for reducing unwanted noise or improving communication around the school and local community.
Assessment End Point	Pupils explain that sounds are produced by vibrations, describe how sound travels through a medium, explain how pitch and volume change, investigate how distance affects sound and use scientific evidence to explain their conclusions.

YEAR 4 SUMMER 1 – 6 WEEK TEACHING SEQUENCE - Sound

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	**Hook – The Greatstone Sound Laboratory**	Sounds are produced when objects vibrate. Vibrations are the source of all sounds.	Ask questions, observe and identify evidence.	Investigate mystery sound makers and identify the vibrating part of each object. Observe vibrating rulers, drums and elastic bands.	Tuning forks, drums, rulers, elastic bands, instruments, speakers.	Complete a sound walk identifying natural and human-made sounds.	Prior knowledge assessment.	Emphasise that vibration is movement backwards and forwards very quickly.
2	**How Does Sound Travel?**	Vibrations travel through solids, liquids and gases before reaching our ears. Sound cannot travel without a medium.	Observe, compare and explain.	Investigate string telephones and compare sound travelling through solids and air.	String telephones, cups, tuning forks, water trays.	Compare sounds heard across the beach and through fences or benches.	Explain how sound travels.	Avoid describing sound as a physical object moving through the air. Focus on vibrations travelling through a medium.
3	**Investigating Pitch**	Pitch depends on how quickly an object vibrates. Smaller, shorter or tighter vibrating objects usually produce higher pitches.	Carry out comparative tests.	Investigate pitch using elastic bands, pan pipes or water-filled bottles.	Elastic bands, boxes, bottles, water, rulers.	Compare bird calls of different pitches.	Explain pitch changes.	Avoid using "loud" when discussing pitch.
4	**Investigating Volume**	Louder sounds are produced by stronger vibrations.	Measure and compare.	Investigate loudness using drums, shakers and elastic bands.	Drums, tuning forks, sound meters (if available).	Compare natural and human-made sound levels.	Explain patterns.	Distinguish clearly between pitch and volume.
5	**How Does Distance Affect Sound?**	Sounds become quieter as distance from the source increases.	Measure and identify patterns.	Outdoor investigation measuring hearing distance.	Measuring tapes, sound makers, recording sheets.	Measure how seabird or whistle sounds change with distance.	Record evidence accurately.	Consider background noise during investigations.
6	**Protecting Hearing and Solving Sound Problems**	Sound is useful but excessive noise can damage hearing. Scientific knowledge can solve sound problems.	Plan, evaluate and communicate.	Investigate soundproofing materials and present findings.	Foam, fabric, cardboard, felt, boxes.	Investigate natural materials that absorb sound.	End-point assessment.	Link investigations to real-world applications including classrooms, theatres and wildlife habitats.

Whole Unit Resource List

Investigation Equipment

- Tuning forks
- Drums
- Tambourines
- Elastic bands
- Rulers
- Plastic cups
- String
- Measuring tapes
- Thermometers (for outdoor conditions if required)
- Sound meter (if available)
- Clipboards
- Cameras or iPads

Consumables

- Cardboard boxes
- Foam
- Felt
- Cotton wool
- Fabric samples
- Plastic bottles
- Water
- Recording sheets
- Labels
- Large paper

Beach School Resources

- Nature journals
- Sound recording devices
- Measuring tapes
- Weatherproof clipboards
- Identification guides for birds
- Wind socks
- Cameras

Adaptive Teaching

- Begin with visible vibrations before discussing invisible sound travel.
- Allow pupils to feel vibrations using tuning forks, drums and elastic bands.
- Use diagrams and models to illustrate sound travelling through different materials.
- Introduce pitch and volume separately before comparing them.
- Provide structured investigation tables and sentence stems.
- Use paired discussion before written explanations.
- Allow pupils to record findings using photographs, diagrams or oral presentations.
- Challenge higher attainers to evaluate investigation reliability, identify variables and explain why sound cannot travel through a vacuum.

Health & Safety

- Avoid producing excessively loud sounds close to pupils' ears.
- Do not strike tuning forks against hard surfaces that may damage equipment.
- Supervise the safe use of tuning forks and elastic bands.
- Ensure string telephones do not create trip hazards.
- Monitor sound levels during practical investigations.
- Encourage pupils to avoid shouting during outdoor investigations.
- Follow Beach School risk assessments during sound walks.
- Check outdoor environments for hazards before measuring sound over distance.

Common Misconception	Teaching Response
Sound is made by the air itself.	Demonstrate that vibrating objects produce sound and the air carries those vibrations.
Louder sounds travel faster.	Explain that volume and speed are different properties.
High pitch means loud.	Compare pitch and volume independently using investigations.
Bigger instruments always produce louder sounds.	Show that instrument size mainly affects pitch, while vibration strength affects volume.
Sound can travel through empty space.	Explain that sound needs a material (medium) through which vibrations can travel.
Ears create sound.	Reinforce that ears detect vibrations produced elsewhere.
Sound disappears completely over distance.	Explain that vibrations spread out and become weaker, making sounds fainter.
Soundproof materials stop all sound.	Investigate how materials absorb or reduce sound rather than eliminating it completely.

Reflection Question	Purpose
What evidence showed that sound begins with vibrations?	Reinforce the source of sound.
How did your investigation show that sound needs a medium?	Connect practical enquiry with scientific explanation.
What changed when the pitch became higher or lower?	Develop understanding of vibration frequency in an age-appropriate way.
How did stronger vibrations affect the sound produced?	Reinforce the relationship between vibration strength and volume.
Why did sounds become quieter as you moved further away?	Encourage interpretation of investigation results.
Which material absorbed sound most effectively? What evidence supports your answer?	Promote evidence-based conclusions.
How can understanding sound help people and wildlife around Greatstone?	Link science to the **PROTECTORS** theme and local environment.
What inventions use scientific understanding of sound to improve our lives?	Connect learning to the **LEGACY** theme and STEM careers.
How has this learning helped answer our big question?	Consolidate understanding that sounds are created by vibrations, travel through materials and can be investigated and applied to improve communication, safety and the environment.

YEAR 4 - Electricity – SUMMER 2

How does electricity flow through a circuit, and how can we use it safely to solve problems?

Section	Overview
Curriculum Rationale	This unit introduces pupils to electricity through practical circuit building and systematic investigation. Pupils identify common appliances that use electricity and distinguish between mains-powered and battery-powered devices. They learn the components of a simple series circuit and investigate what is needed for a bulb, buzzer or motor to work. Through Developing Experts enquiries, pupils build, test and troubleshoot circuits, classify materials as electrical conductors or insulators and investigate how switches control the flow of electricity. The unit develops careful observation, fair testing, problem-solving and safe working while preparing pupils for more complex circuit work in Year 6.
The Greatstone Way	**PROTECTORS → LEGACY** – Children learn how electricity improves communication, safety and everyday life while recognising the responsibility to use it carefully and sustainably. They become young electrical engineers, designing circuits that solve practical problems and considering how energy-saving choices can protect people, resources and the environment. Through local links, pupils explore how electrical systems support coastal communities, warning systems and public safety.
National Curriculum Coverage	• Identify common appliances that run on electricity. • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. • Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. • Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. • Recognise some common conductors and insulators and associate metals with being good conductors.

Developing Experts Knowledge Progression	Pupils begin by identifying electrical appliances and considering safe use. They then learn the components of a simple series circuit and construct complete circuits. Pupils investigate why some circuits work and others do not before exploring switches, conductors and insulators. Finally, they apply their understanding by designing and evaluating a simple electrical product or safety solution.
Curriculum Journey	**Previous Learning:** Key Stage 1 – everyday materials and their properties; Year 3 – forces and magnets, including practical testing and classification. **Current Learning:** Electrical appliances, circuit components, complete series circuits, switches, conductors and insulators. **Next Learning:** Year 6 – Electricity, including circuit symbols, voltage, component performance and more complex series circuits.
Scientific Enquiry Question	**How can we build, test and improve electrical circuits so that they work safely and reliably?**
Sticky Knowledge	Electricity is used to power many appliances. Some appliances use mains electricity and others use cells or batteries. A simple circuit needs a cell, wires and a component such as a bulb, buzzer or motor. A circuit must form a complete loop for electricity to flow. A switch opens or closes a circuit. Metals are usually good electrical conductors. Materials such as plastic, rubber and wood are usually electrical insulators. Electricity must always be used safely.
Working Scientifically	Ask relevant questions. Make predictions. Construct circuits. Observe systematically. Carry out comparative tests. Identify and control variables. Classify materials. Record results. Troubleshoot problems. Draw conclusions and evaluate designs.
Scientific Knowledge & Skills	Identify electrical appliances. Distinguish mains and battery power. Name circuit components. Construct complete series circuits. Explain why a circuit works or fails. Use switches. Test conductors and insulators. Apply knowledge to design a simple electrical product.
Substantive Concepts	Electricity • Energy • Circuits • Components • Conductors • Insulators • Safety
Disciplinary Concepts	Observe • Predict • Construct • Test • Compare • Classify • Record • Explain • Evaluate
Scientific Vocabulary	electricity, electrical appliance, mains electricity, cell, battery, circuit, series circuit, wire, bulb, lamp, buzzer, motor, switch, component, complete circuit, incomplete circuit, conductor, insulator, metal, terminal
Working Scientifically Vocabulary	question, predict, test, comparative test, variable, observe, classify, result, evidence, conclusion, troubleshoot, evaluate, improve
Beach School & Outdoor Learning	Identify electrical systems used for coastal safety, communication and monitoring, such as warning lights, radios and weather equipment. Explore battery-powered outdoor devices and consider why waterproofing and insulation are important. Carry out a non-live materials investigation into suitable casings and protective materials for outdoor electrical products.
Greatstone & Local Links	Explore how electricity supports homes, schools, beach safety systems, emergency services, street lighting and local businesses. Consider electrical equipment used near the coast and why protection from water, salt and weather is essential. Link circuit design to warning lights, illuminated signs or simple signalling devices.
Cross-Curricular Links	Design and Technology (electrical products and switches), Computing (inputs and outputs), Mathematics (tables and comparative data), English (instructions and explanations), Geography (energy use and sustainability), PSHE (safety and responsibility).
High Quality Texts	*Oscar and the Bird: A Book About Electricity*; *The Boy Who Harnessed the Wind*; *Electrical Wizard: How Nikola Tesla Lit Up the World*; age-appropriate books about circuits, inventions and energy.
Significant Scientists & STEM Careers	Michael Faraday, Thomas Edison, Nikola Tesla, Hertha Ayrton, electrical engineer, electrician, renewable-energy engineer, electronics technician, product designer.
Memorable Hook	**The Greatstone Electrical Rescue Challenge** – Pupils receive a set of failed warning devices, lamps and buzzers. They become electrical engineers responsible for diagnosing faults, rebuilding circuits and designing a reliable safety device for the Greatstone community.
Authentic Outcome	**Greatstone Electrical Inventions Fair** – Pupils design and present a simple battery-powered product such as a warning light, buzzer system or illuminated model. They explain the circuit, identify conductors and insulators and demonstrate how the switch controls the device.
Assessment End Point	Pupils identify common electrical appliances, name circuit components, construct and troubleshoot a complete series circuit, explain the role of a switch, classify common materials as conductors or insulators and apply their understanding to a safe electrical design.

YEAR 4 SUMMER 2 – 6-WEEK TEACHING SEQUENCE - Electricity

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	**Hook – The Greatstone Electrical Rescue Challenge**	Electricity powers many appliances. Appliances may use mains electricity or cells and batteries. Electricity must be used safely.	Ask questions, identify, classify and explain.	Sort appliances by use, power source and location. Examine safe battery-powered devices and identify their purpose.	Appliance photographs, safe battery devices, cells, batteries, sorting cards and safety scenarios.	Identify outdoor electrical equipment used for safety, communication or monitoring.	Assess prior knowledge of electricity, appliances and safety.	Do not dismantle mains-powered appliances. Clarify that a battery contains one or more cells, though everyday language often uses the terms interchangeably.
2	**Building a Simple Circuit**	A simple circuit contains a cell, wires and a component. The components must be connected in a complete loop.	Construct, observe and record.	Build simple circuits to light a bulb or operate a buzzer or motor. Draw labelled representations of the circuit.	Cells, cell holders, wires, bulbs, bulb holders, buzzers, motors and trays.	Discuss how battery-powered warning lights or radios require complete circuits.	Pupils independently construct a working circuit and name each component.	At this stage, use pictorial circuit representations rather than formal symbols. Ensure pupils understand both terminals of the cell and component must be connected.
3	**Why Does a Circuit Work or Fail?**	A component works only when it is part of a complete circuit. Loose connections, incorrectly connected components or flat cells can prevent a circuit from working.	Predict, troubleshoot, compare and use evidence.	Investigate prepared working and non-working circuits. Identify faults, repair each circuit and explain the cause.	Circuit fault cards, cells, wires, bulbs, holders, buzzers and motors.	Complete a simulated outdoor equipment fault-finding challenge using battery circuits indoors or in a sheltered setting.	Explain why a circuit works or does not work using the idea of a complete loop.	Avoid saying electricity is “used up” by the first component. Keep the focus on complete and incomplete circuits. Check components before the lesson so genuine equipment faults do not confuse the investigation.

4	**Switches and Control**	A switch opens and closes a circuit. A closed circuit allows the component to work; an open circuit breaks the loop. Different switch designs can control a circuit.	Design, construct, test and improve.	Build simple switches using card, split pins, paper clips or foil. Compare switch designs and use one to control a bulb or buzzer.	Circuit components, card, foil, paper clips, split pins, masking tape and design sheets.	Design a switch for a coastal warning light or communication device.	Pupils explain how their switch opens and closes the circuit.	Clarify the difference between an open switch and an open circuit. A circuit is complete only when the switch closes the conducting path.
5	**Conductors and Insulators**	A conductor allows electricity to pass through a circuit. An insulator does not. Metals are generally good conductors, while plastic, rubber, wood and fabric are usually insulators.	Predict, carry out a comparative test, classify and conclude.	Insert different materials into a gap in a simple circuit and observe whether the bulb or buzzer works.	Low-voltage circuits, test materials, metal objects, foil, graphite, plastic, rubber, wood, fabric and recording tables.	Evaluate materials that could protect outdoor electrical devices from water, impact and accidental contact.	Classify materials using test evidence and explain patterns.	Include non-metal graphite as a useful exception if appropriate. Avoid saying all metals will conduct equally well or that all non-metals are insulators. Use only low-voltage cells.
6	**Electrical Inventions Fair**	Electrical products use complete circuits, components, switches, conductors and insulators to perform a purpose safely.	Apply knowledge, design, test, troubleshoot, evaluate and communicate.	Design and construct a simple electrical product or model with a working circuit and switch. Test it against agreed criteria and present the scientific explanation.	Circuit components, construction materials, design templates, insulating materials and presentation resources.	Create a design concept for an outdoor warning light, illuminated sign or signalling device suitable for Greatstone.	End-point practical, oral and written assessment.	Assess scientific understanding and circuit reliability rather than decoration. Require pupils to identify the conducting pathway, insulating casing and one improvement.

Whole Unit Resource List

Investigation Equipment

- Cells
- Cell holders
- Battery packs suitable for primary use
- Connecting wires with crocodile clips
- Bulbs and bulb holders
- Buzzers
- Small motors
- Propellers for motors, where safely enclosed
- Low-voltage LEDs, where compatible with the equipment
- Switches
- Circuit trays
- Multimeters for teacher demonstration only, where appropriate
- Clipboards
- Cameras or iPads

Consumables

- Card
- Paper clips
- Split pins
- Aluminium foil
- Copper tape, where available
- Masking tape
- Sticky tack
- String
- Conductivity test materials
- Metal spoons or coins
- Graphite pencils
- Plastic, rubber, wood, fabric and paper samples
- Circuit fault cards
- Recording tables
- Design sheets
- Large display paper
- Labels and sticky notes

Beach School Resources

- Photographs of coastal electrical equipment
- Battery-powered torches or radios for observation
- Waterproof casing samples
- Reflective and insulating materials
- Weatherproof clipboards
- Cameras
- Product-design templates
- Coastal safety scenario cards

Adaptive Teaching

- Begin with familiar appliances before introducing abstract circuit ideas.
- Use large, colour-coded circuit components and clearly identify each terminal.
- Model one successful circuit before pupils build independently.
- Provide component cards and pictorial circuit-building sequences.
- Use physical loops of rope to model complete and incomplete circuits.
- Offer prepared circuit boards with fewer loose components for pupils who need reduced motor demands.
- Provide fault-finding prompts such as **“Are both terminals connected?”**, **“Is the loop complete?”** and **“Is the component working?”**
- Use sentence stems including **“The bulb lit because…”**, **“The switch controls the circuit by…”** and **“This material is a conductor because…”**
- Allow pupils to explain through practical demonstrations, annotated photographs or oral recordings.
- Assign clear roles during group investigations, such as builder, checker, recorder and equipment manager.
- Challenge higher attainers to compare switch designs, investigate more than one output component and explain limitations in conductivity testing.

Health & Safety

- Use only low-voltage cells and components designed for primary-school circuit work.
- Never connect classroom circuits to mains electricity.
- Do not allow pupils to open, damage, heat or short-circuit cells or batteries.
- Inspect wires, holders and components before use and remove damaged equipment.
- Disconnect circuits when they are not being tested to prevent components and wires from heating.
- Avoid connecting the two terminals of a cell directly with a wire.
- Supervise motors and ensure propellers are securely attached, guarded where necessary and kept away from faces, hair and loose clothing.
- Keep liquids away from all circuit-building activities.
- Ensure hands are dry before handling electrical components.
- Count cells and small components before and after lessons.
- Keep batteries away from mouths and ensure button batteries are never used in open pupil-access activities.
- Follow manufacturer guidance for rechargeable cells and battery packs.
- Use only pre-selected safe materials during conductor testing.
- Outdoor electrical observations should involve battery-powered or disconnected devices only; pupils must not handle public electrical equipment.

Common Misconception	Teaching Response
Electricity comes only from wall sockets.	Compare mains-powered appliances with devices powered by cells, batteries and renewable-energy systems.
A battery and a cell are always exactly the same thing.	Explain that a cell is one electrical power source and a battery contains one or more cells, while acknowledging common everyday usage.
One wire from a cell to a bulb is enough.	Build and trace a complete loop connecting both terminals of the cell and component.
Electricity leaves one end of the cell and is used up by the bulb.	Keep explanations focused on electricity flowing around a complete circuit rather than being consumed at one point.
A bulb will light if it is simply touching a cell.	Investigate how both bulb contacts must connect to different cell terminals within a complete loop.
Any circuit containing all the correct components will work.	Troubleshoot loose connections, incorrect terminal contact, flat cells and damaged components.

An open switch means electricity can pass through.	Model that an open switch creates a gap, while a closed switch completes the circuit.
The switch creates electricity.	Explain that the cell provides the electrical energy and the switch controls the pathway.
All metals conduct electricity in exactly the same way.	Compare test results and explain that metals generally conduct, although conductivity varies.
Only metals conduct electricity.	Use graphite as an age-appropriate example of a non-metal conductor.
An insulator destroys electricity.	Explain that an insulator prevents electrical flow through that pathway.
Plastic coating is used only to make wires colourful.	Explain that plastic insulation protects users by preventing contact with the conducting metal.
A larger bulb always means a brighter bulb.	Keep the focus on circuit conditions and compatible components rather than component size alone.

Reflection Question	**Purpose**
Which appliances use mains electricity and which use cells or batteries?	Reinforce identification of different electrical power sources.
What must be present for a bulb or buzzer to work?	Consolidate the components and complete-loop requirement.
How did you identify the fault in a non-working circuit?	Develop systematic troubleshooting and evidence-based reasoning.
Why did the bulb remain off when there was a gap in the circuit?	Reinforce the concept of a complete conducting pathway.
How does a switch control a circuit?	Secure understanding of open and closed circuits.
What made your switch design reliable?	Encourage evaluation of contact, materials and construction.
Which materials conducted electricity, and what pattern did you notice?	Develop classification from practical evidence.
Why are both conductors and insulators needed in electrical products?	Connect material properties with function and safety.
How did you improve your electrical product after testing it?	Develop evaluation, troubleshooting and iterative design.
How could electricity be used to protect people around Greatstone?	Connect circuit knowledge with the **PROTECTORS** theme and local safety.
What useful electrical invention could leave a positive legacy for the community?	Connect responsible innovation with the **LEGACY** theme.
How has this learning helped answer our big question?	Consolidate understanding that electricity flows through complete circuits and can be controlled and used safely to solve practical problems.

YEAR 5 - Forces – AUTUMN 1

How do forces affect movement, and how can mechanisms help us overcome challenges?

Section	**Overview**
Curriculum Rationale	This unit builds on pupils' Year 3 learning about pushes, pulls, friction and magnetism by developing a more detailed understanding of gravity, air resistance, water resistance and friction. Pupils investigate how these forces affect the movement of objects and learn that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. Through Developing Experts enquiries, pupils plan fair and comparative tests, measure accurately, record data, identify patterns and evaluate the reliability of their findings. The unit strengthens pupils' ability to explain movement using scientific evidence and apply their understanding to engineering problems.
The Greatstone Way	**ROOTS → SURVIVORS** – Children explore the forces that shape movement in their everyday lives and local coastal environment. They investigate how people, animals and engineered objects overcome gravity, friction, air resistance and water resistance. Through practical challenges and Beach School, pupils develop resilience by testing, adapting and improving designs when initial ideas do not succeed.
National Curriculum Coverage	• Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. • Identify the effects of air resistance, water resistance and friction that act between moving surfaces. • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.
Developing Experts Knowledge Progression	Pupils begin by revisiting contact and non-contact forces before investigating gravity and falling objects. They explore air resistance through falling-object investigations and water resistance through tests involving shape and movement in water. Pupils then examine friction and its advantages and disadvantages before investigating levers, pulleys and gears. Finally, they apply their knowledge in an engineering challenge requiring them to control movement or reduce the force needed to complete a task.
Curriculum Journey	**Previous Learning:** Year 3 – Forces and Magnets, including pushes, pulls, friction, movement on surfaces and magnetic forces. **Current Learning:** Gravity, air resistance, water resistance, friction and force-multiplying mechanisms. **Next Learning:** Year 6 – Electricity and Light; Key Stage 3 – balanced and unbalanced forces, pressure, moments and motion.
Scientific Enquiry Question	**How can fair testing and measurement help us explain and control the effects of forces?**
Sticky Knowledge	Gravity pulls unsupported objects towards the Earth. Mass is the amount of matter in an object, while weight is the force caused by gravity acting on that mass. Air resistance acts against objects moving through air. Water resistance acts against objects moving through water. Friction acts between surfaces moving against one another. Streamlined shapes reduce air and water resistance. Levers, pulleys and gears can reduce the effort needed or change the direction or speed of movement.
Working Scientifically	Ask scientific questions. Make reasoned predictions. Plan fair and comparative tests. Identify variables. Measure force, distance and time accurately. Repeat measurements. Record data in tables and graphs. Identify patterns. Draw conclusions. Evaluate reliability and suggest improvements.
Scientific Knowledge & Skills	Explain gravity. Distinguish mass and weight. Investigate air resistance, water resistance and friction. Identify patterns between shape, surface and movement. Explain how levers, pulleys and gears affect force and movement. Apply force knowledge to engineering challenges.
Substantive Concepts	Forces • Gravity • Resistance • Friction • Movement • Mechanisms • Energy
Disciplinary Concepts	Predict • Measure • Compare • Test • Control Variables • Analyse • Conclude • Evaluate
Scientific Vocabulary	force, gravity, gravitational force, mass, weight, newton, air resistance, water resistance, friction, surface, movement, motion, streamlined, mechanism, lever, fulcrum, load, effort, pulley, gear, cog, force multiplier
Working Scientifically Vocabulary	question, prediction, hypothesis, independent variable, dependent variable, control variable, fair test, comparative test, measure, repeat, mean, data, table, line graph, pattern, anomaly, evidence, conclusion, reliability, evaluate
Beach School & Outdoor Learning	Investigate movement across sand, shingle and hard surfaces. Explore air resistance using parachutes, kites or wind-powered objects. Investigate streamlined shapes in safe water trays and compare how objects move through water. Use driftwood, rope and safe equipment to explore simple levers and pulleys.

