Broomwood Primary School Science Curriculum

Contents

EYFS

Preschool

Preschool - What makes me, me?	Autumn What different things can I feel?	Chemistry- Materials and properties

Prior Learning
- Initial tastes
- Early experiences of being outside in different environments.

Next Steps after Unit
- Use all their senses in hands-on exploration of natural materials (Nursery)
- Explore collections of materials with similar and/or different properties. (Nursery)
- Develop an awareness the differences between materials and changes they notice (Nursery)

Understanding the world
- Begin to use senses in hands on exploration of natural materials.
- Explore materials indoors and outdoors.
- Repeat actions that have an effect

Vocabulary When discussing with children, model using vocabulary such as; Big, small, Soft, hard, cold, hot, warm, slippery, wet, fluffy

Cross Curricular Links

PSED
- Recognising routines and linking this with materials (indoor/outdoor, snack)

Communication and Language
- Applying vocabulary to label a material.

EAD
- Using a range of materials to create using hands on methods.

Physical Development
- Hand eye co-ordination and fine motor skills.

Substantive knowledge – By the end of the topic
- Children can explore the difference between materials e.g. playdough, paint, snack, mud.
- Children can use some senses to explore a range of materials.
- Children can explore the new environment and materials found.
- Children recognise that repeat actions have an effect e.g. banging an instrument, splashing in a puddle.

Scientific Enquiry

Classification
- Classifying by similarities and differences

Observing over time
- What happens to ice over time?

Research using secondary sources
- Feeling materials in feely books.

Preschool - Who are the amazing animals that appear in my story?	Spring Which animals live near me?	Biology-Living things and Animals

Prior Learning
- Recognising a few animals.
- Listening skills

Next Steps after Unit
- Recognise, name and know the sounds of common farm animals. (Nursery)
- Begin to develop an awareness that different birds make different sounds. (Nursery)
- Continue to develop their understand for the need to respect and care for the natural environment and all living things. (Nursery)

Understanding the world
- Begin to notice the animals in their local environment with adult support.
- Begin to care for the natural environment and living things that they see with adult support.
- Explore and respond to different natural phenomena in their setting and on trips.

Vocabulary When discussing with children, model using vocabulary such as; Bird, dog, cat, worm, snail, slug, squirrel, gentle, care, little, big

Cross Curricular Links

PSED
- Treating animals and environment with respect
- Learning how to look after animals

Communication and Language
- Making a range of animal noises.

Substantive knowledge – By the end of the topic
- Children can name some of the animals they can see in their local environment.
- Children know where a few animals live – indoors or outdoors
- Children can handle elements of their natural environment with care and respect.
- Children can observe and classify similarities and differences.

Scientific Enquiry

Classification
- Sorting animals between similarities and differences - farm animals and pets, little and big.

Research using secondary sources
- Watching videos of animals in different habitats.

<table>
<tr><td colspan="2">Preschool -
Look up, look down, look all around</td><td>Summer
How is the outside changing?</td><td>Physics-Seasons and phenomena</td></tr>
<tr><td colspan="2">Prior Learning

Next Steps after Unit
• Begin to talk about what they see, using the weather and extensive vocabulary. (Nursery)
• Have an awareness of the seasons (Nursery)
• Have an understanding of different clothing needed to go outside.</td><td colspan="2">Understanding the world
• Explores and responds to different phenomena in their setting and on trips.
• Encourage toddlers and young children to enjoy and explore the natural world.
• Begin to develop an understanding of different weathers.
• Begin to recognise changing in the surroundings.

Vocabulary When discussing with children, model using vocabulary such as;
Cold, warm, sun, rain, hot, cloud, puddle, rainbow, wet, coat, sun cream, umbrella, hat, trees, shade, leaves, flowers,

Cross Curricular Links
PSED
• Becoming responsible for own needs.
Communication and Language
• Applying weather vocabulary to the season.
Physical Development
• Practise fundamental skill of walking on welly walk.</td></tr>
<tr><td colspan="2">Substantive knowledge – By the end of the topic
• Children can recognise the different occurrences during weather patterns e.g. puddles during rain.
• Children can talk about what they see in the weather e.g. it is sunny
• Children are beginning to understand the need for different clothing to go outside in the weathers.
• Children can begin to develop an awareness of season, especially Summer.</td><td colspan="2">Scientific Enquiry
Observation over time
• How has weather changed throughout the day?
• How is the weather different to yesterday?
Research using secondary sources
• Weather in story books.</td></tr>
</table>

Nursery

Nursery – Who lives in my house?	Autumn 1 Who is in my family?	Biology- Humans

Prior Learning

- Explore natural materials, indoors and outside. (Birth to three)
- Make connections between the features of their family and other families. (Birth to three)
- Notice differences between people. (Birth to three)

Next Steps after Unit

- Talk about members of their immediate family and community. (Reception)
- Name and describe people who are familiar to them. (Reception)
- Describe what they see, hear and feel whilst outside. (Reception)
- Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 – Animals, including humans).

Understanding the world

- Begin to use all their senses in hands-on exploration of natural materials.
- Begin to make sense of their own life-story and family's history.
- Begin to understand the key features of the life cycle of a plant and an animal
- Name a variety of human body parts and understand what we use different body parts for.

Vocabulary Model and encourage children to use vocabulary such as:

- grow, change, baby, toddler, child, adult, old person, smell, taste, touch, feel, hear, see, blind, deaf

Expose children to supplementary vocabulary such as:
life cycle, senses, elderly, die (if appropriate)

Cross Curricular Links

Personal, Social and Emotional Development

- Be increasingly independent in meeting their own care needs, e.g. brushing teeth, using the toilet, washing and drying their hands thoroughly.
- Make healthy choices about food, drink, activity and toothbrushing.

Expressive Arts and Design

- Create closed shapes with continuous lines, and begin to use these shapes to represent objects.
- Draw with increasing complexity and detail, such as representing a face with a circle and including details.

Substantive knowledge – By the end of the topic

- Talk about how they have changed since they were babies.
- Can name a variety of body parts.
- describe humans at different ages/life stages.
- Can talk about how they look after themselves and compare this to how a baby is looked after.
- Can talk about how they use their senses when exploring the world around them and natural objects.

Scientific Enquiry

Classification

- Sort images of humans according to their age.
- Sort using different senses. Which do you like/not like?

Observing over time

- How does a baby change over time?

Research using secondary sources

- Find out about the human life-cycle from an expectant mother, parent with a baby and elderly person.

Nursery – Family Who lives in my house?	Autumn 2 What kind of house do I live in?	Chemistry- Materials and Changing Materials

Prior Learning

- Explore materials with different properties. (Birth to three)
- Explore natural materials, indoors and outside. (Birth to three)

Next Steps after Unit

- Explore the natural world around them. (Reception)
- Describe what they see, hear and feel whilst outside. (Reception)
- Distinguish between an object and the material from which it is made. (Y1 – Everyday materials)

Understanding the world

- Begin to use all their senses in hands-on exploration of natural materials.
- Begin to explore collections of materials with similar and/or different properties.
- Begin to develop an awareness the differences between materials and changes they notice

Vocabulary

Model and encourage children to use vocabulary such as:

- mix, stir, change, burn, melt, hard, runny, set, freeze, freezer, cold, blended, hard, soft, bendy, stiff, wobbly, wood, plastic, paper, card, fabric

Expose children to supplementary vocabulary such as:

- solid, liquid, rigid, stronger, weaker

- Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 – Everyday materials)
- Describe the simple physical properties of a variety of everyday materials. (Y1 – Everyday materials)
- Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 – Everyday materials

Cross Curricular Links

Expressive Arts and Design

- Explore different materials freely, in order to develop their ideas about how to use them and what to make.
- Develop their own ideas and then decide which materials to use to express them.
- Join different materials and explore different textures.

Substantive knowledge – By the end of the topic

- Can name the material they are using.
- Can talk about one property of a material.
- Can talk about how materials change when heated.
- Can talk about how materials change when frozen

Scientific Enquiry

Classification

- Sort images of humans according to their age.
- Sort using different senses. Which do you like/not like?

Observing over time

- How does a baby change over time?

Research using secondary sources

- Find out about the human life-cycle from an expectant mother, parent with a baby and elderly person.

Nursery –Insects Is an insect the same as a bug?	Spring 1 What lurks in the pond?	Biology- Living things and their habitats

Prior Learning

- Explore natural materials, indoors and outside. (Birth to three)

Next Steps after Unit

- Draw information from a simple map. (Reception)
- Explore the natural world around them. (Reception)
- Describe what they see, hear and feel whilst outside. (Reception)
- Recognise some environments that are different to the one in which they live. (Reception)

Understanding the world

- Recognise, name and know the sounds of common farm animals
- Begin to develop an awareness that different birds make differ
- Continue to develop their understand for the need to respect and care for the natural environment and all living things.

Model and encourage children to use vocabulary such as:

- natural, plant, animal, leaves, seeds, conkers, acorns, twigs, bark, shells, feathers, pebbles, stones, same, different, pattern

Expose children to supplementary vocabulary such as: living, dead, similar

Cross Curricular Links

Mathematics

- Describe a familiar route.
- Discuss routes and locations, using words like 'in front of' and 'behind'.
- Talk about and identify the patterns around them. For example: stripes on clothes, designs on rugs and wallpaper. Use informal language like 'pointy', 'spotty', 'blobs' etc.
- Extend and create ABAB patterns – stick, leaf, stick, leaf.

Expressive Arts and Design

- Create closed shapes with continuous lines, and begin to use these shapes to represent objects.
- Draw with increasing complexity and detail, such as representing a face with a circle and including details.

Substantive knowledge – By the end of the topic

- Can name and describe some of the different animals which live in environments.
- Can sort the animals into their environment.
- Can name and describe objects in the collection, including patterns they notice on them.
- Can identify natural objects that have come from plants and animals.
- Children do not damage the living things they encounter in the natural environment.
- Children show care and encourage others to care for things they encounter in the natural environment.

Scientific Enquiry

Classification

- Find and identify natural objects to include in the collection.
- Which natural objects are from plants, animals or neither?

Grouping

- Group similar objects.

Nursery – What do I know about the amazing animals in my book?	Spring 2 What can we get from a farm animal?	Biology- Animals (not including Humans)

Prior Learning

- Explore natural materials, indoors and outside. (Birth to three)

Next Steps after Unit

- Recognise some environments that are different to the one in which they live. (Reception)
- Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 – Animals, including humans)
- Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 – Animals, including humans)
- Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 – Animals, including humans)

Understanding the world

- Begin to understand the key features of the life cycle of a plant and an animal.
- Begin to understand the need to respect and care for the natural environment and all living things.

