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| **Early Years Foundation Stage**  In our Foundation Stage, children are prepared for the scientific skills and knowledge that they will use later in school. Science is a key area of learning delivered through a range of areas of the Early Years curriculum, particularly through Understanding of the World. In this Key Stage, the curriculum is delivered using a child-initiated approach, so units are planned then adapted to the interests of the children. Children will learn about different scientific concepts through using a topic heading and linking this to scientific units that can be implemented into their learning. The key focus of science in the Early Years is to explore and develop understanding of a range of scientific concepts and ideas which they can build upon in the years that follow developing a comprehensive understanding of science built upon secure foundations established in the EYFS. | | |
| **All about me**  **Autumn 1** | **Heroes around us**  **Autumn 2** | **Fantasy Island**  **Spring 2** |
| **Nursery (3 & 4-year-olds)**  **Humans.**  **Understanding the world.**  • Use all their senses in hands-on exploration of natural materials.  • Begin to make sense of their own life-story and family’s history.  • Understand the key features of the life cycle of a plant and an animal.  **Opportunities**  • Looking at photographs of the children as babies  • Sharing books about how to look after a baby • Talking to an expectant mother, parent with a baby and elderly person  • Talking to adults about photographs of the adults at different ages  • Identifying pictures of babies, toddlers, children, adults and old people in magazines or other media  • Drawing humans at different ages  • Talking about how they look after their own health and hygiene  • Noticing when they feel hot and cold and how to respond to this  • Choosing appropriate materials to protect themselves from the Sun  • Exploring the natural environment with their senses  • Exploring objects using their senses e.g. smelling pots, feely bags, listening pots etc.  • Sorting collections of natural objects using their senses e.g. bark, pebbles, feathers, seeds, cones, leaves, sticks  • Looking closely at natural objects using a magnifying glass or app on a tablet  • Going on a sound walk  • Playing guessing games where children pick an object and either describe it or are asked questions in order to identify it  • Playing listening games  • Sharing books about senses and sensory impairments  • Tasting food  **Vocabulary**  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)  **Encouraging 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.  **What a child might be doing –**  • learning about the life cycles of humans  • learning about how to take care of themselves • learning about their senses.  • sorting humans by age/life stage  • sorting objects using their senses.  • record their observations when observing humans at different ages/life stages.  **Possible evidence of learning**  Children:  • Can talk about how they have changed since they were babies.  • Can 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 compare smells, sounds, tastes and textures.  • Can talk about what they see when using a magnifying glass or an app on a tablet.  • Can talk about how they use their senses when exploring the world around them and natural objects.  **Reception**  **Humans**  **Understanding the world.**  • Talk about members of their immediate family and community.  • Name and describe people who are familiar to them.  **Opportunities**  • Talking about themselves, friends, family and community using photographs  • Using mirrors to look at their faces  • Creating pictures or collages of themselves, friends, family and community  • Making hand and footprints using paint  • Making fingerprints using ink pads  • Encourage children to look at photographs of different people and to describe them.  • Encourage children to describe their friends and family using photographs to help them.  • Encourage children to talk about how their friends and family are the same and different.  • Encourage children to compare themselves to characters in books.  • Using a ‘magic’ mirror which shows everything about them and getting children to describe themselves and how they are special  • Sharing books about different types of families • Demonstrating and talking about how they look after themselves  • Talking about other people that look after them  • Talking to a dentist, nurse, meal supervisor/school cook, road crossing supervisor etc.  • Sharing videos of people who care for us and how we look after ourselves.  **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  **Encouraging 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?  **What a child might be doing –**  • describing people who are familiar to them  • learning about how to take care of themselves  • sorting humans by their characteristics  • recording their observations when drawing themselves, their family, friends and community.  **Possible evidence of learning**  Children:  • 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. | **Nursery (3 & 4-year-olds)**  **Humans.**  **Understanding the world.**  • Use all their senses in hands-on exploration of natural materials.  • Begin to make sense of their own life-story and family’s history.  • Understand the key features of the life cycle of a plant and an animal.  **Opportunities**  • Looking at photographs of the children as babies  • Sharing books about how to look after a baby  • Talking to an expectant mother, parent with a baby and elderly person  • Talking to adults about photographs of the adults at different ages  • Identifying pictures of babies, toddlers, children, adults and old people in magazines or other media  • Drawing humans at different ages  • Talking about how they look after their own health and hygiene  • Noticing when they feel hot and cold and how to respond to this  • Choosing appropriate materials to protect themselves from the Sun  • Exploring the natural environment with their senses  • Exploring objects using their senses e.g. smelling pots, feely bags, listening pots etc.  • Sorting collections of natural objects using their senses e.g. bark, pebbles, feathers, seeds, cones, leaves, sticks  • Looking closely at natural objects using a magnifying glass or app on a tablet  • Going on a sound walk  • Playing guessing games where children pick an object and either describe it or are asked questions in order to identify it  • Playing listening games  • Sharing books about senses and sensory impairments  • Tasting food  **Vocabulary**  Grow, change, baby, toddler, child, adult, old person, smell, taste, touch, feel, hear, see, blind, deaf.  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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.  **What a child might be doing –**  • learning about the life cycles of humans  • learning about how to take care of themselves • learning about their senses.  • sorting humans by age/life stage  • sorting objects using their senses.  • record their observations when observing humans at different ages/life stages.  **Possible evidence of learning**  Children:  • Can talk about how they have changed since they were babies.  • Can 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 compare smells, sounds, tastes and textures.  • Can talk about what they see when using a magnifying glass or an app on a tablet.  • Can talk about how they use their senses when exploring the world around them and natural objects.  **Reception**  **Humans**  **Understanding the world.**  • Talk about members of their immediate family and community.  • Name and describe people who are familiar to them.  **Opportunities**  • Talking about themselves, friends, family and community using photographs  • Using mirrors to look at their faces  • Creating pictures or collages of themselves, friends, family and community  • Making hand and footprints using paint  • Making fingerprints using ink pads  • Encourage children to look at photographs of different people and to describe them.  • Encourage children to describe their friends and family using photographs to help them.  • Encourage children to talk about how their friends and family are the same and different.  • Encourage children to compare themselves to characters in books.  • Using a ‘magic’ mirror which shows everything about them and getting children to describe themselves and how they are special  • Sharing books about different types of families  • Demonstrating and talking about how they look after themselves  • Talking about other people that look after them  • Talking to a dentist, nurse, meal supervisor/school cook, road crossing supervisor etc.  • Sharing videos of people who care for us and how we look after ourselves.  **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  **Encouraging 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?  **What a child might be doing –**  • describing people who are familiar to them  • learning about how to take care of themselves  • sorting humans by their characteristics  • recording their observations when drawing themselves, their family, friends and community.  **Possible evidence of learning**  Children:  • 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. | **Nursery (3 & 4-year-olds)**  **Materials, including changing materials**  **Understanding the world.**  • Use all their senses in hands-on exploration of natural materials.  • Explore collections of materials with similar and/or different properties.  • Talk about the differences between materials and changes they notice.  **Opportunities**  • Building junk models using a range of materials.  • Shaping and joining materials using equipment e.g. scissors, hole punch, including when using wood e.g. a hammer and nail  • Making smoothies  • Mixing ingredients to make playdough, cakes, biscuits, bread, jelly etc.  • Melting chocolate for decorating bakes/biscuits or to combine with other ingredients e.g. refrigerator cake, chocolate crispy cakes  • Comparing cooked and uncooked pasta, noodles, rice or potatoes  • Cooking popcorn in a microwave  • Cooking cakes, biscuits, bread etc.  • Making ice lollies and ice-cream  • Using medical ice packs including self-activated cool pads  • Removing toys from ice  • Adding baking soda and fizzy bath bombs to water  • Adding coloured sweets to water  • Adding currants to fizzy water/lemonade  • Adding bicarbonate of soda to vinegar to make a bubbling potion  **Vocabulary**  Model and encourage children to use vocabulary such as: mix, stir, cook, hot, oven, microwave, 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  **Encouraging scientific enquiry**  Classification  • Sort materials using simple properties.  Observing over time  • How does the cake mixture change?  • How does chocolate change when heated?  • How does fruit juice change when put in the freezer?  • How does fruit change when blended?  **What a child might be doing –**  • exploring a range of materials  • shaping and joining materials  • change materials.  • sorting materials.  **Possible evidence of learning**  • Can name the material they are using.  • Can talk about one property of a material.  • Can talk about ingredients for recipes.  • Can talk about how mixtures change when ingredients are added.  • Can talk about how materials change when cooked.  • Can talk about how materials change when heated.  • Can talk about how materials change when frozen.  **Forces**  **Understanding the world.**  • Explore how things work.  • Explore and talk about different forces they can feel.  • Talk about the differences between materials and changes they notice.  **Opportunities**  • Pushing floating objects under water e.g. balloons, table tennis balls etc.  • Exploring magnets of different shapes and sizes • Exploring springs of different sizes, both compression and extension springs  • Using bikes and scooters on different surfaces and ramps  • Testing a range of objects to find out if they float or sink  • Playing games that contain springs e.g. bagatelle  • Playing with wind-up toys  • Racing wind-up toys  • Playing with gears and pulleys e.g. sets of gears, large playground pulleys etc.  • Playing with magnetic toys e.g. train carriages joined by magnets, magnetic construction kits etc.  • Pushing, pulling, twisting and bending malleable (e.g. modelling clay, playdough, springs, pipe cleaners, elastics, sponges etc.) and non-malleable objects/materials  • Cutting and joining objects/materials e.g. wood, building kits with nuts and bolts etc.  • object, float, sink, water, up, down, top, bottom, push, pull, magnet, spring, squash, bend, twist, stretch, turn, spin, smooth, rough, fast, slow  **Vocabulary**  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.  **Encouraging 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.  **What a child might be doing –**  • feeling forces  • exploring how things work  • exploring how objects/materials are affected by forces.  • sort objects that float and sink  • sort malleable and non-malleable materials.  **Possible evidence of learning**  Children:  • 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.  **Reception**  **Materials, including changing materials**  **Understanding the world.**  • Explore the natural world around them.  • Describe what they see, hear and feel whilst outside.  **Opportunities**  • Looking for dew, ice, icicles and frost in the playground  • Using their senses to explore natural materials in the environment, such as stones, twigs, leaves, feathers, seeds, flowers etc.  • Gathering natural materials to make collections  • Making pictures using natural materials they have gathered from the environment  • Making dens, nests, bug hotels etc. using natural materials  • Making ice pictures by putting water in a shallow tray and adding natural objects gathered from the environment and then leaving them outside to freeze or putting them in the freezer  • Encourage children to talk about the natural materials they explore, using their senses.  • Encourage children to talk about the materials they are using when making pictures.  • Encourage children to choose from a range of materials, including natural materials, when making models and identify a key property that was required.  • Encourage children to reuse materials and talk about what can be recycled to care for the natural world.  • Support children to list the properties the material has.  • Encourage children to test that their model is fit for purpose and that the materials are suitable.  • Encourage children to compare and describe how materials change over time and in different conditions  • Making junk models with a range of materials, including natural materials they have gathered from the environment  • Making popcorn in a microwave and on a fire  • Making pizza dough with different flours  • Baking bread in different tins or for different times to compare the outcome  • Baking cupcakes and removing one after every five minutes  • Choosing where to put ice cubes in the playground and observing how quickly they melt  • Observing how a large block of ice changes over time, using string to measure around it  • Putting wax crayons in different areas of the playground and observing how they change  • Making a snowman and observing how it changes over time  • Making snowballs and putting them in different parts of the playground and observing how they change over time  **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  **Encouraging scientific enquiry**  Comparative testing  • How does popcorn made in a microwave compare to popcorn made on a fire?  • How quickly do ice cubes melt in different areas of the playground?  • How are pizza bases different when made with different flours?  • How does a loaf cook differently in different tins?  • How do cupcakes cook if they have different amounts of mixture?  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?  **What a child might be doing –**  • exploring a range of materials in a sensory way, including natural materials  • making objects from different materials, including natural materials  • comparing how materials change.  observing how objects melt  • sort materials, including natural materials  • record their observations when materials are changing over time or in different conditions.  **Possible evidence of learning**  Children:  • 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. |
| **Wild things!**  Spring 1 | **Roots, shoots and muddy boots!**  Summer 1 | **Under the Sea.**  Summer 2 |
| **Nursery (3 & 4-year-olds)**  **Animals excluding humans.**  **Understanding the world.**  • Understand the key features of the life cycle of an animal.  • Begin to understand the need to respect and care for the natural environment and all living things.  **Opportunities**  • Caring for eggs and the young animals that emerge, such as chicks, caterpillars, frogs  • Sharing books with information about animal life cycles (fiction and nonfiction)  • Looking at and matching pictures of animals and their young  • Watching videos of animals and their young and how they change over time.  • Playing games involving matching or describing animals and their young  • Playing with small world animals, matching adults to their young  • Visiting a farm, zoo or pet shop, particularly to see young animals  • Talking about the sounds adult and young animals make and comparing them  • Drawing adult animals and their young.  **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  **Encouraging 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.  **What a child might be doing –**  • learning about the life cycles of animals  • comparing adult animals to their young  • observing how young animals change over time.  • children sort animals and their young  • children record their observations when comparing animals and their young  • children record their observations when observing how young animals change over time.  **Possible evidence of learning**  • Can name and describe animals they have encountered.  • Can talk about how they cared for the eggs/animals.  • Can describe how the animals changed over time.  • Can match animals to their young and name them.  **Reception**  **Animals excluding humans**  **Understanding the world.**  • Recognise some environments that are different to the one in which they live.  **Opportunities**  • Sharing books about animals in the local area and animals in other countries e.g. jungle, polar regions, desert.  • Looking at pictures of animals in different habitats  • Watching videos of animals in different habitats  • Playing games involving matching animals to their habitats  • Playing with small world animals in different habitats  • Visiting the zoo, focusing on animals that live in different habitats  • Caring for pets from a different habitat e.g. lizards/snakes  • Creating pictures of animals in their habitats  • Pretending to be animals  • Naming and describing animals they see in books, pictures, videos or while on a trip  • Describing different habitats  **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  **Encouraging scientific enquiry**  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.  **What a child might be doing –**  • Children ask questions, make observations and talk about what they have found out about animals from a different habitat.  • children sort animals.  **Possible evidence of learning**  • Can name and describe animals that live in different habitats.  • Can describe different habitats.  Primary Future link: habitat specialist, zoologist | **Nursery (3 & 4-year-olds)**  **Living things and their habitats.**  **Understanding the world.**  • 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.  **Opportunities**  • Going on local nature walks  • Identifying natural objects and things left by humans  • Gathering natural objects from nature walks to include in a collection for the nature table e.g. stones, leaves, seeds, conkers, pinecones, acorns, twigs, bark, shells, feathers  • Using a magnifying glass or a tablet with an app to observe the natural objects in a collection closely  • Drawing natural objects in the collection  • Grouping together natural objects that are similar in the collection  • Using natural objects to make pictures and patterns  **Vocabulary**  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  **Encouraging scientific enquiry**  Classification  • Find and identify natural objects to include in the collection.  • Which natural objects are from plants, animals or neither?  **What a child might be doing –**  • exploring the surrounding natural environment  • exploring natural objects from the surrounding environment.  • sorting natural objects.  • Children record their observations when drawing natural objects from the collection.  **Possible evidence of learning**  • Can name and describe objects in the collection, including patterns they notice on them.  • Can group similar objects together.  • Can draw natural objects, including some patterns observed 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.  **Plants.**  **Understanding the world.**  • 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.  **Opportunities**  • Visiting a garden centre  • Gathering seeds from the surrounding natural environment  • Gathering seeds from fruit  • Observing collections of seeds and bulbs using a magnifying glass or an app on a tablet  • Drawing seeds and bulbs  • Planting and caring for seeds and bulbs  • Growing vegetable tops  • Observing and photographing/drawing how plants grow and die  • Observing and photographing/drawing what happens when fruit, vegetables and flowers are left to decay  • Gathering seeds and digging up bulbs of the plants they grow  • Designing seed packets  • Using what they grow to make food to eat  • Sharing books about plants and growing plants  **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  **Encouraging 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.  **What a child might be doing –**  • growing plants.  • using equipment to measure when planting seeds and bulbs.  • sorting seeds and bulbs.  • recording their observations when photographing/drawing seeds and bulbs  • recording their observations when photographing/drawing seeds and bulbs as they grow over time  • recording their observations when photographing/drawing vegetables and fruit as they decay and flowers as they die.  **Possible evidence of learning**  • 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.  **Reception**  **Living things and their habitats.**  **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.  **Opportunities**  • Finding minibeasts in the school grounds  • Taking photographs of the minibeasts they find in the school grounds  • Matching the minibeasts they find to pictures that identify them  • Observing the minibeasts closely, using a magnifying glass or app on a tablet  • Drawing pictures of the minibeasts  • Creating a map to show where they found each type of minibeast  • Sharing books about minibeasts  • Playing with small world minibeasts  • Building minibeast homes  • Visiting a contrasting natural environment e.g. forest, beach, etc.  • Finding and taking photographs of plants and animals in the contrasting natural environment  • Sharing non-fiction and fiction books about the contrasting natural environment visited.  **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.  **Encouraging 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.  **What a child might be doing –**  • Exploring the animals in the surrounding natural environment  • Exploring plants and animals in a contrasting natural environment.  • Children record their observations when drawing plants and animals they find.  **Possible evidence of learning**  • 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.  Primary Future link: ecologist, countryside ranger | **Nursery (3 & 4-year-olds)**  **Animals excluding humans.**  **Understanding the world.**  • Understand the key features of the life cycle of an animal.  • Begin to understand the need to respect and care for the natural environment and all living things.  **Opportunities**  • Sharing books with information about animal life cycles with an emphasis on sea creatures (fiction and nonfiction)  • Looking at and matching pictures of animals and their young with an emphasis on sea creatures  • Watching videos of animals and their young and how they change over time with an emphasis on sea creatures  • Playing games involving matching or describing animals and their young with an emphasis on sea creatures  • Playing with small world animals, matching adults to their young with an emphasis on sea creatures  • Visiting an aquarium (The Deep), zoo or pet shop/garden centre (Carr Gate), particularly to see fish  • Drawing adult animals and their young with an emphasis on sea creatures.  **Vocabulary**  Model and encourage children to use vocabulary such as, frog spawn, tadpole, froglet, frog, grow, change, die, names of animals and their young, (e.g. whale / calf,) fins, scales, tail, shells, flippers, swim, patterns, spots, stripes.  Expose children to supplementary vocabulary such as: • life cycle, gills, webbed feet, tentacles  **Encouraging scientific enquiry**  Observing over time  • How does the … change over time? (With an emphasis on sea creatures.)  Researching using secondary sources  • Find out more about the life cycles of the animals observed.  Classification  • Match animals and their young. (With an emphasis on sea creatures.)  **What a child might be doing –**  • learning about the life cycles of animals (with an emphasis on sea creatures.)  • comparing adult animals to their young (with an emphasis on sea creatures.)  • observing how young animals change over time. (With an emphasis on sea creatures.)  • children sort animals and their young  • children record their observations when comparing animals and their young  • children record their observations when observing how young animals change over time. (With an emphasis on sea creatures.)  **Possible evidence of learning**  • Can name and describe animals they have encountered.  • Can talk about how they cared for the eggs/animals.  • Can describe how the animals changed over time.  • Can match animals to their young and name them.  **Reception**  **Animals excluding humans**  **Understanding the world.**  • Recognise some environments that are different to the one in which they live. (Under the sea.)  Marine environment.  **Opportunities**  • Sharing books about animals in the local area and animals in other environments e.g. ocean.  • Looking at pictures of animals in different habitats  • Watching videos of animals in different habitats  • Playing games involving matching animals to their habitats  • Playing with small world animals in different habitats  • Visiting the aquarium (The Deep), focusing on animals that live in different habitats  • Caring for pets from a different habitat e.g. tropical fish  • Creating pictures of animals in their habitats  • Pretending to be animals  • Naming and describing animals they see in books, pictures, videos or while on a trip  • Describing different habitats Particularly marine habitats.  **Vocabulary**  Model and encourage children to use vocabulary such as: • names of animals, live, on land, in water, North Pole, South Pole, sea, hot, cold, wet, dry, snow, ice.  Expose children to supplementary vocabulary such as: • environment, polar regions, ocean, camouflage, fresh water, salt water  **Encouraging scientific enquiry**  Classification  • Sort animals according to where they live. (Giving a marine context – warm water, cold water, near the coast, in deep water, near the surface, near the sea bed.)  Researching using secondary sources  • Learn how animals from a different habitat (marine habitat) are cared for.  • Learn about animals in a different habitat.  **What a child might be doing –**  • Children ask questions, make observations and talk about what they have found out about animals from a different habitat. (Marine habitat.)  • children sort animals.  **Possible evidence of learning**  • Can name and describe animals that live in different habitats.  • Can describe different habitats.  (With a marine context.)  Primary Future link: deep sea diver, marine bioliogst |