Greatstone & Local Links	Explore how forces affect boats, lifeboats, kites, bicycles, beach buggies and objects moving across sand and shingle. Investigate how wind creates air resistance and how streamlined designs help boats and marine animals move through water. Consider how pulleys, winches and lifting systems are used in coastal rescue, fishing and construction.
Cross-Curricular Links	Design and Technology (mechanisms and engineering design), Mathematics (measurement, averages, tables and graphs), Computing (data logging and presentation), PE (movement and resistance), Geography (coastal wind and water), English (scientific explanations and evaluation).
High Quality Texts	*The Boy Who Harnessed the Wind*; *How Machines Work*; *Rosie Revere, Engineer*; *The Most Magnificent Thing*; age-appropriate texts about forces, motion and engineering.
Significant Scientists & STEM Careers	Sir Isaac Newton, Galileo Galilei, Leonardo da Vinci, George Cayley, physicist, mechanical engineer, aeronautical engineer, marine engineer, product designer, sports scientist.
Memorable Hook	**The Greatstone Coastal Rescue Engineering Challenge** – Pupils receive a series of rescue problems involving falling equipment, wind, water and heavy loads. They become forces engineers responsible for investigating the forces involved and designing mechanisms that make each task safer and easier.
Authentic Outcome	**Greatstone Forces and Mechanisms Expo** – Pupils design, test and present a device that controls movement or reduces the effort needed to complete a task. Their presentation includes investigation evidence, measurements, diagrams and an evaluation of how forces and mechanisms affect performance.
Assessment End Point	Pupils explain gravity and distinguish mass from weight, describe the effects of air resistance, water resistance and friction, interpret data from force investigations and explain how levers, pulleys and gears allow a smaller force to have a greater effect.

YEAR 5 AUTUMN 1 – 6-WEEK TEACHING SEQUENCE - Forces

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	**Hook – Greatstone Coastal Rescue Engineering Challenge**	Forces can change the speed, direction or shape of an object. Gravity, friction and resistance affect movement in different ways.	Ask questions, identify forces and make reasoned predictions.	Investigate a set of rescue scenarios involving falling objects, movement across surfaces, wind and lifting loads. Create force diagrams using arrows.	Scenario cards, toy vehicles, ramps, balls, force arrows, ropes and equipment images.	Identify forces affecting kites, waves, boats, birds and movement across the beach.	Prior knowledge assessment and accuracy of initial force explanations.	Revisit Year 3 contact and non-contact forces. Introduce force arrows as models showing direction, without requiring formal vector notation.
2	**Gravity, Mass and Weight**	Gravity pulls unsupported objects towards the Earth. Mass is measured in kilograms, while weight is a force measured in newtons. Objects with greater mass usually have greater weight on Earth.	Measure accurately, compare, record and identify patterns.	Use force meters to measure the weight of objects with different masses. Record results and identify the relationship between mass and weight.	Force meters, masses, balances, objects, tables and graph paper.	Compare the force needed to lift objects or safely selected natural materials of different masses.	Explain the distinction between mass and weight and interpret measurement patterns.	Ensure force meters are zeroed and read in newtons. Avoid stating that heavier objects necessarily fall faster. Gravity causes objects to accelerate regardless of mass when air resistance is negligible.
3	**Air Resistance**	Air resistance is a force that opposes movement through air. Surface area, shape and speed affect the amount of air resistance experienced.	Plan and conduct a fair test, measure time and evaluate reliability.	Investigate how parachute size or shape affects falling time. Repeat tests, calculate a mean where appropriate and identify anomalies.	Parachute materials, string, identical masses, metre sticks, stopwatches and planning sheets.	Test parachutes or wind-resistant designs in a safe sheltered area, accounting for changing wind conditions.	Use evidence to explain how surface area or shape affected falling time.	Change only one variable. Release from the same height using the same mass. Outdoor wind may reduce reliability, so compare with indoor results.
4	**Water Resistance and Streamlining**	Water resistance opposes movement through water. Streamlined shapes reduce resistance by allowing water to flow around them more easily.	Carry out comparative tests, measure time or force and identify patterns.	Compare the movement of differently shaped models through water using equal pulling force or timed drops through a transparent water column.	Water tanks, modelling clay, weights, string, timers, rulers and recording tables.	Compare the shapes of boats, fish and marine mammals and relate them to movement through water.	Explain why a streamlined shape experiences less water resistance.	Keep mass and size as similar as possible when changing shape. Use trays on stable surfaces and clean spillages immediately.
5	**Friction – Helpful and Unhelpful**	Friction acts between moving surfaces. It can provide grip, slow movement, produce heat and cause wear. Different surfaces create different amounts of friction.	Plan a fair test, measure force and evaluate evidence.	Use force meters to measure the force needed to pull the same object across different surfaces.	Force meters, blocks, carpet, wood, plastic, fabric, sandpaper and recording sheets.	Compare the effort needed to pull or move equipment across sand, shingle, grass and a hard path.	Draw an evidence-based conclusion about surface and friction.	Pull at a steady speed and keep the same object and contact area. Friction is not only present on rough surfaces; its size depends on the materials and conditions.
6	**Levers, Pulleys and Gears – Engineering Expo**	Levers, pulleys and gears can change the size, direction or speed of a force. Moving the fulcrum changes the mechanical advantage of a lever. Multiple pulleys can reduce the effort needed to lift a load. Gears transfer movement between rotating parts.	Design, construct, measure, test, evaluate and communicate.	Complete mechanism stations before designing a rescue device using a lever, pulley or gear system. Measure effort and evaluate how well the design works.	Levers, fulcrums, masses, pulleys, rope, gears, construction kits, force meters and design sheets.	Use safe ropes and driftwood or prepared equipment to model lifting and moving loads in coastal rescue situations.	End-point practical, oral and written assessment.	Keep mechanisms age appropriate. Pupils should explain how the mechanism affects force or movement rather than only naming parts. Assess scientific reasoning and testing, not decorative quality.

Whole Unit Resource List
Investigation Equipment

- Force meters measured in newtons
- Balancing scales or digital balances
- Standard masses
- Metre sticks and rulers
- Stopwatches
- Ramps
- Toy vehicles

- Water tanks or deep transparent containers
- Levers and fulcrums
- Pulleys
- Rope and string
- Gear sets or construction kits
- Clipboards
- Cameras or iPads

Consumables

- Parachute materials, including plastic, fabric and paper
- String
- Identical small masses
- Modelling clay
- Surface samples
- Sandpaper
- Cardboard
- Masking tape
- Force-arrow cards
- Recording tables
- Graph paper
- Investigation planning sheets
- Design and evaluation sheets
- Labels and display materials

Beach School Resources

- Weatherproof clipboards
- Stopwatches
- Metre tapes
- Force meters suitable for outdoor use
- Kites or parachute materials
- Surface markers
- Water-resistant model materials
- Ropes and safe pulley equipment
- Wind ribbons or windsocks
- Cameras
- Coastal engineering scenario cards

Adaptive Teaching

- Revisit pushes, pulls, friction and magnetic forces before introducing new force concepts.
- Use physical demonstrations and force arrows to make invisible forces visible.
- Provide clearly labelled force meters and practise reading scales before investigations.
- Use accessible prompts for variables: **change, measure and keep the same**.
- Provide partially completed tables, graphs and investigation plans where needed.
- Allow pupils to model forces physically before recording written explanations.
- Use sentence stems such as **“The force acting against movement was…”**, **“The evidence shows…”** and **“The mechanism reduced the effort because…”**
- Assign structured roles during investigations, including equipment manager, measurer, timer and recorder.
- Repeat investigations and use group data where individual measurements may be unreliable.
- Challenge higher attainers to explain anomalies, calculate means, evaluate reliability and compare the advantages of different mechanisms.

Health & Safety

- Inspect force meters, ropes, pulleys and construction equipment before use.
- Do not exceed the maximum load shown on force meters.
- Ensure objects being lifted are light enough to avoid injury if dropped.
- Secure pulley systems before testing and keep hands away from moving ropes and wheels.
- Establish clear drop zones for parachute investigations.
- Do not allow pupils to stand beneath falling objects.
- Use soft, lightweight masses for falling investigations.
- Ensure water containers are stable and clean spillages immediately.
- Supervise all activities involving stretched materials or moving mechanisms.
- Check outdoor surfaces before pulling or moving equipment.
- Consider wind conditions before parachute or kite investigations.
- Follow established Beach School and coastal risk assessments.
- Adapt physical and lifting tasks for pupils with mobility, medical or sensory needs.

Common Misconception	Teaching Response
Gravity only acts on falling objects.	Explain that gravity acts continuously on all objects with mass, including those supported by surfaces.
Heavier objects always fall faster.	Compare falling objects while controlling shape and surface area, and discuss the effect of air resistance.
Mass and weight are the same.	Measure mass in kilograms and weight in newtons and explain that weight is caused by gravity acting on mass.
There is no gravity in space.	Explain that gravity acts in space, although its effect changes with distance and location.
Air resistance only acts on parachutes.	Identify air resistance acting on vehicles, cyclists, birds, balls and falling objects.
Larger surface area always makes an object move faster.	Show that greater area facing the movement usually increases air or water resistance.
Water resistance is caused only by water being heavy.	Explain that it results from water opposing the movement of an object through it.
Streamlined means pointed at both ends.	Compare shapes and explain that streamlining involves a smooth shape that allows fluid to flow around it.
Friction is always harmful.	Explore grip, brakes, walking and tyre traction alongside wear and energy loss.
Smooth surfaces have no friction.	Measure movement on smooth surfaces and show that friction still acts.
A mechanism removes the need for force.	Explain that mechanisms reduce or redirect the effort but do not eliminate the need for force.
A longer lever always works better regardless of fulcrum position.	Investigate how the distances between the effort, fulcrum and load affect the force required.
A single fixed pulley always reduces the force needed.	Demonstrate that a fixed pulley mainly changes the direction of the force, while suitable pulley systems can reduce the effort.
Gears always make things move faster.	Compare gear arrangements that increase speed, reduce speed or change direction.

Reflection Question	Purpose
How is mass different from weight?	Secure the distinction between the amount of matter and the force caused by gravity.
What evidence showed that gravity acts on unsupported objects?	Connect observation with the effect of gravitational force.
Which variable affected your parachute most, and how do you know?	Develop evidence-based interpretation of fair-test results.
Why did repeating the parachute test improve the reliability of the evidence?	Reinforce repeated measurement, anomalies and means.
How did streamlining affect movement through water?	Connect shape with resistance and movement.
When is friction useful, and when might engineers try to reduce it?	Apply scientific understanding to contrasting real-world situations.
How did changing the fulcrum affect the force needed to lift the load?	Develop understanding of mechanical advantage.
How did the pulley or gear system change the force or movement?	Ensure mechanisms are explained scientifically rather than simply identified.
Which evidence helped you improve your engineering design?	Develop iterative evaluation and evidence-based refinement.
How do animals and people overcome forces in the Greatstone environment?	Connect force knowledge with local survival and adaptation.
How did your team respond when the first design did not work?	Link persistence, adaptation and problem-solving with the **SURVIVORS** theme.
How has this learning helped answer our big question?	Consolidate understanding that forces influence movement and that mechanisms allow people to control forces and overcome practical challenges.

YEAR 5 - Properties and Changes of Materials – Properties of Materials– AUTUMN 2

How can scientists test and compare materials to choose the best one for a purpose?

Section	Overview
Curriculum Rationale	This unit develops pupils' understanding of the properties of materials through scientific investigation. Building on prior learning about everyday materials, rocks and states of matter, pupils investigate the properties of a wide range of materials before comparing them according to hardness, transparency, conductivity, magnetism and solubility. They learn that materials are selected because their properties make them suitable for particular uses. Through Developing Experts enquiries, pupils plan fair tests, measure accurately, identify variables, record results in tables and graphs and use evidence to justify material choices. The unit lays the foundations for the following unit on reversible and irreversible changes.
The Greatstone Way	**SURVIVORS → EXPLORERS** – Children investigate how humans have developed materials to overcome challenges in everyday life. Through practical investigations and Beach School, pupils become materials scientists, exploring which materials survive harsh coastal environments and why engineers select particular materials for different purposes. They develop resilience by refining investigations and using evidence to solve real-world problems.
National Curriculum Coverage	• Compare and group together everyday materials on the basis of their properties, including hardness, solubility, transparency, conductivity (electrical and thermal) and response to magnets. • Know that some materials will dissolve in liquid to form a solution. • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.
Developing Experts Knowledge Progression	Pupils begin by revisiting the properties of familiar materials before carrying out comparative tests to investigate hardness, transparency, magnetism and conductivity. They then investigate solubility before considering how evidence informs the choice of materials for different products. Throughout the unit pupils develop increasingly sophisticated fair-testing skills and learn to justify conclusions using scientific evidence.
Curriculum Journey	**Previous Learning:** Year 1 – Everyday Materials; Year 2 – Uses of Everyday Materials; Year 3 – Rocks; Year 4 – States of Matter. **Current Learning:** Properties of materials, comparative testing, solubility and selecting materials for specific purposes. **Next Learning:** Year 5 Spring – Properties and Changes of Materials (Reversible and Irreversible Changes); KS3 – Particle model, material properties and chemical reactions.
Scientific Enquiry Question	**How can fair testing help scientists identify the best material for a particular purpose?**
Sticky Knowledge	Materials have different properties including hardness, transparency, magnetism, conductivity and solubility. Different properties make materials suitable for different uses. Some materials dissolve to form solutions. Metals are generally good conductors of heat and electricity. Transparent materials allow light to pass through clearly, translucent materials allow some light through and opaque materials block light. Scientists compare evidence before selecting materials.
Working Scientifically	Ask scientific questions. Plan comparative and fair tests. Identify variables. Measure accurately. Observe carefully. Record results. Use tables and graphs. Identify patterns. Draw conclusions. Evaluate investigations using evidence.
Scientific Knowledge & Skills	Compare materials. Measure and record properties. Investigate conductivity, hardness and transparency. Investigate dissolving. Explain why materials are selected for different uses. Justify conclusions using evidence.
Substantive Concepts	Materials • Properties • Solubility • Conductivity • Transparency • Hardness
Disciplinary Concepts	Observe • Compare • Measure • Test • Record • Analyse • Explain • Evaluate
Scientific Vocabulary	material, property, hardness, flexible, rigid, transparent, translucent, opaque, soluble, insoluble, solution, conductivity, thermal conductor, electrical conductor, insulator, magnetism, magnetic, non-magnetic, absorbent, waterproof
Working Scientifically Vocabulary	variable, comparative test, fair test, prediction, evidence, data, table, graph, pattern, anomaly, conclusion, reliability, evaluate
Beach School & Outdoor Learning	Compare materials exposed to coastal weather. Investigate waterproof materials suitable for outdoor shelters. Compare thermal insulation of natural and manufactured materials. Explore why different materials are used for beach equipment, shelters and safety signs.
Greatstone & Local Links	Investigate materials used in beach huts, sea defences, lifeboats, coastal pathways and playground equipment. Compare why wood, metal, concrete and plastics are chosen for different structures exposed to wind, salt water and weather.
Cross-Curricular Links	Design and Technology (product design), Mathematics (measurement and graphs), Computing (data handling), Geography (coastal engineering), English (scientific reports and evaluations).
High Quality Texts	*If I Built a House*; *The Most Magnificent Thing*; *Engineering Everywhere*; age-appropriate texts about materials and engineering.
Significant Scientists & STEM Careers	John McAdam, Stephanie Kwolek, Harry Brearley, materials scientist, civil engineer, product designer, construction engineer, chemist.
Memorable Hook	**The Greatstone Materials Testing Laboratory** – Pupils receive a collection of mystery materials and a series of engineering challenges. They become materials scientists responsible for identifying the best material for different real-life coastal situations.
Authentic Outcome	**Greatstone Materials Expo** – Pupils produce a scientific recommendation guide explaining which materials should be used for a variety of coastal engineering, construction and everyday products, supported by evidence from their investigations.
Assessment End Point	Pupils compare materials according to their properties, explain how evidence supports material selection, investigate solubility and justify why particular materials are suitable for specific purposes using scientific evidence.

YEAR 5 AUTUMN 2 – 6 WEEK TEACHING SEQUENCE -Properties of Materials

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	**Hook – The Greatstone Materials Testing Laboratory**	Materials have different properties that determine how they are used.	Ask questions, observe and classify.	Investigate mystery materials and predict suitable uses based on observable properties.	Material samples, magnifiers, sorting cards.	Identify materials used around the school and beach.	Prior knowledge assessment.	Introduce the concept that evidence is needed before deciding which material is best.
2	**Comparing Material Properties**	Materials can be compared by hardness, flexibility,	Plan comparative tests and classify.	Investigate hardness, flexibility and transparency using standard methods.	Material samples, scratch tools, light	Compare natural and manufactured materials outdoors.	Correct identification of properties.	Emphasise fair comparisons by testing one property at a time.

		transparency, absorbency and magnetism.			source, recording sheets.			
3	**Conductors and Insulators**	Metals are usually good conductors of heat and electricity. Some materials are good insulators.	Carry out comparative tests and identify patterns.	Test electrical conductivity using low-voltage circuits and investigate thermal insulation.	Circuits, thermometers, insulated containers, material samples.	Investigate why different outdoor materials feel warmer or cooler.	Explain patterns using evidence.	Reinforce electrical safety and distinguish between thermal and electrical conductivity.
4	**Which Materials Dissolve?**	Some materials dissolve to form solutions while others remain insoluble.	Carry out fair tests and record observations.	Investigate the solubility of common substances in water.	Water, beakers, salt, sugar, sand, flour, stirrers.	Compare dissolving with natural mixtures found outdoors.	Explain which materials are soluble.	Clarify the difference between dissolving and melting.
5	**Choosing Materials for a Purpose**	Scientists and engineers select materials according to evidence about their properties.	Analyse data and justify conclusions.	Investigate the best materials for waterproofing, strength or insulation.	Selection of materials, water trays, weights, thermometers.	Design a waterproof shelter for Beach School.	Evidence-based material selection.	Encourage pupils to justify every decision using investigation results.
6	**Greatstone Materials Expo**	Material choice depends upon evidence from testing.	Evaluate, present and communicate.	Design a product or engineering solution using suitable materials and present scientific reasoning.	Investigation results, display materials, models.	Present designs for a coastal structure or survival shelter.	End-point assessment.	Assess reasoning and use of evidence rather than product appearance.

Whole Unit Resource List

Investigation Equipment

- Material samples (wood, plastic, metal, glass, fabric, rubber, ceramic)
- Magnifying glasses
- Low-voltage circuit equipment
- Thermometers
- Force meters
- Beakers
- Measuring cylinders
- Stirrers
- Timers
- Clipboards
- Cameras or iPads

Consumables

- Salt
- Sugar
- Sand
- Flour
- Baking soda
- Water
- Filter paper
- Waterproof fabrics
- Recording sheets
- Graph paper
- Labels
- Sticky notes

Beach School Resources

- Natural materials
- Waterproof fabrics
- Tarpaulins
- Buckets
- Thermometers
- Nature journals
- Weatherproof clipboards
- Cameras

Adaptive Teaching

- Begin with hands-on exploration before introducing scientific vocabulary.
- Provide labelled property cards and visual examples.
- Model comparative testing before independent investigations.
- Use structured planning sheets to support fair-test design.
- Provide partially completed tables and graphs where appropriate.
- Encourage oral reasoning before written conclusions.
- Use sentence stems such as **"This material is suitable because…"** and **"The evidence shows…"**
- Allow pupils to record through diagrams, annotated photographs or digital presentations.
- Challenge higher attainers to evaluate reliability, identify anomalies and recommend materials where multiple properties must be considered together.

Health & Safety

- Use only low-voltage electrical equipment during conductivity investigations.
- Keep electrical equipment away from water at all times.
- Supervise the use of glass containers and thermometers.
- Check for allergies before handling powders or other investigation materials.
- Do not allow pupils to taste any substances used during dissolving investigations.
- Clean spillages immediately to prevent slips.
- Ensure pupils wash hands after handling materials and powders.
- Follow Beach School risk assessments during outdoor investigations.
- Handle sharp-edged materials such as glass or metal safely and inspect for damage before use.

Common Misconception	Teaching Response
The hardest material is always the best.	Compare products requiring different combinations of properties.
All metals are magnetic.	Test aluminium, copper and brass alongside iron and steel.
Transparent means colourless.	Investigate coloured transparent materials.
Dissolving means disappearing.	Explain that the substance is still present within the solution.
Melting and dissolving are the same process.	Compare both processes using practical investigations.
Waterproof materials never absorb any water.	Compare degrees of waterproofing and water resistance.
One investigation is enough to prove a conclusion.	Emphasise repetition, reliability and evidence.

Reflection Question	Purpose
Which material properties were most useful when making your decision?	Develop evidence-based material selection.
How did your investigation remain fair?	Reinforce understanding of variables.
Why did some materials dissolve while others did not?	Consolidate understanding of solubility.
What evidence showed that one material was a better conductor?	Promote interpretation of investigation results.
Which material would you choose for a coastal structure? Why?	Apply scientific understanding to a local context.
How did repeating your investigation improve reliability?	Develop evaluation of scientific enquiry.

How do engineers use evidence before selecting materials?	Link science to STEM careers and real-world applications.
How did exploring materials help us solve practical problems?	Connect learning to the **SURVIVORS** theme.
How did careful investigation help us discover new possibilities?	Connect scientific enquiry to the **EXPLORERS** theme.
How has this learning helped answer our big question?	Consolidate understanding that fair testing enables scientists and engineers to compare materials and select the most suitable one for a particular purpose.

YEAR 5- Properties and Changes of Materials – Changes of Materials – SPRING 1

How can materials be mixed, separated and changed, and how can we tell whether a change is reversible?