Vocabulary

Model and encourage children to use vocabulary such as:

- egg, chick, bird, caterpillar, cocoon, chrysalis, butterfly, frog spawn, tadpole, froglet, frog, grow, change, die, names of animals and their young, fur, feathers, scales, tail, wings, beak, claws, paws, hooves, swim, walk, run, jump, jump, fly, patterns, spots, stripes

Expose children to supplementary vocabulary such as: life cycle, mane, webbed feet

Cross Curricular Links

Mathematics

- Talk about and identify the patterns around them. For example: stripes on clothes, designs on rugs and wallpaper. Use informal language like 'pointy', 'spotty', 'blobs' etc.

Expressive Arts and Design

- Create closed shapes with continuous lines, and begin to use these shapes to represent objects.
- Draw with increasing complexity and detail, such as representing a face with a circle and including details.

Substantive knowledge – By the end of the topic

- Can name and describe animals they have encountered.
- Can talk about how they cared for eggs/animals.
- Can describe how the animals changed over time.
- Can match animals to their young and name them.

Scientific Enquiry

Observing over time

- How does the … change over time?

Researching using secondary sources

- Find out more about the life cycles of the animals observed.

Classification

- Match animals and their young.

Nursery – Mary, Mary quite contrary. How does your garden grow?	Summer 1 How does Mary's garden grow?	Biology - Plants

Prior Learning

- Explore natural materials, indoors and outside. (Birth to three)

Next Steps after Unit

- 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
- Observe and describe how seeds and bulbs grow into mature plants. (Y2 – Plants)
- Find out and describe how plants need water, light and a

Understanding the world

- Use all their senses in hands-on exploration of natural materials.
- Explore collections of materials with similar and/or different properties.
- Plant seeds and care for growing plants.
- Understand the key features of the life cycle of a plant and an animal.
- Begin to understand the need to respect and care for the natural environment and all living things.

Vocabulary

Model and encourage children to use vocabulary such as:

- plant, leaf, stem, branch, root, bark, flower, petal, seed, berry, fruit, vegetable, bulb, plant, hole, dig, water, weed, grow, shoot, die, dead, soil, names of plants they grow

Expose children to supplementary vocabulary such as:

seedling, healthy, unhealthy, strong, sturdy, wilting, decay, mould, life cycle

suitable temperature to grow and stay healthy. (Y2 – Plants)
- Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 – Plants)

Cross Curricular Links

Mathematics
- Talk about and identify the patterns around them. For example: stripes on clothes, designs on rugs and wallpaper. Use informal language like 'pointy', 'spotty', 'blobs' etc.

Expressive Arts and Design
- Create closed shapes with continuous lines, and begin to use these shapes to represent objects.
- Draw with increasing complexity and detail, such as representing a face with a circle and including details.

Substantive knowledge – By the end of the topic
- Can describe some differences between seeds and bulbs.
- Can identify seeds and bulbs.
- Can talk about how they planted and cared for seeds and bulbs.
- Can explain that a seed or bulb grew into a plant and then died.
- Children do not damage the living things they encounter in the natural environment.
- Children show care and encourage others to care for things they encounter in the natural environment

Scientific Enquiry

Comparative testing
- Compare how quickly different seeds/bulbs germinate.
- Compare how different vegetable tops grow.

Observing over time
- How does a plant change as it grows?
- What happens to fruit, vegetables and flowers when left over time?

Researching using secondary sources
- Look at seed and bulb packets to learn how to plant and care for them.

Nursery – What can I do with water?	Summer 2 Will it float or does it sink?	Physics- Forces

Prior Learning
- Explore natural materials, indoors and outside. (Birth to three)

Next Steps after Unit
- Explore the natural world around them. (Reception)
- Describe what they see, hear and feel whilst outside. (Reception)
- Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 – Uses of everyday materials)

Understanding the world
- Begin to explore how things work.
- Begin to explore and talk about different forces they can feel.
- Talk about the differences between materials and changes they notice

Vocabulary

Model and encourage children to use vocabulary such as:
- object, float, sink, water, up, down, top, bottom, push, pull, magnet, spring, squash, bend, twist, stretch, turn, spin, smooth, rough, fast, slow

Expose children to supplementary vocabulary such as:
rising, falling, attract, repel, faster, slower, pulley, gear, elastic

Cross Curricular Links

Expressive Arts and Design
Join different materials and explore different textures.

Substantive knowledge – By the end of the topic
- Can identify objects that float and sink.
- Can identify objects whose shape can be changed and talk about how they changed their shape.
- Can describe what they feel when exploring magnets.
- Can describe what they feel and see when pushing, pulling, bending and twisting objects e.g. springs, elastics, wind-up toys, gears, pulleys etc.
- Can describe what they feel when riding bikes and scooters on different surfaces and ramps.

Scientific Enquiry

Comparative testing
- Compare the path of different wind-up toys.
- Compare how far different wind-up toys move.
- Compare the speed and direction of gears.
- Compare how easy or hard it is to lift an object with or without a pulley.
- Compare how easy it is to ride a scooter or bike on different surfaces.

Classification
- Sort objects according to whether they float or sink.
- Sort objects/materials according to whether their shape can be changed.

Reception

Reception – What do I know about me?	Autumn 1 How am I part of my family?	Biology- Humans

Prior Learning

- Use all their senses in hands-on exploration of natural materials. (Nursery)
- Begin to make sense of their own life-story and family's history. (Nursery)
- Understand the key features of the life cycle of a plant and an animal. (Nursery)
- Begin to understand the need to respect and care for the natural environment and all living things. (Nursery)

Next Steps after Unit

- Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 – Animals, including humans)

Understanding the world

- Talk about members of their immediate family and community.
- Name and describe people who are familiar to them.

Vocabulary - Model and encourage children to use vocabulary such as:

hair (black, brown, dark, light, blonde, ginger, grey, white, long, short, straight, curly), eyes (blue, brown, green, grey), skin (black, brown, white), big/tall, small/short, bigger/smaller, baby, toddler, child, adult, old person, old, young, brother, sister, mother, father, aunt, uncle, grandmother, grandfather, cousin, friend, family, boy, girl, man, woman

Expose children to supplementary vocabulary such as: bald, elderly, wrinkles, male, female, freckles

Cross Curricular Links

Personal, Social and Emotional Development

- See themselves as a valuable individual.
- Manage their own needs.

Physical Development

- Know and talk about the different factors that support their overall health and wellbeing: regular physical activity; healthy eating; toothbrushing; sensible amounts of 'screen time'; having a good sleep routine; being a safe pedestrian.
- Further develop the skills they need to manage the school day successfully: lining up and queuing; mealtimes; personal hygiene.

Mathematics

- Compare length, weight and capacity.

Substantive knowledge – By the end of the topic

- Can describe themselves, family, friends and community.
- Can create pictures of themselves, family, friends and community and identify their distinguishing features.
- Can talk about what they see when using a mirror.
- Can compare hand, foot and fingerprints and talk about how they are different.
- Can talk about how they look after themselves and how other people look after them.

Scientific Enquiry

Classification

- Sort images of people according to their characteristics.

Researching using secondary sources

- Find out information from visitors (dentist, nurse etc.).

Pattern seeking

- Are taller children faster?
- Are taller children stronger?

Reception – Who's afraid of the Big Bad Wolf?	Autumn 2 Where do the characters in my fairytale live?	Biology - Animals not including humans

Prior Learning

- Use all their senses in hands-on exploration of natural materials.
- Explore collections of materials with similar and/or different properties.
- Begin to understand the need to respect and care for the natural environment and all living things.

Next Steps after Unit

- Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 – Plants)
- Explore and compare the differences between things that are living, dead, and things that have never been alive. (Y2

Understanding the world

- Explore the natural world around them.
- Describe what they see, hear and feel whilst outside.
- Recognise some environments that are different to the one in which they live.

Vocabulary - Model and encourage children to use vocabulary such as:

- plant, tree, bush, flower, vegetable, herb, weed, animal, names of plants and animals they see, name of a contrasting environment e.g. beach, forest

Expose children to supplementary vocabulary such as: environment

– Living things in their habitat)
- Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 – Living things in their habitat)

Cross Curricular Links

PSED
- Children can demonstrate the importance of caring for the natural environment.
-

Substantive knowledge – By the end of the topic
- Can name and describe plants and animals in the school grounds and their environment.
- Can talk about how another environment is different to their surrounding natural environment.
- Children do not damage the living things they encounter in the natural environment.

Scientific Enquiry

Classification
- Name and describe plants and animals they find in the school grounds.

Pattern seeking
- Look for minibeasts in different areas of the school grounds.
- Look for plants in different areas of the school grounds.

Reception Where would the naughty bus travel?	Spring 1- How can the naughty bus travel to different places?	Physics- Forces

Prior Learning
- Explore how things work. (Nursery)
- Explore and talk about different forces they can feel. (Nursery)
- Talk about the differences between materials and changes they notice. (Nursery)

Next Steps after Unit
- Compare how things move on different surfaces. (Y3 – Forces and magnets)
- Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. (Y5 – Forces)
- Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. (Y5 – Forces)

Understanding the world
- Explore the natural world around them.
- Describe what they see, hear and feel whilst outside.

Vocabulary - Model and encourage children to use vocabulary such as:
- float, sink, up, down, top, bottom, surface, move, roll, drop, fly, turn, spin, fall, fast, slow, faster, slower, fastest, slowest, further, furthest, wind, air, water, blow, bounce

Expose children to supplementary vocabulary such as: force, rotate, solid, liquid, gravity

Cross Curricular Links

PD
- Explore different textures with their hands.

Substantive knowledge – By the end of the topic
- Can talk about how they changed objects to make them float or sink.
- Can talk about how they changed how cars move down ramps or gutters.
- Can talk about how they changed how wheels turn when sand or water is poured through them.
- Can talk about how they changed how balls bounce.
- Can compare how different boats and airplanes performed.
- Can describe how objects fall with and without a parachute.
- Can describe how a marble moves through different liquids.

Scientific Enquiry

Comparative testing
- Compare how cars move down ramps/gutters.
- Compare how wheels turn when sand or water is poured through.
- Compare how objects fall with and without parachutes.
- Compare how different balls bounce.
- Compare how things move when blown.
- Compare how a marble moves through different liquids.
- Compare how different paper airplanes fly.