| Marvelous Me  (Autumn 1) | **Heroes around us**  **(Autumn 2)** | To Infinity and Beyond.  Spring 1 |
| **Nursery (3 & 4-year-olds)**  **Humans.**  **Understanding the world.**  • Use all their senses in hands-on exploration of natural materials.  • Begin to make sense of their own life-story and family’s history.  • Understand the key features of the life cycle of a plant and an animal.  **Opportunities**  • Looking at photographs of the children as babies  • Sharing books about how to look after a baby • Talking to an expectant mother, parent with a baby and elderly person  • Talking to adults about photographs of the adults at different ages  • Identifying pictures of babies, toddlers, children, adults and old people in magazines or other media  • Drawing humans at different ages  • Talking about how they look after their own health and hygiene  • Noticing when they feel hot and cold and how to respond to this  • Choosing appropriate materials to protect themselves from the Sun  • Exploring the natural environment with their senses  • Exploring objects using their senses e.g. smelling pots, feely bags, listening pots etc.  • Sorting collections of natural objects using their senses e.g. bark, pebbles, feathers, seeds, cones, leaves, sticks  • Looking closely at natural objects using a magnifying glass or app on a tablet  • Going on a sound walk  • Playing guessing games where children pick an object and either describe it or are asked questions in order to identify it  • Playing listening games  • Sharing books about senses and sensory impairments  • Tasting food  **Vocabulary**  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)  **Encouraging 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.  **What a child might be doing –**  • learning about the life cycles of humans  • learning about how to take care of themselves • learning about their senses.  • sorting humans by age/life stage  • sorting objects using their senses.  • record their observations when observing humans at different ages/life stages.  **Possible evidence of learning**  Children:  • Can talk about how they have changed since they were babies.  • Can 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 compare smells, sounds, tastes and textures.  • Can talk about what they see when using a magnifying glass or an app on a tablet.  • Can talk about how they use their senses when exploring the world around them and natural objects.  **Reception**  **Humans**  **Understanding the world.**  • Talk about members of their immediate family and community.  • Name and describe people who are familiar to them.  **Opportunities**  • Talking about themselves, friends, family and community using photographs  • Using mirrors to look at their faces  • Creating pictures or collages of themselves, friends, family and community  • Making hand and footprints using paint  • Making fingerprints using ink pads  • Encourage children to look at photographs of different people and to describe them.  • Encourage children to describe their friends and family using photographs to help them.  • Encourage children to talk about how their friends and family are the same and different.  • Encourage children to compare themselves to characters in books.  • Using a ‘magic’ mirror which shows everything about them and getting children to describe themselves and how they are special  • Sharing books about different types of families • Demonstrating and talking about how they look after themselves  • Talking about other people that look after them  • Talking to a dentist, nurse, meal supervisor/school cook, road crossing supervisor etc.  • Sharing videos of people who care for us and how we look after ourselves.  **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  **Encouraging 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?  **What a child might be doing –**  • describing people who are familiar to them  • learning about how to take care of themselves  • sorting humans by their characteristics  • recording their observations when drawing themselves, their family, friends and community.  **Possible evidence of learning**  Children:  • 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. | **Nursery (3 & 4-year-olds)**  **Humans.**  **Understanding the world.**  • Use all their senses in hands-on exploration of natural materials.  • Begin to make sense of their own life-story and family’s history.  • Understand the key features of the life cycle of a plant and an animal.  **Opportunities**  • Looking at photographs of the children as babies  • Sharing books about how to look after a baby • Talking to an expectant mother, parent with a baby and elderly person  • Talking to adults about photographs of the adults at different ages  • Identifying pictures of babies, toddlers, children, adults and old people in magazines or other media  • Drawing humans at different ages  • Talking about how they look after their own health and hygiene  • Noticing when they feel hot and cold and how to respond to this  • Choosing appropriate materials to protect themselves from the Sun  • Exploring the natural environment with their senses  • Exploring objects using their senses e.g. smelling pots, feely bags, listening pots etc.  • Sorting collections of natural objects using their senses e.g. bark, pebbles, feathers, seeds, cones, leaves, sticks  • Looking closely at natural objects using a magnifying glass or app on a tablet  • Going on a sound walk  • Playing guessing games where children pick an object and either describe it or are asked questions in order to identify it  • Playing listening games  • Sharing books about senses and sensory impairments  • Tasting food  **Vocabulary**  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)  **Encouraging 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.  **What a child might be doing –**  • learning about the life cycles of humans  • learning about how to take care of themselves • learning about their senses.  • sorting humans by age/life stage  • sorting objects using their senses.  • record their observations when observing humans at different ages/life stages.  **Possible evidence of learning**  Children:  • Can talk about how they have changed since they were babies.  • Can 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 compare smells, sounds, tastes and textures.  • Can talk about what they see when using a magnifying glass or an app on a tablet.  • Can talk about how they use their senses when exploring the world around them and natural objects.  **Reception**  **Humans**  **Understanding the world.**  • Talk about members of their immediate family and community.  • Name and describe people who are familiar to them.  **Opportunities**  • Talking about themselves, friends, family and community using photographs  • Using mirrors to look at their faces  • Creating pictures or collages of themselves, friends, family and community  • Making hand and footprints using paint  • Making fingerprints using ink pads  • Encourage children to look at photographs of different people and to describe them.  • Encourage children to describe their friends and family using photographs to help them.  • Encourage children to talk about how their friends and family are the same and different.  • Encourage children to compare themselves to characters in books.  • Using a ‘magic’ mirror which shows everything about them and getting children to describe themselves and how they are special  • Sharing books about different types of families • Demonstrating and talking about how they look after themselves  • Talking about other people that look after them  • Talking to a dentist, nurse, meal supervisor/school cook, road crossing supervisor etc.  • Sharing videos of people who care for us and how we look after ourselves.  **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  **Encouraging 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?  **What a child might be doing –**  • describing people who are familiar to them  • learning about how to take care of themselves  • sorting humans by their characteristics  • recording their observations when drawing themselves, their family, friends and community.  **Possible evidence of learning**  Children:  • 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. | **Nursery (3 & 4-year-olds)**  **Materials, including changing materials**  **Understanding the world.**  • Use all their senses in hands-on exploration of natural materials.  • Explore collections of materials with similar and/or different properties.  • Talk about the differences between materials and changes they notice.  **Opportunities**  • Building junk models using a range of materials.  • Shaping and joining materials using equipment e.g. scissors, hole punch, including when using wood e.g. a hammer and nail  • Making smoothies  • Mixing ingredients to make playdough, cakes, biscuits, bread, jelly etc.  • Melting chocolate for decorating bakes/biscuits or to combine with other ingredients e.g. refrigerator cake, chocolate crispy cakes  • Comparing cooked and uncooked pasta, noodles, rice or potatoes  • Cooking popcorn in a microwave  • Cooking cakes, biscuits, bread etc.  • Making ice lollies and ice-cream  • Using medical ice packs including self-activated cool pads  • Removing toys from ice  • Adding baking soda and fizzy bath bombs to water  • Adding coloured sweets to water  • Adding currants to fizzy water/lemonade  • Adding bicarbonate of soda to vinegar to make a bubbling potion  **Vocabulary**  Model and encourage children to use vocabulary such as: mix, stir, cook, hot, oven, microwave, 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  **Encouraging scientific enquiry**  Classification  • Sort materials using simple properties.  Observing over time  • How does the cake mixture change?  • How does chocolate change when heated?  • How does fruit juice change when put in the freezer?  • How does fruit change when blended?  **What a child might be doing –**  • exploring a range of materials  • shaping and joining materials  • change materials.  • sorting materials.  **Possible evidence of learning**  • Can name the material they are using.  • Can talk about one property of a material.  • Can talk about ingredients for recipes.  • Can talk about how mixtures change when ingredients are added.  • Can talk about how materials change when cooked.  • Can talk about how materials change when heated.  • Can talk about how materials change when frozen.  **Reception**  **Earth and space.**  **Understanding the world.**  • Explore the natural world around them.  **Opportunities**  Opportunities to learn about the Earth, Sun, Moon, planets and stars.  • Observing that the Sun appears to move across the sky  • Observing that it is warmer and brighter when the Sun is shining than when it is behind the clouds  • Observing that they can see the Moon at night and sometimes in the day  • Observing that they can only see the stars at night  • Making model planets e.g. with papier-mâché or Modroc and balloons  • Modelling a cratered moon landscape with papier-mâché or Modroc  • Observing distant objects, including the Moon, with binoculars or a small telescope  • Sharing books and video clips about the Earth, Sun, Moon, planets and stars.  **Opportunities to learn about space travel**  • Joining materials to make model rockets, Moon buggies/Mars rovers and space stations  • Making and testing simple air-propelled card or plastic bottle rockets  • Sharing books and video clips about space exploration including video clips of astronauts walking on the Moon and floating in the space station  **Encouraging scientific enquiry**  Comparative testing  • Make and testing air-propelled rockets to find out which is the ‘best’.  Pattern seeking  • Find simple patterns in how light levels and temperature change with the movement, or obscuring of, the Sun.  Research using secondary sources  • Find out about the Solar System, stars and space travel.  **What a child might be doing –**  • exploring a range of materials  • shaping and joining materials  • change materials.  Sorting materials.  • learning about the Earth, Sun, Moon, planets and stars  • learning about space travel  • record their observations when making models of Earth, Sun, Moon, planets and stars  • record their observations when drawing things that happen in the daytime and at night.  **Possible evidence of learning**  • Can identify the Sun, Moon and stars and talk about how they are different from Earth.  • Can identify differences between day and night.  • Can talk about some differences between being on Earth and travelling in space.  Primary Future link: engineer, astronaut, designer, technician, astronomer, astrophysicist. |
| **Traditional Stories**  **(Spring 2)** | **Dinosaurs**  Summer 1 | **Going Places**  Summer 2 |
| Nursery- Animals excluding humans  Reception- Animals excluding humans  Living things and their habitats | Nursery- Animals, excluding humans  Reception- Animals, excluding humans  Primary Future link: paleontologist, archaeologist | Nursery- Materials, including changing materials  Electricity  Light  Reception- Materials, including changing materials  Forces  Earth and space  Primary Future link: pilot, travel agent |

The nursery units of Sound will be taught across the EYFS themes.

The reception units of Light and Sound will be taught across the EYFS themes.