Section	Overview
Curriculum Rationale	This unit builds directly on pupils' Autumn 2 learning about material properties and solubility. Pupils investigate how mixtures and solutions are formed before exploring methods for separating materials, including sieving, filtering, evaporation and magnetic separation. They distinguish between reversible physical changes, where the original materials can be recovered, and irreversible changes that produce new materials. Through Developing Experts enquiries, pupils plan and conduct fair and comparative tests, select appropriate separation methods, measure accurately, record evidence and use observations to justify whether a change is reversible or irreversible.
The Greatstone Way	**EXPLORERS → INVENTORS** – Children explore how materials behave when they are mixed, heated, cooled or combined. They develop curiosity by investigating changes that are not always visible and use scientific evidence to solve practical separation and materials challenges. Through Beach School and local coastal links, pupils consider how scientists and engineers separate useful materials, clean water and develop new materials to solve environmental and everyday problems.
National Curriculum Coverage	• Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution. • Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. • Demonstrate that dissolving, mixing and changes of state are reversible changes. • Explain that some changes result in the formation of new materials and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.
Developing Experts Knowledge Progression	Pupils begin by revisiting solutions and distinguishing dissolving from melting. They explore mixtures and select appropriate methods for separating solids of different sizes, insoluble solids from liquids and dissolved solids from solutions. Pupils then compare reversible and irreversible changes, investigate reactions that produce new materials and use evidence such as gas production, temperature change and permanent colour change to identify chemical change. The unit culminates in an applied materials-recovery challenge.
Curriculum Journey	**Previous Learning:** Year 4 – States of Matter; Year 5 Autumn 2 – Properties of Materials, including solubility, conductivity and suitability. **Current Learning:** Solutions, separation methods, reversible changes and irreversible changes that form new materials. **Next Learning:** Year 6 – Electricity, Light and Evolution; Key Stage 3 – particles, atoms, chemical reactions, acids and alkalis and separation techniques.
Scientific Enquiry Question	**How can scientific evidence help us separate mixtures and decide whether a material change is reversible or irreversible?**
Sticky Knowledge	A mixture contains two or more substances that are physically combined. A solution forms when a solute dissolves in a solvent. Insoluble solids can be separated from liquids by filtering. Solids of different sizes can be separated by sieving. Magnetic materials can be removed using magnets. A dissolved solid can be recovered by evaporating the solvent. Dissolving, mixing, melting and freezing are usually reversible physical changes. Some changes produce new materials and are not usually reversible. Evidence of an irreversible change can include gas production, permanent colour change, temperature change or the formation of a new solid.
Working Scientifically	Ask scientific questions. Make reasoned predictions. Plan fair and comparative tests. Select equipment. Identify variables. Observe changes carefully. Measure mass, volume, time and temperature. Record data systematically. Identify patterns. Draw conclusions from evidence. Evaluate methods and reliability.
Scientific Knowledge & Skills	Describe mixtures and solutions. Distinguish solute, solvent and solution. Select and use separation methods. Recover dissolved solids. Explain reversible physical changes. Identify evidence that new materials have formed. Compare reversible and irreversible changes.
Substantive Concepts	Materials • Mixtures • Solutions • Separation • Physical Change • Chemical Change • Reversibility
Disciplinary Concepts	Observe • Predict • Separate • Measure • Compare • Test • Analyse • Conclude • Evaluate
Scientific Vocabulary	material, substance, mixture, solution, solute, solvent, soluble, insoluble, dissolve, separation, sieve, filter, filtration, residue, filtrate, evaporation, recover, reversible, irreversible, physical change, chemical change, reaction, reactant, product, gas, temperature change, combustion
Working Scientifically Vocabulary	question, prediction, hypothesis, independent variable, dependent variable, control variable, fair test, comparative test, measure, repeat, data, evidence, pattern, anomaly, conclusion, reliability, evaluate
Beach School & Outdoor Learning	Examine mixtures of sand, shells, stones and manufactured litter and decide how they could be separated safely. Investigate filtration using sand and gravel models while making clear that filtered water is not automatically safe to drink. Explore evaporation from seawater using prepared samples rather than collecting water for consumption. Consider how waste materials are sorted and recovered from coastal environments.
Greatstone & Local Links	Investigate how materials may be separated during beach cleaning, recycling and water treatment. Explore how salt can be recovered from seawater through evaporation and how filtration and settling are used to remove suspended materials. Consider the importance of separating litter, pollutants and reusable materials to protect Greatstone's coastal habitats.
Cross-Curricular Links	Design and Technology (material processes and product development), Mathematics (mass, volume, temperature, tables and graphs), Geography (water treatment, coasts and environmental management), Computing (data recording and presentation), English (methods, explanations and evaluations), PSHE (sustainability and responsible resource use).
High Quality Texts	*The Boy Who Harnessed the Wind*; *What a Waste*; *The Story of Inventions*; age-appropriate texts about materials science, recycling, water treatment and chemical change.
Significant Scientists & STEM Careers	Antoine Lavoisier, Marie Curie, Stephanie Kwolek, Spencer Silver, chemist, materials scientist, chemical engineer, water-treatment scientist, recycling engineer, forensic scientist.
Memorable Hook	**The Greatstone Materials Recovery Laboratory** – Pupils receive a contaminated coastal mixture containing solids, liquids and dissolved substances. They become materials scientists responsible for identifying its contents, selecting separation methods and determining which changes can be reversed.
Authentic Outcome	**Greatstone Materials Recovery and Innovation Expo** – Pupils design and demonstrate a multi-stage process for separating a complex mixture before presenting an investigation into reversible and irreversible change. Their explanations include scientific evidence, annotated diagrams and an evaluation of their methods.

Assessment End Point	Pupils explain the difference between mixtures and solutions, select appropriate methods to separate materials, describe how a dissolved solid can be recovered, distinguish reversible from irreversible changes and use evidence to explain when a new material has formed.

YEAR 5 SPRING 1 – 6-WEEK TEACHING SEQUENCE - Changes of Materials

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	**Hook – The Greatstone Materials Recovery Laboratory**	Mixtures contain substances that are physically combined. A solution forms when a solute dissolves in a solvent. Dissolving is different from melting.	Observe, classify, ask questions and make predictions.	Examine mystery mixtures and solutions. Identify visible components and investigate whether selected solids dissolve in water.	Salt, sugar, sand, gravel, water, transparent containers, magnifiers, spoons and sorting cards.	Examine safe prepared mixtures based on sand, shells and pebbles and propose separation methods.	Assess prior understanding of mixtures, solutions, melting and dissolving.	Reinforce that dissolved substances remain present even when they cannot be seen. Melting involves heating and a change of state; dissolving involves a solute spreading through a solvent.
2	**Separating Solid Mixtures**	Solids can be separated according to physical properties such as particle size and magnetism. Sieving separates particles of different sizes. Magnets remove magnetic materials.	Plan comparative methods, select equipment and evaluate effectiveness.	Separate a mixture containing gravel, sand, paper clips and other safe solids using hand sorting, sieving and magnets.	Sieves, magnets, trays, gravel, sand, paper clips, rice or lentils, spoons and collection pots.	Design a method for separating a simulated beach-clean mixture without handling actual hazardous litter.	Explain why each method was suitable for a particular component.	Avoid suggesting that one separation method works for all mixtures. Pupils should sequence methods logically and minimise loss of material.
3	**Filtering Insoluble Solids from Liquids**	Filtration separates an insoluble solid from a liquid. The solid left in the filter is the residue and the liquid passing through is the filtrate. Dissolved substances pass through ordinary filter paper.	Plan and conduct a comparative test, observe and measure.	Filter mixtures of water and insoluble solids. Compare filter materials and evaluate the clarity and volume of filtrate produced.	Filter funnels, filter paper, fabric, gravel, sand, muddy-water models, measuring cylinders and beakers.	Construct a layered filter model using prepared clean materials and discuss coastal water treatment.	Accurately use residue and filtrate and explain the limitations of filtration.	Filtered water is not necessarily safe to drink because dissolved substances and microorganisms may remain. No filtered investigation water should be consumed.
4	**Recovering a Dissolved Solid**	A dissolved solid can be recovered by evaporating the solvent. Evaporation is a reversible physical change because the original solid remains present in the solution.	Measure, observe over time, record systematically and draw conclusions.	Prepare salt or sugar solutions and compare evaporation in dishes with different surface areas or safe temperature conditions. Recover and examine the solid residue.	Salt or sugar solutions, evaporation dishes, measuring cylinders, balances, thermometers and hand lenses.	Observe how seawater evaporation can leave salt deposits using teacher-prepared samples or images.	Explain how evaporation recovers a dissolved solid and interpret changes in mass or volume.	Use natural evaporation or safe, indirect warming. Do not boil solutions over open flames. Surface area and temperature should not both be changed in the same fair test.
5	**Reversible and Irreversible Changes**	Mixing, dissolving and changes of state are usually reversible. Some reactions create new materials and are not usually reversible. Evidence may include gas production, temperature change or permanent colour change.	Make predictions, observe carefully, measure and compare evidence.	Compare reversible changes such as melting and dissolving with controlled reactions such as bicarbonate of soda and acid, or milk and vinegar forming a new solid.	Ice, chocolate in sealed bags, water, bicarbonate of soda, vinegar or citric acid, thermometers, balloons, cups and trays.	Identify examples of reversible and irreversible changes linked to weathering, cooking, rusting and decomposition in the wider environment.	Classify changes and justify decisions using evidence.	Use “not usually reversible” rather than “never reversible.” Gas bubbles alone do not always prove a chemical reaction, as boiling also creates bubbles. Consider several pieces of evidence.
6	**Materials Recovery and Innovation Expo**	Scientists combine separation techniques to recover materials from complex mixtures. Reliable conclusions depend on evidence and evaluation.	Plan, sequence, separate, recover, evaluate and communicate.	Separate a complex mixture using a multi-stage method involving magnetism, sieving, filtration and evaporation. Present findings and evaluate material loss, purity and efficiency.	Complex prepared mixtures, magnets, sieves, filter equipment, evaporation dishes, planning sheets and presentation resources.	Develop a scientific proposal for recovering useful materials from a simulated coastal-waste mixture.	End-point practical, oral and written assessment.	Assess method selection, sequencing, scientific vocabulary, evidence and evaluation. Pupils should acknowledge practical limitations and suggest realistic improvements.

Whole Unit Resource List

Investigation Equipment

- Sieves of different mesh sizes
- Bar magnets or magnetic wands
- Sorting trays
- Filter funnels
- Filter paper
- Fabric and mesh filters
- Beakers and transparent containers
- Measuring cylinders
- Evaporation dishes
- Digital balances
- Thermometers
- Timers
- Hand lenses
- Pipettes and spoons
- Clipboards
- Cameras or iPads

Consumables

- Salt
- Sugar
- Sand
- Gravel
- Rice or lentils
- Paper clips or iron filings sealed appropriately
- Water
- Muddy-water simulation materials
- Bicarbonate of soda
- Vinegar or citric-acid solution
- Ice

- Chocolate in sealed bags or containers
- Milk and vinegar, where appropriate
- Balloons
- Recording tables
- Method cards
- Graph paper
- Labels and display materials

Beach School Resources

- Clean prepared sand, shell and pebble mixtures
- Sieves
- Magnets
- Sorting trays
- Weatherproof clipboards
- Gloves
- Litter-picking equipment for observation only
- Coastal waste photographs
- Water-treatment diagrams
- Cameras
- Environmental scenario cards

Adaptive Teaching

- Revisit the Autumn 2 vocabulary of **soluble**, **insoluble**, **solution**, **property** and **state of matter**.
- Use visible, contrasting mixtures before introducing less obvious solutions.
- Provide pictorial process cards for sieving, magnetic separation, filtration and evaporation.
- Use colour-coded labels for **solute**, **solvent**, **solution**, **residue** and **filtrate**.
- Model each separation technique before pupils select methods independently.
- Provide structured planning frames with prompts for equipment, sequence, observations and evaluation.
- Allow pupils to explain methods using annotated diagrams, photographs or oral recordings.
- Assign practical roles such as equipment manager, measurer, observer and recorder.
- Use sentence stems including **“This method is suitable because…”**, **“The evidence that a new material formed was…”** and **“This change is reversible because…”**
- Reduce the number of mixture components where processing demands are high.
- Challenge higher attainers to compare the efficiency and limitations of separation methods, calculate recovery percentages where appropriate and evaluate whether evidence is sufficient to identify a chemical change.

Health & Safety

- Use only small quantities of substances and follow current school science guidance for all reactions.
- Do not allow pupils to taste any investigation materials or recovered substances.
- Check allergies and sensitivities before using food products, powders, acids or scented materials.
- Wear eye protection where there is a risk of splashing during reaction investigations.
- Use dilute household vinegar or citric-acid solution only and avoid stronger acids or alkalis.
- Do not seal gas-producing reactions in rigid containers.
- Balloons used to collect gas must be supervised and must not be placed near faces.
- Use natural evaporation or safe indirect warming; pupils must not use open flames or boiling liquids.
- Keep electrical heating equipment away from water and supervise its use directly.
- Clean spills immediately and wash hands after investigations.
- Avoid direct handling of iron filings; use larger magnetic objects or sealed samples where possible.
- Glassware should be inspected before use, with plastic alternatives selected where appropriate.
- Filtered or treated investigation water must never be consumed.
- Use only clean, prepared mixtures for Beach School separation activities rather than unknown beach waste.

Common Misconception	Teaching Response
A mixture always contains a liquid.	Compare mixtures of solids, liquids and gases and define a mixture as substances physically combined.
A dissolved substance has disappeared or no longer exists.	Recover the dissolved solid through evaporation and compare mass where appropriate.
Dissolving and melting are the same.	Contrast dissolving in a solvent with melting caused by heating and a change of state.
Every solid will eventually dissolve if stirred long enough.	Test soluble and insoluble substances under the same conditions.
Filtration separates dissolved solids from liquids.	Demonstrate that salt solution passes through filter paper because the salt is dissolved.
Filtering makes water safe to drink.	Explain that filtration may remove visible solids but not dissolved substances or microorganisms.
Evaporation destroys the liquid.	Explain that the liquid becomes a gas and may be condensed back into a liquid.
Sieving can separate any mixture.	Compare particle size with other properties such as magnetism and solubility.
All reversible changes are easy to reverse.	Discuss that some reversible changes require specialist equipment, time or energy.
Every irreversible change involves burning.	Investigate acid–bicarbonate reactions, rusting, cooking and the formation of new solids.
Bubbles always prove that a new material has formed.	Compare gas-producing reactions with boiling and require multiple pieces of evidence.
Irreversible means the materials have vanished.	Explain that atoms remain but have been rearranged into new substances, using age-appropriate language.
Cooling always reverses a chemical change.	Contrast reversible freezing with irreversible reactions that cannot be undone by cooling.

Reflection Question	Purpose
How is a solution different from a mixture in which all components remain visible?	Consolidate understanding of dissolving and uniform solutions.
Why was sieving suitable for one part of the mixture but not another?	Develop method selection based on material properties.
What evidence showed that filtration had separated an insoluble solid?	Reinforce the meanings of residue and filtrate.
Why did the dissolved salt pass through the filter paper?	Address the limitation of filtration for solutions.
How did evaporation allow you to recover the dissolved solid?	Connect changes of state with separation and reversibility.
What did you change, measure and keep the same in your investigation?	Reinforce variable control and fair testing.
Which observations suggested that a new material had formed?	Develop evidence-based identification of irreversible change.
Why is one piece of evidence sometimes insufficient to prove a chemical change?	Encourage critical evaluation of scientific evidence.
Which separation method was most effective, and how did you judge this?	Develop evaluation using purity, recovery and material loss.
How could separation science help protect Greatstone’s beach and coastal habitats?	Apply learning to local environmental problem-solving.
How did exploring mixtures lead to an inventive solution?	Connect scientific curiosity and method development with **EXPLORERS → INVENTORS**.

How has this learning helped answer our big question?	Consolidate understanding that mixtures can be separated through physical processes and that evidence helps distinguish reversible physical changes from irreversible changes that form new materials.

YEAR 5 – Animals Including Humans – Human Growth and Development - SPRING 2

How do humans change throughout their lives, and how can scientific evidence help us understand development?

Section	Overview
Curriculum Rationale	This unit develops pupils' understanding of the human life cycle by describing the changes that occur from birth to old age. Building on Year 2 learning about offspring, growth and healthy living, pupils explore the stages of human development and identify patterns in physical, emotional and social change. They investigate growth during infancy and childhood, learn about the changes associated with puberty and consider how adulthood and ageing affect the body. Through Developing Experts enquiries, pupils interpret secondary data, measure and compare growth, identify patterns, evaluate evidence and communicate scientific understanding sensitively and accurately.
The Greatstone Way	**EXPLORERS → INVENTORS** – Children explore how every person grows and changes through a unique but recognisable human life cycle. They develop respectful scientific language and recognise that individuals experience development at different rates. Through enquiry, discussion and health-related STEM links, pupils consider how scientific and medical understanding has led to inventions, treatments and support that help people live healthier lives at every stage.
National Curriculum Coverage	• Describe the changes as humans develop to old age.
Developing Experts Knowledge Progression	Pupils begin by sequencing the main stages of the human life cycle. They investigate rapid growth and dependency during infancy before exploring physical and developmental changes during childhood. Pupils then learn about puberty as the stage when a child's body develops towards physical maturity. They consider adulthood, ageing and changes in physical ability before applying their knowledge to interpret patterns in human growth data and explain the complete human life cycle.
Curriculum Journey	**Previous Learning:** Year 1 – human body and senses; Year 2 – offspring, growth, survival and healthy living; Year 3 – nutrition, skeletons and muscles; Year 4 – digestion and teeth. **Current Learning:** Human development from birth to old age, including infancy, childhood, puberty, adulthood and ageing. **Next Learning:** Year 6 – the circulatory system, nutrient and water transport and the effects of diet, exercise, drugs and lifestyle; Key Stage 3 – human reproduction and more detailed body systems.
Scientific Enquiry Question	**How can observations and data help us explain the patterns of change that occur throughout a human life?**
Sticky Knowledge	Humans develop through recognisable life stages: infancy, childhood, adolescence, adulthood and old age. Babies are highly dependent on adults and grow rapidly. During childhood, physical skills, independence and understanding develop. Puberty causes physical and emotional changes as the body develops towards adulthood. The timing and rate of development vary between individuals. Adults are physically mature. Ageing can lead to changes in strength, movement, senses and memory, although experiences differ greatly. Human development is continuous rather than a series of sudden, identical changes.
Working Scientifically	Ask relevant questions. Use secondary sources. Measure accurately. Gather and record data. Present data in tables and graphs. Identify patterns and trends. Compare evidence. Draw conclusions. Recognise limitations in data. Communicate findings sensitively.
Scientific Knowledge & Skills	Sequence stages of human development. Describe infancy and childhood growth. Identify changes associated with puberty. Explain development into adulthood. Describe common changes linked with ageing. Interpret growth data. Recognise individual variation.
Substantive Concepts	Humans • Growth • Development • Life Cycles • Puberty • Adulthood • Ageing
Disciplinary Concepts	Observe • Measure • Compare • Interpret • Identify Patterns • Explain • Evaluate
Scientific Vocabulary	human, life cycle, development, growth, life stage, infant, baby, toddler, child, adolescent, puberty, adult, old age, mature, dependency, independence, physical change, emotional change, ageing, life expectancy
Working Scientifically Vocabulary	question, measure, data, table, line graph, pattern, trend, evidence, compare, interpret, conclusion, variation, reliability, evaluate
Beach School & Outdoor Learning	Complete age-appropriate physical-development investigations involving balance, coordination, reaction time or movement, using anonymised class data. Compare how people of different life stages may access and enjoy outdoor environments. Design an inclusive Beach School activity or route suitable for people with different physical needs and levels of mobility.
Greatstone & Local Links	Explore how Greatstone's beach, community spaces and services can support people throughout life, including young children, families and older adults. Consider local health, care, fitness and community careers. Pupils may gather memories or non-sensitive information from community members to explore how childhood experiences and opportunities have changed over time.
Cross-Curricular Links	PSHE and RSE (puberty, emotions, self-care and respectful relationships), PE (physical development and fitness), Mathematics (growth data and line graphs), English (scientific explanation and sensitive discussion), Computing (data presentation), Design and Technology (inclusive product or environment design).
High Quality Texts	Age-appropriate human body and life-cycle texts; *The Growing Story*; *What's Happening to Me?*; *The Human Body Book*; carefully selected school RSE resources about puberty and development.
Significant Scientists & STEM Careers	Dr James Tanner, Virginia Apgar, paediatrician, midwife, health visitor, gerontologist, physiotherapist, occupational therapist, nurse, developmental psychologist.
Memorable Hook	**The Greatstone Human Development Research Centre** – Pupils receive a collection of anonymised photographs, measurements, developmental clues and everyday objects associated with different stages of life. They become human-development scientists responsible for sequencing the evidence and explaining how humans change from birth to old age.
Authentic Outcome	**Human Life Journey Exhibition** – Pupils create an accurate and inclusive exhibition explaining each stage of human development through timelines, graphs, scientific diagrams and advice for supporting health and wellbeing across life.
Assessment End Point	Pupils describe the main stages of human development from birth to old age, explain key changes during infancy, childhood, puberty, adulthood and ageing, interpret growth data and recognise that the timing and experience of development vary between individuals.

YEAR 5 SPRING 2 – 6-WEEK TEACHING SEQUENCE - Animals Including Humans – Human Growth and Development

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes

1	**Hook – The Greatstone Human Development Research Centre**	Humans have a life cycle and develop through infancy, childhood, adolescence, adulthood and old age. Development is continuous, although life stages help scientists describe patterns.	Ask questions, observe, sequence and justify using evidence.	Examine anonymised photographs, objects and developmental clues. Sequence them into likely life stages and justify decisions.	Life-stage photographs, object clues, timeline cards, sorting hoops and enquiry packs.	Discuss how people at different life stages might use the beach and outdoor spaces differently.	Assess prior understanding of growth, life cycles and ageing.	Avoid presenting life stages as rigid age boundaries. Explain that individuals develop at different rates and families have varied structures and experiences.
2	**Infancy and Early Childhood**	Babies are dependent on adults and grow rapidly. During infancy and early childhood, movement, communication, teeth, coordination and independence develop.	Use secondary data, measure, compare and identify patterns.	Analyse anonymised infant growth charts or developmental data. Compare changes in height, mass, movement or skills over time.	Anonymised growth charts, developmental milestone cards, rulers, graph paper and data tables.	Design a safe sensory or movement activity suitable for a young child outdoors.	Interpret a growth graph and describe patterns without making judgements about individuals.	Milestones are broad patterns, not deadlines. Avoid comparing pupils' personal development or requesting baby photographs unless participation is optional and carefully managed.
3	**Childhood Growth and Development**	During childhood, bones, muscles, coordination, knowledge and independence continue to develop. Growth rates vary and are influenced by inherited and environmental factors.	Gather anonymised data, calculate ranges or means where appropriate and interpret variation.	Use prepared or anonymised data to investigate patterns in height, hand span, foot length or reaction time across age groups.	Prepared datasets, rulers, tape measures, stopwatches, graph paper and recording sheets.	Complete a balance, coordination or reaction-time investigation and discuss how physical skills develop with practice.	Explain a pattern and identify limitations in the data.	Do not rank or publicly compare pupils' bodies. Prefer prepared datasets or collect non-sensitive data anonymously. Make clear that body size does not measure ability or health.
4	**Puberty and Adolescence**	Puberty is a stage of development in which the body changes towards physical maturity. Changes may include growth spurts, body hair, skin changes, body-shape changes, menstruation, voice changes and emotional changes. The timing varies between individuals.	Use reliable secondary sources, classify changes and communicate scientifically.	Sort age-appropriate puberty information into changes that may happen to everyone, changes associated with particular reproductive anatomy and emotional or social changes. Create an accurate information diagram.	School-approved RSE resources, puberty cards, body diagrams, vocabulary sheets and anonymous question box.	Consider how clothing, hydration, hygiene and privacy support wellbeing during outdoor activities as bodies develop.	Explain puberty accurately using respectful scientific vocabulary.	Follow the school's RSE policy and agreed terminology. Establish clear ground rules and use an anonymous question system. Do not ask pupils to disclose personal experiences. Puberty changes are normal and happen at different times.
5	**Adulthood and Ageing**	Adulthood includes physical maturity and may include parenthood, work and care responsibilities. Ageing can affect strength, joints, senses, reaction time and memory, but people age differently and remain capable of learning and contributing.	Compare evidence, identify trends and challenge unsupported generalisations.	Analyse data or case studies about reaction time, muscle strength, hearing or life expectancy across adulthood. Design an inclusive everyday product or environment.	Prepared datasets, case studies, inclusive-design materials, graphs and accessibility scenarios.	Audit an outdoor route or activity for accessibility across different ages and mobility needs.	Explain common patterns of ageing while recognising individual variation.	Avoid stereotypes that older people are weak, dependent or forgetful. Distinguish common age-related trends from assumptions about every individual.
6	**Human Life Journey Exhibition**	Human development involves physical, emotional and social changes from birth to old age. Scientific data show broad patterns, but individuals vary.	Interpret, synthesise, explain, evaluate and communicate.	Create and present a human-life timeline incorporating scientific explanations, growth data and inclusive advice for supporting wellbeing at different stages.	Timelines, graphs, diagrams, display materials, assessment tasks and presentation resources.	Present an inclusive plan showing how Greatstone's outdoor environment could support people across the human life cycle.	End-point practical, oral and written assessment.	Assess scientific accuracy, interpretation of data, recognition of variation and respectful communication. Revisit the big question explicitly.