Reception- How do we know the pirates are coming?	Spring 2 What is the best material for a pirate ship?	Chemistry- Materials and changing materials

Prior Learning

- Use all their senses in hands-on exploration of natural materials. (Nursery)
- Explore collections of materials with similar and/or different properties. (Nursery)
- Talk about the differences between materials and changes they notice. (Nursery)

Next Steps after Unit

- Distinguish between an object and the material from which it is made. (Y1 – Everyday materials)
- Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 – Everyday materials)
- Describe the simple physical properties of a variety of everyday materials. (Y1 – Everyday materials)
- Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 – Everyday materials)

Understanding the world

- Explore the natural world around them.
- Describe what they see, hear and feel whilst outside.

Vocabulary - Model and encourage children to use vocabulary such as:

- ice, water, frozen, icicle, snow, melt, wet, cold, slippery, smooth, big, bigger, biggest, smaller, smaller, smallest, hard, soft, bendy, rigid, wood, plastic, paper, card, metal, strong, weak, hot, apply heat, waterproof, soggy, not waterproof, best, change, change back

Expose children to supplementary vocabulary such as: solid, liquid, gas, most suited

Cross Curricular Links

Communication and Language

- Using descriptive language to talk about different materials using newly introduced vocabulary.

Substantive knowledge – By the end of the topic

- Can name the material they are using and why.
- Can talk about multiple properties of the material and why it is suited for its purpose.
- Can observe changes in their natural world and say why it is different now or will change in the future.
- Can compare and describe how materials change over time and in different conditions.

Scientific Enquiry

Comparative testing

- How quickly do ice cubes melt in different areas of the playground?

Observing over time

- How does the block of ice change over time?
- How does a snowman change over time?
- How does cake mixture/bread dough change as it is cooked?

Reception – Would we see a dinosaurs in Timperley Village?	Summer 1 – Which is the best habitat for a dinosaur to live in?	Biology - Living things and their habitats

Prior Learning

- Understand the key features of the life cycle of a plant and an animal. (Nursery)
- Begin to understand the need to respect and care for the natural environment and all living things. (Nursery)

Next Steps after Unit

- Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 – Animals, including humans)
- Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 – Animals, including humans)
- Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 – Animals, including humans)

Understanding the world

- Recognise some environments that are different to the one in which they live.

Vocabulary - Model and encourage children to use vocabulary such as:

- names of animals, live, on land, in water, jungle, desert, North Pole, South Pole, sea, hot, cold, wet, dry, snow, ice

Expose children to supplementary vocabulary such as: environment, polar regions, ocean, camouflage

Cross Curricular Links

Physical Development

Revise and refine the fundamental movement skills they have already acquired: rolling; crawling; walking; jumping; running; hopping; skipping; climbing.

Substantive knowledge – By the end of the topic	Scientific Enquiry
• Can name and describe animals that live in different habitats. • Can describe different habitats	*Classification* • Sort animals according to where they live. *Researching using secondary sources* • Learn how animals from a different habitat are cared for. Learn about animals in a different habitat.

Reception – Why are vegetables super?	Summer 2 – What does a plant need to grow?	Biology- Plants

Prior Learning
- Understand the key features of the life cycle of a plant and an animal. (Nursery)
- Begin to understand the need to respect and care for the natural environment and all living things. (Nursery)

Next Steps after Unit
- 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
- Observe and describe how seeds and bulbs grow into mature plants. (Y2 – Plants)
- Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. (Y2 – Plants)
- Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 – Plants)

Understanding the world
- To recognise the importance of trees.
- To know what plants, need to grow
- To know that plants and flowers grow in the spring and the summer and recall seasonal changes.

Vocabulary -

Plant, tree, shoot, seed, seedling, light, soil, water, air,

Cross Curricular Links

PSED
- Looking after the natural environment and recognisng that plants need care.

Physical Development
- Using fine motor skills to pick up seeds when planting.

Substantive knowledge – By the end of the topic	Scientific Enquiry
• Can recognise a range of plants and trees in our school environment. • Can recognise changes which happen to plants throughout the year. • Can understand that fruits and vegetables grow and can be eaten. • Understand the life-cycle of a plant over time. • Children can recognise the ways which they show responsibility to the natural environment.	*Observation over time* • To grow a range of plants in the outdoor provision. • To observe changes to plants over time. *Classifying and grouping and identifying* • To group plants and trees based on similar characteristics. • To identify plants and trees in our school environment.

KS1

Year 1

YEAR 1 – Introduction to Plants	Year A – Spring 2 Year B - Spring 1	Biology-Plants

Prior Learning
Children can recognise a range of plants and trees, recognise changes which happen to plants throughout the year. They can understand fruits and vegetables which can be eaten and understand elements of a plant life cycle. Children should have a respect for the natural environment.

Next Steps after Unit
Year 2 – How plants grow from seeds and bulbs and that they develop roots, stems, leaves and flowers. Children will learn that plants need water and warmth to germinate and light and temperature to grow.

Scientist of the topic
Agnes Arber – Researched and drew plants and historical botany

Vocabulary
Data, deciduous, diagram, edible, evergreen, feature, fruit, flower, garden plants, grouping, growth, investigation, leaf, measure, observe, plant, prediction, roots, research, seed, shoot, stem, trunk, wild plants

Non Statutory Guidance
Pupils should use the local environment throughout the year to explore and answer questions about plants growing in their habitat. Where possible, they should observe the growth of flowers and vegetables that they have planted.

Substantive Knowledge

Plant Structure and Function

- To know a variety of common plants, and how they differ.
- To know that deciduous trees lose their leaves seasonally, but evergreen trees do not.
- To know the basic structure (including leaves, flowers (blossom), fruit, roots, bulb, seed, trunk, branches, stem) of a variety of common plants, including flowering plants and trees.

Plant Growth and Seeds

- To begin to understand how plants grow and change over time.

Working Scientifically / Disciplinary Knowledge

- Observing closely, perhaps using magnifying glasses.
- Comparing and contrasting familiar plants.
- Describing how they were able to identify and group them
- Drawing diagrams showing the parts of different plants including trees.
- Keeping records of how plants have changed over time, for example the leaves falling off trees and buds opening.
- Comparing and contrasting what they have found out about different plants.

YEAR 1 Sensitive Bodies	Year A – Autumn 1 Year B – Autumn 1	Biology- Animals Including Humans

Prior Learning
EYFS – Knowledge of senses and parts of the human body. Recognising growth from a baby and families.

Next Steps after Unit
Year 2 – Life Cycles and health
Covering change into adulthood, stages of some animal life cycles, the basic needs of humans and animals to survive.

Scientist of the topic
Miller Hutchingson – Engineer who invented the electric hearing aid

Vocabulary
Action, bitter, blind, body, compare, data, direction, distance, feeling, group, hearing, investigation, loud, obstacle, pattern, quiet, research, salty, sense, senses, sensitive, sight, smell, sour, sweet, taste, touch, volume

Non-Statutory Guidance
Pupils should have plenty of opportunities to learn the names of the main body parts (including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth) through games, actions, songs and rhymes.

Substantive Knowledge

Animal Structure and Function

- To know key parts of the human body (including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth).
- To know the five main senses: sight, smell, hearing, taste and touch.
- To know that the skin is used for touch, the tongue is used for taste, the nose is used for smell, the eyes are for sight.

Pupils might work scientifically by:

- using their senses to compare different textures, sounds and smells.
- Compare and group body parts.
- Begin to recognise patterns in data and use these to answer questions.
- Record data in a table.
- Measure using non-standard units.

YEAR 1 – Comparing Animals	Year A – Spring 1 Year B – Summer 1	Biology- Animals Including Humans

Prior Learning
EYFS covering life cycles and basic animals. Through stories, children will recognise a range of animals and their features.

Next Steps after Unit
Year 2 – Life Cycles and health
Covering change into adulthood, stages of some animal life cycles, the basic needs of humans and animals to survive.

Scientist of the topic
Chris Packham – Zoologist and presenter

Vocabulary
Amphibian, bird, block chart, body, carnivore, compare, data, diet, differences, feature, fish, group, herbivore, hunt, mammal, observe, omnivore, pet, record, reptile, research, scientist, similarities, tally

Non-Statutory Guidance
Pupils should use the local environment throughout the year to explore and answer questions about animals in their habitat. They should understand how to take care of animals taken from their local environment and the need to return them safely after study. Pupils should become familiar with the common names of some fish, amphibians, reptiles, birds and mammals, including those that are kept as pets.

Substantive Knowledge

Animal Growth
- To know a variety of common animals (including fish, amphibians, reptiles, birds and mammals).

Animal Structure and Function
- To know the main body parts of common animals (arms, legs, wings, tails, fins, head, trunk, horns/tusks, shell)

Health and nutrition
- To know that a carnivore is an animal that eats other animals and give some examples.
- To know that a herbivore is an animal that eats only plants and give some examples.
- To know that an omnivore is an animal that eats both animals and plants, and to give some examples.

Pupils might work scientifically by:
- Use a non-fiction text to find out about specific animals' diets.
- Recognise that there are different ways to gather data.
- Record data in a block graph and use this to answer questions.
- Recognise what the scientist Chris Packham was known for.

YEAR 1 Seasonal Changes	Year A – Autumn 2 Year B – Autumn 2	Physics- Earth and Space

Prior Learning
Across EYFS, children will have been recognising the seasonal changed and this is covered as an explicit topic in Preschool.

Next Steps after Unit
Year 5, the children will learn about why the seasons are formed due to the rotation of the Earth in the Earth and Space topic.

Scientist of the topic
Jim Cantore – Meteorologist and storm tracker

Vocabulary
Conclusion, data, deciduous tree, evergreen tree, pictogram, predict, record, season, sunrise, sunset, symbol, temperature, thermometer, weather

Non-Statutory Guidance
Pupils should observe and talk about changes in the weather and the seasons.
Note: Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses.

Substantive Knowledge

Key Facts
- To know the name and order of the four seasons; spring, summer, autumn and winter.
- To know that it is unsafe to look directly at the Sun

Forces in motion
- To know weather associated with the four seasons and how it changes (in the UK).
- To understand that day length varies across the four seasons, with fewer daylight hours in the winter and more in the summer.

Pupils might work scientifically by:
- To raise questions about observations.
- To predict an outcome using their own experiences.
- To observe and gather data and to make comparisons between seasons.
- To begin to understand how measurements can be taken, i.e. using a thermometer.
- To begin to draw pictograms.
- To begin to analyse data in a pictogram by comparing the seasons.
- To use a pictogram to answer questions.
- To begin to draw conclusions.

<table>
<tr><td>YEAR 1 Everyday Materials</td><td>Year A – Summer 1
Year B – Spring 2</td><td>Chemistry - Materials</td></tr>
<tr><td colspan="2">Prior Learning
In EYFS, children will have explored everyday materials and discussed the best material for making a pirate ship.