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| **Year One**  The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information. They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos. ‘Working scientifically’ is described separately in the programme of study, but must always be taught through and clearly related to the teaching of substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content. Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1. | |
| Everyday materials | Seasonal changes (Autumn and Winter) |
| **Introduction:** This ‘Everyday Materials’ unit will teach your class about everyday materials including wood, plastic, metal, water and rock. Children will learn to identify and name everyday materials and will have the opportunity to explore the properties of these materials. Children also will carry out a simple investigation to help them decide which material would be most suitable to use for an umbrella. At the end of the unit children apply their knowledge of everyday materials to sort objects by their properties. A range of learning activities are used in this unit including, discussions, labelling and matching activities, games, and an investigation to encourage where children have the opportunity to ask and find the answers to questions. | **Introduction:** This ‘Seasonal Changes (Autumn and Winter)’ unit will teach your class about the four seasons, with a particular focus on autumn and winter. Children will learn what the word weather means and find out how different types of weather can be measured. Children will use a class weather station to observe measure and record the weather across the seasons. They will also observe changes across the seasons by exploring the signs of autumn and winter through nature and wildlife. A range of learning activities are used in this unit including observation, discussion and learning outside. Children also work scientifically by collecting, recording and interpreting simple data. |
| **Pupils should be taught to:**   * Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock by matching a material to its name. * Distinguish between an object and the material from which it is made by naming objects and identifying the material which they are made from. * Distinguish between an object and the material from which it is made by looking and touching different materials. * Describe the simple physical properties of a variety of everyday materials by testing different objects. * Observe closely by watching what happens to teddy. * Perform simple tests to find out which material would be suitable to make an umbrella from. * Use their observations and ideas to suggest answers to questions by deciding which materials would be suitable to make an umbrella from. * Compare and group together a variety of everyday materials on the basis of their simple physical properties by sorting objects.   **End point:** By the end of this unit pupils will be able to, identify and name everyday materials. Describe simple properties of everyday materials. Distinguish between an object and the material it is made from. Make a prediction. Perform simple tests. Use their observations to answer simple questions. Sort objects 3 ways.  Primary Future link: Engineer, Quantity Surveyor, Builder, Architect, Designer, Project Manager.  Twinkl – Science – Year 1 – Everyday materials. | **Pupils should be taught to:**   * Observe changes across the 4 seasons in the context of the weather. * Observe and describe how day length varies by exploring the average number of hours of day light in autumn. * Observe and describe weather associated with the seasons by observing the weather in autumn. * Gather and record data to help in answering questions by recording the weather, temperature, rainfall and wind direction in autumn. * Observe changes across the 4 seasons by going on an autumn walk. * Observe and describe how day length varies in the context of autumn to winter. * Observe and describe weather associated with the seasons by observing and recording the weather in winter. * Gather and record data to help in answering questions by recording the weather, temperature, rainfall and wind direction in winter. * Observe changes across the 4 seasons by exploring how some animals adapt to survive in winter.   **End point:** By the end of this unit pupils will be able to, name the four seasons. Name different types of weather. Children will be able to make observations about the weather. Describe the weather associated which each season. They can collect and record simple data. Interpret simple data. Name an event or occasion which happens in each season. Make simple observations about changes across the seasons. They can describe how day length varies between two seasons and make a more detailed comparison between two seasons.  Primary Future link: Meteorologist, weather forecaster, climatologist.  Twinkl – Science – Year 1 – Seasonal changes (Autumn and Winter.). |
| Key Threads:  • Use all their senses in hands-on exploration of natural materials. (Nursery - Materials, including changing materials)  • Explore collections of materials with similar and/or different properties. (Nursery - Materials, including changing materials)  • Talk about the differences between materials and changes they notice. (Nursery - Materials, including changing materials) | Key Threads:  • Understand the key features of the life cycle of a plant and an animal. (Nursery – Plants & Animals, excluding humans)  • Explore the natural world around them. (Reception – Seasonal changes)  • Describe what they see, hear and feel whilst outside. (Reception – Seasonal changes)  • Understand the effect of changing seasons on the natural world around them. (Reception – Seasonal changes) |
| **Sticky Knowledge** | |
| All objects are made of one or more materials. Some objects can be made from different materials e.g. plastic, metal or wooden spoons.  Materials can be described by their properties e.g. shiny, stretchy, rough etc. Some materials e.g. plastic can be in different forms with very different properties. | In the UK, the day length is longest at mid-summer (about 16 hours) and gets shorter each day until mid-winter (about 8 hours) before getting longer again.  The weather also changes with the seasons. In the UK, it is usually colder and rainier in winter, and hotter and dryer in the summer. The change in weather causes many other changes. Some examples are: numbers of minibeasts found outside; seed and plant growth; leaves on trees; and type of clothes worn by people. |
| **Learning Objectives** | |
| • Identify and name different materials.  • Tell the difference between an object and the materials it is made from.  • Describe the properties of everyday materials.  • Identify which materials have certain properties.  • Watch closely. (By watching what happens to teddy.)  • Test different materials. (To find out which material would be suitable to make an umbrella from.)  • Use what I have learnt to make a decision. (By deciding which materials would be suitable to make an umbrella from.)  • Sort objects by their properties. | • Describe how the weather changes across the seasons.  • Describe day length in autumn.  • Observe and describe the weather in autumn.  • Collect and record data about the weather in autumn.  • Identify signs of autumn.  • Describe how day length varies from autumn to winter.  • Identify changes in the trees and in clothes that we wear from autumn to winter.  • Observe and describe the weather in winter.  • Collect and record data about the weather in winter.  • Explain how some animals adapt in winter. |
| **Vocabulary Vault** | |
| Object, material, soft, stretchy, hard, shiny, dull, rough, smooth, bendy, not bendy, waterproof, not waterproof, absorbent, not absorbent, opaque, transparent | Seasons, autumn, winter, weather, daylight weather, sunny, rainy, raining, shower, windy, snowy, cloudy, hot, warm, cold, storm, thunder, lightning, hail, sleet, snow, icy, frost, puddles, rainbow, seasons, winter, autumn, sun, sunrise, sunset, day length |
| **Common Misconceptions** | |
| Some children may think:  • only fabrics are materials  • only building materials are materials  • only writing materials are materials  • the word ‘rock’ describes an object rather than a material  • ‘solid’ is another word for hard. | Some children may think:  • it always snows in winter  • it is always sunny in the summer  • there are only flowers in spring and summer  • it rains most in the winter. |
| **National Curriculum** | |
| Statutory:   * distinguish between an object and the material from which it is made * identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock * describe the simple physical properties of a variety of everyday materials * compare and group together a variety of everyday materials on the basis of their simple physical properties   Notes and 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.  Pupils might work scientifically by: performing simple tests to explore questions, for example: ‘What is the best material for an umbrella? … for lining a dog basket? … for curtains? … for a bookshelf? … for a gymnast’s leotard?’ | Statutory:   * observe changes across the 4 seasons * observe and describe weather associated with the seasons and how day length varies   Notes and 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.  Pupils might work scientifically by: making tables and charts about the weather; and making displays of what happens in the world around them, including day length, as the seasons change. |
| Seasonal changes (Spring and Summer) | Animals including humans |
| **Introduction:** This ‘Seasonal Changes (Spring and Summer)’ unit will teach your class about spring and summer. Children will continue to use a class weather station to observe, measure and record the weather in different seasons and will start to make comparisons between two seasons, as well as across all four seasons. They will also observe changes across the seasons by exploring the signs of spring and summer through nature and wildlife. A range of learning activities are used in this unit, including observation, discussion and learning outside. Children also work scientifically by collecting, recording and interpreting simple data. | **Introduction:** In this unit about Animals Including Humans, children will learn about five of the groups that scientists use to classify animals: mammals, fish, birds, reptiles and amphibians. They will learn to identify the group an animal belongs to by its features and will classify animals according to their group. They will also learn about the different diets animals eat. Children will learn about the parts of the human body and have the opportunity to explore the five senses through a simple investigation. In the final lesson, children will use all their knowledge from this unit to classify animals according to their own criteria. |
| **Pupils should be taught to:**   * Observe and describe how day length varies in the context of winter to spring. * Observe changes across the four seasons by looking at how trees and the clothes that we wear change from winter to spring. * Observe and describe weather associated with the seasons by observing the weather in spring. * Gather and record data to help in answering questions by recording the weather, temperature, rainfall and wind direction in spring. * Observe changes across the four seasons by going on a spring walk. * Observe and describe how day length varies in the context of spring to summer. * Observe changes across the four seasons by looking at how trees and the clothes that we wear change from spring to summer. * Observe and describe weather associated with the seasons by observing and recording the weather in summer. * Gather and record data to help in answering questions by recording the weather, temperature, rainfall and wind direction in summer. * Observe and describe weather associated with the seasons in the context of the summer sun.   **End point:** By the end of this unit pupils will be able to, Name the four seasons. Name different types of weather. Make observations about the weather. Describe the weather associated which each season. Collect and record simple data. Interpret simple data. Name an event or occasion which happens in each season. Describe how day length varies between two seasons. Make simple observations about changes across the seasons. Make a more detailed comparison between two seasons.  Primary Future link: Meteorologist, weather forecaster, climatologist.  Twinkl – Science – Year 1 – Seasonal changes (Spring and Summer.) | **Pupils should be taught to:**   * Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. * Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets). (Comparing animals.) * Identify and name a variety of common animals that are carnivores, herbivores and omnivores. * Identify, name, draw and label the basic parts of the human body. * Say which part of the body is associated with each sense. * Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets). (Sorting animals.)   **End point:** By the end of this unit pupils will be able to, identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. Children can describe and compare the observable features of animals from a range of groups. They can name and identify animals that are herbivore, carnivore or omnivore. Children can name and locate parts of the human body and begin to make suggestions about what some parts of the body do. They can name the five senses and the part of the body they are related to. Pupils can explain how they use each of their senses. Children can identify a variety of common animals.  **Working Scientifically:**  Children observe and identify animals in the world around them. With a support resource, they sort and classify them into simple groups. Children make careful observations of animals in the same group and can use simple features to compare living things (animals). They can use simple secondary sources to find answers to help them sort and classify animals according to what they eat. Pupils can use their senses to carry out simple practical tests, using simple equipment. After making careful observations, they can draw simple conclusions and can, with support, record and communicate their findings in a range of ways. Children use simple sorting diagrams to sort and classify objects (animals) into simple groups of their choice and are beginning to explain why they have sorted them this way.  Primary Future link: Scientist, biologist, zoologist, taxonomist, conservationist, nurse, doctor,  Twinkl – Science – Year 1 – Animals including Humans. |
| Key Threads:  • Understand the key features of the life cycle of a plant and an animal. (Nursery – Plants & Animals, excluding humans)  • Explore the natural world around them. (Reception – Seasonal changes)  • Describe what they see, hear and feel whilst outside. (Reception – Seasonal changes)  • Understand the effect of changing seasons on the natural world around them. (Reception – Seasonal changes) | Key Threads:  • Use all their senses in hands-on exploration of natural materials. (Nursery - Humans)  • Name and describe people who are familiar to them. (Reception - Humans) |
| **Sticky Knowledge** | |