Whole Unit Resource List

Investigation Equipment

- Rulers and metre sticks
- Tape measures
- Stopwatches
- Reaction-time rulers or digital timers
- Balancing or coordination equipment
- Clipboards
- Cameras or iPads
- Calculators, where appropriate
- Graphing resources

Consumables

- Life-stage photographs and cards
- Developmental milestone cards
- Anonymised growth charts
- Prepared height, mass, hand-span or reaction-time datasets
- Puberty information cards
- Human-body diagrams
- Timeline templates
- Graph paper
- Anonymous question slips and question box
- Inclusive-design scenario cards
- Large display paper
- Labels and sticky notes

Beach School Resources

- Weatherproof clipboards
- Stopwatches
- Cones and markers
- Balance and coordination equipment
- Accessibility audit sheets
- Route maps
- Cameras
- Inclusive outdoor-activity planning cards

Adaptive Teaching

- Revisit Year 2 learning about offspring and growth before introducing the full human life cycle.
- Use timelines, photographs and familiar examples before abstract data.
- Present development as a continuous process rather than fixed stages with exact boundaries.
- Pre-teach sensitive vocabulary and display agreed scientific definitions.
- Use school-approved diagrams and RSE materials.
- Provide partially completed graphs and timelines where needed.
- Use prepared or anonymised datasets rather than requiring pupils to share personal body measurements.
- Offer an anonymous question box during puberty learning.

- Allow pupils to demonstrate understanding through diagrams, timelines, oral explanations or digital presentations.
- Use sentence stems such as **“The data suggest…”**, **“A common change during this stage is…”** and **“Development varies because…”**
- Provide advance notice of puberty content for pupils who may need additional emotional or communication support.
- Challenge higher attainers to evaluate data limitations, distinguish correlation from cause and compare how social, medical and environmental factors influence life expectancy and wellbeing.

Health & Safety

- Follow the school’s RSE, safeguarding and confidentiality policies throughout the unit.
- Use agreed, scientifically accurate and age-appropriate terminology.
- Establish discussion ground rules before sensitive content.
- Do not ask pupils to disclose personal experiences of puberty, family development, medical history or home circumstances.
- Use anonymised or prepared data for growth comparisons.
- Avoid public comparison, ranking or judgement of pupils’ height, mass, development or physical ability.
- Store and dispose of any collected data securely and do not retain identifiable measurements unnecessarily.

- Adapt physical investigations for pupils with medical, mobility, sensory or coordination needs.
- Ensure adequate spacing and supervision during reaction-time, balance and movement activities.
- Allow pupils to opt for an alternative non-personal dataset where measurement activities could cause discomfort.
- Signpost pupils to an appropriate trusted adult or pastoral support route if questions or concerns arise.
- Follow established Beach School risk assessments for outdoor activities and accessibility audits.

Misconception	Teaching Response
Human life stages begin and end at exact ages.	Explain that stages describe broad patterns and people develop at different rates.
Growth means only becoming taller.	Explore changes in mass, proportions, coordination, communication, independence and maturity.
All babies and children develop skills at the same time.	Use broad developmental ranges and explain normal individual variation.
Body size shows how mature or capable someone is.	Separate physical size from emotional, social and cognitive development.
Puberty begins at the same age for everyone.	Reinforce that the timing and sequence of changes vary considerably.
Puberty changes happen only to boys or only to girls.	Distinguish changes that may occur broadly from those associated with particular reproductive anatomy.
Menstruation is an illness or injury.	Explain it as a normal biological process linked to reproductive development.
Emotional changes during puberty mean something is wrong.	Explain that changing emotions can be a normal part of development while support is available when feelings become difficult.
Humans stop developing after puberty.	Explore continued development through adulthood and ageing.
Everyone becomes physically weak or forgetful in old age.	Use evidence showing broad trends alongside substantial individual variation.
Older people cannot learn new skills.	Use examples and evidence demonstrating lifelong learning and varied capability.
A graph about average growth predicts exactly how one person will develop.	Explain that averages show group patterns and cannot determine an individual pathway.
Longer life expectancy means every individual will live to that age.	Clarify that life expectancy is a population average, not a personal prediction.

Reflection Question	Purpose
What evidence helped you sequence the human life stages?	Develop reasoning from observable and researched developmental characteristics.
Which changes occur most rapidly during infancy?	Consolidate understanding of early growth and dependency.
What pattern did you identify in the growth data?	Develop accurate interpretation of graphs and datasets.
Why can two people of the same age be at different stages of development?	Reinforce individual variation and avoid rigid expectations.
How is puberty part of the wider human life cycle?	Connect adolescence with continuous development from childhood to adulthood.
Why is respectful scientific vocabulary important when discussing development?	Support accurate, inclusive and sensitive communication.
What do the data show about adulthood and ageing, and what can they not tell us?	Develop evaluation of trends, averages and limitations.
How could an outdoor space be designed for people at different life stages?	Apply scientific understanding through inclusive problem-solving.
Which health or care professionals support people at different stages of life?	Connect learning with STEM and community careers.
How has scientific understanding improved people’s lives as they grow and age?	Link human-development research with the **INVENTORS** theme.
How did exploring evidence help challenge assumptions about age and development?	Connect scientific enquiry with the **EXPLORERS** theme.
How has this learning helped answer our big question?	Consolidate understanding that humans change continuously from birth to old age and that scientific data reveal broad patterns alongside individual variation.

YEAR 5 - Earth and Space - SUMMER 1

How do the movements of the Earth, Moon and Sun create the patterns we observe in space and time?

Section	Overview
Curriculum Rationale	This unit develops pupils’ understanding of the solar system and the movements of the Earth and Moon. Building on earlier learning about light, shadows, seasonal change and the water cycle, pupils learn that the Sun is a star at the centre of our solar system and that the planets orbit it. They investigate the Earth’s rotation and revolution, explain day and night and explore the Moon’s orbit around the Earth. Through Developing Experts enquiries, pupils use models, secondary sources, observations and data to explain patterns that cannot be investigated directly in the classroom. The unit develops spatial reasoning, scientific modelling and an appreciation of the scale and complexity of the universe.

The Greatstone Way	**PROTECTORS → LEGACY** – Children explore Earth as our shared home within a much larger solar system. They consider the importance of protecting a planet that is uniquely suited to support life and investigate how space science has transformed communication, navigation, weather forecasting and our understanding of the environment. Pupils reflect on the legacy of space exploration and how future scientific discoveries may help protect life on Earth.
National Curriculum Coverage	• 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.
Developing Experts Knowledge Progression	Pupils begin by exploring the scale and structure of the solar system before identifying the Sun as a star and the planets as approximately spherical bodies that orbit it. They investigate the Earth's rotation to explain day and night and distinguish rotation from revolution. Pupils then explore the Moon's orbit around the Earth and use models to explain why the Moon appears to change position and shape. Finally, they apply their understanding to explain observable patterns and evaluate the strengths and limitations of scientific models.
Curriculum Journey	**Previous Learning:** Year 1 – Seasonal Changes and day length; Year 3 – Light and shadows; Year 4 – the water cycle and environmental observation. **Current Learning:** The solar system, planetary movement, Earth's rotation, day and night and the Moon's orbit. **Next Learning:** Year 6 – Light, including how light travels and how we see; Key Stage 3 – gravity, seasons, eclipses, the universe and space physics.
Scientific Enquiry Question	**How can observations, evidence and scientific models help us explain movements in the solar system?**
Sticky Knowledge	The Sun is a star at the centre of our solar system. Eight planets orbit the Sun. The planets, Sun and Moon are approximately spherical. Earth rotates once approximately every 24 hours, causing day and night. Earth takes approximately 365¼ days to orbit the Sun. The Moon orbits Earth approximately every 28 days. The Sun appears to move across the sky because Earth is rotating. Scientific models help explain objects and movements that are too large, distant or slow to observe directly.
Working Scientifically	Ask scientific questions. Use secondary sources. Observe patterns over time. Use and evaluate models. Measure shadows. Gather and present data. Identify patterns. Use evidence to explain phenomena. Compare historical and current scientific ideas.
Scientific Knowledge & Skills	Name and order the planets. Describe the solar system. Explain planetary orbits. Distinguish rotation from revolution. Explain day and night. Describe the Moon's movement around Earth. Use models to represent space movements and evaluate their limitations.
Substantive Concepts	Earth • Space • Solar System • Orbit • Rotation • Revolution • Time • Light
Disciplinary Concepts	Observe • Model • Compare • Measure • Interpret • Explain • Evaluate
Scientific Vocabulary	Sun, star, solar system, planet, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Moon, sphere, spherical, orbit, rotation, revolution, axis, day, night, year, shadow, astronomy, satellite
Working Scientifically Vocabulary	question, observation, secondary source, model, scale, pattern, data, evidence, interpretation, conclusion, limitation, evaluate
Beach School & Outdoor Learning	Observe and measure shadows at different times of day. Use the horizon and open coastal sky to discuss the apparent movement of the Sun. Create human models of the solar system in a large outdoor space. Explore navigation, tides, weather satellites and the use of astronomy in coastal communities.
Greatstone & Local Links	Use Greatstone's wide coastal horizon for safe observations of daylight, shadows and the sky. Explore how sailors and coastal communities have used the Sun, Moon and stars for navigation. Consider how satellites support weather forecasting, communication, emergency services and coastal monitoring around Kent.
Cross-Curricular Links	Mathematics (scale, time, measurement and data), Geography (time zones, weather satellites and navigation), English (scientific explanation and biography), Computing (simulation, data and satellite technology), History (changing models of the solar system), Art (space imagery and scientific illustration).
High Quality Texts	*Hidden Figures*; *Look Up!*; *The Darkest Dark*; *Professor Astro Cat's Frontiers of Space*; *The Skies Above My Eyes*; age-appropriate astronomy texts.
Significant Scientists & STEM Careers	Nicolaus Copernicus, Galileo Galilei, Caroline Herschel, Katherine Johnson, Mae Jemison, astronomer, astrophysicist, astronaut, satellite engineer, space-weather scientist, aerospace engineer.
Memorable Hook	**The Greatstone Space Observatory** – Pupils receive a series of unexplained shadow records, planet images and satellite messages. They become astronomers responsible for using evidence and models to explain how Earth, the Moon and the planets move.
Authentic Outcome	**Greatstone Space Science Exhibition** – Pupils create an interactive solar-system model, day-and-night demonstration and Moon-orbit explanation. They present how space science supports life on Earth through navigation, communication, weather forecasting and environmental monitoring.
Assessment End Point	Pupils describe the movement of the Earth and other planets around the Sun, explain the movement of the Moon around Earth, identify the Sun, Earth and Moon as approximately spherical and use Earth's rotation to explain day, night and the apparent movement of the Sun.

YEAR 5 SUMMER 1 – 6-WEEK TEACHING SEQUENCE - Earth and Space

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	**Hook – The Greatstone Space Observatory**	The Sun is a star at the centre of the solar system. The eight planets orbit the Sun and differ in size, composition and distance.	Ask questions, use secondary sources, compare and classify.	Investigate mystery planet evidence and construct a correctly ordered solar-system model.	Planet cards, images, data tables, scale objects, string and enquiry packs.	Create a large human solar-system model using the open outdoor space.	Assess prior knowledge of the Sun, Moon, planets and space.	Keep the focus on relative order and movement rather than requiring precise distances. Clarify that the solar system is not the same as the universe or galaxy.
2	**The Shape and Movement of the Planets**	The Sun, Earth, Moon and planets are approximately spherical. Planets rotate on their axes and revolve around the Sun. An orbit is the curved path of one object around another.	Use and evaluate models, compare evidence and explain.	Compare historical and modern evidence for spherical bodies. Use balls and lamps to model rotation and revolution.	Globes, balls, lamps, historical images, satellite photographs and model-evaluation sheets.	Observe the horizon and discuss why it cannot alone prove Earth's shape; compare with reliable secondary evidence.	Distinguish rotation, revolution and orbit accurately.	Avoid saying planets are perfect spheres; "approximately spherical" is the National Curriculum wording. Explain that models are not to scale unless specifically designed to be.

3	**Earth's Rotation – Day and Night**	Earth rotates once approximately every 24 hours. The side facing the Sun experiences day while the side facing away experiences night. The Sun's apparent movement is caused by Earth's rotation.	Observe patterns, use models, predict and explain.	Use a globe and lamp to model day and night. Track a marked location through a full rotation and explain sunrise, midday, sunset and night.	Globes, lamps, location markers, torches and recording diagrams.	Observe and record the position and length of shadows at selected times without looking directly at the Sun.	Explain day and night using Earth's rotation rather than the Sun moving around Earth.	Ensure the lamp remains stationary while the globe rotates. Avoid using language suggesting the Sun travels around Earth each day.
4	**Shadows, Time and the Apparent Movement of the Sun**	Shadows change direction and length because Earth rotates and the Sun appears to change position in the sky. Shadow patterns can be used to estimate time.	Plan observations, measure accurately, record data and identify patterns.	Set up a shadow stick and measure shadow length and direction at regular intervals. Present data in a table or graph.	Shadow sticks, chalk, compasses, metre sticks, timers, clipboards and graph paper.	Complete the investigation in an open, safe location with a clear view of the sky.	Interpret shadow data and link patterns to Earth's rotation.	Do not look directly at the Sun. Weather may interrupt observations, so use prepared data as a backup. Explain that a sundial gives local solar time and is affected by season and location.
5	**The Moon's Orbit Around Earth**	The Moon is Earth's natural satellite and takes approximately 28 days to orbit Earth. The Moon rotates as it orbits, so approximately the same side faces Earth. The Moon does not make its own light.	Use models, observe patterns in secondary data and explain.	Model the Moon's orbit using balls and lamps. Sequence Moon observations and distinguish orbit from rotation.	Earth and Moon models, lamps, Moon-phase photographs, sequencing cards and diagrams.	Observe the Moon safely at home or use prepared photographic records taken over time.	Explain the Moon's movement and identify reflected sunlight as the reason it is visible.	The National Curriculum requires movement of the Moon relative to Earth, not detailed phase explanations. Avoid suggesting Earth's shadow normally causes Moon phases.
6	**Greatstone Space Science Exhibition**	Scientific models and observations explain planetary movement, day and night and the Moon's orbit. Space science supports life on Earth through satellites and exploration.	Synthesise evidence, construct models, evaluate limitations and communicate.	Create and present a working model or explanation of the solar system, day and night or the Earth–Moon system. Include a model evaluation and real-world application.	Model-making materials, globes, lamps, planet data, display resources and assessment tasks.	Present how satellites assist coastal weather forecasting, communication, navigation or environmental monitoring.	End-point practical, oral and written assessment.	Assess scientific accuracy and explanation rather than model decoration. Require pupils to identify at least one limitation, such as incorrect scale, distance or speed.

Whole Unit Resource List

Investigation Equipment

- Globes
- Lamps or bright torches
- Balls of different sizes
- Planet models
- Shadow sticks
- Metre sticks and rulers
- Compasses
- Stopwatches or timers
- Clipboards
- Cameras or iPads
- Binoculars for terrestrial observation only
- Astronomy software or simulations, where available

Consumables

- Planet cards
- Solar-system data tables
- String and rope
- Location markers
- Moon observation cards
- Shadow-recording sheets
- Graph paper
- Black card
- Modelling materials
- Labels and sticky notes
- Large display paper
- Model-evaluation sheets

Beach School Resources

- Weatherproof clipboards
- Shadow sticks
- Chalk
- Metre tapes
- Compasses
- Timers
- Sky-observation sheets
- Coastal navigation scenario cards
- Satellite and weather-map images
- Cameras

Adaptive Teaching

- Begin with pupils' existing ideas and explicitly identify common misconceptions.
- Use large physical models before diagrams and written explanations.
- Keep **rotation**, **revolution** and **orbit** visually distinct through consistent gestures and symbols.
- Use colour-coded arrows to show direction of movement.
- Provide planet-order mnemonics as retrieval support while ensuring pupils understand that Pluto is classified as a dwarf planet.
- Use short animations or simulations alongside physical models.
- Provide partially completed diagrams and sequencing cards where needed.
- Allow pupils to explain through models, oral recordings, annotated photographs or diagrams.
- Use sentence stems such as **"Day and night happen because…"**, **"The Moon moves by…"** and **"This model is limited because…"**
- Provide prepared shadow or Moon data when outdoor observation is inaccessible.
- Challenge higher attainers to compare geocentric and heliocentric models, evaluate scale models and explain why different planets have different year lengths.

Health & Safety

- **Never allow pupils to look directly at the Sun**, with or without sunglasses, cameras, telescopes or binoculars.
- Do not use magnifying glasses, mirrors or lenses to concentrate or redirect sunlight.
- Use lamps or torches rather than direct sunlight for close practical modelling.
- Ensure lamps remain stable, do not become excessively hot and are kept away from flammable materials.
- Switch lamps off when not in use.
- Keep walkways clear during darkened-room demonstrations.
- Establish safe spacing during large human-model activities.
- Check weather and ground conditions before outdoor shadow observations.
- Use chalk or markers safely and remove trip hazards after investigations.
- Moon observations outside school should be optional, supervised by families and replaceable with supplied photographic evidence.
- Do not require pupils to use personal devices or remain outdoors after dark.
- Follow established Beach School risk assessments for all outdoor work.

Common Misconception	Teaching Response
The Sun is a planet.	Reinforce that the Sun is a star and planets orbit it.

The solar system and the universe are the same.	Place the solar system within the Milky Way galaxy and the wider universe using nested models.
The planets are close together and similar in size.	Evaluate common diagrams and explain that scale and distance are usually compressed.
Earth is a perfect sphere.	Use “approximately spherical” and discuss slight flattening without unnecessary detail.
Earth is stationary while the Sun moves around it each day.	Use a fixed lamp and rotating globe to model the cause of day and night.
The Sun rises because it moves around Earth.	Explain that the Sun appears to move because Earth rotates.
Day and night are caused by Earth orbiting the Sun.	Distinguish the 24-hour rotation from the approximately 365-day revolution.
Every place on Earth experiences day and night at the same time.	Use the globe to show that different locations face the Sun at different times.
Seasons are caused by Earth moving closer to and further from the Sun.	Clarify that seasons are linked to Earth’s axial tilt; retain detailed teaching for later where appropriate.
The Moon produces its own light.	Demonstrate that it reflects light from the Sun.
The Moon remains still while Earth moves.	Model the Moon orbiting Earth while the Earth–Moon system orbits the Sun.
Earth’s shadow causes the usual phases of the Moon.	Use a lamp and models to show changing views of the illuminated half of the Moon.
The Moon does not rotate.	Demonstrate that the Moon rotates once during each orbit, which is why approximately the same side faces Earth.
Astronauts experience no gravity in space.	Explain that gravity acts in space and keeps planets and moons in orbit; apparent weightlessness results from continuous falling.
Scientific models are exact copies of reality.	Evaluate model limitations involving scale, distance, shape and speed.

Reflection Question	Purpose
What evidence shows that the Sun is a star and the planets orbit it?	Develop explanation based on reliable secondary evidence.
How are rotation and revolution different?	Secure two essential movement concepts.
Why is it daytime in one part of Earth while another part experiences night?	Apply Earth’s rotation to different locations.
What pattern did you observe in the length and direction of shadows?	Develop interpretation of observations over time.
How did the shadow investigation support the idea that Earth rotates?	Connect local evidence with a larger scientific explanation.
Why does the Sun appear to move across the sky?	Address geocentric misconceptions directly.
How does the Moon move relative to Earth?	Consolidate understanding of orbit and rotation.
Why can we see the Moon if it does not produce its own light?	Reinforce reflection of sunlight.
What was useful about your model, and what could it not show accurately?	Develop critical evaluation of scientific models.
How does space science help protect people and environments around Greatstone?	Link satellites, weather forecasting and coastal monitoring with **PROTECTORS**.
Which achievements in space science have left an important legacy?	Connect scientific discovery and technology with **LEGACY**.
How has this learning helped answer our big question?	Consolidate understanding that movements of the Earth, Moon and planets create observable patterns in day, night, time and the sky.

YEAR 5 - Living Things and Their Habitats – Life Cycles and Reproduction - SUMMER 2

How do living things reproduce and complete their life cycles to ensure the survival of their species?

Section	Overview
Curriculum Rationale	This unit develops pupils' understanding of life cycles and reproduction across plants, mammals, amphibians, insects and birds. Building on Year 4 classification and habitats and Year 5 learning about human development, pupils investigate how different organisms reproduce and complete their life cycles. They compare similarities and differences between life cycles, explore sexual and asexual reproduction in plants and understand how reproduction ensures the continuation of species. Through Developing Experts enquiries, pupils observe, compare, interpret evidence from secondary sources and use scientific models to explain biological processes that cannot be observed directly.
The Greatstone Way	**LEGACY** – Children discover that every living thing leaves a legacy through reproduction and the continuation of its species. They investigate how plants and animals ensure survival across generations and recognise the importance of protecting habitats so future generations of living things can thrive. Through Beach School, pupils observe local life cycles and consider how conservation today protects biodiversity for tomorrow.
National Curriculum Coverage	• Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. • Describe the life process of reproduction in some plants and animals.
Developing Experts Knowledge Progression	Pupils begin by revisiting the characteristics of living things before comparing complete life cycles in mammals, birds, amphibians and insects. They investigate complete and incomplete metamorphosis before exploring reproduction in flowering plants, including pollination, fertilisation, seed formation and seed dispersal. Finally, pupils investigate asexual reproduction in plants and compare this with sexual reproduction, recognising how both contribute to species survival.
Curriculum Journey	**Previous Learning:** Year 2 – Growth and survival of animals; Year 4 – Living Things and Their Habitats (classification and environmental change); Year 5 – Animals Including Humans (human development). **Current Learning:** Life cycles and reproduction in plants and animals. **Next Learning:** Year 6 – Evolution and Inheritance; Key Stage 3 – reproduction, genetics, variation and ecosystems.
Scientific Enquiry Question	**How do different organisms reproduce and complete their life cycles successfully?**
Sticky Knowledge	All living things reproduce to produce offspring. Mammals, birds, amphibians and insects have different life cycles. Some insects undergo complete metamorphosis. Plants reproduce sexually through pollination, fertilisation and seed production. Some plants reproduce asexually using runners, bulbs, tubers or cuttings. Sexual reproduction produces offspring with variation. Asexual reproduction produces genetically identical offspring. Life cycles help species survive across generations.
Working Scientifically	Ask scientific questions. Observe over time. Compare life cycles. Use secondary sources. Identify patterns. Interpret diagrams. Record findings. Draw conclusions using evidence. Evaluate scientific models.
Scientific Knowledge & Skills	Compare life cycles. Explain reproduction in plants and animals. Describe pollination and fertilisation. Identify methods of seed dispersal. Compare sexual and asexual reproduction. Explain how reproduction contributes to species survival.