Next Steps after Unit
In Year 2, Children will learn about the uses of everyday materials. They will consider why an object is made from a particular material and their suitability for purpose. Children will learn about the changes of materials and how solid objects can be squashed, pulled etc.</td><td>Scientist of the topic
Chester Greenwood – Inventor of earmuffs

Vocabulary
Absorbent, data, fabric, glass, group, material, metal, object, opaque, plastic, property, rock, tough, transparent, waterproof, wood

Non-Statutory Guidance
Pupils should explore, name, discuss and raise and answer questions about everyday materials so that they become familiar with the names of materials and properties such as: hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent. Pupils should explore and experiment with a wide variety of materials, not only those listed in the programme of study, but including for example: brick, paper, fabrics, elastic, foil.</td></tr>
<tr><td colspan="2">Substantive Knowledge
Identifying and Naming
• To know that objects are items or things.
• To know that a material is what an object is made from.
• To identify and name a variety of everyday materials,
• including wood, plastic, glass, metal, water and rock.

Properties and Uses
• To know that property refers to how a material can be described.
• To describe the physical properties of a variety of everyday materials.
• To understand that materials can be grouped based on their physical properties.</td><td>Pupils might work scientifically by:
• Sort objects based on the materials they are made from.
• Group objects based on their properties.
• Suggest ways to test materials for their properties.
• Make predictions and recognise whether they were accurate.
• Use their observations to answer questions.
• Begin to recognise if a test is fair.</td></tr>
</table>

YEAR 2

YEAR 2 – Life cycles and Health	Year A - Autumn 1 Year B – Autumn 1	Biology - Animals, Including Humans

Prior Learning
In Year 1, children learnt about classifying animals into groups, and the different diets of animals.

Next Steps after Unit
In Year 3, children will be learning about the parts of a human body, e.g. skeleton and the nutrition that a human needs. They will learn about the diets of different animals and the food groups.

Scientist of the topic
Maria Sibylla Merian – Published findings of life cycles with drawings.

Vocabulary
Adult, air, baby, basic needs, butterfly, child, carbohydrates, caterpillar, dairy, egg, exercise, fitness, food, frog, froglet, fruit, germs, growth, health, height, hygiene, lamb, life cycle, live young, measure, offspring, oils, proteins, pupa, sheep, spawn, spreads, stage, survive, tadpole, teenager, toddler, vegetables, water.

Non-Statutory Guidance
Pupils should be introduced to the basic needs of animals for survival, as well as the importance of exercise and nutrition for humans. They should also be introduced to the processes of reproduction and growth in animals. The focus at this stage should be on questions that help pupils to recognise growth; they should not be expected to understand how reproduction occurs.
The following examples might be used: egg, chick, chicken; egg, caterpillar, pupa, butterfly; spawn, tadpole, frog; lamb, sheep. Growing into adults can include reference to baby, toddler, child, teenager, adult.

Substantive Knowledge

Animal Growth
- To understand how living things change, and that animals have offspring that grow into adults.
- To know which offspring comes from which parent animal.
- To know the stages in some animal life cycles

Health and nutrition
- To know that animals, including humans, need water, food and air to survive.
- To understand the importance of exercise, a balanced diet and hygiene for humans.

Pupils might work scientifically by:
- Measure using simple equipment.
- Record results in a table.
- Use data to answer a simple question.
- Research using secondary sources.

YEAR 2 – Plant Growth	Year A - Spring 1 Year B – Spring 1	Biology - Plants

Prior Learning
In Y1, children learnt about identifying a variety of common plants and understood the basic structure of a plant. Children know how plants change over time.

Next Steps after Unit
In Y3, children will be learning about the functions of a plant and to know that water is transported throughout the plant. Children should know how about the life cycle of a plant and the process of pollination.

Scientist of the topic
Angie Burnett – Plant biologist who grows plants in different conditions and tests.

Vocabulary
Bulb, comparative test, conclusion, condition, diagram, energy, flower, germinate, growth, leaf, life cycle, measure, nutrient, observe, plant, shoot, seed, seedling, seed coat, stem, wilt.

Non-Statutory Guidance
Pupils should use the local environment throughout the year to observe how plants grow. Pupils should be introduced to the requirements of plants for germination, growth and survival, as well as the processes of reproduction and growth in plants.
Note: seeds and bulbs need water to grow but most do not need light; seeds and bulbs have a store of food inside them.

Substantive Knowledge

Plant Growth and Seeds
- To know that seeds and bulbs grow into seedlings by producing roots and shoots.
- To know that seedlings grow into mature plants by developing parts such as roots, stems, leaves and flowers.
- To know that seeds need water and warmth to germinate.
- To know that plants need water, light and a suitable temperature for growth and health.

Pupils might work scientifically by:
- Set up comparative tests.
- Plan observations and measurements.
- Use rulers to measure and record stem height.
- Record plant growth data in a table.
- Compare plant growth in different test conditions.
- Use a magnifying glass to observe and compare plants.
- Draw diagrams to represent a plant's life cycle.

YEAR 2 – Uses of Everyday Materials	Year A Autumn 2 Year B – Spring 2	Chemistry- Materials

Prior Learning
Year 1, children will have covered a range of everyday materials and be able to identify and name a variety. They will know that a property refers to how a material can be described and materials can be grouped by these properties.

Next Steps after Unit
Children will be learning about rocks and soil in year 3 and will apply their knowledge of materials to identify, name and classify a range of rocks.

Scientist of the topic
Charles Mackintosh – inventor of waterproof raincoat.

Vocabulary
elastic, fabric, flexible, glass, material, metal, object, plastic, property, pull, push, record, rock, squash, stretch, suitable, twist, wood

Non-Statutory Guidance
Pupils should identify and discuss the uses of different everyday materials so that they become familiar with how some materials are used for more than one thing (metal can be used for coins, cans, cars and table legs; wood can be used for matches, floors, and telegraph poles) or different materials are used for the same thing (spoons can be made from plastic, wood, metal, but not normally from glass). They should think about the properties of materials that make them suitable or unsuitable for particular purposes and they should be encouraged to think about unusual and creative uses for everyday materials.

Substantive Knowledge

Properties and Uses
- To know why objects are made from particular materials and to give examples of their suitability.
- To know that one material can be used for a range of purposes (and to give examples.)
- To know that different materials can be used for the same purpose (and to give examples.)
- To know why certain materials are unsuitable for particular objects..

Changes
- To know that a push or pull must be applied to change the shape of a solid object.
- To know that solid objects can be squashed, bent, twisted or stretched.
- To know that different solid objects may take a different amount of force to change shape.

Pupils might work scientifically by:
- Comparing the uses of everyday materials in and around the school with materials found in other places (at home, the journey to school, on visits, and in stories, rhymes and songs.)
- Observing closely and recording their observations.
- identifying and classifying the uses of different materials. Measure using non-standard units.
- Recording results in a table.
- Use data to answer a simple question.
- Record results in a block graph.

YEAR 2 – Habitats	Year A - Spring 2 Year B – Autumn 2	Biology- Living things and their habitats

Prior Learning
In EYFS, children learnt about a range of habitats. They learnt about a range of different habitats.

Next Steps after Unit
Children will next visit habitats in Year 4 where they will learn about classifying animals into different groups and using a classification key to group and identify plants and animals. Children will learn that habitats change throughout the year and that humans can have both a positive and negative impact on the environment.

Scientist of the topic
Prem Singh Gill – Polar scientist who studies where Antarctic seals live and breed.

Vocabulary
Alive, analyse, camouflage, carnivore, classify, coastal, dead, depend, diet, energy, excretion, food chain, growth, habitat, herbivore, life process, mammal, movement, nutrition, ocean, omnivore, predator, prey, producer, rainforest, reproduction, sensitivity, shelter, woodland

Non-Statutory Guidance

Pupils should be introduced to the idea that all living things have certain characteristics that are essential for keeping them alive and healthy. They should raise and answer questions that help them to become familiar with the life processes that are common to all living things. Pupils should recognise a 'habitat' is a natural environment or home of a variety of plants and animals.

Substantive Knowledge	Pupils might work scientifically by:
Characteristics of living things • To begin to understand some of the life processes including movement, reproduction, sensitivity, growth, excretion, and nutrition, • To know the difference between things that are living, dead, and things that have never been alive, using some of the life processes. Variation and Inheritance • To know a variety of plants and animals and describe some differences. Habitats and Interdependence • To name a variety of habitats, including woodland, ocean, rainforest and coastal. • To know that a habitat is the environment where an animal or plant lives/grows because it provides what they need to survive. • To know that living things depend upon each other (e.g. for food, shelter.) • To understand that a food chain can be used to show how animals obtain food from eating either plants and/or other animals.	• To ask simple questions, recognising that they can be answered in different ways. • To classify objects into groups. • Sorting and classifying things according to whether they are living, dead or were never alive. • Recording their findings using charts. To gather and record data in a simple table. • To carry out research to find answers to questions. • To construct a simple food chain (e.g. grass, cow, human) • Finding out how the conditions affect the number/type of plants/animals in a given habitat.

YEAR 2 – Microhabitats	Year A - Summer 1 Year B – Summer 1	Biology- Living things and their habitats

Prior Learning	Scientist of the topic
In EYFS, children learnt about a range of habitats. They learnt about a range of different habitats. Earlier in the year, children will have learnt about habitats. Next Steps after Unit Children will next visit habitats in Year 4 where they will learn about classifying animals into different groups and using a classification key to group and identify plants and animals. Children will learn that habitats change throughout the year and that humans can have both a positive and negative impact on the environment.	Helen Scales – Marine biologist who studies rockpools and has written children books. Vocabulary Botanist, camouflage, characteristics, classification key, classify, comparative/fair test, conclusion, criteria, data, food chain, identify, invertebrate, method, microhabitat, minibeast, research, results, species, survey, tally, test Non-Statutory Guidance Pupils should recognise that a 'microhabitat' is a very small habitat, for example for woodlice under stones, logs or leaf litter. They should raise and answer questions about the local environment that help them to identify and study a variety of plants and animals within their habitat and observe how living things depend on each other, for example, plants serving as a source of food and shelter for animals. Pupils should compare animals in familiar habitats with animals found in less familiar habitats, for example, on the seashore, in woodland, in the ocean, in the rainforest.