| In the UK, the day length is longest at mid-summer (about 16 hours) and gets shorter each day until mid-winter (about 8 hours) before getting longer again.  The weather also changes with the seasons. In the UK, it is usually colder and rainier in winter, and hotter and dryer in the summer. The change in weather causes many other changes. Some examples are: numbers of minibeasts found outside; seed and plant growth; leaves on trees; and type of clothes worn by people. | Animals vary in many ways having different structures e.g. wings, tails, ears etc. They also have different skin coverings e.g. scales, feathers, hair. These key features can be used to identify them.  Animals eat certain things - some eat other animals, some eat plants, some eat both plants and animals.  Humans have key parts in common, but these vary from person to person. Humans (and other animals) find out about the world using their senses. Humans have five senses – sight, touch, taste, hearing and smelling. These senses are linked to particular parts of the body. |
| **Learning Objectives** | |
| • Describe how day length varies from winter to spring.  • Identify changes in the trees and in clothes that we wear from winter to spring.  • Observe and describe the weather in spring.  • Collect and record data about the weather in spring.  • Identify signs of spring.  • Describe how day length varies from spring to summer.  • Identify changes in the trees and in clothes that we wear from spring to summer.  • Observe and describe the weather in summer.  • Collect and record data about the weather in summer.  • Explain how to stay safe in the sun. | • Identify and name some common animals. (Identifying and classifying.)  • Describe and compare the structure of a variety of common animals. (Identifying and classifying.)  • Identify, name and sort animals that are herbivores, carnivores and omnivores. (Identifying and classifying.)  • Name and label the parts of the human body.  • Name the five senses and to perform simple tests to find out more about them. (To perform simple tests.)  • Sort animals according to certain criteria. (Identifying and classifying.) |
| **Vocabulary Vault** | |
| weather, sunny, rainy, raining, shower, windy, snowy, cloudy, hot, warm, cold, storm, thunder, lightning, hail, sleet, snow, icy, frost, puddles, rainbow, seasons, summer, spring, sun, sunrise, sunset, day length. | Amphibians, birds, fish, mammals, reptiles, carnivore, herbivore, omnivore, sight, hearing, touch, taste, smell. |
| **Common Misconceptions** | |
| Some children may think:  • it always snows in winter  • it is always sunny in the summer  • there are only flowers in spring and summer  • it rains most in the winter. | Some children may think:  • only four-legged mammals, such as pets, are animals  • humans are not animals  • insects are not animals  • all ‘bugs’ or ‘creepy crawlies’, such as spiders, are part of the insect group  • amphibians and reptiles are the same. |
| **National Curriculum** | |
| Statutory:   * observe changes across the 4 seasons * observe and describe weather associated with the seasons and how day length varies   Notes and 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.  Pupils might work scientifically by: making tables and charts about the weather; and making displays of what happens in the world around them, including day length, as the seasons change. | Statutory:   * identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals * identify and name a variety of common animals that are carnivores, herbivores and omnivores * describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets) * identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense   Notes and 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.  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.  Pupils might work scientifically by: using their observations to compare and contrast animals at first hand or through videos and photographs, describing how they identify and group them; grouping animals according to what they eat; and using their senses to compare different textures, sounds and smells. |
| Plants | Scientists and Inventors |
| **Introduction:** In this unit about plants, children will learn to name the basic parts of a plant, including seeds. They will have the opportunity to plant their own seeds and to make observations of how they grow over time. Children will also learn to identify, name and describe a variety of garden and wild plants as well as evergreen and deciduous trees. In their final lesson, the children will use all of their knowledge gained throughout the topic to identify, compare and classify plants. | Introduction: This ‘Scientists and Inventors’ unit will teach your class about famous scientists and inventors linked to the Y1 science curriculum. Children will learn about the inventions of Lego and ear muffs, and will explore the materials used to make them. They will investigate other materials that keep us warm, carrying out simple tests. Children will find out about the work of animal scientists, such as vets and zoo keepers. They will group and sort animals to make their own paper zoo, and will act in role as a vet, identifying the body parts of different animals. Children will have the opportunity to collect data when finding out about horticulturists and meteorologists. They will create bar charts of their favourite sensory plants, and make rain gauges to gather data on rainfall. Throughout the unit, children will work in a fun and hands on way to learn about scientists and inventors. |
| **Pupils should be taught to:**   * Identify and describe the basic structure of a variety of common flowering plants, including trees. * Ask simple questions and recognising that they can be answered in different ways. (To describe and compare plants, seeds and bulbs.) * Observe closely, using simple equipment. (To describe and compare plants, seeds and bulbs.) * Identify and describe the basic structure of a variety of common flowering plants, including trees. * Observe closely, using simple equipment. (To name and compare the parts of plants.) * Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. * Observe closely, using simple equipment. (To identify and name some common garden and wild plants.) * Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. * Identify and classify. (To identify and name some common trees.) * Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. * Identify and classify. (To name, sort and compare some common fruit and vegetable plants.) * Using their observations and ideas to suggest answers to questions. (To name and compare some common plants and trees.)   **End point:** By the end of this unit pupils will be able to, describe some of the features of seeds and plants. They can begin to make comparisons of different plants and seeds. Children can identify, name and begin to describe the basic structure of a variety of common flowering plants. They identify and name a variety of common wild and garden plants. Pupils identify and name a variety of deciduous and evergreen trees. They identify, name and describe the basic parts of a tree. Children identify and name a variety of fruit and vegetable plants. They identify and describe the basic structure of a variety of common plants. Pupils can identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.  **Working Scientifically:**  Children can make careful observations, sometimes using equipment to help them, of seeds and plants. They can explore the world around them, leading them to ask some simple scientific questions about how and why things happen. Pupils can make close observations of plants. They can observe the natural world around them. Children can observe closely. They can identify, classify and sort plants from their observations. They begin to explain their choices using simple scientific language. Pupils can identify similarities and differences between plants and begin to sort them according to a given criteria.  Primary Future link: Botanist, Gardener, Farmer, Florist  Twinkl – Science – Year 1 – Plants. | Pupils should be taught to:   * Describe the simple physical properties of a variety of everyday materials, by identifying the properties of plastic in the context of Lego. (Lego) * Use observations to suggest answers to questions, by thinking about why Lego is made out of plastic. (Lego) * Ask simple questions and use simple secondary sources to find answers, by role playing an interview with Mae Jemison. (Mae Jemison) * Describe and compare the structure of a variety of common animals, by sorting animals according to their features. (Zoos) * Identify and classify animals, by sorting animals according to their features. (Zoos) * Identify and name a variety of common wild and garden plants, by exploring a range of sensory plants. (Sensory Garden.) * Gather and record data to help in answering questions, by creating a chart showing the class’ most popular sensory plants. (Sensory Garden.) * Observe and describe weather associated with the seasons, by measuring rainfall with a rain gauge they have made. (Measuring the weather.) * Gather and record data to help in answering questions, by measuring rainfall with a rain gauge they have made. (Measuring the weather.) * Describe and compare the structure of a variety of common animals, including pets, by exploring the work of vets. (At the vets.) * Identify and classify, by identifying the basic parts of animals’ bodies. (At the vets.) * Perform simple tests, by testing the insulating properties of different materials. (Wrapping up warm.) * Compare a variety of everyday materials on the basis of their simple properties, by finding the best insulating materials. (Wrapping up warm.) * Say which part of the body is associated with each sense, by finding out about the scientist who discovered how we smell things. (Super senses.) * Use their senses to identify and compare different smells, by matching smells to items. (Super senses.)   End point: By the end of this unit pupils will be able to, identify the material that Lego is made out of; observe and describe properties of plastic; sort animals into 4 groups based on their body parts; name 6 sensory plants; add information to a pictogram to show their favourite plant; make a rain gauge and use it to measure rainfall; record rainfall data; identify which materials will keep us warm.  Primary Future link: Lego designer, architect, engineer, physician, astronaut, zoologist, zoo-keeper, vet, designer, climatologist, doctor, nurse.  Twinkl – Science – Year 1 – Scientists and Inventors. |
| Key Threads:  • Plant seeds and care for growing plants. (Nursery – Plants)  • Understand the key features of the life cycle of a plant and an animal. (Nursery – Plants)  • Begin to understand the need to respect and care for the natural environment and all living things. (Nursery – Plants)  • Explore the natural world around them. (Reception – Living things and their habitats)  • Recognise some environments that are different to the one in which they live. (Reception – Living things and their habitats) | Key Threads:  N/A |
| **Sticky Knowledge** |  |
| Growing locally, there will be a vast array of plants which all have specific names. These can be identified by looking at the key characteristics of the plant. Plants have common parts, but they vary between the different types of plants. Some trees keep their leaves all year while other trees drop their leaves during autumn and grow them again during spring. | Pupils will be able to, identify the material that Lego is made out of; observe and describe properties of plastic; sort animals into 4 groups based on their body parts; name 6 sensory plants; add information to a pictogram to show their favourite plant; make a rain gauge and use it to measure rainfall; record rainfall data; identify which materials will keep us warm. |
| **Learning Objectives** | **Learning Objectives** |
| • Describe and compare plants, seeds and bulbs. (Observing closely, using simple equipment.)  • Name and compare the parts of plants.  • Identify and name some common garden and wild plants.  • Identify and name some common trees. (Identifying and classifying.)  • Name, sort and compare some common fruit and vegetable plants. (Identifying and classifying.)  • Name and compare some common plants and trees. (Using their observations and ideas to suggest answers to questions.) | • Describe the properties of Lego. (Lego)  • Think about why Lego is made out of plastic. (Lego)  • Ask questions about Mae Jemison and find out the answers. (Mae Jemison.)  • Compare the bodies of different animals. (Zoos.)  • Sort animals into different groups. (Zoos.)  • Name different plants. (Sensory Garden.)  • Make a chart to show our favourite plants. (Sensory Garden.)  • Observe and describe the weather. (Measuring the weather.)  • Measure and record information about rain. (Measuring the weather.)  • Describe how vets look after animals. (At the vets.)  • Identify parts of animals’ bodies. (At the vets.)  • Test which items keep us warm. (Wrapping up warm.)  • Describe the properties of materials that keep us warm. (Wrapping up warm.)  • Describe what Linda Buck found out about how we smell things. (Super senses.)  • I can identify smells. (Super senses.) |
| **Vocabulary Vault** | |
| Wild plants, garden plants, weed, deciduous, evergreen, roots, stem, leaves, flowers, petals, fruit, seed, bulb. | People of interest (See Knowledge organizer.) - Ole Kirk Christiansen, Mae Jemison, George Mottershead, George James Symons, Linda Brown Buck.  Inventor, scientist, astronaut, biologist, veterinarian (vet). |
| **Common Misconceptions** | |
| Some children may think:  • plants are flowering plants grown in pots with coloured petals and leaves and a stem  • trees are not plants  • all leaves are green  • all stems are green  • a trunk is not a stem  • blossom is not a flower. |  |
| **National Curriculum** | |
| Statutory:   * 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   Notes and 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.  They should become familiar with common names of flowers, examples of deciduous and evergreen trees, and plant structures (including leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem). Pupils might work scientifically by: observing closely, perhaps using magnifying glasses, and comparing and contrasting familiar plants; describing how they were able to identify and group them, and drawing diagrams showing the parts of different plants including trees. Pupils might keep records of how plants have changed over time, for example, the leaves falling off trees and buds opening; and compare and contrast what they have found out about different plants. | A non-national curriculum unit. |

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| **Year Two**  The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information. They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos. ‘Working scientifically’ is described separately in the programme of study, but must always be taught through and clearly related to the teaching of substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content. Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1. | |
| Living things and their habitats | Uses of everyday materials |
| **Introduction:** In this unit children will learn about a variety of habitats and the plants and animals that live there. They learn to tell the difference between things that are living, dead and things that have never been alive, and apply this in a range of contexts. They make observations of a local habitat and the creatures that live there, investigating conditions in local microhabitats and how they affect the minibeasts found within them. This unit allows children to research a range of global habitats and how the living things that live there are suited to their environments, and also provides an introduction to the idea of dependency between plant and animal species. | **Introduction:** This ‘Uses of Everyday Materials’ unit will teach your class about the uses of everyday materials including wood, plastic, metal, glass, brick, paper and cardboard. Children then go on to compare the suitability of different everyday materials for different purposes. They explore how objects made of some everyday materials can change shape and how the recycling process is able to reuse some everyday materials numerous times. It finishes with children learning about new discoveries which have made over time with a specific focus on John McAdam. A range of learning activities are used in this unit including, discussions, debates, sequencing and a local walk where children work scientifically to identify the uses of everyday materials in the local area. |