Substantive Concepts	Living Things • Life Cycles • Reproduction • Growth • Inheritance • Survival
Disciplinary Concepts	Observe • Compare • Sequence • Interpret • Explain • Evaluate
Scientific Vocabulary	life cycle, reproduction, offspring, adult, egg, larva, pupa, chrysalis, metamorphosis, amphibian, mammal, bird, insect, pollination, pollen, anther, stigma, fertilisation, ovule, seed, seed dispersal, germination, sexual reproduction, asexual reproduction, runner, bulb, tuber, cutting
Working Scientifically Vocabulary	observe, compare, classify, pattern, sequence, evidence, data, conclusion, model, evaluate
Beach School & Outdoor Learning	Observe flowering plants, insects and birds in local habitats. Investigate pollinators visiting flowers. Identify naturally dispersed seeds. Observe plant runners and bulbs where appropriate. Carry out biodiversity surveys to identify evidence of reproduction in the local environment.
Greatstone & Local Links	Investigate dune grasses, wildflowers, insects, butterflies, bees, coastal birds and marine life around Greatstone. Explore how protected habitats support breeding birds, pollinating insects and native plants. Investigate how conservation projects protect life cycles from disturbance.
Cross-Curricular Links	Geography (ecosystems and biodiversity), Mathematics (life-cycle timelines and graphs), English (scientific explanations), Art (botanical illustration), Computing (digital life-cycle presentations), PSHE (respect for living things).
High Quality Texts	*The Extraordinary Gardener*; *The Bee Book*; *A Butterfly Is Patient*; *Life Cycles*; *Hidden Life Cycles*; age-appropriate texts about reproduction and biodiversity.
Significant Scientists & STEM Careers	Maria Sibylla Merian, Gregor Mendel, David Attenborough, botanist, ecologist, horticulturalist, wildlife conservationist, entomologist, marine biologist.
Memorable Hook	**The Greatstone Biodiversity Investigation** – Pupils receive mystery eggs, seeds, larvae, flowers and animal photographs. They become life-cycle scientists responsible for identifying how different organisms reproduce and survive across generations.
Authentic Outcome	**Greatstone Living World Exhibition** – Pupils create interactive life-cycle displays, seed-dispersal demonstrations and plant-propagation investigations before presenting recommendations for protecting local wildlife and habitats for future generations.
Assessment End Point	Pupils compare the life cycles of mammals, birds, insects and amphibians, explain reproduction in plants and animals, distinguish between sexual and asexual reproduction in plants and use scientific vocabulary accurately to explain how reproduction ensures species survival.

YEAR 5 SUMMER 2 – 6 WEEK TEACHING SEQUENCE - Living Things and Their Habitats – Life Cycles and Reproduction

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	**Hook – The Greatstone Biodiversity Investigation**	All living things reproduce and have life cycles. Different organisms have different life-cycle stages.	Ask questions, observe and classify.	Sort mystery eggs, seeds, larvae and adult organisms into possible life cycles.	Specimens, photographs, life-cycle cards, magnifiers.	Search for evidence of life cycles in local habitats.	Prior knowledge assessment.	Revisit Year 4 classification before introducing life cycles.
2	**Comparing Animal Life Cycles**	Mammals, birds, amphibians and insects have different life cycles.	Compare and identify patterns.	Construct and compare life-cycle diagrams.	Animal life-cycle cards, models, diagrams.	Observe birds, insects or amphibians where appropriate.	Explain similarities and differences.	Clarify that all organisms grow and reproduce but in different ways.
3	**Metamorphosis**	Some insects undergo complete metamorphosis while others develop differently. Amphibians also undergo major developmental changes.	Sequence, compare and interpret.	Compare butterfly and frog development.	Butterfly and frog models, photographs, sequencing cards.	Search for insects and discuss life stages.	Sequence accurately.	Distinguish metamorphosis from simple growth.
4	**Plant Reproduction**	Flowering plants reproduce sexually through pollination, fertilisation and seed production.	Observe, dissect and identify structures.	Dissect flowers and identify reproductive parts.	Flowers, magnifiers, tweezers, diagrams.	Observe pollinators visiting flowers.	Label flower parts accurately.	Reinforce respectful handling of living plants.
5	**Seed Dispersal and Asexual Reproduction**	Seeds are dispersed in different ways. Some plants reproduce asexually using runners, bulbs, tubers and cuttings.	Compare, investigate and explain.	Investigate seed dispersal and propagate plants from cuttings or runners.	Seeds, fans, trays, runners, bulbs, cuttings.	Collect naturally dispersed seeds.	Explain different reproductive strategies.	Compare advantages of sexual and asexual reproduction.
6	**Greatstone Living World Exhibition**	Reproduction ensures the continuation of species. Different organisms use different reproductive strategies.	Present, evaluate and communicate.	Create life-cycle displays and explain conservation links.	Models, diagrams, display materials.	Present local biodiversity findings.	End-point assessment.	Assess scientific understanding rather than artistic presentation.

Whole Unit Resource List

Investigation Equipment

- Hand lenses
- Microscopes or digital microscopes (where available)
- Flower dissection equipment
- Tweezers
- Petri dishes
- Magnifying glasses
- Clipboards
- Cameras or iPads

Consumables

- Fresh flowers
- Seeds
- Bulbs
- Plant cuttings
- Life-cycle cards
- Sequencing cards
- Labels
- Graph paper
- Large display paper

Beach School Resources

- Nature journals
- Bug viewers
- Identification guides
- Seed collection trays
- Binoculars
- Cameras
- Weatherproof clipboards

Adaptive Teaching

- Begin with familiar animals before introducing complete life-cycle comparisons.
- Use large visual timelines and sequencing cards.
- Provide labelled diagrams for flower structure before dissection.
- Use videos where life-cycle stages cannot be observed directly.
- Model scientific vocabulary before independent explanations.
- Provide partially completed life-cycle diagrams where appropriate.
- Encourage oral rehearsal before written scientific explanations.

- Allow pupils to demonstrate understanding through models, diagrams or presentations.
- Challenge higher attainers to compare reproductive strategies and evaluate the advantages of sexual and asexual reproduction in different environments.

Health & Safety

- Check for pollen, plant or insect allergies before outdoor activities.
- Supervise flower dissections and the safe use of tweezers or scissors.
- Wash hands after handling plants or soil.
- Return any living organisms carefully to their habitats.

- Avoid disturbing nests, eggs or breeding animals.
- Follow Beach School risk assessments throughout outdoor investigations.
- Ensure pupils do not taste seeds, berries or plant material.
- Clean equipment thoroughly after handling soil or plant material.

Common Misconception	Teaching Response
All animals have the same life cycle.	Compare mammals, birds, amphibians and insects directly.
Metamorphosis happens to every animal.	Use contrasting examples to show that many animals grow without metamorphosis.
Pollination and fertilisation are the same process.	Demonstrate that pollination happens first and fertilisation follows inside the flower.
Every flower is pollinated by insects.	Compare insect, wind and other methods of pollination.
Seeds begin growing immediately after dispersal.	Explain that germination only occurs when suitable conditions are present.
Asexual reproduction produces different offspring.	Compare genetically identical offspring with variation produced through sexual reproduction.
All plants reproduce using seeds.	Investigate runners, bulbs, tubers and cuttings.
Every insect has a chrysalis stage.	Compare complete and incomplete metamorphosis using different insect examples.
Reproduction guarantees survival of every offspring.	Explain that producing offspring increases the chance of species survival, but many offspring do not survive to adulthood.

Reflection Question	Purpose
How are the life cycles of mammals, birds, amphibians and insects similar and different?	Develop comparative scientific thinking.
Why do some organisms undergo metamorphosis?	Explore adaptation and development.
What evidence showed how flowering plants reproduce?	Reinforce understanding of plant reproduction.
Why do plants disperse their seeds?	Connect reproduction with survival.
What are the advantages of asexual reproduction?	Compare reproductive strategies.
How do different reproductive methods help species survive?	Link adaptations to biodiversity.
Why is protecting habitats important for future generations of living things?	Connect science to conservation and sustainability.
How does reproduction help create a legacy for every species?	Link the unit to the **LEGACY** theme.
How has this learning helped answer our big question?	Consolidate understanding that different organisms have different life cycles and reproductive strategies, ensuring the continuation and survival of species across generations.

YEAR 6 - Electricity – AUTUMN 1

How can we use our understanding of electricity to design, improve and troubleshoot electrical systems safely?

Section	Overview
Curriculum Rationale	This unit builds on pupils' Year 4 learning about simple electrical circuits by developing a deeper understanding of electrical components, symbols and circuit behaviour. Pupils investigate how changing components affects the brightness of bulbs, the volume of buzzers and the speed of motors. They learn to use recognised circuit symbols to construct and interpret circuit diagrams and apply their understanding to troubleshoot faulty circuits. Through Developing Experts enquiries, pupils plan comparative investigations, identify variables, collect quantitative evidence and evaluate how electrical systems are designed for different purposes. The unit develops logical reasoning, scientific modelling and engineering skills while preparing pupils for Key Stage 3 physics.
The Greatstone Way	**ROOTS → SURVIVORS** – Children investigate how electricity supports everyday life and keeps communities safe. Through engineering challenges linked to Greatstone's coastal environment, pupils develop resilience by designing, testing and refining electrical systems that solve real-world problems. They recognise how reliable electrical systems support communication, rescue services and sustainability within their local community.
National Curriculum Coverage	• Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. • Compare and give reasons for variations in how components function, including the brightness of bulbs, loudness of buzzers and on/off position of switches. • Use recognised symbols when representing a simple circuit in a diagram.
Developing Experts Knowledge Progression	Pupils revisit the components of simple series circuits before investigating how voltage affects circuit output. They compare different circuit arrangements and investigate why components behave differently. Pupils learn internationally recognised circuit symbols before applying their understanding to interpret, construct and troubleshoot increasingly complex circuits. Finally, they apply their learning through an engineering design challenge requiring careful testing, refinement and evaluation.
Curriculum Journey	**Previous Learning:** Year 4 – Electricity (simple circuits, switches, conductors and insulators). **Current Learning:** Circuit diagrams, voltage, component performance and troubleshooting. **Next Learning:** Key Stage 3 – Current, potential difference, resistance, parallel circuits and electrical calculations.
Scientific Enquiry Question	**How can scientific testing help us improve and explain the performance of electrical circuits?**
Sticky Knowledge	Electrical circuits require a complete conducting pathway. Adding more cells usually increases the brightness of bulbs, the loudness of buzzers and the speed of motors when suitable components are used. Circuit diagrams use internationally recognised symbols. Electrical components behave differently depending on the design of the circuit. Systematic testing allows faults to be identified and corrected. Electricity should always be used safely.
Working Scientifically	Ask questions. Make predictions. Plan comparative and fair tests. Identify variables. Measure and observe carefully. Record results in tables and graphs. Interpret patterns. Draw conclusions using evidence. Troubleshoot systematically. Evaluate investigations.

Scientific Knowledge & Skills	Construct and interpret circuit diagrams. Compare circuit performance. Explain the effect of additional cells. Investigate switches and components. Troubleshoot faulty circuits. Apply electrical knowledge to engineering design.
Substantive Concepts	Electricity • Energy • Circuits • Voltage • Components • Conductors • Systems
Disciplinary Concepts	Observe • Predict • Test • Measure • Compare • Interpret • Evaluate • Explain
Scientific Vocabulary	electricity, electrical energy, cell, battery, voltage, circuit, complete circuit, series circuit, component, bulb, lamp, buzzer, motor, switch, wire, terminal, conductor, insulator, circuit diagram, circuit symbol, fault, output
Working Scientifically Vocabulary	comparative test, fair test, variable, observation, prediction, evidence, data, pattern, anomaly, conclusion, reliability, troubleshoot, evaluate
Beach School & Outdoor Learning	Investigate battery-powered safety equipment used outdoors. Explore how electrical systems support weather monitoring, navigation and emergency communication. Design low-voltage warning systems suitable for coastal environments. Investigate waterproof housing materials for outdoor electrical devices.
Greatstone & Local Links	Explore electrical systems used in lifeboat stations, coastal warning lights, weather stations, navigation equipment and emergency communication around Greatstone. Consider renewable energy sources, including local wind and solar technologies, and their role in sustainable coastal communities.
Cross-Curricular Links	Design and Technology (electrical products), Computing (inputs, outputs and control systems), Mathematics (measurement and data handling), Geography (renewable energy), English (technical explanations and evaluations).
High Quality Texts	*Electrical Wizard: How Nikola Tesla Lit Up the World*; *The Boy Who Harnessed the Wind*; *See Inside Electricity*; age-appropriate texts on electricity and engineering.
Significant Scientists & STEM Careers	Michael Faraday, Nikola Tesla, Thomas Edison, Hertha Ayrton, electrical engineer, renewable energy engineer, electronics technician, systems engineer, electrician.
Memorable Hook	**The Greatstone Emergency Power Challenge** – Following a simulated power failure affecting coastal safety systems, pupils become electrical engineers responsible for diagnosing faults, improving circuits and designing reliable emergency electrical systems for the Greatstone community.
Authentic Outcome	**Greatstone Engineering Showcase** – Pupils design, build and present a working low-voltage electrical system with labelled circuit diagrams and evidence explaining how scientific testing improved the final design.
Assessment End Point	Pupils construct and interpret circuit diagrams using recognised symbols, explain how additional cells affect circuit performance, troubleshoot faulty circuits using evidence and apply their understanding to design a safe electrical system.

YEAR 6 AUTUMN 1 – 6 WEEK TEACHING SEQUENCE - Electricity

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	**Hook – Greatstone Emergency Power Challenge**	Electricity powers many everyday systems. Engineers investigate and solve electrical problems using evidence.	Ask questions, observe and identify components.	Investigate non-working electrical systems and identify possible faults.	Circuit kits, fault cards, electrical photographs, engineering scenarios.	Identify outdoor electrical systems used around the local environment.	Prior knowledge assessment.	Revisit Year 4 circuit knowledge before introducing circuit diagrams.
2	**Recognised Circuit Symbols**	Electrical circuits can be represented using internationally recognised symbols.	Observe, interpret and record.	Match components to symbols before drawing complete circuit diagrams.	Circuit symbol cards, components, whiteboards.	Sketch outdoor electrical systems using circuit symbols where appropriate.	Draw accurate circuit diagrams.	Reinforce correct symbol conventions throughout the unit.
3	**How Does Voltage Affect Circuits?**	Adding more cells generally increases the brightness of bulbs, loudness of buzzers and speed of motors.	Plan comparative tests and identify variables.	Compare circuits with different numbers of cells.	Cells, bulbs, buzzers, motors, stopwatches.	Investigate where increased power is useful in coastal equipment.	Explain evidence using scientific vocabulary.	Ensure pupils understand that suitable components are required.
4	**Investigating Circuit Performance**	Different components respond differently within electrical circuits.	Measure, compare and interpret patterns.	Compare bulbs, buzzers and motors under different circuit conditions.	Circuit kits, recording sheets.	Design a warning system for Beach School.	Interpret investigation data.	Encourage quantitative observations where possible.
5	**Troubleshooting Electrical Systems**	Faults can be identified through systematic testing.	Predict, test and evaluate.	Diagnose and repair faulty circuits.	Prepared faulty circuits, testing checklists.	Troubleshoot outdoor battery-powered equipment models.	Explain reasons for faults.	Promote logical step-by-step problem solving.
6	**Engineering Showcase**	Scientific testing improves electrical designs.	Evaluate, communicate and justify.	Design and build a working electrical product using circuit diagrams.	Construction materials, circuit kits, design sheets.	Present coastal safety designs.	End-point assessment.	Assess scientific reasoning rather than appearance.

Whole Unit Resource List

Investigation Equipment

- Low-voltage circuit kits
- Cells and battery holders
- Bulbs and bulb holders
- Buzzers
- Small motors
- Switches
- Connecting wires
- Circuit symbol cards
- Force meters (where required for integrated investigations)
- Timers
- Clipboards
- Cameras or iPads

Consumables

- Card
- Copper tape (optional)
- Split pins
- Paper clips
- Foil
- Design sheets
- Graph paper
- Labels
- Recording sheets

Beach School Resources

- Battery-powered torches
- Weather station images
- Renewable energy photographs
- Weatherproof clipboards
- Cameras

- Outdoor electrical scenario cards

Adaptive Teaching

- Revisit Year 4 circuit-building before introducing abstract circuit diagrams.
- Model each recognised symbol before independent recording.
- Use colour-coded circuit diagrams alongside real components.
- Provide troubleshooting flow charts.
- Use structured recording tables for comparative investigations.
- Encourage oral explanations before written conclusions.
- Provide sentence stems such as **"The circuit worked because…"** and **"The evidence suggests…"**
- Allow pupils to explain through diagrams, photographs or demonstrations.
- Challenge higher attainers to explain how increased voltage affects circuit output and evaluate investigation reliability.

Health & Safety

- Use only approved low-voltage educational circuit equipment.
- Never connect classroom circuits to mains electricity.
- Inspect wires and components before use.
- Disconnect circuits immediately after investigations.
- Avoid overheating bulbs or motors.
- Keep water away from electrical equipment.
- Wash hands after outdoor investigations before handling electrical equipment.
- Follow Beach School risk assessments for outdoor activities.
- Ensure damaged cells or wires are removed immediately.

Common Misconception	Teaching Response
More cells always make any circuit work better.	Investigate suitable voltage for different components and discuss safe operating ranges.
Circuit symbols are pictures of components.	Explain that symbols are internationally recognised scientific representations.
Electricity is "used up" by the bulb.	Reinforce the idea of a complete circuit allowing electrical energy to transfer.
A brighter bulb means electricity is travelling faster.	Distinguish between voltage and the speed of electrical energy transfer at this level.
Fault finding involves guessing.	Teach systematic troubleshooting using evidence.
Any circuit diagram can be drawn in any style.	Reinforce standard scientific conventions.
Electrical systems never fail if built correctly.	Investigate wear, loose connections and damaged components.

Reflection Question	Purpose
Why do scientists use recognised circuit symbols?	Reinforce scientific communication.
What evidence showed how additional cells affected the circuit?	Develop evidence-based explanations.
How did systematic testing help identify the fault?	Promote logical scientific reasoning.
Which investigation produced the most reliable evidence? Why?	Develop evaluation skills.
How did your engineering design improve after testing?	Reinforce iterative design.
Why is electrical safety so important?	Connect scientific knowledge to everyday life.
How do electrical systems help protect communities like Greatstone?	Link science to local contexts and the **ROOTS** theme.
What legacy have electrical engineers left for society?	Connect scientific discovery to the **LEGACY** of innovation and engineering.
How has this learning helped answer our big question?	Consolidate understanding that scientific investigation allows engineers to design, improve and troubleshoot safe, reliable electrical systems.

YEAR 6 - Light – AUTUMN 2

How does light travel, how do we see objects, and how can understanding light help us solve problems?

Section	Overview
Curriculum Rationale	This unit builds on pupils' Year 3 understanding that light is needed to see, is reflected from surfaces and can be blocked to form shadows. Pupils develop a more precise model in which light travels in straight lines from a source, reflects from objects and enters the eye. They use this model to explain vision, reflection and shadow formation before investigating how the size and shape of shadows change. Through Developing Experts enquiries, pupils plan comparative and fair tests, take accurate measurements, use diagrams and models, identify patterns and evaluate the reliability of evidence. The unit prepares pupils for Key Stage 3 learning about light waves, reflection and refraction.
The Greatstone Way	**ROOTS → SURVIVORS** – Children investigate light as an essential part of everyday life, communication and safety. They explore how humans have used light to navigate, signal danger and survive challenging environments. Through Greatstone and Beach School links, pupils consider lighthouses, reflective equipment and coastal warning systems, developing resilience as they test, refine and improve solutions to practical light-related problems.
National Curriculum Coverage	• Recognise that light appears to travel in straight lines. • Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. • Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. • Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.
Developing Experts Knowledge Progression	Pupils begin by revisiting light sources, reflection and shadow formation before gathering evidence that light travels in straight lines. They use ray diagrams and physical models to explain how light enters the eye from luminous and non-luminous objects. Pupils then investigate reflection and use mirrors to alter the direction of light. They explore shadow shape and size through systematic testing before applying their understanding to an optical or coastal safety challenge.
Curriculum Journey	**Previous Learning:** Year 3 – Light sources, reflection, sun safety, shadows and changes in shadow size; Year 5 – Earth and Space, including day, night and the apparent movement of the Sun. **Current Learning:** Straight-line travel of light, vision, reflection, ray diagrams and shadow formation. **Next Learning:** Key Stage 3 – light waves, reflection, refraction, colour, lenses and the human eye.
Scientific Enquiry Question	**How can evidence, diagrams and models help us explain the way light travels and enables us to see?**
Sticky Knowledge	Light travels in straight lines. Luminous objects produce their own light. Non-luminous objects are seen because they reflect light. We see when light enters our eyes. Light travels directly from a source to the eye or reflects from an object before entering the eye. Mirrors change the direction of light through reflection. Opaque objects block light and form shadows. Shadows have the same outline as the object because light travels in straight lines. Shadow size changes when the positions of the light source, object or screen change.
Working Scientifically	Ask scientific questions. Make reasoned predictions. Plan fair and comparative tests. Identify variables. Measure distance and shadow size accurately. Use models and ray diagrams. Record data in tables and graphs. Identify patterns. Draw conclusions. Evaluate evidence, methods and model limitations.