Substantive Knowledge	Pupils might work scientifically by:
Characteristics of living things • To begin to understand some of the life processes including movement, reproduction, sensitivity, growth, excretion, and nutrition, Variation and inheritance • To know the difference between things that are living, dead, and things that have never been alive, using some of the life processes. Habitats and Interdependence • To know that a habitat is the environment where an animal or plant lives/grows because it provides what they need to survive. • To know that a micro-habitat is a very small habitat (e.g. stones, logs and leaf litter). • To know that living things depend on each other e.g. food or shelter	• Group minibeasts and create simple classification keys. • Ask questions and recognise that they can be answered in different ways. • Gather and record data and use it to answer questions. • Plan what observations to make in an experiment. • Order the steps of a method. • Describe the appearance of flowering plants. • Use an identification chart to name flowering plants.

LKS2

Year 3

YEAR 3 – Rocks and Soil	Year A - Autumn 1 Year B – Spring 1	Chemistry- Materials

Prior Learning
In KS1, children have learnt about every day materials and describe changes from different forces. Children can name a range of materials and describe the suitability and unsuitability of materials.

Next Steps after Unit
In Year 4, children will be learning about the states of matter and how materials can exist as solids, liquids and gases and how materials can change between these states.

Scientist of the topic
Florence Bascom – geologist who studied the formation of mountains.

Vocabulary
Absorbency, acid rain, bone, clay, clay soil, crystal, earthworm, era, fossil, fossil record, grain, hard, hardness, impermeable, igneous rock, imprint, lava, loam soil, magma, metamorphic rock, mineral, molten rock, organic matter, paelantologist, peaty soil, permeable, rate, rock, sandy, sandy soil, sediment, sedimentary, sedimentation, silt, soft, soil.

Non-Statutory Guidance
Linked with geography, pupils should explore different kinds of rocks and soils, including those in the local environment.

Substantive Knowledge

Identifying and Naming
- To know that rocks can be grouped based on their appearance or properties, (e.g. colour, texture, hardness, permeability.)
- To know that rocks may contain grains, crystals or fossils.
- To know that grains and crystals appear differently and can be used to classify rocks.
- To know that soils are made from rocks and dead matter.

Properties and Uses
- To understand the relationship between the properties of rocks and their uses.

Change
- To know that fossils can form from the remains of living things.
- To know that rocks can change over time (e.g. erosion, weathering)

Pupils might work scientifically by:
- Use a magnifying glass correctly to observe the appearance of a rock in detail.
- Use results to choose the appropriate rock type for a specific use, suggest a better choice of rock for a specific use and to predict how a rock will be affected by the weather.
- Research and present information on fossil formation using a single source.
- Use a model of the fossil record to determine the relative age of a fossil, to suggest how a living thing has changed over time and to suggest what living things were around in a certain era.
- Draw and label the bars on a bar chart.
- Accurately draw and label the layers of sediment in a sedimentation jar.

YEAR 3 – Forces and Magnets	Year A - Spring 1 Year B – Autumn 2	Physics- Forces and Space

Prior Learning
This is children's first interaction with forces since work in the EYFS around floating and sinking. Children may have come across forces during extra-curricular science activities and science weeks so check for prior knowledge.

Next Steps after Unit
In Y5, children will be learning about other forces such as gravity and air resistance. Children will be learning about the effect of imbalances forces and understanding how forces can be changed.

Scientist of the topic
William Gilbert – Developed the theory of magnetism

Vocabulary
Force, contact force, non-contact force, friction, magnetism, magnet, north pole, south pole, magnetic material, non-magnetic, material, attract, repel, electromagnet

Non-Statutory Guidance
Pupils should observe that magnetic forces can act without direct contact, unlike most forces, where direct contact is necessary (for example, opening a door, pushing a swing). They should explore the behaviour and everyday uses of different magnets (for example, bar, ring, button, and horseshoe).

Substantive Knowledge	Pupils might work scientifically by:
Key Facts • To know some examples of contact and non-contact forces. • To know that some forces are a result of contact between two surfaces, but some forces can act at a distance (e.g. magnetism). • To know the North and South poles of a magnet. • To know some examples of magnetic materials, including iron and nickel, and how they react to a magnet and each other. • To know some different examples of magnets, including bar, horseshoe, button and ring, • To know some uses of magnets. Forces in Motion • To know that friction is a contact force that acts between two surfaces to slow an object down. • To know that magnetism is a non-contact force that affects objects containing magnetic metal. • To understand that the opposite poles of a magnet attract one another and like poles repel one another. Factors affecting forces • To know that rougher surfaces have more friction between them than smoother surfaces. • To understand that the strength of different magnets may vary.	• Use arrows and scientific vocabulary to show the direction of a contact force. • Use evidence to support conclusions. • Identify the variables to change, measure and control. • Write a method to explain how to use a magnet to sort and classify materials as magnetic or non-magnetic. • Label the axes of a bar chart. • Draw bars on a chart accurately. • Identify key information from a source. • Use more than one source to research a question.

YEAR 3 – Movement and Nutrition	Year A – Autumn 2 Year B – Autumn 1	Biology- Animals Including Humans

Prior Learning	Scientist of the topic
In Year 2, children have learnt about offspring and growth and about some animal life cycles. They recognise what animals inc. humans need to survive and the importance of exercise, diet and hygiene. Next Steps after Unit Children will be learning in Y4 about their digestion and food. They will learn about the digestive system and teeth and how to look after their own needs. Children will understand food chains, prey, predators and producers in food chains.	Ruth Wakefield – Dietician inventing the first choc chip cookie Vocabulary balanced diet, bone, carbohydrate, endoskeleton, exoskeleton, fat, fibre, invertebrate, joint, mineral, movement, muscle, nutrient, protection, protein, skeleton, support, vertebrate, vitamin, water. Non-Statutory Guidance Pupils should continue to learn about the importance of nutrition and should be introduced to the main body parts associated with the skeleton and muscles, finding out how different parts of the body have special functions.

Substantive Knowledge	Pupils might work scientifically by:
Animal structure and function • To know that animals can be grouped based on the presence of a skeleton. • To know that the skeleton in humans and some animals is used for movement, protection, and support. • To know that the muscular system in humans and some animals works with the skeleton for movement. • To know the main bones in the body. Health and Nutrition • To know that animals, including humans, need the right types and amount of nutrition. • To understand that humans cannot make their own food and therefore eat to get the nutrition needed. • To know the main food groups (carbohydrates, protein, fats, fibre, vitamins, minerals and water) and their simple functions. • To know that a balanced diet should include all food groups. • To describe the diets of different animals.	• Record measurements of different bones and use the data to sort them into size order. • Describe some ways scientific research has improved the field of bionics/prosthetics, such as the choice of materials or linking their movement to muscles in the arm. • Find relevant data on food packaging and make numerical comparisons.

YEAR 3 – Light and Shadows	Year A – Spring 1 Year B – Summer 1	Physics – Energy (Light)

Prior Learning
Children will not have learnt about light before and this is a new topic, however they will have encountered light and shadow through everyday life. Check children's prior knowledge before teaching this topic.

Next Steps after Unit
In Y6, children will revisit light to understand how light travels, how light is reflected and how the angle of a reflected ray is affected by the angle of an incoming ray. Children will know how and why the distance between an object is affected.

Scientist of the topic
Percy Shaw – Inventor of the cat's eye

Vocabulary
cast a shadow, dangerous, light source, luminous, non-luminous, opaque, protect, reflect, reflection, reflective (shiny), shadow, shadow puppet, translucent, transparent

Non-Statutory Guidance
Pupils should explore what happens when light reflects off a mirror or other reflective surfaces, including playing mirror games to help them to answer questions about how light behaves. They should think about why it is important to protect their eyes from bright lights. They should look for, and measure, shadows, and find out how they are formed and what might cause the shadows to change.

Substantive Knowledge

Sources
- To know that light travels from a source (e.g. the Sun, light bulbs and torches).
- To know that light is needed to see things and that dark is the absence of light.
- To know that light from the Sun can be dangerous and how to protect their eyes.

Transfer
- To know that all materials reflect light.
- To know that shadows are formed when the light from a light source is blocked by an opaque object.

Factors affecting energy
- To know that shadows change as a result of different factors:
  - Changing the position of the light source.
  - Changing the distances between the light source, object and surface.
- To know that shadows change position and length throughout the day as the Sun changes position in the sky.

Pupils might work scientifically by:
- looking for patterns in what happens to shadows when the light source moves or the distance between the light source and the object changes.

Note: pupils should be warned that it is not safe to look directly at the sun, even when wearing dark glasses.

YEAR 3 – Plant Reproduction	Year A – Summer 1 Year B – Spring 2	Biology- Plants

Prior Learning
From Y2, children know that seeds and bulbs grow into seedlings and produce roots and shoots. They know that seeds water and warmth to germinate and that they need water, light and suitable temperature for growth and health.

Next Steps after Unit
Plants are not covered again in the KS2 curriculum and will be revisited by children in KS3.

Scientist of the topic
George Washington Carver – Discovered new plants

Vocabulary
Absorb, air, animal dispersal, carrying, conclude, disperse, dropping, eating, evaluate, female, flower, fruit, germination, improve, leaves, male, nutrients, petal, pollen, pollination, roots, soil, seed, seed formation, shaking, space, stem/trunk, sunlight, support, testable, transport, water, water dispersal, wind dispersal.

Non-Statutory Guidance
Pupils should be introduced to the relationship between structure and function: the idea that every part has a job to do. They should explore questions that focus on the role of the roots and stem in nutrition and support, leaves for nutrition and flowers for reproduction.

Note: pupils can be introduced to the idea that plants can make their own food, but at this stage they do not need to understand how this happens.

Substantive Knowledge	Pupils might work scientifically by:
Plant Structure and function • To understand the functions of the basic parts of a plant and the relationship between structure and function. • To know that water is transported within a plant from the root, through the stem, to the leaves. Plant Growth and Seeds • To know that plants need water, light, air, nutrients and a suitable temperature for growth and health. • To understand that the needs for growth and health vary from plant to plant. Plant Life Cycle • To know the life cycle of a plant from seed to mature plant. • To know that flowers are the reproductive organ of a plant. • To know that the process of pollination is the transfer of pollen to the female (part of the) flower. • To know that the process of seed formation is the growth of a seed after pollination. • To know some different methods of seed dispersal and the benefits of each.	• comparing the effect of different factors on plant growth, for example, the amount of light, the amount of fertiliser. • Discovering how seeds are formed by observing the different stages of plant life cycles over a period of time. • Looking for patterns in the structure of fruits that relate to how the seeds are dispersed. • They might observe how water is transported in plants, for example, by putting cut, white carnations into coloured water and observing how water travels up the stem to the flowers.

Year 4

YEAR 4 – Digestion and food	Year A – Autumn 2 Year B – Spring 2	Biology- Animals including Humans

Prior Learning
In Y3, children will recognise the need for a skeleton and the muscular system in the body. They learn about the importance of nutrition and the diets of animals.