| **Pupils should be taught to:**   * Explore and compare the differences between things that are living, dead, and things that have never been alive by thinking about life processes. * Use their observations and ideas to suggest answers to questions by explaining how they know something is living, dead or has never been alive. * Identify and name a variety of plants and animals in their habitats, by mapping a habitat and identifying its inhabitants. * Identify and classify, and sort objects into categories by sorting objects that are living, dead and have never been alive. * Identify and name a variety of plants and animals in their habitats, including microhabitats by identifying minibeasts in microhabitats. * Gather and record data to help in answering questions by investigating the preferred habitat of minibeasts. * Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, by researching habitats and the animals that live in them. * Ask simple questions and recognise that they can be answered in different ways by asking and answering questions about a range of different habitats. * Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other by considering the adaptations of animals, and how living things in a habitat depend on each other. * Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food by making a variety of food chains   **End point:** By the end of this unit pupils will be able to, say what is different about things that are living, dead or have never been alive. Identify some of the plants and animals in a familiar habitat. Explain some of the life processes. Ask questions to decide if a thing is living, dead or has never been alive. Identify some plants and animals in global habitats. Draw a map of a local habitat Identify and name minibeasts in microhabitats. Describe the conditions in a habitat. Gather and record information. Suggest how an animal is able to survive in their habitat. Answer questions about habitats they have researched. Explain why the animals in a habitat need the plants. Draw a simple food chain.  Primary Future link: Conservationist, Environmentalist, Zoologists, Botanist, Taxonomist, Habitat Restoration Engineer, Wildlife Technician.  Twinkl – Science – Year 2 – Living things and their habitats. | **Pupils should be taught to:**   * Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses, by identifying the uses of different materials. * Identify and classify the uses of everyday materials, in the context of the local area. * Gather and record data to help in answering questions, by exploring the purposes of different objects. * Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses, by exploring the purposes of different objects. * Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching, by changing the shape of objects. * Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching, in the context of recycling. * To find out about people who have developed new materials, by learning about John McAdam. (Tarmac. Macadamisation)   **End point:** By the end of this unit pupils will be able to, identify and name everyday materials. • Identify different uses of everyday materials. Compare the uses of different everyday materials. Compare the suitability of different everyday materials. Demonstrate and explain how shapes of objects made from some materials can be changed. Explain the basic progress of recycling. Explain the advantages of recycling. Name the process invented by John McAdam.  Primary Future link: Engineer, Quantity Surveyor, Builder, Architect, Designer, Project Manager.  Twinkl – Science – Year 2 – Uses of everyday materials. |
| Key Threads:  • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants)  • Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants)  • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals including humans)  • 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)  • Observe changes across the four seasons. (Y1 - Seasonal changes) | Key Threads:  • 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) |
| **Sticky Knowledge** | |
| All objects are either living, dead or have never been alive. Living things are plants (including seeds) and animals. Dead things include dead animals and plants and parts of plants and animals that are no longer attached e.g. leaves and twigs, shells, fur, hair and feathers (This is a simplification, but appropriate for Year 2 children.)  An object made of wood is classed as dead. Objects made of rock, metal and plastic have never been alive (again ignoring that plastics are made of fossil fuels).  Animals and plants live in a habitat to which they are suited, which means that animals have suitable features that help them move and find food and plants have suitable features that help them to grow well. The habitat provides the basic needs of the animals and plants – shelter, food and water.  Within a habitat there are different micro-habitats e.g. in a woodland – in the leaf litter, on the bark of trees, on the leaves. These micro-habitats have different conditions e.g. light or dark, damp or dry. These conditions affect which plants and animals live there. The plants and animals in a habitat depend on each other for food and shelter etc. The way that animals obtain their food from plants and other animals can be shown in a food chain. | All objects are made of one or more materials that are chosen specifically because they have suitable properties for the task. For example, a water bottle is made of plastic because it is transparent allowing you to see the drink inside and waterproof so that it holds the water. When choosing what to make an object from, the properties needed are compared with the properties of the possible materials, identified through simple tests and classifying activities. A material can be suitable for different purposes and an object can be made of different materials.  Objects made of some materials can be changed in shape by bending, stretching, squashing and twisting. For example, clay can be shaped by squashing, stretching, rolling, pressing etc. This can be a property of the material or depend on how the material has been processed e.g. thickness. |
| **Learning Objectives** | |
| • Compare the differences between things that are living, dead and have never been alive.  • Answer questions about things that are living, dead or have never been alive.  • Map a habitat and identify what is in it.  • Classify objects as those that are living, dead and those that have never been alive.  • Identify animals in their habitats.  • Use information I have gathered to answer a question.  • Describe a habitat and identify animals live in it.  • Ask and answer questions about habitats.  • Identify how an animal is suited to its habitat.  • Explain how living things in a habitat depend on each other  • Describe how animals get their food. | • Identify uses of different everyday materials.  • Identify and group the uses of everyday materials.  • Record my observations.  • Compare the suitability of different everyday materials.  • Explain how the shapes of objects made from some materials can be changed.  • Explain the process of recycling.  • Pupils can tell you about the inventor John McAdam. |
| **Vocabulary Vault** | |
| Life processes, living, dead, never living, food chain, food sources, habitat, microhabitat, depend, survive. | Materials, suitability, properties, squash, twist, bend, stretch, engineer, inventor, process, John McAdam, John Dunlop, Charles Macintosh, Macadamisation. |
| **Common Misconceptions** | |
| Some children may think:  • an animal’s habitat is like its ‘home’  • plants and seeds are not alive as they cannot be seen to move  • fire is living  • arrows in a food chain mean ‘eats.’ | Some children may think:  • only fabrics are materials  • only building materials are materials  • only writing materials are materials  • the word rock describes an object rather than a material  • solid is another word for hard. |
| **National Curriculum** | |
| Statutory:   * explore and compare the differences between things that are living, dead, and things that have never been alive * identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other * identify and name a variety of plants and animals in their habitats, including microhabitats * describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.   Notes and 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 be introduced to the terms, ‘habitat’ (a natural environment or home of a variety of plants and animals) and ‘microhabitat’ (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.  Pupils might work scientifically by: sorting and classifying things according to whether they are living, dead or were never alive, and recording their findings using charts. They should describe how they decided where to place things, exploring questions like: ‘Is a flame alive? Is a deciduous tree dead in winter?’ and talk about ways of answering their questions. They could construct a simple food chain that includes humans (eg, grass, cow, human). They could describe the conditions in different habitats and microhabitats (under log, on stony path, under bushes); and find out how the conditions affect the number and type(s) of plants and animals that live there. | Statutory:   * identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses * find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching   Notes and 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. Pupils might find out about people who have developed useful new materials, for example John Dunlop, Charles Macintosh or John McAdam.  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, identifying and classifying the uses of different materials, and recording their observations. |
| **Animals including humans** | **Plants** |
| **Introduction:** In this unit, Animals Including Humans, children will begin by looking at animal young and comparing them to their adults. They will look at how animals change as they grow up and be introduced to the life cycles of several varied common animals, including humans. They look in detail at how humans change as they grow older, drawing on their own observations. Children are introduced to the three basic needs of animals for survival (water, food and air). They will apply this knowledge, alongside research from secondary sources, to suggest ways to look after pets. The unit ends with children looking at healthy lifestyles, including the importance of exercise, healthy eating and hygiene. These healthy living lessons develop ‘working scientifically’ skills through investigating the impact of exercise on our bodies and how handwashing is essential for good hygiene. | **Introduction:** In this unit, children will learn about different seeds and bulbs. They will learn about plants we can eat and what plants need to stay healthy. They will have the opportunity to carry out their own investigations into what plants need to grow well. Children will also closely observe the inside of a seed and learn about the life cycle of a plant. They will also learn how plants look when they don’t get the things they need. |
| **Pupils should be taught to:**   * Notice that animals, including humans, have offspring which grow into adults. Identifying and classifying. * Notice that animals, including humans, have offspring which grow into adults. Gathering and recording data to help in answering questions. * Notice that animals, including humans, have offspring which grow into adults. * Ask simple questions. Using their observations and ideas to suggest answers to questions. * Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). * Use their observations and ideas to suggest answers to questions. * Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. Perform simple tests. * Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. Perform simple tests. Observe closely, using simple equipment.   **End point:** By the end of this unit pupils will be able to, identify and match several animal offspring and their adult forms. They can describe the main characteristics of the offspring found in different animal groups. Children can describe the main stages of at least two different animal life cycles. They start to compare these life cycles. They can identify several ways that humans grow and develop through each life cycle stage. Children can name the three basic needs of all animals to survive. They can describe the specific needs of a given animal. Children can describe the effects of exercise and begin to explain the importance of exercise for the human body. They can identify several foods according to the basic food groups and can talk about the importance of a balanced diet. They can explain how to be hygienic and why this is important.  **Working Scientifically:**  Children can sort and classify objects (animals) into simple groups. They use scientific language to talk about their findings. They start, with support, to notice patterns and relationships between the groups. Children can use simple secondary sources to find answers to a question. They can ask simple scientific questions and use scientific language to answer them. Children use simple secondary sources to find answers and talk about their findings to an audience. They can carry out simple practical tests and use their observations and ideas to suggest answers to questions. Children can carry out simple practical tests, make careful observations and draw simple conclusions.  Primary Future link: Doctor, Nurse, Paramedic, First Aider, Personal Trainer.  Twinkl – Science – Year 2 – Animals including humans. | **Pupils should be taught to:**   * Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. * Performing simple tests. (About what plants need to grow.) * Using their observations and ideas to suggest answers to questions. (About what plants need to grow.) * Observe and describe how seeds and bulbs grow into mature plants. * Observing closely, using simple equipment. (What is inside a seed?) * Observe and describe how seeds and bulbs grow into mature plants. * Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. * Using their observations and ideas to suggest answers to questions. (What do plants need in order to stay healthy?) * Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. (Part 2) * Using their observations and ideas to suggest answers to questions. (What happens to plants if they don’t get all the things they need to stay healthy?) * Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. * Using their observations and ideas to suggest answers to questions. (How and why are plants suited to their habitats?)   **End point:** By the end of this unit pupils will be able to, suggest what they think a plant needs to grow and stay healthy. They can order the life cycle of a plant and begin to explain what happens at each stage. Children explain that plants need water, light and a suitable temperature to grow and stay healthy. Pupils begin to explain what happens if a plant does not get everything it needs. They find out and describe how different plants need different amounts of water and light and different temperatures to grow and stay healthy. Children understand how some plants are suited to their habitats.  **Working Scientifically:**  • Children can begin to recognise ways in which they might answer scientific questions. They can carry out simple practical tests, using simple equipment. Children observe the natural world around them. Pupils can notice links between cause and effect and talk about their findings to a variety of audiences in a variety of ways. Children can use simple features to compare living things.  Primary Future link: Botanist, Gardener, Farmer, Florist.  Grammarsaurus – Plants unit. |