Scientific Knowledge & Skills	Explain that light travels in straight lines. Distinguish luminous and non-luminous objects. Explain how light enters the eye. Construct and interpret ray diagrams. Explain reflection. Investigate shadow formation and size. Apply knowledge to optical and safety problems.
Substantive Concepts	Light • Vision • Reflection • Shadows • Energy • Optical Systems
Disciplinary Concepts	Observe • Predict • Model • Measure • Test • Analyse • Explain • Evaluate
Scientific Vocabulary	light, light source, luminous, non-luminous, ray, beam, travel, straight line, reflection, reflect, incident light, reflected light, mirror, surface, eye, pupil, retina, opaque, translucent, transparent, shadow, angle, periscope
Working Scientifically Vocabulary	question, prediction, hypothesis, independent variable, dependent variable, control variable, fair test, comparative test, measure, data, table, line graph, pattern, anomaly, evidence, conclusion, reliability, evaluate, limitation
Beach School & Outdoor Learning	Investigate changing shadows using the wide coastal horizon. Explore reflective materials used in outdoor and emergency equipment. Use mirrors or safe reflective devices indoors or in shaded outdoor areas to redirect torchlight. Investigate how lighthouses and warning lights communicate across distance. Design a periscope or reflective safety device for a coastal scenario.
Greatstone & Local Links	Explore how lighthouses, navigation lights, reflective clothing, bicycle reflectors and coastal warning signs improve safety around Greatstone. Investigate reflection from water, wet surfaces and windows. Consider how lifeboat crews, emergency services and road users rely on reliable light signals in poor visibility.
Cross-Curricular Links	Design and Technology (periscopes and optical devices), Mathematics (angles, distance, measurement and graphs), Computing (light sensors and digital imaging), Art (perspective, reflection and shadow), Geography (coastal navigation), English (scientific explanation and evaluation).
High Quality Texts	*The Darkest Dark*; *The Lighthouse Keeper's Lunch*; *Women in Science*; *The Story of Light*; age-appropriate texts about optics, vision, lighthouses and scientific discovery.
Significant Scientists & STEM Careers	Ibn al-Haytham, Isaac Newton, Thomas Young, Patricia Bath, physicist, optical engineer, ophthalmologist, photographer, lighting engineer, lighthouse technician.
Memorable Hook	**The Greatstone Lighthouse Signal Failure** – Pupils receive reports that a coastal warning system is no longer directing light effectively. They become optical scientists responsible for investigating how light travels, reflects and forms shadows before designing a reliable signalling or viewing device.
Authentic Outcome	**Greatstone Light and Optics Exhibition** – Pupils create working optical demonstrations, accurate ray diagrams, shadow investigations and a designed device such as a periscope or reflective warning system. They explain how scientific testing improved safety and performance.
Assessment End Point	Pupils explain that light travels in straight lines, describe how luminous and non-luminous objects are seen, draw accurate ray diagrams, explain reflection and use straight-line travel to account for the shape and changing size of shadows.

YEAR 6 AUTUMN 2 – 6-WEEK TEACHING SEQUENCE - Light

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	**Hook – The Greatstone Lighthouse Signal Failure**	Light is produced by luminous sources. Non-luminous objects are visible because they reflect light. Light is essential for vision and safety.	Ask questions, observe, classify and use prior knowledge.	Examine a failed lighthouse or warning-system scenario. Classify luminous and non-luminous objects and generate questions about how light reaches an observer.	Torches, lamps, reflective materials, object cards, lighthouse images, enquiry packs and dark boxes.	Identify natural and artificial light sources and reflective safety features around the school or local area.	Prior knowledge assessment of light sources, reflection, vision and shadows.	Revisit Year 3 without accepting the idea that eyes send out light. The Moon and reflective signs are non-luminous because they reflect light from another source.
2	**Does Light Travel in Straight Lines?**	Light appears to travel in straight lines. Evidence can be gathered by observing that light passes through aligned openings but is blocked when the openings are moved.	Make predictions, plan a comparative investigation and use models.	Shine a torch through several cards with small holes. Align and misalign the holes and record when the light is visible. Use a light box or ray box where available.	Torches, card screens, stands, hole punches, darkened space, light boxes and recording sheets.	Use safe shaded locations to explore straight-line sightlines linked to coastal signalling.	Explain how the evidence supports straight-line travel.	Avoid stating that the investigation proves everything about light. It provides evidence consistent with a straight-line model. Never use laser pointers.
3	**How Do We See Objects?**	Light travels directly from a luminous source to the eye. Non-luminous objects are seen when light travels from a source, reflects from the object and enters the eye.	Use and evaluate models, draw ray diagrams and explain cause and effect.	Use torches, objects and eye-position cards to model the path of light. Construct ray diagrams for luminous and reflected-light situations.	Torches, objects, mirrors, eye cards, ray-arrow strips, diagrams and whiteboards.	Model how a navigation light or reflective sign becomes visible to an observer.	Draw and explain accurate source–object–eye pathways.	Arrows in ray diagrams show the direction in which light travels. They must point towards the eye, not out of it. Keep eye anatomy limited to what supports the concept of light entering the eye.
4	**Reflection and Redirecting Light**	Light changes direction when it reflects from a surface. Smooth, shiny surfaces form clearer reflections than rough surfaces. Mirrors can be arranged to redirect light and enable viewing around obstacles.	Predict, measure angles where appropriate, compare and evaluate designs.	Investigate torchlight reflecting from mirrors. Build and test a simple periscope or mirror maze.	Plane mirrors, torches, protractors where appropriate, card tubes or boxes, mirror holders and design sheets.	Design a reflective viewing or signalling device for a coastal rescue scenario.	Explain how mirrors redirect light through the device.	Keep mirror work away from direct sunlight. At Year 6, pupils may notice that reflection angles are equal, but formal teaching of the law of reflection is not required by the primary National Curriculum.
5	**Shadows and Straight-Line Light**	Shadows form when opaque objects block straight-line light. A shadow has the same outline as the object. Its size changes according to the relative positions of the source, object and screen.	Plan and conduct a fair test, identify variables, measure and graph data.	Investigate how changing the distance between a light source and an opaque object affects shadow size while keeping other variables constant.	Torches, opaque shapes, screens, metre sticks, rulers, stands, graph paper and fair-test plans.	Measure and compare outdoor shadows where conditions allow, linking observations to the Sun's position.	Interpret data and explain the pattern using straight-line travel.	Use one independent variable. A larger shadow is not caused by the object growing. Keep the torch, object orientation and screen position controlled according to the chosen investigation design.

6	**Greatstone Light and Optics Exhibition**	Knowledge of straight-line travel, reflection and shadows can be applied to design safe and effective optical systems. Scientific models and investigations have strengths and limitations.	Apply, design, test, refine, evaluate and communicate.	Complete an optical engineering challenge such as a periscope, reflective warning system, shadow signalling device or light-path maze. Present ray diagrams and test evidence.	Mirrors, torches, card, reflective materials, screens, construction equipment, design criteria and presentation materials.	Present designs linked to lighthouse, beach or emergency-safety scenarios.	End-point practical, oral and written assessment.	Assess the accuracy of the light explanation, diagrams and evaluation rather than decoration. Require pupils to identify how testing led to an improvement and one limitation of the model or device.

Whole Unit Resource List

Investigation Equipment

- Torches
- Low-heat lamps
- Light boxes or ray boxes, where available
- Plane mirrors
- Mirror stands
- Dark boxes
- Card screens and stands
- Metre sticks and rulers
- Protractors, where appropriate
- Opaque, translucent and transparent objects
- Shadow screens
- Clipboards
- Cameras or iPads

Consumables

- Black and white card
- Cardboard boxes and tubes
- Aluminium foil
- Reflective tape
- Acetate and tracing paper
- Opaque shape templates
- Hole-punched cards
- Masking tape
- Ray-arrow strips
- Ray-diagram worksheets
- Fair-test planning sheets
- Graph paper
- Design and evaluation sheets
- Labels and display materials

Beach School Resources

- Weatherproof clipboards
- Shadow sticks
- Metre tapes
- Chalk
- Reflective safety materials
- Lighthouse and navigation-light images
- Coastal rescue scenario cards
- Cameras
- Periscope or viewing-device materials
- High-visibility equipment for observation

Adaptive Teaching

- Revisit Year 3 vocabulary before introducing the more precise straight-line model.
- Use large physical arrows to model light travelling from source to object and into the eye.
- Colour-code the light source, object, reflected ray and eye consistently.
- Build physical light paths before asking pupils to draw ray diagrams.
- Provide partially completed ray diagrams with arrowheads missing or one section of the pathway omitted.
- Use dark boxes and controlled torchlight to make light pathways easier to observe.
- Provide practical periscope templates for pupils who need reduced construction demands.
- Use sentence stems such as **“We see the object because…”**, **“The shadow formed because…”** and **“The mirror changed the light’s direction by…”**
- Allow pupils to demonstrate understanding through models, annotated photographs, oral explanation or diagrams.
- Assign structured roles during investigations, including equipment manager, measurer, observer and recorder.
- Challenge higher attainers to explain anomalous shadow results, evaluate model limitations and use measured angles to identify patterns in reflection.

Health & Safety

- **Never allow pupils to look directly at the Sun**, including through cameras, mirrors, binoculars or optical devices.
- Do not use mirrors, magnifying glasses or lenses to focus or redirect sunlight.
- Use torches and low-heat lamps for all controlled reflection investigations.
- Do not use laser pointers or high-powered light sources.
- Check lamps and electrical equipment before use and keep them away from water.
- Switch lamps off when not required and allow them to cool before handling.
- Keep walkways clear during darkened-room activities.
- Ensure pupils move slowly and remain seated or within defined areas when lighting is reduced.
- Use acrylic or safety-backed mirrors where possible and inspect them for damage before use.
- Supervise scissors and craft knives; pupils should not use craft knives.
- Secure mirrors within periscopes and optical devices so they cannot fall out.
- Avoid shining torches directly into another person’s eyes.
- Follow established Beach School risk assessments for outdoor shadow and safety-equipment investigations

Common Misconception	Teaching Response
Eyes send out light so that we can see.	Model light travelling from a source to an object and then into the eye.
Every visible object produces its own light.	Distinguish luminous sources from non-luminous objects that reflect light.
The Moon is a light source.	Explain that the Moon reflects light from the Sun.
Light bends around corners by itself.	Use aligned screens and periscopes to show that light travels in straight lines but mirrors can redirect it.
We can see a beam of light travelling through clean air.	Explain that the path usually becomes visible only when light is scattered by dust, mist or smoke; avoid generating smoke in the classroom.
A mirror creates light.	Demonstrate that a mirror redirects light from an existing source.
A rough white surface reflects no light.	Explain that most visible surfaces reflect light, but rough surfaces scatter it in many directions.
A shadow is a dark reflection.	Reinforce that a shadow is an area where light has been blocked.
Transparent objects cannot form any shadow.	Compare transparent, translucent and opaque objects and observe that transparent materials may still produce faint shadows.
Shadows always remain the same size as the object.	Investigate how distances between the source, object and screen affect shadow size.
The position of the eye does not affect what can be seen in a mirror.	Use ray models and practical viewing tasks to explore reflected light reaching different eye positions.
Ray diagrams show physical lines that exist in the air.	Explain that rays are scientific models representing the direction in which light travels.
Reflection reverses objects from left to right.	Use careful observation to show that mirrors reverse front-to-back orientation; avoid overcomplicating unless relevant.

Reflection Question	Purpose
What evidence supports the idea that light travels in straight lines?	Develop reasoning from practical observations rather than memorised statements.
Why could you see the torch through aligned holes but not through misaligned holes?	Apply the straight-line model directly to evidence.

How does light travel from a lamp to a non-luminous object and then to your eye?	Consolidate the full source–object–eye pathway.
Why must arrows on a ray diagram point towards the eye?	Secure accurate representation of light direction.
How did the mirrors allow you to see around an obstacle?	Apply reflection to a practical optical system.
What evidence showed that the mirror changed the direction of light?	Connect observation with an explanation of reflection.
Why does a shadow have the same outline as the object that made it?	Use straight-line travel to explain shadow shape.
What pattern did you find between distance and shadow size?	Develop interpretation of fair-test data.
Which variables did you control in the shadow investigation, and why?	Reinforce precise fair-testing methodology.
What was useful about your light model, and what could it not show accurately?	Develop evaluation of scientific models.
How can light and reflection help people survive or remain safe around Greatstone?	Connect scientific knowledge with coastal safety and the **SURVIVORS** theme.
How did scientific testing help you improve your optical device?	Reinforce resilience, refinement and evidence-based engineering.
How has this learning helped answer our big question?	Consolidate understanding that light travels in straight lines, reflects from objects into our eyes and can be controlled to create shadows and solve practical problems.

YEAR 6 - Animals Including Humans – The Circulatory System and Healthy Lifestyles – SPRING 1

How does the circulatory system keep us alive, and how can scientific evidence help us make healthy lifestyle choices?

Section	Overview
Curriculum Rationale	This unit develops pupils' understanding of the human circulatory system and its role in transporting oxygen, nutrients and water around the body. Building on previous learning about nutrition, digestion, skeletons and human development, pupils investigate the structure and function of the heart, blood vessels and blood. They explore how diet, exercise and lifestyle affect body systems and use scientific evidence to evaluate healthy choices. Through Developing Experts enquiries, pupils collect and interpret data, carry out comparative investigations, identify patterns and evaluate evidence from practical investigations and secondary sources.
The Greatstone Way	**EXPLORERS → INVENTORS** – Children investigate one of the body's most remarkable systems through practical scientific enquiry. They become medical scientists exploring how discoveries about the heart and circulation have transformed healthcare and improved human life. Through Beach School and outdoor investigations, pupils examine how physical activity affects heart rate and consider how healthy choices today create a positive legacy for the future.
National Curriculum Coverage	• Identify and name the main parts of the human circulatory system and describe the functions of the heart, blood vessels and blood. • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. • Describe the ways in which nutrients and water are transported within animals, including humans.
Developing Experts Knowledge Progression	Pupils begin by identifying the major components of the circulatory system before investigating the structure and function of the heart. They explore the roles of blood and blood vessels before investigating how exercise affects heart rate and recovery. Pupils then examine how diet, lifestyle and substances affect body systems before applying their understanding to design evidence-based health recommendations.
Curriculum Journey	**Previous Learning:** Year 2 – Healthy lifestyles; Year 3 – Nutrition, skeletons and muscles; Year 4 – Digestion and teeth; Year 5 – Human development and puberty. **Current Learning:** Circulatory system, transport of nutrients and water, healthy lifestyles and body systems. **Next Learning:** Key Stage 3 – Cells, respiration, gas exchange, cardiovascular disease, homeostasis and human biology.
Scientific Enquiry Question	**How does the circulatory system work, and what scientific evidence helps us understand how lifestyle choices affect our bodies?**
Sticky Knowledge	The circulatory system consists of the heart, blood vessels and blood. The heart is a muscular pump that moves blood around the body. Blood transports oxygen, nutrients and water to cells and removes carbon dioxide and other waste products. Arteries carry blood away from the heart, veins carry blood back and capillaries allow exchange with body tissues. Exercise strengthens the heart over time but temporarily increases heart rate. A balanced diet, regular exercise, sleep and avoiding harmful substances help maintain a healthy circulatory system. Nutrients and water are transported in the blood to all parts of the body.
Working Scientifically	Ask questions. Plan comparative investigations. Measure pulse rate accurately. Collect and present data. Identify variables. Interpret tables and graphs. Use secondary sources. Identify patterns. Draw conclusions. Evaluate evidence and reliability.
Scientific Knowledge & Skills	Identify the parts of the circulatory system. Explain the functions of the heart, blood vessels and blood. Measure pulse rate. Interpret physiological data. Explain the effects of diet, exercise and lifestyle. Describe nutrient and water transport.
Substantive Concepts	Humans • Circulatory System • Transport • Health • Nutrition • Exercise
Disciplinary Concepts	Observe • Measure • Compare • Interpret • Analyse • Explain • Evaluate
Scientific Vocabulary	circulatory system, heart, blood, blood vessel, artery, vein, capillary, pulse, heart rate, oxygen, carbon dioxide, nutrients, water, transport, circulation, exercise, fitness, recovery, lifestyle, balanced diet, cardiovascular, muscle
Working Scientifically Vocabulary	variable, comparative test, prediction, evidence, data, graph, table, trend, pattern, reliability, conclusion, evaluate
Beach School & Outdoor Learning	Measure heart rate before and after different outdoor activities. Compare recovery times following walking, running and low-impact activities. Explore how outdoor exercise supports cardiovascular health. Design healthy activity trails linked to Beach School.
Greatstone & Local Links	Investigate how lifeboat crews, RNLI volunteers, emergency responders and outdoor professionals rely on cardiovascular fitness. Explore opportunities for active lifestyles along Greatstone beach and local walking routes. Consider how community health initiatives encourage healthy living.
Cross-Curricular Links	PE (fitness and exercise), Mathematics (graphs, averages and data interpretation), Computing (data logging and presentation), PSHE (healthy lifestyles and informed choices), English (scientific reports and persuasive health campaigns).
High Quality Texts	*The Human Body Book*; *Kay's Anatomy*; *See Inside Your Body*; *The Incredible Human Body*; age-appropriate texts about the circulatory system and health.

Significant Scientists & STEM Careers	William Harvey, Helen Taussig, Christiaan Barnard, cardiac surgeon, cardiologist, nurse, paramedic, physiologist, sports scientist, dietitian.
Memorable Hook	**The Greatstone Medical Research Centre** – Pupils receive data from athletes, emergency responders and patients. They become medical scientists investigating how the circulatory system works and how healthy choices influence long-term wellbeing.
Authentic Outcome	**Healthy Hearts Expo** – Pupils create interactive displays explaining the circulatory system and present evidence-based advice promoting healthy lifestyles for children and families in the Greatstone community.
Assessment End Point	Pupils identify the main parts of the circulatory system, explain the roles of the heart, blood vessels and blood, describe how nutrients and water are transported, interpret pulse-rate data and explain how lifestyle choices affect the body's functioning using scientific evidence.

YEAR 6 SPRING 1 – 6 WEEK TEACHING SEQUENCE - Animals Including Humans – The Circulatory System

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	**Hook – The Greatstone Medical Research Centre**	The circulatory system transports substances around the body. It consists of the heart, blood vessels and blood.	Ask questions, observe models and interpret diagrams.	Investigate mystery medical evidence and identify the components of the circulatory system.	Anatomical models, diagrams, stethoscopes, enquiry packs.	Identify why active outdoor professionals need healthy circulatory systems.	Prior knowledge assessment.	Revisit Year 4 digestion and Year 5 human development before introducing transport systems.
2	**The Heart – The Body's Pump**	The heart is a muscular organ that pumps blood continuously around the body.	Observe, interpret models and explain.	Investigate how the heart works using models and measure resting pulse rate.	Heart models, stethoscopes, timers, pulse charts.	Compare resting pulse before and after gentle outdoor walking.	Explain heart function accurately.	Clarify that the heart is a muscle rather than simply a container for blood.
3	**Blood and Blood Vessels**	Blood carries oxygen, nutrients and water while arteries, veins and capillaries transport blood throughout the body.	Interpret diagrams and compare structures.	Investigate how different blood vessels transport blood using models.	Tubing models, diagrams, coloured water.	Compare circulation pathways using active movement outdoors.	Identify vessel functions.	Keep explanations age appropriate without introducing excessive anatomical detail.
4	**How Does Exercise Affect the Body?**	Exercise temporarily increases heart rate. Regular exercise strengthens the circulatory system.	Plan comparative investigations and interpret data.	Measure pulse before and after different physical activities and compare recovery rates.	Stopwatches, pulse charts, graph paper.	Complete activity stations around Beach School.	Interpret patterns in heart-rate data.	Ensure activities are inclusive and adapted where necessary.
5	**Healthy Lifestyles**	Diet, exercise, sleep and avoiding harmful substances help maintain a healthy circulatory system.	Use secondary evidence and evaluate claims.	Investigate nutrition labels and compare lifestyle scenarios using scientific evidence.	Food packaging, case studies, nutrition information.	Plan healthy outdoor activity programmes.	Explain evidence-based healthy choices.	Avoid oversimplifying foods as "good" or "bad".
6	**Healthy Hearts Expo**	Scientific understanding helps people make informed lifestyle choices.	Evaluate, communicate and justify.	Create health campaigns explaining how the circulatory system works and how to keep it healthy.	Display materials, models, graphs, diagrams.	Present healthy lifestyle trails around Greatstone.	End-point assessment.	Assess scientific understanding and use of evidence rather than presentation quality.

Whole Unit Resource List

Investigation Equipment

- Anatomical heart models
- Stethoscopes
- Stopwatches
- Pulse oximeters (if available)
- Timers
- Measuring tapes
- Clipboards
- Cameras or iPads

Consumables

- Pulse recording sheets
- Graph paper
- Nutritional information labels
- Food packaging
- Lifestyle scenario cards
- Display materials
- Labels
- Sticky notes

Beach School Resources

- Activity cones
- Weatherproof clipboards
- Timers
- Heart-rate recording sheets
- Trail maps
- Cameras

Adaptive Teaching

- Begin with simple models before introducing labelled diagrams.
- Demonstrate pulse-taking techniques before independent measurement.
- Provide colour-coded diagrams showing arteries, veins and capillaries.
- Use animations to illustrate blood circulation.
- Supply structured recording tables for pulse investigations.
- Encourage oral reasoning before written conclusions.
- Use sentence stems such as **"The heart pumps..."**, **"The evidence suggests..."** and **"Exercise affects the body because..."**
- Allow pupils to explain learning through diagrams, presentations or digital media.
- Adapt physical activities for pupils with medical or physical needs.
- Challenge higher attainers to evaluate investigation reliability, explain recovery rates and interpret more complex physiological data.

Health & Safety

- Check medical information before any physical activity.
- Ensure pupils with asthma or medical conditions have access to required medication.
- Allow pupils to opt out of strenuous activities where appropriate.
- Emphasise correct hydration before and after exercise.
- Ensure outdoor investigations follow Beach School risk assessments.
- Stop investigations immediately if pupils feel unwell.
- Use hygienic procedures when sharing stethoscopes or equipment.
- Encourage appropriate warm-up and cool-down activities.

Misconception	Teaching Response
Blood is blue inside veins.	Explain that blood is always shades of red; diagrams use blue for clarity.
The heart stores blood.	Reinforce that the heart is a muscular pump.
Veins carry "used" blood only.	Explain that veins carry blood towards the heart, with the pulmonary vein as an important exception introduced later.
Exercise damages the heart because it beats faster.	Explain temporary increases in heart rate and long-term benefits of regular exercise.

Healthy people always have the same resting heart rate.	Compare data showing normal variation between individuals.
Eating one unhealthy meal causes heart disease.	Discuss lifestyle as a long-term pattern rather than isolated choices.
Blood carries only oxygen.	Reinforce its role in transporting nutrients, water, hormones and waste products.
Nutrients travel through the body independently.	Explain that nutrients are transported in the blood after absorption.

Reflection Question	Purpose
How does the heart keep the body alive?	Consolidate understanding of circulation.
What evidence showed how exercise affected heart rate?	Develop interpretation of investigation data.
Why do arteries, veins and capillaries have different jobs?	Reinforce structure and function.
How are nutrients and water transported around the body?	Connect digestion and circulation.
Which healthy choices have the greatest long-term impact? Why?	Encourage evidence-based lifestyle decisions.
How reliable were your investigation results?	Develop evaluation skills.
Why is cardiovascular fitness important for people working in coastal environments?	Link science to local STEM careers.
How has medical science improved people's lives?	Connect learning to the **INVENTORS** theme.
How has this learning helped answer our big question?	Consolidate understanding that the circulatory system transports essential substances around the body and that scientific evidence helps people make informed choices to maintain lifelong health.

YEAR 6 - Living Things and Their Habitats – Classification and Microorganisms – SPRING 2

How do scientists classify living things, and how can observable characteristics help us understand biodiversity?