Next Steps after Unit
In Y5, children will learn about the human lifecycle and in Y6 about the circulation system.

Scientist of the topic
Paul Sharpe – bioengineer who studies how to regrow teeth.

Vocabulary
Absorb, canine, carnivore, digest, faeces, food chain, herbivore, incisor, large intestine, molar, mouth, oesophagus, omnivore, predator, premolar, prey, producer, saliva, small intestine, stomach.

Non-Statutory Guidance
Pupils should be introduced to the main body parts associated with the digestive system, for example: mouth, tongue, teeth, oesophagus, stomach, and small and large intestine, and explore questions that help them to understand their special functions.

Substantive Knowledge

Animal Structure and Function

- To know the main organs of the human digestive system (mouth, teeth, tongue, oesophagus, stomach, small and large intestines) and describe their simple functions.
- To know the different types of human teeth (incisor, canine, premolar and molar) and their simple functions.

Health and Nutrition

- To know that teeth can be damaged, including the effect of sugary and acidic food.
- To know that it is important to brush teeth twice a day, make good food choices and visit the dentist regularly.
- To describe the teeth of carnivores and herbivores and understand why they are different.
- To know that predators hunt for their food and prey are the animals being hunted.
- To know that producers make their own food.
- To know that food chains begin with a producer followed by consumers, and arrows to show the energy passed on.

Pupils might work scientifically by:

- Evaluate a strength or weakness of the digestive system model.
- Comparing the teeth of carnivores and herbivores and reasons for differences.
- Finding out what damages teeth and how to look after them.
- Describe an example of evidence that can be used to study teeth.
- Identify some of the variables that need to be kept the same, predict an outcome and identify limitations to the experiment.
- Recall that scientific research needs repeated results before use in society.
- Identify trends in a predator-prey graph.
- Draw a results table that has space for observations about different poo samples.

YEAR 4 – Electricity and Circuits	Year A – Spring 1 Year B – Autumn 2	Physics – Energy (Electricity)

Prior Learning
Children's first interaction with electricity in the national curriculum but it may have been visited during a science curriculum enrichment.

Next Steps after Unit
In Y6, children will learn about using a wider variety of components in a circuit and to understand the importance of voltage.

Scientist of the topic
Michael Faraday – Physicist inventing the first electric motor

Vocabulary
Ammeter, appliance, battery, bulb, buzzer, cell, circuit, component, electrical conductor, electrical insulator, electricity, hazard, mains, material, motor, power source, precaution, property, safety, series circuit, switch, wire.

Non-Statutory Guidance
Pupils should construct simple series circuits, trying different components, for example, bulbs, buzzers and motors, and including switches, and use their circuits to create simple devices. Pupils should draw the circuit as a pictorial representation, not necessarily using conventional circuit symbols at this stage; these will be introduced in year 6. Note: pupils might use the terms current and voltage, but these should not be introduced or defined formally at this stage. Pupils should be taught about precautions for working safely with electricity.

Substantive Knowledge

Sources

- To know that all electrical appliances need a power source, including batteries or mains electricity.
- To know that an electrical circuit needs a complete path for the electrical charge to flow through.
- To know the main components in a simple series circuit.

Pupils might work scientifically by:

- Draw a results table and record a range of appliances under the correct headings 'Mains' or 'Batteries'.
- Identify and draw simplified electric circuit symbols and

• To know the precautions for working safely with electricity. Transfer • To know that some materials allow electrical charge to pass through them quickly and these are known as electrical conductors (e.g. metals). • To know that some materials do not allow electrical charge to pass through them easily and these are known as electrical insulators (e.g wood and plastic). • To know that metals are used for cables and wires because they are good conductors of electricity. • To know that plastic is used to cover cables and wires because it is a good insulator. Factors affecting energy • To understand that an open switch breaks a series circuit so the components will be off. • To understand that a closed switch completes a series circuit so the components will be on. • To understand the relationship between bulb brightness and the number of bulbs in a circuit.	use these to draw a simplified circuit diagram. • Write a method for the investigation that considers appropriate equipment, ordering clearly written steps and considering safety. • Pose questions relating to bulbs in an electrical circuit. • Explain why a selected question is testable. • Suggest that new inventions will change safety advice.

YEAR 4 – States of matter	Year A – Autumn 1 Year B – Spring 1	Chemistry- Materials
Prior Learning Children have learnt that 'materials' means what an object is made from and can describe a range of properties. In Y3, children learnt about soils, rocks and fossils and the relationship between properties and uses. Next Steps after Unit In Y5, children will be learning about a broader range of properties to describe materials and use the properties to create mixtures, study separation and know how changes occur to materials.	Scientist of the topic Robert Boyle – discovered volume of a gas decreases with pressure, The Boyle Law. Vocabulary boiling point, climate change, compress, condensation, condensing, condensing point, drought, evaporating, evaporation rate, flood, force, freezing, freezing point, gas, gaseous, liquid, matter, melting, melting point, precipitation, rate, solid, state, steam, temperature, thermometer, the water cycle, volume, water vapour Non-Statutory Guidance- Pupils should explore a variety of everyday materials and develop simple descriptions of the states of matter (solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container). Pupils should observe water as a solid, a liquid and a gas and should note the changes to water when it is heated or cooled. Note: teachers should avoid using materials where heating is associated with chemical change, for example, through baking or burning.	

Substantive Knowledge	Pupils might work scientifically by:
Identifying and naming • To know that all substances around us can exist as solids, liquids, and gasses. Properties and Uses • To know that a property of a solid is that it keeps its shape unless a force is applied to it. • To know that a property of a liquid can flow freely and take on the shape of a container. • To know that a property of a gas does not have a fixed shape and can escape from an unsealed container. Change • To know that heating causes solids to turn into liquids (melting) and liquids to turn into gases (evaporating). • To know that cooling causes gases to turn into liquids (condensing) and liquids to turn into solids (freezing). • To know that water can exist as a solid, a liquid or a gas. • To know that the melting point of water is zero degrees Celsius and the boiling point of water is 100 degrees Celsius. • To know that water flows around the world in a continuous process called the water cycle. • To know that in the water cycle, evaporation is when bodies of water are heated and turn into water vapour. • To know that in the water cycle, condensation is the process of water vapour cooling to form water droplets in clouds, which can result in precipitation. • To know that the rate of evaporation increases as temperature rises.	• Grouping and classifying a variety of different materials. • Exploring the effect of temperature on substances such as chocolate (for example, to make food such as chocolate crispy cakes) • Research the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid. • They might observe and record evaporation over a period of time, for example, a puddle in the playground or washing on a line, and investigate the effect of temperature on washing drying or snowmen melting.

YEAR 4 – Sound	Year A – Spring 2 Year B – Summer 1	Physics – Energy (Sound)

Prior Learning
In EYFS, children will have learnt about the importance of hearing as one of the senses. Children will have learnt about sounds as part of the music curriculum including pitch and dynamics.

Next Steps after Unit
Continuing through the music curriculum and energy of light taught in Year 6.

Scientist of the topic
Alexander Graham Bell – Invented first telephone and a hearing test machine

Vocabulary
Air, decibels (dB), decibel meter, ear, eardrum, ear protectors, gas, hertz (Hz), high pitch, insulator of sound, liquid, loud, low pitch, matter, medium, musical instrument, pitch, quiet, solid, sound, sound proofing, vibration, volume.

Non-Statutory Guidance
Pupils should explore and identify the way sound is made through vibration in a range of different musical instruments from around the world; and find out how the pitch and volume of sounds can be changed in a variety of ways.

Substantive Knowledge

Sources
- To understand the sound is a result of vibrations.

Transfer
- To know that vibrations from sounds travel through mediums to the ear.
- To know that an insulating material reduces the amount of vibrations that pass through it and this can be used to protect the ears from damaging sounds.
- To know that different materials provide different amounts of insulation against sound.

Factors affecting energy
- To know a variety of ways to change the pitch or volume of a sound.
- To know that quicker vibrations cause higher-pitched sounds and slower vibrations cause lower-pitched sounds.
- To know that stronger vibrations cause louder sounds and weaker vibrations cause quieter sounds.
- To know that sounds get fainter as the distance from the sound source increases.

Pupils might work scientifically by:
- To observe closely how different instruments create a sound.
- Research how whales and dolphins communicate underwater.
- Present results using a bar chart.
- Suggest which variables to measure and for how long.
- Design simple results tables.
- Identify when results or observations do not match predictions.

YEAR 4 – Classification and Changing Habitats	Year A – Summer 1 Year B – Autumn 1	Biology- Living things and their Habitats

Prior Learning
In Y2, children learnt about a range of habitats and microhabitats. Children could classify animals by their life processes and create simple food chains to show how living things can depend on each other.

Next Steps after Unit
In Year 5, children will learn about how the life cycles of different animals occur and how sexual reproduction and asexual reproduction occur.

Scientist of the topic
Rachel Carson – Aquatic Biologist who wrote about environmental pollution

Vocabulary
Carroll diagram, classification key, classify, conservation, conservationist, deforestation, earthquake, endangered, flood, flowering plants, human impact, invertebrate, observe, nature reserve, non-flowering plants, pollution, seasonal changes, taxonomist, uprooted, vertebrate, Venn diagram, waterlogged, wildfire

Non-Statutory Guidance
Pupils should use the local environment to identify and study plants and animals in their habitat. They should identify how the habitat changes throughout the year. that include animals, flowering plants and non-flowering plants. Pupils should explore possible ways of grouping a wide range of living things. Note: plants can be grouped into categories such as flowering plants (including grasses) and non-flowering plants, for example ferns and mosses.
Pupils should explore examples of human impact (both positive and negative) on environments, for example, the positive effects of nature reserves, ecologically planned parks, or garden ponds, and the negative effects of population and development, litter or deforestation.

Substantive Knowledge

Characteristics of living things
- To know that living things can be grouped in different ways.
- To know that a classification key can be used to group and identify plants and animals.

Pupils might work scientifically by:
- Record data in different ways.
- Apply and create classification keys.
- Make careful observations.