| Key Threads:  • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans)  • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans) | Key Threads:  • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants)  • Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants)  **Future learning:**  **Year 3** – Children will learn about the functions of the different parts of the plant, find out how flowers play a part in the life cycle of the plant and investigate how water is transported in plants.  **Year 5** - Children will look at the life cycle of a plant including the life process of reproduction. **KS3** - Children will study plants in much closer detail, observing the cell structure and how plants create their own food through photosynthesis |
| **Sticky Knowledge** | |
| Animals, including humans, have offspring which grow into adults. In humans and some animals, these offspring will be young, such as babies or kittens, that grow into adults. In other animals, such as chickens or insects, there may be eggs laid that hatch to young or other stages which then grow to adults. The young of some animals do not look like their parents e.g. tadpoles.  All animals, including humans, have the basic needs of feeding, drinking and breathing that must be satisfied in order to survive. To grow into healthy adults, they also need the right amounts and types of food and exercise.  Good hygiene is also important in preventing infections and illnesses. | Plants may grow from either seeds or bulbs. These then germinate and grow into seedlings which then continue to grow into mature plants. These mature plants may have flowers which then develop into seeds, berries, fruits etc. Seeds and bulbs need to be planted outside at particular times of year and they will germinate and grow at different rates. Some plants are better suited to growing in full sun and some grow better in partial or full shade. Plants also need different amounts of water and space to grow well and stay healthy. Plants grow and change throughout their life cycle. |
| **Learning Objectives** | |
| • Match, sort and group young animals and their adults.  • Find out how animals change as they grow into adults  • Compare the stages of the human life cycle.  • Research and describe what animals, including humans, need to survive.  • Test the effects of exercise on the human body.  • Investigate the importance of healthy eating and hygiene. | • I can identify that fruit, vegetables and herbs are a type of plant that we eat.  I can observe and describe how seeds grow into mature plants.  I know what plants need to grow and stay healthy.  I know what plants need to grow and stay healthy.  I can explain the life cycle of plants. |
| **Vocabulary Vault** | |
| Adult, develop, life cycle, offspring, young, live young, diet, exercise, germs, hygiene, nutrition. | Plant, tree, flower, roots, stem, leaf, seed, bulb. |
| **Common Misconceptions** | |
| Some children may think:  • an animal’s habitat is like its ‘home’  • all animals that live in the sea are fish  • respiration is breathing  • breathing is respiration. | Some children may think:   * Children may not realise that plants are living things and that they can die. They may think only things with faces and brains are alive. * Children may not know that plants have roots in the ground that help the plant. * Children may think that all seeds look the same, so we need to make sure that we allow them to explore and observe a variety of seeds and bulbs. |
| **National Curriculum** | |
| Statutory:   * notice that animals, including humans, have offspring which grow into adults * find out about and describe the basic needs of animals, including humans, for survival (water, food and air) * describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.   Notes and 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.  Pupils might work scientifically by: observing, through video or first-hand observation and measurement, how different animals, including humans, grow; asking questions about what things animals need for survival and what humans need to stay healthy; and suggesting ways to find answers to their questions. | Statutory:   * observe and describe how seeds and bulbs grow into mature plants * find out and describe how plants need water, light and a suitable temperature to grow and stay healthy   Working scientifically objectives   * ask simple questions and recognise that they can be answered in different ways * observe closely, using simple equipment * perform simple tests * identify and classify * use their observations and ideas to suggest answers to questions * gather and record data to help in answering questions   Notes and 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.  Pupils might work scientifically by: observing and recording, with some accuracy, the growth of a variety of plants as they change over time from a seed or bulb, or observing similar plants at different stages of growth; setting up a comparative test to show that plants need light and water to stay healthy. |
| Biodiversity and Minibeasts | Scientists and inventors |
| **Introduction**: In this unit about Biodiversity and Minibeasts, children will learn about the importance of biodiversity and what an ecosystem is. The unit focuses on minibeasts and habitats found in the UK. Children will learn about different types of minibeasts, their microhabitats, what they need from their habitat and how living things depend on each other in order to survive. They will also learn about the benefits of minibeasts for the planet and the important roles they play, including pollination. Part of the aim of this unit is to eliminate fear and misconceptions surrounding minibeasts in order to build a better understanding and appreciation of their importance for the planet and how they impact daily life. | **Introduction:** This ‘Scientists and Inventors’ unit will teach your class about famous scientists and inventors linked to the Year 2 science curriculum. Children will learn about the invention of the waterproof coat, and will explore other waterproof materials by carrying out simple tests. Children will find out about the work of doctors, and will learn about Elizabeth Garrett Anderson, the first woman doctor in Britain. Children will have the opportunity to create their own greenhouse based on the invention of the biomes at the Eden Project, and use their greenhouse to compare the growth of plants. They will learn about how germs are spread, looking at the work of Louis Pasteur and carrying out a fun experiment to prove how far germs can spread in a few minutes. Children will set up a small world to show the effects of water pollution, as discovered by Rachel Carson during her research on ocean habitats. Finally, children will learn about the development of wind turbines and how this invention is used to generate power. Throughout the unit, children will work in a fun and hands-on way to learn about scientists and inventors. |
| **Pupils should be taught to:**   * Identify and name a variety of plants and animals in their habitats, including microhabitats. Gathering and recording data to help in answering questions. Using their observations and ideas to suggest answers to questions. Observing closely, using simple equipment. * Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. Observing closely, using simple equipment. * Find out about and describe the basic needs of animals including humans, for survival (water, food and air). Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. Asking simple questions and recognising that they can be answered in different ways. Gathering and recording data to help in answering questions. * Find out about and describe the basic needs of animals including humans, for survival (water, food and air). Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. Use their observations and ideas to suggest answers to questions. * Find out about and describe the basic needs of animals including humans, for survival (water, food and air). Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. Asking simple questions and recognising that they can be answered in different ways. Using their observations and ideas to suggest answers to questions. * Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. Find out about and describe the basic needs of animals including humans, for survival (water, food and air). Using their observations and ideas to suggest answers to questions.   **End point:** By the end of this unit pupils will be able to, identify and name a variety of plants and animals in their habitats, including microhabitats; describe the basic needs of animals, including humans, for survival and what factors influence this, such as their habitats; describe how different types of animals and plants in a habitat depend on each other; understand the idea of a simple food chain; describe how plants need water, light and a suitable temperature to grow and stay healthy; identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different types of animals and plants.  **Working Scientifically:**  • Children can observe the natural world around them by making careful observations, using simple equipment.  • Children can gather and record data in a variety of ways to help in answering questions, such as simple tables.  • Children can begin to draw simple conclusions.  • Children can use simple secondary sources to find answers.  • When presenting their findings, children can use simple and scientific language appropriately, to a level consistent with their increasing word reading and spelling knowledge.  Primary Future link: Entomologist, Conservationist, Ecologist.  Twinkl – Science – Year 2 – Biodiversity and Minibeasts. | **Pupils should be taught to:**   * Find out how plants need water, light and a suitable temperature to grow and stay healthy in the context of exploring how plants grow in greenhouses, including in the biomes at the Eden Project. (Greenhouse growing.) * Find out how plants need water, light and a suitable temperature to grow and stay healthy in the context of comparing plant growth in and out of a greenhouse. (Greenhouse growing.) * Identify and describe the basic structure of common flowering plants by observing and sketching a range of common plants. (Brilliant Botany.) * Observe closely using simple equipment by using a magnifying glass to sketch details of different plants. (Brilliant Botany.) * Use their observations and ideas to suggest answers to questions in the context of considering whether doctors are scientists. (Doctor’s surgery.) * Describe the importance for humans of exercise, of eating the right amounts of different types of food, and hygiene in the context of creating a poster for a doctor’s surgery to explain how to stay healthy. (Doctor’s surgery.) * Describe the importance of hygiene to humans in the context of investigating Louis Pasteur’s work on how germs spread. (Discovering germs.) * Use their observations and ideas to answer simple question in the context of investigating how germs spread and the effect of hand washing. (Discovering germs.) * Find out about people who have developed new materials in the context of learning about Charles Macintosh. (Charles Macintosh.) * To identify and compare the suitability of a variety of everyday materials for particular uses in the context of testing materials to find the most suitable material for a waterproof coat. (Charles Macintosh.) * Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain in the context of exploring Rachel Carson's study of the ocean. (Rachel Carson.) * Observe closely, using simple equipment in the context of investigating the effects of pesticides in water, as researched by Rachel Carson. (Rachel Carson.) * Use their ideas to answer questions in the context of answering questions on renewable energy and the invention of wind turbines. (Wind power.)   **End point:** By the end of this unit pupils will be able to, describe how the greenhouses invented at the Eden Project help plants grow healthily; use a ruler to measure the height of plants; use their ideas and observations to explain how doctors use science; describe healthy life choices; explain what Louis Pasteur found out about germs; describe how to wash our hands effectively; test materials to find out whether they are waterproof; describe an ocean food chain that Rachel Carson studied; explain what an investigation shows about water pollution; identify renewable and non-renewable sources of energy; describe the invention of wind turbines; share their ideas about the use of wind power.  Primary Futures link: Horticuluralist, Farmer, Botanist, Biologist, Doctor, Nurse, Microbiologist, Inventor, Designer, Engineer, Marine biologist, Oceanographer, Conservationist, Ecologist, Environmental health officer, Energy engineer.  Twinkl – Science – Year 2 – Scientists and Inventors. |
| Key Threads:  •Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants)  • Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants)  • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals including humans)  • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 – Animals, including humans) |  |
| **Sticky Knowledge** | |
| Living things are plants (including seeds) and animals. Animals and plants live in a habitat to which they are suited, which means that animals have suitable features that help them move and find food and plants have suitable features that help them to grow well. The habitat provides the basic needs of the animals and plants – shelter, food and water. Within a habitat there are different micro-habitats e.g. in a woodland – in the leaf litter, on the bark of trees, on the leaves. These micro-habitats have different conditions e.g. light or dark, damp or dry. These conditions affect which plants and animals live there. The plants and animals in a habitat depend on each other for food and shelter etc. The way that animals obtain their food from plants and other animals can be shown in a food chain. | Pupils will be able to, describe how the greenhouses invented at the Eden Project help plants grow healthily; use a ruler to measure the height of plants; use their ideas and observations to explain how doctors use science; describe healthy life choices; explain what Louis Pasteur found out about germs; describe how to wash our hands effectively; test materials to find out whether they are waterproof; describe an ocean food chain that Rachel Carson studied; explain what an investigation shows about water pollution; identify renewable and non-renewable sources of energy; describe the invention of wind turbines; share their ideas about the use of wind power. |
| **Learning Objectives** | |