Section	Overview
Curriculum Rationale	This unit develops pupils' understanding of biological classification by building on their Year 4 work grouping living things and using simple classification keys. Pupils examine similarities and differences in greater detail and learn that broad groups can be divided into increasingly specific subgroups. They classify vertebrates, invertebrates, plants and microorganisms using observable characteristics and scientific evidence. Pupils explore the work of Carl Linnaeus and use branching and multi-access keys to identify unfamiliar organisms. Through Developing Experts enquiries, pupils observe, compare, research, classify, construct keys, analyse fieldwork data and evaluate the limitations of classification systems.
The Greatstone Way	**EXPLORERS → INVENTORS** – Children become biological scientists, exploring the diversity of life around Greatstone and beyond. They investigate how classification allows scientists to organise evidence, communicate discoveries and identify new organisms. Through fieldwork, microscopy and model-making, pupils use curiosity and logical reasoning before applying their learning to create effective classification systems and biodiversity resources.
National Curriculum Coverage	• Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals. • Give reasons for classifying plants and animals based on specific characteristics.
Developing Experts Knowledge Progression	Pupils begin by revisiting classification and considering why scientists organise living things into groups. They classify animals using increasingly specific characteristics before comparing major invertebrate groups. Pupils then classify plants using reproductive and structural features and investigate microorganisms as living things that are usually too small to see without magnification. Finally, they construct and evaluate classification keys and apply them to local biodiversity.
Curriculum Journey	**Previous Learning:** Year 2 – habitats, microhabitats and food chains; Year 4 – grouping living things, classification keys, biodiversity and environmental change; Year 5 – life cycles and reproduction. **Current Learning:** Detailed classification of animals, plants and microorganisms using similarities, differences and specific characteristics. **Next Learning:** Year 6 – Evolution and Inheritance; Key Stage 3 – cells, taxonomy, ecosystems and variation between organisms.
Scientific Enquiry Question	**How can careful observation and scientific classification help us identify and explain the diversity of living things?**
Sticky Knowledge	Scientists classify living things according to shared characteristics. Broad groups can be divided into smaller groups using increasingly specific features. Vertebrates include mammals, birds, fish, amphibians and reptiles. Invertebrates include groups such as insects, arachnids, molluscs, annelids and crustaceans. Plants can be classified using characteristics including flowers, seeds, spores, leaves and stems. Microorganisms are living things that are usually too small to see without a microscope. Classification keys use questions or choices to identify organisms. Classification systems may change when new evidence becomes available.
Working Scientifically	Ask relevant questions. Make systematic observations. Use microscopes and secondary sources. Compare similarities and differences. Classify using specific characteristics. Construct and evaluate keys. Record data. Identify patterns. Explain reasoning using evidence. Evaluate limitations and reliability.
Scientific Knowledge & Skills	Explain why classification is useful. Classify vertebrates and invertebrates. Group plants using structural and reproductive characteristics. Recognise microorganisms as living things. Use and construct detailed classification keys. Give reasons for classification decisions.
Substantive Concepts	Living Things • Classification • Biodiversity • Organisms • Microorganisms • Variation • Evidence
Disciplinary Concepts	Observe • Compare • Classify • Identify • Interpret • Explain • Evaluate
Scientific Vocabulary	organism, classify, classification, taxonomy, kingdom, group, subgroup, characteristic, similarity, difference, vertebrate, invertebrate, mammal, bird, fish, amphibian, reptile, insect, arachnid, mollusc, annelid, crustacean, flowering plant, non-flowering plant, microorganism, bacteria, fungus, yeast, mould, virus, microscope, classification key
Working Scientifically Vocabulary	question, observation, secondary source, identify, classify, compare, evidence, data, pattern, criterion, key, conclusion, reliability, limitation, evaluate
Beach School & Outdoor Learning	Conduct biodiversity surveys and classify local plants and animals using detailed keys. Compare invertebrates found in different microhabitats. Photograph rather than remove sensitive organisms. Investigate plant characteristics across dunes, grassland and sheltered areas. Collect environmental samples only where safe and approved for teacher-led microscopic observation.
Greatstone & Local Links	Classify coastal birds, dune plants, insects, arachnids, molluscs, annelids and crustaceans found around Greatstone and Romney Marsh. Explore how identification and classification support wildlife monitoring and conservation. Consider how environmental scientists use species records to detect changes in coastal biodiversity.

Cross-Curricular Links	Geography (fieldwork and ecosystems), Mathematics (tables, branching diagrams and data handling), Computing (databases and digital identification tools), English (scientific reports and explanations), Art (scientific illustration), PSHE (responsible environmental action).
High Quality Texts	*The Variety of Life*; *The Lost Words*; *Micro Life*; *The Book of Tiny Creatures*; age-appropriate classification, microscopy and biodiversity texts.
Significant Scientists & STEM Careers	Carl Linnaeus, Ernst Haeckel, Lynn Margulis, Antonie van Leeuwenhoek, taxonomist, microbiologist, ecologist, botanist, zoologist, conservation scientist.
Memorable Hook	**The Greatstone Classification Case Files** – Pupils receive photographs, microscope images and field notes for a series of unidentified organisms. They become taxonomists responsible for deciding how each organism should be grouped and what evidence supports their decision.
Authentic Outcome	**Greatstone Biodiversity Classification Guide** – Pupils create a scientifically accurate identification resource for local plants, animals and selected microorganisms. It includes detailed keys, scientific illustrations, explanations of classification decisions and guidance for responsible wildlife observation.
Assessment End Point	Pupils describe how living things are classified into broad groups and smaller subgroups, classify plants, animals and microorganisms using specific characteristics, construct and use detailed classification keys and justify their decisions using scientific evidence.

YEAR 6 SPRING 2 – 6-WEEK TEACHING SEQUENCE - Living Things and Their Habitats – Classification and Microorganisms

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	**Hook – The Greatstone Classification Case Files**	Classification organises living things according to similarities and differences. Broad groups can be divided into increasingly specific subgroups.	Ask questions, observe closely, compare and justify groupings.	Examine mystery organism case files and devise several possible classification systems. Compare the usefulness of different criteria.	Organism images, models, case files, magnifiers, sorting hoops and classification cards.	Complete an initial biodiversity survey and record organisms without disturbing habitats.	Prior knowledge assessment and justification of grouping criteria.	Revisit Year 4 classification but increase precision. More than one initial grouping may be valid if the criterion is scientific and clearly stated.
2	**Classifying Vertebrates in Greater Detail**	Vertebrates can be classified as mammals, birds, fish, amphibians or reptiles using combinations of characteristics such as body covering, reproduction, temperature regulation and breathing.	Use secondary sources, compare features and classify unfamiliar examples.	Analyse vertebrate data cards and construct a classification matrix or branching key.	Vertebrate data cards, skeleton images, reference texts, tables and key templates.	Identify and classify local birds and other vertebrates from sightings, tracks or photographs.	Classify unfamiliar vertebrates and give evidence-based reasons.	Do not classify by habitat alone. Include challenging examples such as bats, whales, penguins and aquatic reptiles.
3	**Classifying Invertebrates**	Invertebrates are diverse and can be classified using body segments, numbers of legs, shells, antennae and other structures. Major groups include insects, arachnids, crustaceans, molluscs and annelids.	Observe systematically, compare, classify and construct criteria.	Examine photographs, models and safe specimens using hand lenses or microscopes. Construct an invertebrate identification key.	Digital microscopes, hand lenses, specimens or replicas, images, classification mats and key templates.	Conduct a microhabitat survey and classify observed invertebrates before returning them safely.	Give reasons for classification using precise structural characteristics.	Reinforce that not all invertebrates have exoskeletons and that “minibeast” is not a formal scientific group.
4	**Classifying Plants**	Plants can be grouped using characteristics such as flowering or non-flowering, seed production, spores, leaf structure, stems and reproductive features.	Observe, compare, use field guides and create classification keys.	Examine plants or detailed images and classify flowering plants, conifers, ferns and mosses. Create a local plant key.	Plant samples, photographs, microscopes, hand lenses, field guides and key templates.	Compare dune grasses, flowering plants, shrubs, mosses and other approved local species.	Explain why selected plant characteristics are useful for classification.	Avoid relying only on visible flowers because plants may not be flowering. Use leaves, stems, cones, seeds and spores where evidence is available.
5	**Microorganisms**	Microorganisms are living things that are usually too small to see without magnification. They include bacteria and microscopic fungi. Some are useful, some cause disease and many are harmless. Viruses are usually discussed alongside microorganisms but are not generally considered fully living.	Use microscopes, observe change over time, use secondary evidence and interpret results.	Observe prepared microscope slides or images. Investigate yeast activity under controlled conditions, recording gas production as evidence of activity.	Microscopes, prepared slides, yeast, sugar solution, bottles, balloons, thermometers, timers and secondary-source materials.	Discuss microorganisms involved in decomposition and nutrient cycling; use prepared samples only rather than culturing environmental microorganisms.	Explain why microorganisms are classified separately and interpret evidence of yeast activity.	Do not culture unknown microorganisms from hands, surfaces, beach water or soil. Clarify that microorganisms are not all harmful. Avoid saying viruses are simply another type of bacterium.
6	**Greatstone Biodiversity Classification Guide**	Effective classification depends on precise characteristics, reliable evidence and keys that can be tested and refined. Scientific classifications may change when new evidence is discovered.	Construct, test, refine, evaluate and communicate.	Create and peer-test a detailed classification guide or multi-stage key for local organisms and selected microorganisms. Present and defend classification decisions.	Fieldwork records, images, key templates, digital-publishing tools, display materials and assessment tasks.	Test local identification keys using photographs or observations from the beach and school grounds.	End-point practical, oral and written assessment.	Assess scientific accuracy, clarity of criteria and evidence-based justification. Require pupils to identify limitations and explain one improvement made after testing.

Whole Unit Resource List
Investigation Equipment

- Hand lenses
- Magnifying glasses
- Digital microscopes or light microscopes
- Prepared microscope slides
- Bug viewers
- Sorting hoops and trays
- Quadrats
- Binoculars
- Clipboards
- Cameras or iPads

- Identification guides
- Classification keys
- Thermometers
- Timers

Consumables

- Organism classification cards
- Vertebrate and invertebrate data cards
- Plant samples or detailed photographs
- Branching-key templates
- Classification matrices
- Prepared yeast
- Sugar
- Warm water
- Small bottles or flasks
- Balloons
- Recording sheets
- Graph paper
- Labels and sticky notes
- Large display paper
- Scientific illustration materials

Beach School Resources

- Weatherproof clipboards
- Local plant and wildlife identification guides
- Binoculars
- Bug viewers
- Quadrats
- Cameras
- Nature journals
- Classification recording sheets
- Boundary markers
- Safe specimen-viewing trays

Adaptive Teaching

- Revisit the Year 4 classification hierarchy before introducing more detailed criteria.
- Use real organisms, models and high-quality photographs before written descriptions.
- Colour-code broad groups and subgroups consistently.
- Provide classification matrices showing key characteristics side by side.
- Model how one broad group is divided into smaller groups before pupils work independently.
- Use partially completed branching keys and gradually remove scaffolds.
- Provide key vocabulary alongside diagrams of body structures and plant features.
- Allow pupils to record using annotated photographs, scientific illustrations, oral explanations or digital keys.
- Assign fieldwork roles such as observer, identifier, recorder and photographer.
- Use sentence stems including **“This organism belongs to… because…”**, **“The most useful characteristic was…”** and **“This key was limited because…”**
- Reduce the number of organisms while retaining contrasting examples where cognitive load is a barrier.
- Challenge higher attainers to compare alternative classification systems, identify ambiguous characteristics and explain how DNA evidence has influenced modern taxonomy.

Health & Safety

- Complete risk assessments before all fieldwork and microscopy activities.
- Check beach, weather and tidal conditions before outdoor investigation.
- Establish clear boundaries and close supervision during biodiversity surveys.
- Do not handle unknown plants, fungi, animal remains or hazardous coastal objects.
- Keep living organisms in viewers for the shortest possible time and return them to the exact habitat where they were found.
- Do not disturb nests, burrows, eggs, protected plants or dune vegetation.
- Wash hands after handling soil, plants, natural materials or shared equipment.
- Carry microscopes with two hands and place them on stable surfaces.
- Use prepared slides and approved specimens only.
- Do not culture microorganisms collected from pupils, surfaces, soil, food waste or environmental water.
- Use fresh commercial yeast for investigations and dispose of mixtures promptly.
- Do not seal yeast reactions in rigid containers; balloons must be loosely and safely fitted.
- Check allergies and sensitivities before using yeast or plant materials.
- Clean spillages immediately and disinfect surfaces after microorganism investigations.
- Pupils must not taste any substances or touch microscope samples.

Misconception	Teaching Response
Living things have only one possible way of being classified.	Explain that scientists may group organisms at different levels, but each classification must use clear and relevant criteria.
Classification is based mainly on where an organism lives.	Use whales, bats, penguins and aquatic reptiles to show why structural and reproductive characteristics are more reliable.
All animals with wings are birds.	Compare birds with bats and insects using body covering, skeleton and reproduction.
All animals living in water are fish.	Compare fish with aquatic mammals, amphibians, reptiles and invertebrates.
Every invertebrate is an insect.	Compare insects with arachnids, molluscs, annelids and crustaceans.
Spiders have six legs and are insects.	Observe that arachnids have eight legs and two main body sections.
Every invertebrate has an exoskeleton.	Use worms, slugs and jellyfish as contrasting examples.
Every plant produces flowers and seeds.	Compare flowering plants with ferns, mosses and other spore-producing plants.
Fungi are plants.	Explain that fungi form a separate biological group and do not make food in the same way as plants.
Microorganisms are tiny animals.	Show that microorganisms include bacteria, fungi and other groups with different structures.
All microorganisms cause illness.	Explore useful microorganisms in digestion, decomposition and food production alongside harmful examples.
Bacteria and viruses are the same.	Explain that bacteria are living cells, while viruses are much smaller and generally not considered fully living.
Mould appears from nowhere.	Explain that microscopic spores are present in the environment and grow when conditions are suitable.
Classification systems never change.	Use examples showing that new evidence, including genetic evidence, can lead scientists to revise classifications.

Reflection Question	Purpose
Why do scientists classify living things?	Reinforce classification as a tool for organising, identifying and communicating biological knowledge.
Which characteristics were most useful for classifying vertebrates?	Develop selection of reliable scientific criteria.
Why is habitat alone not enough to classify an animal?	Address superficial grouping and strengthen biological reasoning.
What evidence helped you distinguish an insect from an arachnid?	Encourage precise observation of body structure.
How did your plant key identify organisms that were not flowering?	Develop classification using multiple persistent characteristics.
Why are microorganisms difficult to classify using ordinary observation?	Connect classification with microscopy and secondary evidence.
What evidence showed that yeast was active?	Develop interpretation of gas production and observable change.
Why should we avoid describing all microorganisms as harmful?	Build accurate understanding of microbial diversity and function.
How did peer testing improve your classification key?	Develop evaluation, refinement and scientific communication.
What limitations did your biodiversity survey have?	Encourage critical understanding of sampling, season, weather and identification accuracy.
How does classification support conservation around Greatstone?	Apply scientific identification to biodiversity monitoring and environmental protection.

How have microscopes and new technologies changed biological classification?	Connect scientific exploration with innovation and the **INVENTORS** theme.
How has this learning helped answer our big question?	Consolidate understanding that scientists use increasingly specific observable characteristics and reliable evidence to classify living things and understand biodiversity.

YEAR 6 - Evolution and Inheritance – SUMMER 1

How do inherited characteristics, variation and adaptation help living things survive and change over time?

Section	Overview
Curriculum Rationale	This unit develops pupils' understanding of inheritance, variation, adaptation and evolution. Building on earlier learning about animal groups, habitats, classification, fossils and reproduction, pupils investigate how offspring are similar to, but not identical to, their parents. They explore variation within species and distinguish inherited characteristics from features influenced by the environment. Pupils then examine how adaptations help organisms survive in particular habitats and how advantageous characteristics may become more common over many generations. Fossils are used as evidence that living things have changed over time. Through Developing Experts enquiries, pupils compare evidence, analyse data, use models, interpret fossil records and construct evidence-based explanations of evolutionary change.
The Greatstone Way	**PROTECTORS → LEGACY** – Children explore how living things inherit characteristics and adapt to survive within changing environments. They recognise that biodiversity is the legacy of millions of years of change and consider humanity's responsibility to protect species, habitats and genetic diversity. Through Greatstone and Beach School investigations, pupils examine how coastal organisms survive challenging conditions and how conservation can protect their future.
National Curriculum Coverage	• 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.
Developing Experts Knowledge Progression	Pupils begin by exploring inherited characteristics and variation between offspring and parents. They distinguish inherited features from those influenced by lifestyle and environment before investigating adaptations in plants and animals. Pupils use fossil evidence to understand that organisms have changed over time and explore how advantageous characteristics may become more common across generations. Finally, they apply their understanding to explain how environmental change may influence survival and future populations.
Curriculum Journey	**Previous Learning:** Year 3 – Rocks and fossil formation; Year 4 – classification, habitats and conservation; Year 5 – life cycles and reproduction; Year 6 Spring – detailed classification of plants, animals and microorganisms. **Current Learning:** Inheritance, variation, adaptation, fossil evidence and evolution over time. **Next Learning:** Key Stage 3 – genetics, chromosomes, natural selection, extinction, biodiversity and ecosystems.
Scientific Enquiry Question	**How can evidence from living things and fossils help us explain inheritance, adaptation and evolutionary change?**
Sticky Knowledge	Offspring inherit characteristics from their parents but are not identical to them. Variation means differences between individuals of the same species. Some characteristics are inherited, while others are affected by the environment or lifestyle. Adaptations are characteristics that help organisms survive and reproduce in particular environments. Fossils provide evidence about organisms that lived millions of years ago. Populations contain variation. Individuals with advantageous characteristics may be more likely to survive and reproduce. Over many generations, these characteristics may become more common, leading to evolutionary change. Evolution occurs in populations over generations, not within an individual organism's lifetime.
Working Scientifically	Ask questions. Use secondary sources. Observe and compare variation. Classify characteristics. Analyse data. Interpret fossil evidence. Identify patterns and relationships. Use models. Construct evidence-based explanations. Evaluate the strengths and limitations of evidence and models.
Scientific Knowledge & Skills	Explain inheritance and variation. Distinguish inherited and acquired characteristics. Identify adaptations. Relate adaptation to habitat and survival. Interpret fossils as evidence of change over time. Explain in simple terms how adaptation may lead to evolution.
Substantive Concepts	Inheritance • Variation • Adaptation • Evolution • Fossils • Survival • Biodiversity
Disciplinary Concepts	Observe • Compare • Interpret • Analyse • Model • Explain • Evaluate
Scientific Vocabulary	evolution, inheritance, inherited characteristic, offspring, parent, species, population, variation, adaptation, environment, habitat, survival, reproduction, generation, fossil, fossil record, ancestor, descendant, extinct, natural selection
Working Scientifically Vocabulary	question, observation, secondary source, evidence, data, pattern, relationship, model, interpretation, conclusion, reliability, limitation, evaluate
Beach School & Outdoor Learning	Investigate variation in shells, pebbles, leaves and organisms without removing protected or living specimens. Compare adaptations of coastal plants, birds and invertebrates. Explore how marram grass, shells, waterproof coverings, camouflage and specialised feeding structures support survival. Use environmental scenarios to predict which characteristics may be advantageous under changing conditions.
Greatstone & Local Links	Explore adaptations of dune plants, seabirds, insects, molluscs and other organisms around Greatstone and Romney Marsh. Investigate how coastal wind, salt, sand, water availability, tides and human disturbance create survival challenges. Consider how habitat protection preserves biodiversity and the potential for future adaptation.
Cross-Curricular Links	Geography (climate, habitats and environmental change), Mathematics (variation data, tables and graphs), History (changing scientific ideas and fossil discoveries), English (evidence-based explanation), Computing (data analysis and simulations), Art (scientific illustration and fossil reconstruction).
High Quality Texts	*One Beetle Too Many*; *Moth: An Evolution Story*; *Charles Darwin's On the Origin of Species* adapted for children; *Stone Girl Bone Girl*; *The Pebble in My Pocket*; age-appropriate texts about evolution and fossils.
Significant Scientists & STEM Careers	Charles Darwin, Alfred Russel Wallace, Mary Anning, Rosalind Franklin, palaeontologist, evolutionary biologist, geneticist, conservation scientist, ecologist, museum curator.
Memorable Hook	**The Greatstone Evolution Evidence Files** – Pupils receive fossil replicas, family-trait evidence, photographs of unusual organisms and records from changing habitats. They become evolutionary scientists responsible for explaining how variation, adaptation and inheritance connect living things across generations.
Authentic Outcome	**Greatstone Evolution and Biodiversity Museum** – Pupils create evidence-based exhibits explaining inheritance, variation, adaptation, fossil evidence and evolutionary change. They include a conservation proposal showing how protecting habitats preserves the legacy and future of biodiversity.
Assessment End Point	Pupils explain that offspring inherit characteristics but vary from their parents, distinguish inherited and environmentally influenced characteristics, identify adaptations, use fossil evidence to explain change over time and describe how advantageous adaptations may lead to evolution across many generations.

YEAR 6 SUMMER 1 – 6-WEEK TEACHING SEQUENCE - Evolution and Inheritance

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	**Hook – The Greatstone Evolution Evidence Files**	Living things produce offspring of the same kind. Offspring inherit characteristics from their parents but are not identical.	Ask questions, compare evidence and identify similarities and differences.	Examine fictional family and animal pedigrees, parent–offspring photographs and trait cards. Identify inherited similarities and variation.	Parent–offspring photographs, fictional family data, trait cards, organism images and evidence packs.	Compare variation in safe natural examples such as shells, leaves or photographs of local species.	Assess prior understanding of offspring, reproduction, inheritance and variation.	Use fictional or anonymised examples rather than asking pupils to disclose personal family information. Avoid implying that every characteristic has a simple one-gene cause.
2	**Inherited and Environmentally Influenced Characteristics**	Some characteristics are inherited. Others are affected by environment, learning, experience or lifestyle. Many characteristics result from a combination of inheritance and environmental influence.	Classify evidence, compare examples and justify decisions.	Sort characteristic cards and analyse case studies involving inherited, acquired and combined influences.	Characteristic cards, twin or plant case studies, photographs, classification grids and secondary sources.	Compare how the same plant species grows in exposed and sheltered locations, using photographs or approved observations.	Explain why selected characteristics are inherited, acquired or influenced by both.	Scars, language and learned skills are acquired rather than inherited. Suntans and muscle development are not passed genetically to offspring. Avoid presenting complex traits as entirely genetic or environmental.
3	**Variation Within Species**	Individuals of the same species show variation. Variation may affect appearance, behaviour or function and is essential for populations to respond to environmental change.	Gather or analyse data, measure, graph and interpret variation.	Analyse anonymised or non-sensitive data such as seed size, leaf length, shell pattern or bird measurements. Present the range and distribution.	Seed, leaf or shell datasets, specimens where appropriate, rulers, graph paper and digital graphing tools.	Record variation in leaves, shells or plant structures without damaging habitats or collecting protected materials.	Interpret a variation graph and explain why individuals are not identical.	Use one species or clearly comparable samples. Do not equate variation with superiority. Human measurements should be avoided or anonymised and handled sensitively.
4	**Adaptation and Survival**	Adaptations are inherited structural or behavioural characteristics that increase an organism's chances of surviving and reproducing in a particular environment. Different environments favour different adaptations.	Compare organisms, identify relationships and use models.	Complete adaptation challenges involving feeding tools, camouflage or water retention. Match characteristics to environmental pressures and evaluate model limitations.	Feeding tools, model foods, camouflage materials, habitat cards, plant images and investigation sheets.	Investigate adaptations of dune plants, birds, molluscs and invertebrates to wind, salt, sand and water conditions.	Explain how a named adaptation supports survival in a particular habitat.	Avoid implying that organisms choose or develop adaptations because they need them. Individuals may adjust behaviour, but inherited evolutionary adaptations arise across generations.
5	**Fossils and Evolutionary Change**	Fossils provide evidence of organisms that lived millions of years ago. Comparing fossils with living organisms can reveal similarities, differences, extinction and change over time.	Observe, compare, sequence, interpret evidence and evaluate limitations.	Examine fossil replicas or images and reconstruct a sequence showing change in a group over time. Compare fossil and living forms.	Fossil replicas, photographs, timelines, geological time strips, organism comparisons and magnifiers.	Compare modern shells or traces with fossil images and discuss how coastal sediments may preserve evidence.	Use fossil evidence to support an explanation of change over time.	Fossil records are incomplete because fossilisation is rare and many organisms decay without leaving evidence. Fossils do not show that one living individual changed into another species.
6	**How Adaptation May Lead to Evolution**	Populations contain inherited variation. Individuals with characteristics better suited to an environment may survive and reproduce more successfully. Over many generations, advantageous characteristics may become more common.	Use models, analyse population data, identify patterns, construct explanations and evaluate limitations.	Complete a modelled survival-and-reproduction investigation using contrasting traits and changing environments. Track trait frequencies over several simulated generations and present conclusions.	Trait tokens or organism models, habitat backgrounds, data tables, graph paper, scenario cards and exhibition materials.	Apply the model to a changing coastal habitat and propose how conservation could protect population diversity.	End-point practical, oral and written assessment.	Make clear that the activity is a simplified model. Evolution occurs in populations across generations; individual organisms do not evolve during their lifetime. Random variation exists before environmental selection.