• To know that vertebrates are animals which have a backbone, and invertebrates are animals which do not have a backbone. • To know that plants can be grouped into flowering or non-flowering varieties. • To know that flowering plants include grasses and non-flowering plants includes ferns and mosses. • To know that there are five main vertebrate groups: birds, mammals, reptiles, amphibians and fish. • To know that invertebrate groups include snails, slugs, worms, spiders and insects. <u>Habitats and Interdependence</u> • To know that habitats can change throughout the year, and this can be dangerous for living things. • To know that humans can have both a positive and negative impact on the environment.	• Make and use classification keys. • Present information in different ways. • Research using an information sheet. • Raising and answering questions based on their observations of animals and what they have found out from research. • Pupils should explore possible ways of grouping a wide selection of living things

UKS2

Year 5

YEAR 5 – Human Timeline	Year A – Autumn 2 Year B – Autumn 1	Biology- Animals inc. Humans

Prior Learning
Children have learnt about how living things change and functions of the human body. In PSHE, they will have learnt about how the human body grows and changed over time. Depending on the time of year, children may also have covered life cycles and reproduction.

Next Steps after Unit
In Y6, children will be learning about the circulatory system as part of the animals including Humans topic. This area is also a major part of the PSHE curriculum.

Scientist of the topic
Robert Winston – Professor of Science and Society who studies fertility and childhood (TV presenter)

Vocabulary
Adolescence, elderly, fertilisation, gestation, hormone, menstruation, puberty, reproduce, infancy, newborn, toddler, child, childhood, adulthood, glands, mature, reproduction,, sperm, egg, life expectancy

Non-Statutory Guidance
Pupils should draw a timeline to indicate stages in the growth and development of humans. They should learn about the changes experienced in puberty.

Substantive Knowledge

Animal Growth

- To describe the human life cycle, including the stages of growth and development (baby, toddler, child, teenager, adult, elderly).
- To describe changes that occur during puberty (in boys and girls).
- To know that gestation periods vary across mammals.

Pupils might work scientifically by:

- Pupils could work scientifically by researching the gestation periods of other animals and comparing them with humans.
- finding out and recording the length and mass of a baby as it grows.

YEAR 5 – Life Cycles and Reproduction	Year A – Spring 1 Year B – Spring 2	Biology- Living things and their Habitats

Prior Learning
Children have learnt about life cycles in Y2 and different vertebrates and invertebrates in Y4.

Next Steps after Unit
In Y5, (depending on succession of topics) children will learn about the human cycle, puberty and gestation periods. These topic can be linked. In Y6, children will be learning about classifying big and small and evolution and inheritance.

Scientist of the topic
Jane Goodall – Close study of gorillas
David Attenborough – Naturalist and TV presenter

Vocabulary
Adolescence, adult, amphibian, asexual reproduction, bird, birth, bulb, carnivore, characteristic, chrysalis, cocoon, cuttings, egg, estimating, extrapolating fertilisation, fledgling, flowering stage, four-legged tadpole, four-stage life cycle, frog, froglet, germination stage, gestation, gills, hatch, hatchling, herbivore, incubation, infancy, insect, juvenile, larva, leaf growing stage, life cycle, line of best fit, lungs, mammal, mating, metamorphosis, nest, nestling, newborn, nymph, offspring, ovule, pollen, pollination, pupa, reproduction, seed dispersal, seed stage, seedling stage, seed, sexual reproduction, species, tadpole, three-stage life cycle, tuber,

Non-Statutory Guidance
Pupils should study and raise questions about their local environment throughout the year. They should observe life-cycle changes in a variety of living things, for example, plants in the vegetable garden or flower border, and animals in the local environment. They should find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall. Pupils should find out about different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals.

Substantive Knowledge

Variation and inheritance

- To know that a life cycle shows the changes an animal or plant goes through until the reproduction of a new generation when the cycle starts again.
- To know that all living things must reproduce for the species to survive.
- To know that sexual reproduction requires two parents, whereas asexual reproduction only requires one parent.
- To know that there are different processes plants and animals use to reproduce (asexual and sexual reproduction).

Pupils might work scientifically by:

- Observe and compare equivalent parts in different flowers.
- Research the life cycles of different mammals.
- Pose questions to compare the life cycles of different birds.
- Suggest how one temperature may affect egg hatching.
- Use data to describe a relationship and make predictions.
- Represent root growth over time on a line graph.

YEAR 5 – Mixtures and Separation	Year A – Spring 1 Year B – Spring 2	Chemistry- Materials

Prior Learning
In Y4, children learnt about the states of matter, solid liquid and gas, the properties of these states and how changes can occur.

Next Steps after Unit
During Y5, one of the following science topics will focus on properties and change where pupils will learn about a diverse range of properties and how materials can change.

Scientist of the topic
Amalie Auguste Melitta Bentz – Invented the paper coffee filter

Vocabulary
control variable, crystallising, dissolve, evaporation, evaporation method, filtering, insoluble, mixture, particle, sieve, sieving, soluble, solution, variable

Non-Statutory Guidance
They should explore reversible changes, including evaporating, filtering, sieving, melting, and dissolving, recognising that melting and dissolving are different processes. Pupils should explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example, vinegar with bicarbonate of soda.

Substantive Knowledge

Identifying and naming
- To define the term mixture and name some common examples.
- To know the term 'solution' and 'dissolve' and name some common examples.

Properties and Uses
- To describe a broader range of materials and their properties including hardness, solubility, conductivity, and response to magnets.

Change
- To know that some substances will dissolve in a liquid to form a solution.
- To know the factors that affect the time taken to dissolve, including temperature, and stirring.
- To understand that dissolving, mixing and changes of state are reversible changes.
- To know that some liquids and solids can be separated using sieving, filtering, and evaporation and to describe these processes.

Pupils might work scientifically by:
- Research a mixture to find out what substances it is made from.
- Draw and annotate a diagram to explain how sieving separates a solid-solid mixture.
- Identify and justify which type of enquiry to use to answer my testable question.
- Identify solutions by observing and describing their appearance.
- Suggest which variables to change, measure and control when investigating how temperature affects the time taken to dissolve.
- Choose which measurements to take and how long to take them for.

YEAR 5 – Properties and Changes	Year A – Spring 2 Year B – Summer 2	Chemistry- Materials

Prior Learning
In Y5, children have learnt about mixtures and separation and will be able to recall methods of making mixtures (e.g. dissolving) and separation (e.g. filtering, sieving and evaporating).

Next Steps after Unit
Properties and materials will next be covered in KS3.

Scientist of the topic
Ruth Benerito – Chemist/Textiles
Spencer Silver & Arthur Fry – Chemical engineers who invented Post-it notes.

Vocabulary
Burning, change of state, circumference, condensing, conductor, dissolve, electrical conductivity, evaporating, freezing, hard, hardness, insulator, irreversible change, light intensity, light meter, melting, mixture, opaque, property, reversible change, rust, rusting, soft, states of matter, trustworthy, thermal conductivity, translucent, transparency, transparent

Non-Statutory Guidance
Pupils should build a more systematic understanding of materials by exploring and comparing the properties of a broad range of materials, including relating these to what they learnt about magnetism in year 3 and about electricity in year 4. Pupils should explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example, vinegar with bicarbonate of soda. Note: pupils are not required to make quantitative measurements about conductivity and insulation at this stage. It is sufficient for them to observe that some conductors will produce a brighter bulb in a circuit than others and that some materials will feel hotter than others when a heat source is placed against them. Safety guidelines should be followed when burning materials.

Substantive Knowledge	Pupils might work scientifically by:
Properties and Uses • To describe a broader range of materials and their properties, including hardness, solubility, transparency, conductivity, and response to magnets Changes • To know that some substances will dissolve in a liquid to form a solution. • To understand that dissolving, mixing and changes of state are reversible changes. • To understand that some changes result in the formation of new materials and that these are usually irreversible. (e.g. burning, rusting, the action of acid on bicarbonate of soda.)	• Evaluate the hardness test to determine the degree of trust in the results. • Plan and draw a table of results. • Write a detailed, organised, and easy to follow method. • Write a prediction using prior knowledge of the states of matter. • Analyse observations about rusting and use them to support a conclusion. • Measure accurately in centimetres.

YEAR 5 – Earth and Space	Year A – Summer 1 Year B – Autumn 2	Physics – Earth and Space

Prior Learning	Scientist of the topic
In Y1, children learnt about seasonal changes. They recognised the weather changes, and the variation in day length from summer to winter. This is the first instance of Earth and Space. Next Steps after Unit KS3	Mae Jemison – Astronaut and first black woman in space Margaret Hamilton – Computer scientist during Apollo 11 journey. Vocabulary artificial satellite, axis, calibrate, celestial bodies, climate change, day, daytime (daylight), data, Earth, elliptical, face, first quarter moon, force, full moon, gnomon, gravity, horizon, Jupiter, last , quarter moon, Mars, Mercury, midday, moon, natural satellite, Neptune, new moon, night , (nighttime), phase, planet, Pluto, orbit, our Solar System, reflect, rotate, Saturn, season, shadow, Solar System, space, space junk, spherical, star, summer, sundial, sunrise, sunset, table, the Sun, the Moon, tilt, Uranus, Venus, inter, year Non-Statutory Guidance Pupils should be introduced to a model of the sun and Earth that enables them to explain day and night. Pupils should learn that the sun is a star at the centre of our solar system and that it has 8 planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006). They should understand that a moon is a celestial body that orbits a planet (Earth has 1 moon; Jupiter has 4 large moons and numerous smaller ones). Note: pupils should be warned that it is not safe to look directly at the sun, even when wearing dark glasses. Pupils should find out about the way that ideas about the solar system have developed, understanding how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists such as Ptolemy, Alhazen and Copernicus.

Substantive Knowledge	Pupils might work scientifically by:
Key facts • To know that the Sun is a star at the centre of our solar system. • To know that the Sun, Earth and Moon are approximately spherical bodies • To know the names, order and relative positions of the planets and other main celestial bodies. • To know that a moon is a celestial body that orbits a planet and give examples of moons that orbit other planets. Forces in motion • To know that the Earth and other planets orbit around the Sun. • To know that the tilt of the Earth and its orbit around the Sun causes the seasons. • To know that the Moon orbits around the Earth. • To understand how the Earth's rotation causes day and night and the apparent movement of the Sun across the sky.	• Pose and identify testable questions about the movement of the celestial bodies in our Solar System. • Use a model to represent the Solar System. • Design and draw a table to record data on moons. • Accurately draw day and night and seasons diagrams. • Calibrate a sundial using a compass and torch and use it to measure time. • Analyse patterns in temperature data for the Earth and use them to predict temperature values for the Earth in the future.

<table>
<tr><td colspan="2">YEAR 5 – Unbalanced Forces</td><td>Year A – Autumn 1
Year B – Spring 1</td><td>Physics- Forces</td></tr>
<tr><td rowspan="3">Prior Learning
In Y3, children explored forces and learnt about contact and non contact forces. They looked at magnets and friction of surfaces.