Whole Unit Resource List

Investigation Equipment

- Hand lenses
- Magnifying glasses
- Fossil replicas
- Rulers and callipers, where appropriate
- Sorting hoops and trays
- Clipboards
- Cameras or iPads
- Digital microscopes, where useful
- Feeding-tool models such as tweezers, spoons and pegs
- Camouflage backgrounds
- Timers

Consumables

- Parent–offspring image cards
- Fictional inheritance case studies
- Characteristic sorting cards
- Seed, leaf and shell datasets
- Graph paper
- Habitat and adaptation cards
- Trait tokens or organism models
- Fossil-sequence cards
- Geological timeline strips
- Natural-selection simulation tables
- Labels and sticky notes
- Large presentation paper
- Museum-exhibit materials

Beach School Resources

- Weatherproof clipboards
- Local wildlife and plant identification guides
- Magnifiers
- Nature journals
- Cameras

- Variation recording sheets
- Habitat scenario cards
- Shell and plant photograph sets
- Coastal adaptation trail cards
- Boundary markers

Adaptive Teaching

- Revisit Year 5 reproduction and Year 6 classification before introducing inheritance and evolution.
- Use familiar parent–offspring examples before fossil and population evidence.
- Keep **inheritance**, **variation**, **adaptation** and **evolution** visually distinct through consistent definitions and symbols.
- Use fictional families and anonymised datasets to avoid requiring personal disclosure.
- Provide sorting grids for inherited, acquired and combined influences.
- Use physical models and simulations before written evolutionary explanations.
- Break explanations into the sequence: **variation → environmental pressure → differential survival and reproduction → change over generations**.
- Provide partially completed graphs, timelines and cause-and-effect diagrams.
- Use sentence stems such as **"This characteristic may be advantageous because…"**, **"The fossil evidence suggests…"** and **"Over many generations…"**
- Allow pupils to record through diagrams, annotated photographs, oral explanation or digital presentations.
- Pair pupils strategically during modelling and data analysis.
- Challenge higher attainers to evaluate fossil gaps, distinguish adaptation from acclimatisation and explain how environmental change may alter which characteristics are advantageous.

Health & Safety

- Use fictional or anonymised inheritance examples and avoid collecting sensitive family or medical information.
- Do not ask pupils to identify inherited traits in classmates or compare physical characteristics publicly.
- Avoid taste-based or health-related genetic activities.
- Check natural specimens for sharp edges, contamination or allergens before handling.
- Do not remove living organisms, protected plants, shells occupied by animals or sensitive materials from habitats.
- Wash hands after handling fossils, soil or natural materials.
- Supervise the safe use of tweezers, pegs and other tools during feeding simulations.
- Use only safe food substitutes or non-food model items during adaptation investigations.
- Establish clear movement boundaries during camouflage or survival simulations.
- Ensure fossil replicas and geological samples are stable and free from sharp edges.
- Follow established Beach School risk assessments, including weather, tides and protected habitat guidance.

Common Misconception	Teaching Response
Offspring are identical copies of their parents.	Compare siblings and animal offspring to show inherited similarities alongside variation.
Every characteristic is inherited.	Sort examples such as scars, learned skills, language and fitness alongside inherited features.
Acquired characteristics are passed to offspring.	Explain that changes gained during life, such as stronger muscles through exercise, are not normally inherited genetically.
Variation means something is wrong or abnormal.	Present variation as a normal and essential feature of all populations.
Individuals change because they need to survive.	Explain that inherited variation already exists and environmental conditions influence which individuals reproduce successfully.
Organisms choose their adaptations.	Reinforce that adaptations become common over many generations rather than through conscious choice.
Adaptation happens during one organism's lifetime.	Distinguish evolutionary adaptation from short-term behavioural or physiological responses.
Evolution means becoming better or more advanced.	Explain that evolution means change in populations over generations and suitability depends on the environment.
Humans evolved from modern monkeys.	Explain that humans and modern apes share earlier common ancestors.
Evolution always produces entirely new species quickly.	Emphasise gradual population change across many generations, while rates can vary.
Fossils are the actual unchanged bodies of all prehistoric organisms.	Compare preserved remains, impressions, casts, tracks and mineralised fossils.
The fossil record contains every organism that ever lived.	Explain that fossilisation is rare and the record is incomplete.
Every extinct organism failed because it was poorly adapted.	Explore rapid environmental change, habitat loss, competition and catastrophic events.
Natural selection is completely random.	Clarify that variation may arise without purpose, but environmental selection is non-random because some traits affect survival and reproduction.
Evolution has stopped.	Use modern examples of changing populations and explain that environments and populations continue to change.

Reflection Question	Purpose
How can offspring resemble their parents but still be different?	Consolidate the relationship between inheritance and variation.
Which characteristics are inherited and which are influenced by environment or experience?	Develop accurate classification of trait origins.
Why is variation important within a population?	Connect individual differences with population survival under changing conditions.
What pattern did you identify in the variation data?	Develop interpretation of ranges and distributions.
How does a particular adaptation help an organism survive and reproduce?	Link structure or behaviour to habitat pressures and reproductive success.
Why do different habitats favour different adaptations?	Develop understanding that advantage depends on environmental context.
What can fossils tell us about organisms from the past?	Reinforce fossils as evidence for previous life and change over time.
What can fossils not tell us with certainty?	Develop evaluation of incomplete evidence.
How did the simulation show characteristics becoming more common across generations?	Connect modelled evidence with natural selection.
Why did the individual organisms not evolve during the investigation?	Address the distinction between individual survival and population evolution.
How might a changing coastal environment affect which characteristics are advantageous?	Apply evolutionary reasoning to Greatstone's local environment.
Why is protecting biodiversity important for the future of species?	Connect genetic variation and conservation with **PROTECTORS**.
What evolutionary legacy is recorded in fossils and living organisms?	Connect evidence across generations with **LEGACY**.
How has this learning helped answer our big question?	Consolidate understanding that inheritance creates similarities, variation creates differences, and advantageous adaptations may become more common over many generations, producing evolutionary change.

YEAR 6 - Looking After Our Environment – Sustainability and Environmental Science – SUMMER 2

How can scientific understanding help us protect our environment and create a positive legacy for future generations?

Section	Overview
Curriculum Rationale	This unit provides a purposeful culmination of pupils' primary science learning by drawing together knowledge from habitats, classification, evolution, materials, Earth and Space and working scientifically. Pupils investigate how human activity affects ecosystems, biodiversity, climate and natural resources before exploring sustainable solutions to environmental challenges. They collect fieldwork data, analyse environmental evidence and evaluate conservation strategies. Through Developing Experts enquiries, pupils use all aspects of scientific enquiry to investigate real environmental issues, communicate evidence and propose practical actions to improve the local environment.
The Greatstone Way	**LEGACY** – Children recognise that today's actions shape tomorrow's world. Through scientific enquiry and outdoor learning, they investigate how everyone has a responsibility to care for Greatstone's unique coastal environment. Pupils become environmental scientists, using evidence to protect habitats, reduce pollution and promote biodiversity so future generations inherit a healthy, sustainable environment.
National Curriculum Coverage	**This unit draws together knowledge and skills from the entire Key Stage 2 National Curriculum.** It consolidates understanding of habitats, living things, classification, evolution, adaptation, materials, Earth and Space, scientific enquiry and environmental stewardship through applied scientific investigations.
Developing Experts Knowledge Progression	Pupils revisit ecosystems and biodiversity before investigating human impacts including pollution, climate change and habitat loss. They analyse environmental data, compare sustainable and unsustainable practices and investigate renewable resources. Pupils then apply scientific understanding to design practical conservation solutions before evaluating how scientific knowledge can improve environmental sustainability locally and globally.
Curriculum Journey	**Previous Learning:** EYFS–Year 6 science, including habitats, materials, plants, animals, Earth and Space, classification, evolution and working scientifically. **Current Learning:** Environmental science, sustainability, conservation and application of scientific enquiry. **Next Learning:** Key Stage 3 – Ecology, ecosystems, climate science, environmental chemistry, biodiversity, sustainability and Earth systems.
Scientific Enquiry Question	**How can scientific evidence help us understand environmental challenges and make informed decisions that protect our planet?**
Sticky Knowledge	Healthy ecosystems support biodiversity. Human activities can positively and negatively affect the environment. Pollution, habitat destruction and climate change reduce biodiversity. Renewable resources can reduce environmental impact. Recycling, reducing waste and conserving habitats help protect ecosystems. Scientific evidence informs environmental decisions. Individuals and communities can make positive changes that contribute to global sustainability.
Working Scientifically	Ask questions. Plan investigations. Collect fieldwork data. Sample fairly. Observe over time. Measure accurately. Analyse evidence. Interpret graphs and maps. Identify patterns. Evaluate reliability. Draw evidence-based conclusions. Communicate scientific recommendations.
Scientific Knowledge & Skills	Explain biodiversity and ecosystems. Investigate environmental change. Collect and analyse environmental data. Evaluate sustainability strategies. Apply scientific knowledge to environmental problems. Design conservation solutions. Communicate evidence effectively.
Substantive Concepts	Environment • Ecosystems • Biodiversity • Sustainability • Conservation • Climate • Resources
Disciplinary Concepts	Observe • Measure • Sample • Analyse • Interpret • Evaluate • Predict • Explain
Scientific Vocabulary	biodiversity, ecosystem, habitat, conservation, sustainability, renewable, non-renewable, pollution, climate, climate change, carbon footprint, greenhouse gases, recycling, reduce, reuse, renewable energy, ecosystem services, habitat restoration, food web, biodiversity survey, environmental impact
Working Scientifically Vocabulary	survey, sampling, quadrat, transect, observation, evidence, data, graph, trend, anomaly, reliability, conclusion, recommendation, evaluate
Beach School & Outdoor Learning	Carry out biodiversity surveys across Greatstone's coastal habitats. Measure environmental quality using observational data. Investigate microhabitats, coastal erosion, litter distribution and habitat diversity. Participate in practical habitat improvement, litter collection, species recording and conservation projects.
Greatstone & Local Links	Investigate the ecology of Greatstone beach, dunes and Romney Marsh. Explore coastal erosion, plastic pollution, marine litter, habitat restoration, dune conservation and local biodiversity. Consider how organisations such as Natural England, the RSPB, Kent Wildlife Trust and the RNLI contribute to environmental protection.
Cross-Curricular Links	Geography (sustainability, climate and fieldwork), Mathematics (statistics, graphs and sampling), Computing (data analysis and presentations), English (scientific reports and persuasive writing), Design & Technology (sustainable design), PSHE (citizenship and responsibility).
High Quality Texts	*What a Waste*; *Greta and the Giants*; *Planet Ocean*; *The Lorax*; *The Story of Climate Change*; *There Is No Planet B* (adapted); age-appropriate environmental science texts.
Significant Scientists & STEM Careers	David Attenborough, Jane Goodall, Sylvia Earle, Wangari Maathai, Rachel Carson, environmental scientist, marine biologist, ecologist, conservation officer, climate scientist, sustainability consultant, environmental engineer.
Memorable Hook	**The Greatstone Environmental Summit** – Pupils receive environmental reports showing changes in biodiversity, pollution and habitat quality around Greatstone. They become environmental scientists responsible for investigating the evidence and proposing practical solutions to improve the local environment.
Authentic Outcome	**The Greatstone Environmental Legacy Project** – Pupils present scientific investigations, biodiversity surveys and conservation proposals to governors, families and the local community. They produce an evidence-based environmental action plan for Greatstone Primary that creates a lasting legacy for future pupils.
Assessment End Point	Pupils use scientific evidence from fieldwork and investigations to explain environmental issues, evaluate sustainable solutions, communicate evidence-based recommendations and demonstrate how scientific understanding can protect biodiversity and create a positive environmental legacy.

YEAR 6 SUMMER 2 – 6 WEEK TEACHING SEQUENCE - Looking After Our Environment

Week	Learning Focus	Knowledge to be Secured	Working Scientifically	Practical Investigation	Resources	Beach School	Assessment	Teacher Notes
1	**Hook – The Greatstone Environmental Summit**	Scientists use evidence to investigate environmental change. Ecosystems support biodiversity and healthy habitats.	Ask questions, analyse evidence and identify priorities.	Analyse environmental reports, photographs and biodiversity data before identifying enquiry questions.	Environmental reports, aerial photographs, maps, biodiversity data, satellite images.	Complete an initial biodiversity walk to identify environmental strengths and concerns.	Prior knowledge assessment.	Draw together learning from Year 4 habitats, Year 5 life cycles and Year 6 classification and evolution.
2	**Investigating Biodiversity**	Biodiversity is the variety of living things in an ecosystem. Greater biodiversity generally	Plan surveys, sample fairly and record observations.	Carry out quadrat and transect surveys to	Quadrats, transect tapes, identification	Compare biodiversity across dunes, grassland and school grounds.	Interpret biodiversity data.	Reinforce consistent sampling methods and ethical treatment of living organisms.

		supports healthier ecosystems.		compare habitats. Record plant and animal diversity.	guides, clipboards, tally sheets.			
3	**Human Impact on the Environment**	Human activities can damage or improve ecosystems. Pollution, habitat loss and climate change affect biodiversity.	Collect evidence, compare data and identify patterns.	Survey litter distribution, investigate decomposition and compare natural and manufactured materials.	Litter audit sheets, gloves, collection bags, decomposition cards.	Conduct a beach or school litter survey and classify waste.	Explain links between evidence and environmental impact.	Discuss positive examples of environmental restoration alongside challenges.
4	**Renewable Resources and Sustainability**	Renewable resources reduce reliance on finite resources. Sustainable choices help protect ecosystems and future generations.	Interpret secondary data and evaluate evidence.	Compare renewable-energy case studies and investigate sustainable product choices.	Renewable-energy models, product packaging, life-cycle information, energy data.	Investigate local renewable-energy examples and coastal flood protection.	Evaluate sustainable solutions.	Encourage balanced discussions considering environmental, economic and social factors.
5	**Conservation in Action**	Conservation protects species, habitats and biodiversity through scientific management.	Design investigations, predict outcomes and evaluate evidence.	Design a habitat improvement or biodiversity enhancement project for the school grounds.	Habitat maps, planting plans, species information, design materials.	Build bug hotels, plant pollinator-friendly species or improve microhabitats where appropriate.	Present conservation proposals.	Emphasise that conservation decisions should always be evidence-based.
6	**The Greatstone Environmental Legacy Project**	Scientific evidence helps communities make informed environmental decisions. Everyone can contribute to sustainability.	Evaluate, communicate and justify recommendations.	Present biodiversity investigations, environmental audits and conservation action plans to an audience.	Presentation materials, displays, graphs, digital presentations and reports.	Share findings from Beach School investigations with families or governors.	End-point assessment.	Assess scientific reasoning, use of evidence and quality of recommendations rather than presentation alone.

Whole Unit Resource List

Investigation Equipment

- Quadrats
- Transect tapes
- Identification guides
- Binoculars
- Hand lenses
- Thermometers
- Soil thermometers
- Measuring tapes
- Clipboards
- Cameras or iPads
- Weather meters (where available)
- Litter pickers
- Digital microscopes (optional)

Consumables

- Biodiversity recording sheets
- Habitat maps
- Species identification cards
- Graph paper
- Large maps
- Gloves
- Refuse sacks
- Recycling samples
- Design materials
- Labels
- Sticky notes

Beach School Resources

- Nature journals
- Weatherproof clipboards
- Bug viewers
- Quadrats
- Identification charts
- Cameras
- Litter-picking equipment
- Habitat restoration materials
- Native plant guides

Adaptive Teaching

- Revisit key scientific concepts from across Key Stage 2 before introducing environmental case studies.
- Use local examples before exploring global environmental issues.
- Provide photographs and visual evidence alongside written reports.
- Model fieldwork methods before independent investigations.
- Use structured recording sheets for biodiversity surveys.
- Allow pupils to present findings through posters, reports, videos or oral presentations.
- Use sentence stems such as **"The evidence suggests…"**, **"This habitat supports…"** and **"Our recommendation is…"**
- Support pupils with pre-prepared datasets where fieldwork is limited.
- Allocate clear investigation roles including ecologist, recorder, surveyor and photographer.
- Challenge higher attainers to evaluate the reliability of environmental data, compare conservation strategies and consider long-term sustainability.

Health & Safety

- Complete full Beach School and fieldwork risk assessments before outdoor investigations.
- Check weather forecasts, tide times and site conditions before coastal visits.
- Establish clear boundaries and adult supervision throughout fieldwork.
- Wear gloves during litter surveys and never handle hazardous waste.
- Wash hands thoroughly after handling soil, plants or natural materials.
- Do not disturb nests, burrows, protected species or sensitive dune habitats.
- Avoid contact with standing water unless specifically risk assessed.
- Ensure pupils wear suitable clothing, footwear, hats and sunscreen where appropriate.
- Carry first aid equipment, drinking water and emergency contact information during off-site investigations.
- Follow safe manual-handling procedures when moving logs, stones or habitat materials.
- Check for allergies before planting or handling vegetation.
- Reinforce respect for wildlife by observing rather than collecting living organisms wherever possible.

Common Misconception	Teaching Response
All human activity harms the environment.	Compare negative impacts with successful conservation and restoration projects.
Biodiversity only means the number of animals.	Explain that biodiversity includes plants, fungi, microorganisms and habitats as well as animals.
Recycling solves every environmental problem.	Discuss reducing consumption, reusing materials and preventing waste alongside recycling.
Renewable resources have no environmental impact.	Evaluate both benefits and limitations of renewable technologies.
Climate and weather are the same.	Compare long-term climate patterns with short-term weather conditions.
Plastic is always harmful.	Explore appropriate uses of plastics while discussing responsible production, reuse and disposal.
Extinction only happened in prehistoric times.	Investigate modern endangered species and current conservation work.
Nature always recovers by itself.	Compare habitats that recover naturally with those requiring active conservation.

One person's actions cannot make a difference.	Use local conservation case studies showing cumulative positive impact.
Scientists always agree on environmental solutions.	Explain that scientists evaluate evidence, but different approaches may be debated depending on priorities and available evidence.

Reflection Question	Purpose
What did your biodiversity survey tell you about the health of the habitat?	Develop interpretation of ecological evidence.
Which environmental issue had the greatest impact on your local area? Why?	Encourage evidence-based evaluation.
How did your investigation provide reliable evidence?	Reinforce working scientifically.
Which conservation strategy would make the biggest difference locally?	Apply scientific understanding to real-world decision-making.
Why is biodiversity important for healthy ecosystems?	Consolidate ecological understanding.
How can scientific evidence influence environmental decisions?	Connect enquiry with policy and action.
What responsibilities do we have for protecting Greatstone's environment?	Link science with local citizenship and stewardship.
How will your Environmental Legacy Project benefit future pupils?	Connect learning directly to the **LEGACY** theme.
Which scientific knowledge from primary school helped you most during this project?	Encourage retrieval and curriculum reflection.
How has this learning helped answer our big question?	Consolidate understanding that scientific enquiry provides the evidence needed to understand environmental challenges, protect biodiversity and create a sustainable legacy for future generations.

Science Curriculum Risk Assessment (Whole School)

Activity/Hazard	Risks	Who is at Risk	Control Measures	Further Action	Person Responsible
Practical investigations	Cuts, burns, spills, slips	Pupils, staff	Activities planned according to NC expectations; teacher demonstrations where required; clear safety briefing before each investigation	Monitor annually	Class Teacher
Use of scissors	Minor cuts	Pupils	Age-appropriate scissors; correct modelling; close supervision in EYFS/KS1	Replace damaged scissors	Class Teacher
Magnifying glasses	Broken lenses, misuse	Pupils	Plastic lenses where possible; teach correct handling	Inspect regularly	Class Teacher
Thermometers	Breakage	Pupils	Use alcohol/digital thermometers only; no mercury	Check equipment	Science Lead
Water investigations	Slips	Pupils, staff	Small quantities used; spills cleaned immediately	Reminder to staff	Class Teacher
Heating activities	Burns	Pupils	Teacher only handles hot equipment; pupils remain behind safety line	Risk assess individual activity	Teacher
Electrical investigations	Electric shock	Pupils	Battery-operated equipment only; PAT tested equipment; damaged items removed	Annual inspection	Site Manager
Magnets	Pinched fingers, swallowing small magnets	Pupils	Use age-appropriate magnets; supervise closely; count equipment before and after use	Replace damaged equipment	Teacher
Rocks, soils and natural materials	Allergies, contamination	Pupils	Wash hands after use; avoid contaminated materials; collect safely	Review local collection sites	Teacher
Living things	Allergic reactions, bites, scratches	Pupils	Observe rather than handle where possible; handwashing; follow CLEAPSS guidance	Individual risk assessment for animals	Teacher
Plants	Allergies, poisonous species	Pupils	Avoid toxic plants; identify safe specimens; supervise collection	Review annually	Science Lead
Beach School investigations	Uneven ground, tides, weather	Pupils, staff	Follow Beach School risk assessment; appropriate clothing; staff ratios maintained	Dynamic assessment before visit	Visit Leader
Weather investigations	Sun exposure, cold, wind	Pupils	Appropriate clothing; sun cream policy; hydration; activities adapted	Daily weather check	Teacher
Food investigations	Allergies	Pupils	Allergy information checked before activities; avoid known allergens	Update allergy records	Teacher
Cleaning after investigations	Infection	Pupils	Wash hands; disinfect surfaces; safe disposal of waste	Monitor	Teacher

General Control Measures

- Appropriate adult:pupil ratios maintained.
- Equipment checked before use.
- Damaged equipment removed immediately.
- Teachers follow CLEAPSS guidance where appropriate.
- Appropriate PPE worn where required.
- First Aid provision available.
- Medical needs and allergies checked before practical work.
- Dynamic risk assessments completed before outdoor investigations.