Next Steps after Unit
KS3</td><td colspan="3">Scientist of the topic
Archimedes (287BC – 212BC) – Buoyancy & Isaac Newton – Laws of motion & gravity</td></tr>
<tr><td colspan="3">Vocabulary
Aerodynamics, air resistance, amplify, balanced, contact force, distance, effort, force, friction, gear, gravity, lever, load, machine, mass, matter, non-contact force, pivot, pulley, streamlining, surface area, unbalanced, water resistance</td></tr>
<tr><td colspan="3">Non-Statutory Guidance
Pupils should explore falling objects and raise questions about the effects of air resistance. They should explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall. They should experience forces that make things begin to move, get faster or slow down. Pupils should explore the effects of friction on movement and find out how it slows or stops moving objects, for example, by observing the effects of a brake on a bicycle wheel. Pupils should explore the effects of levers, pulleys and simple machines on movement. Pupils might find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.</td></tr>
<tr><td colspan="3">Substantive Knowledge

Key Facts
• To know that gravity is a non-contact force that pulls objects together.
• To know that air resistance and water resistance are both types of friction.
Forces in motion
• To know that unsupported objects fall towards the Earth because of gravity.
• To know that friction, air resistance and water resistance act in the opposite direction to a moving object.
• To know that when forces are imbalanced, the speed, shape or direction of an object changes.
• To know that when forces are balanced the speed, shape or direction of an object stays the same.
• To know that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect.
Factors affecting forces
• To know that rougher surfaces have more friction between them than smoother surfaces and how that may affect movement.
• To know that the larger the surface area of an object the greater the air or water resistance it creates.</td><td>Pupils might work scientifically by:

• exploring falling paper cones or cupcake cases, designing and making a variety of parachutes and carrying out fair tests to determine which designs are the most effective.
• They might explore resistance in water by making and testing boats of different shapes.
• They might design and make products that use levers, pulleys, gears and/or springs and explore their effects.</td></tr>
</table>

Year 6

Year 6 – Classifying big and small	Year A – Spring 1 Year B – Autumn 1	Biology – Living things and their habitats

Prior Learning
In Y5, children have learnt about a range of life cycles, reproduction, and the different processes which plants and animals use to reproduce. In Y4, children learn about a classification system which they will study in more detail.

Next Steps after Unit
In Y6, children will learn about evolution and inheritance, that living things change over time, characteristics passed from parents to offspring and evolution and adaptation over time.

Scientist of the topic
Carl Linnaeus – Botanist and Zoologist who developed taxonomy for classification.

Vocabulary
Amphibian, binomial system, bird, characteristic, classify, classification key, cold-blooded, conifer, exoskeleton, fern, fish, flowering plant, insect, invertebrate, life process, Linnaean system, mammal, micro-organism, microscopic, moss, organism, reptile, snail, spider, vertebrate, warm-blooded, worm.

Non-Statutory Guidance
Pupils should build on their learning about grouping living things in year 4 by looking at the classification system in more detail. They should be introduced to the idea that broad groupings, such as micro-organisms, plants and animals can be subdivided. Through direct observations where possible, they should classify animals into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals). They should discuss reasons why living things are placed in one group and not another. Pupils might find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification

Substantive Knowledge

Characteristics of living things.

- To know that 'organism' is a term used to refer to an individual living thing.
- To know that micro-organisms are incredibly small and cannot usually be seen by the naked eye.
- To know the characteristics of the different groups of vertebrates and commonly found invertebrates.

Pupils might work scientifically by:

- Use a classification key to group and identify organisms.
- Make a simple classification key.
- Research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system.

YEAR 6 – Evolution and Inheritance	Year A – Spring 2 Year B – Summer 1	Biology – Living things and their habitats

Prior Learning
Building on what they learned about fossils in the topic on rocks in year 3, pupils should find out more about how living things on earth have changed over time.

Next Steps after Unit
Continued in KS3

Scientist of the topic
Charles Darwin – Biologist & Mary Anning- Fossils

Vocabulary
Adaptation, ancestor, characteristic, competition, environmental, evidence, evolution, extinct, fossil, gene, habitat, inherit, natural selection, offspring, peer review, population, reproduce, scientific theory, selective breeding, species, specimen, survival, survival of the fittest, variation

Non-Statutory Guidance
They should be introduced to the idea that characteristics are passed from parents to their offspring, for instance by considering different breeds of dogs, and what happens when, for example, labradors are crossed with poodles. They should also appreciate that variation in offspring over time can make animals able to survive in particular environments, for example, by exploring how giraffes' necks got longer, or the development of insulating fur on the arctic fox. Pupils might find out about the work of palaeontologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution. Note: at this stage, pupils are not expected to understand how genes and chromosomes work.

Substantive Knowledge

Variation and Inheritance

- To know that living things have changed over time.
- To know that fossils provide us with information about living things that inhabited the Earth millions of years ago.
- To know that characteristics are passed from parents to their offspring, but that all offspring vary from their parents.
- To know that over time, variation in offspring can affect animals' chances of survival in particular environments.

Habitats and interdependence

- To know that animals and plants have adapted to suit their environment over many millions of years and that this process can be called evolution.

Pupils might work scientifically by:

- Sort variation as environmental, inherited or a mixture of both.
- Evaluate a method by recalling variables that were effectively kept the same and those that were harder to control.
- Comment on the reliability of the results and the degree of trust.
- Consider how evidence is used to form theories and the degree of trust the evidence offers.

YEAR 6 – Circulation and Health	Year A – Autumn 1 Year B – Spring 2	Biology – Animals including Humans

Prior Learning
In Y3, children learnt about the skeletal system in the body, and in Y4, the digestive system. Use this to scaffold knowledge about the circulatory system.

Next Steps after Unit
KS3

Scientist of the topic
Dr Christian Barnard – First Heart transplant & Professor Tu Youyou – Malaria

Vocabulary
balanced diet, blood, bloodstream, blood vessels, carbon dioxide, circulatory system, diet, drug, exercise, fitness, health, heart, heart rate, lifestyle, lungs, mass, nutrient, oxygen, pulse, pump (verb), rate, resting heart rate, transport, water

Non-Statutory Guidance
Pupils should build on their learning from years 3 and 4 about the main body parts and internal organs (skeletal, muscular and digestive system) to explore and answer questions that help them to understand how the circulatory system enables the body to function. Pupils should learn how to keep their bodies healthy and how their bodies might be damaged – including how some drugs and other substances can be harmful to the human body.

Substantive Knowledge

Animal Structure and function
- To know the main parts of the human circulatory system (heart, blood vessels and blood).
- To know that the heart pumps blood around the body.
- To know that the blood vessels transport blood around the body.
- To know that the blood transports vital substances around the body, including oxygen and nutrients.
- To understand the relationships between different organ systems.

Health and Nutrition
- To understand the impact of diet, exercise, drugs and lifestyle on the way a body functions.
- To know that the heart rate is the number of beats per minute.
- To know that exercise increases heart rate.

Pupils might work scientifically by:
- Evaluate the trustworthiness of secondary sources that provide health advice.
- Evaluate the model blood by considering a strength and a weakness when representing blood and suggesting improvements.
- Compare class values and recognise when they do not match.
- Use identified patterns to predict new values.
- Write a method for an enquiry with consideration of equipment, the different versions of the changed variable and how to complete the measured variable.
- Choose a suitable title and axis labels with units for the line graph and plot points on the line graph.

YEAR 6 – Light and Reflection	Year A – Summer 1 Year B – Autumn 2	Physics – Energy (Light)

Prior Learning
In Y3, children have learnt about light sources, that light is needed to see and that shadows are formed when light is blocked by an opaque object and that shadows can change as a result of a range of factors.

Next Steps after Unit
KS3

Scientist of the topic
Colin Webb – Professor of Lazer Physics.

Vocabulary
Cast, incoming ray, light ray, light source, luminous, mirror, non-luminous, opaque, periscope, pupil, ray diagram, reflected ray, reflective, shadow, straight

Non-Statutory Guidance
Pupils should build on the work on light in year 3, exploring the way that light behaves, including light sources, reflection and shadows. They should talk about what happens and make predictions.

Substantive Knowledge

Sources
- To know that light travels in a straight line from a light source.
- To understand that luminous objects are seen as a result of light directly entering the eye, whereas non-luminous objects reflect light into the eye.

Transfer
- To know that shiny surfaces reflect light uniformly.
- To know that when light is reflected off a surface, its direction changes.
- To know that mirrors and periscopes work using reflection of light on smooth surfaces.
- To understand why shadows have the same shape as the objects that cast them as a result of light travelling in straight lines.
- To understand relationships between light sources, objects and shadows.

Pupils might work scientifically by:
- Make observations about the properties of light.
- Use my observations as evidence to support conclusions about light.
- Draw ray diagrams.
- Pose testable questions in response to observations.
- Record my measurements as a line graph.
- Use my line graph to extrapolate data and make

Factors affecting energy • To understand how and why the distance between the object and the screen affects the size of the shadow. • To understand how the angle of a reflected ray is affected by the angle of the incoming ray on a smooth surface.	predictions about missing values. • Recall various jobs or inventions that use mirrors and reflection.

YEAR 6 – Circuits batteries and switches	Year A – Autumn 2 Year B – Spring 1	Physics – Energy (Electricity)
Prior Learning In Y4, children learnt that all electrical appliances need a power source, batteries or mains electricity and can recognise the main components in a simple series circuit. Children know that a switch can break or complete a circuit and the relationship between brightness and the number of bulbs in a circuit. Next Steps after Unit KS3	Scientist of the topic Alexander Volta – Invented 1st Battery & Thomas Eddison – Light Bulb Vocabulary Ammeter, appliance, battery, bulb, buzzer, cell, circuit, circuit diagram, component, current, electricity, motor, power source, resistance, switch, voltage, voltmeter, wire Non-Statutory Guidance Building on their work in year 4, pupils should construct simple series circuits, to help them to answer questions about what happens when they try different components, for example, switches, bulbs, buzzers and motors. They should learn how to represent a simple circuit in a diagram using recognised symbols. Note: pupils are expected to learn only about series circuits, not parallel circuits. Pupils should be taught to take the necessary precautions for working safely with electricity.	
Substantive Knowledge Sources • To know a wider variety of components in a series circuit (including buzzer and motor). • To know the conventions used to draw circuit diagrams, including the recognised symbols for common components and using straight lines. Factors affecting energy • To know that the voltage of a circuit can be changed and how this affects bulb brightness (or buzzer volume).		Pupils might work scientifically by: • Draw circuit diagrams with straight lines and using standard circuit symbols. • Design a results table with an appropriate number of columns and headings with units. • Identify the changed, measured and control variables in an enquiry to plan a method.