| * Identify and name a variety of minibeasts and their habitats. * Explain the importance of bees and pollination. * Research minibeasts and explain their importance. * Show how a microhabitat is suitable for a minibeast. * Describe the importance of worms for healthy soil. * Explain the importance and needs of minibeasts and microhabitats. | • Describe how greenhouses help plants grow healthily. (Greenhouse growing.)  • Observe whether plants grow best inside or outside of a greenhouse. (Greenhouse growing.)  • Identify different parts of plants. (Brilliant Botany.)  • Use a magnifying glass to help me draw different parts of plants. (Brilliant Botany.)  • Use my own ideas to explain how doctors use science. (Doctor’s surgery.)  • Describe what is important in order to stay healthy. (Doctor’s surgery.)  • Describe Louis Pasteur’s life and work. (Discovering germs.)  • Find out why we wash our hands. (Discovering germs.)  • Describe Charles Macintosh and his famous invention. (Charles Macintosh.)  • I can investigate the most suitable fabric for a particular use. (Charles Macintosh.)  • Describe what Rachel Carson learnt about ocean habitats. (Rachel Carson.)  • Investigate Rachel Carson’s findings on water pollution. (Rachel Carson.)  • Answer questions about the invention of wind turbines. (Wind Power.) |
| **Vocabulary Vault** | |
| Minibeast, invertebrate, decomposer, predator minibeast, pollinator, pollination, habitat, microhabitat, biodiversity, ecosystem, depend, food chain. | People of interest (See Knowledge organizer.) - Tim Smit, Nicholas Grimshaw, Jane Colden, Elizabeth Garrett Anderson, Louis Pasteur, Charles Macintosh, Rachel Carson, James Blyth.  Biome, Eden Project, botanist, doctor, germs, turbine, waterproof. |
| **Common Misconceptions** |  |
| Some children may think:  • an animal’s habitat is like its ‘home’  • plants and seeds are not alive as they cannot be seen to move  • fire is living  • arrows in a food chain mean ‘eats’ |  |
| **National Curriculum** | |
| A non-national curriculum unit. | A non-national curriculum unit. |

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| **Year Three**  The principal focus of science teaching in lower key stage 2 is to enable pupils to broaden their scientific view of the world around them. They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions. They should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out.  ‘Working scientifically’ is described separately at the beginning of the programme of study, but must always be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.  Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word-reading and spelling knowledge. | |
| **Rocks** | **Animals including humans** |
| **Introduction:** In this unit, children will discover the different types of rocks and how they are formed. Children will compare and group rocks based on appearance and simple properties. They will learn how fossils are formed and learn about the contribution of Mary Anning to the field of palaeontology. Children will understand how soil is formed and then investigate the permeability of different types of soil. | **Introduction:** This unit recaps the children’s learning from year 2 about how animals survive and stay healthy and helps children to learn more about what makes a healthy, balanced diet. They learn about the nutrients that different foods provide and how these nutrients help our bodies. They also explore how different animals eat different types of foods and need different proportions of nutrients. They understand what food labels on packaging show and gather information from food labels to help them to answer questions. In this unit, children also explore the different types of skeletons that animals have and compare these. They learn some names of bones in the human body and carry out an investigation to explore if people with longer femurs jump further. They discuss how to plan a fair test and measure and record accurately. Children learn about how muscles help us to move and make a simple scientific model which they use to explain to a partner how skeletal muscles work. In the final lesson, children apply their ‘working scientifically’ skills to design and carry out an investigation of their own, based on the human skeleton. |
| **Pupils should be taught to:**   * Compare different kinds of rocks based on their appearance in the context of understanding the difference between natural and human-made rocks. * Make systematic and careful observations by examining different types of rocks. * Group together different kinds of rocks on the basis of their simple physical properties in the context of natural rocks. * Describe in simple terms how fossils are formed when things that have lived are trapped within rock by explaining the fossilisation process and by comparing fossils to the animals they belong to. * Identify changes related to simple scientific ideas in the context of theories about fossils. * Recognise that soils are made from rocks and organic matter by explaining how soil is formed. * Making systematic and careful observations in the context of investigating the permeability of different soils. * Record findings using simple scientific language. Reporting on findings from enquiries, including presentations of results and conclusions. Children will present their findings using the key science vocabulary for this lesson.   **End point:** By the end of this unit pupils will be able to, name the three different types of rocks. Children will be able to give examples of natural and human-made rocks. They will be able to group rocks by their properties and identify simple similarities and differences. Children will be able to explain the difference between a bone and a fossil. Children will learn to make careful observations. They will be able to take part in and contribute towards an oral presentation of their observations. They will make and record observations accurately.  Primary Future link: Palaeontologist, Archaeologist, Geologist, Farmer, Gardener, Horticulturist, (Forensic) Ecologist.  Twinkl – Science – Year 3 – Rocks. | **Pupils should be taught to:**   * Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (Food groups and nutrients that different foods provide.) * Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (Nutritional values of different foods.) * Identify that humans and some other animals have skeletons and muscles for support, protection and movement. (Skeletons) * Identify that humans and some other animals have skeletons and muscles for support, protection and movement. (Human Skeletons) (Investigation into how the human skeleton supports movement.) * Identify that humans and some other animals have skeletons and muscles for support, protection and movement. (Muscles) (Bones and muscles work together to support movement.) * Identify that humans and some other animals have skeletons and muscles for support, protection and movement. Asking relevant questions and using different types of scientific enquiries to answer them. Setting up simple practical enquiries, comparative and fair tests. Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. (Setting up own investigation to carry out.)   **End point:** By the end of this unit pupils will be able to, talk about what animals and humans need to stay healthy, showing an understanding of the food groups and the nutrients humans need for a healthy diet. Children can talk about how and why different animals require a different balance of nutrients and can gather and understand a range of information from food labels. Children can name, describe then start to discuss the features and advantages and disadvantages of different types of skeleton. Children can name the main parts of the human skeleton. Children can give a simple explanation of how muscles work.  Working Scientifically:  • Children can group and classify foods into food groups and identify the nutrients that different foods provide. Children can present data from food labels in a table to help in answering questions. Children can group and classify animal skeletons and can use scientific vocabulary to talk about animal skeletons. Children can help decide how to set up a test that is fair and can draw simple conclusions from their results. Children can show their understanding of a process by using scientific language and a labelled diagram. Children can set up and carry out a test that is fair, including making decisions about what measurements to take.  Primary Future link: Doctor, Nurse, Paramedic, First Aider, Personal Trainer  Twinkl – Science – Year 3 – Animals including humans. |
| Key Threads:  • 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)  • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials) | Key Threads:  • 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)  • Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). (Y2 - Animals, including humans)  • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans) |
| **Sticky Knowledge** | |
| Rock is a naturally occurring material. There are different types of rock e.g. sandstone, limestone, slate etc. which have different properties. Rocks can be hard or soft. They have different sizes of grain or crystal. They may absorb water. Rocks can be different shapes and sizes (stones, pebbles, boulders). Soils are made up of pieces of ground down rock which may be mixed with plant and animal material (organic matter). The type of rock, size of rock pieces and the amount of organic matter affect the property of the soil.  Some rocks contain fossils. Fossils were formed millions of years ago. When plants and animals died, they fell to the seabed. They became covered and squashed by other material. Over time the dissolving animal and plant matter is replaced by minerals from the water. | Animals, unlike plants which can make their own food, need to eat in order to get the nutrients they need. Food contains a range of different nutrients – carbohydrates (including sugars), protein, vitamins, minerals, fats, sugars, water – and fibre that are needed by the body to stay healthy. A piece of food will often provide a range of nutrients.  Humans, and some other animals, have skeletons and muscles which help them move and provide protection and support. |
| **Learning Objectives** | |
| • Compare different types of rocks.  • Make systematic and careful observations  • Group rocks based on their properties.  • Explain how fossils are formed.  • Explain Mary Anning’s contribution to palaeontology.  • Explain how soil is formed.  • Observe carefully and systematically. (Investigating the permeability of different soils.)  • Present my findings using scientific vocabulary. (Investigating the permeability of different soils.) | * Sort foods into food groups and find out about the nutrients that different foods provide. * Explore the nutritional values of different foods by gathering information from food labels. * Sort animal skeletons into groups, discussing patterns and similarities and differences. * Investigate an idea about how the human skeleton supports movement. * Explain how bones and muscles work together to create movement. * Design and carry out my own investigation. |
| **Vocabulary Vault** | |
| Igneous rock, sedimentary rock, metamorphic rock, lava, magma, sediment, permeable, impermeable, fossilisation, palaeontology/palaeontologist. | Healthy, nutrients, energy, saturated fats, unsaturated fats, carbohydrates, protein, fibre, fats, vitamins, minerals, water (for moving nutrients around the body.) vertebrate, invertebrate, muscles, tendons, joints. |
| **Common Misconceptions** | |
| Some children may think:  • rocks are all hard in nature  • rock-like, man-made substances such as concrete or brick are rocks  • materials which have been polished or shaped for use, such as a granite worktop, are not rocks as they are no longer ‘natural’  • certain found artefacts, like old bits of pottery or coins, are fossils  • a fossil is an actual piece of the extinct animal or plant  • soil and compost are the same thing. | Some children may think:  • certain whole food groups like fats are ‘bad’ for you  • certain specific foods, like cheese are also ‘bad’ for you  • diet and fruit drinks are ‘good’ for you  • snakes are similar to worms, so they must also be invertebrates  • invertebrates have no form of skeleton. |
| **National Curriculum** | |
| Statutory:   * compare and group together different kinds of rocks on the basis of their appearance and simple physical properties * describe in simple terms how fossils are formed when things that have lived are trapped within rock * recognise that soils are made from rocks and organic matter   Notes and guidance:  Linked with work in geography, pupils should explore different kinds of rocks and soils, including those in the local environment.  Pupils might work scientifically by: observing rocks, including those used in buildings and gravestones, and exploring how and why they might have changed over time; using a hand lens or microscope to help them to identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them. Pupils might research and discuss the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed. Pupils could explore different soils and identify similarities and differences between them and investigate what happens when rocks are rubbed together or what changes occur when they are in water. They can raise and answer questions about the way soils are formed. | Statutory:   * identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat * identify that humans and some other animals have skeletons and muscles for support, protection and movement   Notes and 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.  Pupils might work scientifically by: identifying and grouping animals with and without skeletons and observing and comparing their movement; exploring ideas about what would happen if humans did not have skeletons. They might compare and contrast the diets of different animals (including their pets) and decide ways of grouping them according to what they eat. They might research different food groups and how they keep us healthy, and design meals based on what they find out. |
| **Forces and magnets** | **Plants** |
| **Introduction:** This ‘Forces and Magnets’ unit will teach your class about forces, friction and magnetic attraction. They will learn about forces in the context of pushing and pulling, and will identify different actions as pushes or pulls. The children will work scientifically and collaboratively to investigate friction, by exploring the movement of a toy car over different surfaces. They will work in a hands-on way to identify magnetic materials. Furthermore, they will, conduct an investigation into the strength of different types of magnet. The children will have chance to explore the way magnetic poles can attract and repel in an exciting activity, making their own compass and using it to find hidden items. The children will use their understanding of magnetic attraction to design and create their own magnetic game. They will develop their scientific enquiry skills, making observations, predictions and conclusions. | **Introduction:** This ‘Plants’ unit will teach your class about everything they need to know about plants. They will learn the names of different parts of plants, and the jobs they do. The children will work scientifically and collaboratively to investigate what plants need to grow well, and will present their findings to their classmates. Furthermore, they will have chance to predict what will happen in an exciting investigation into the transportation of water within plants. They will work in a hands-on way to identify the parts of a flower, and will explore the different stages of the life cycle of a flowering plant. |
| **Pupils should be taught to:**   * Notice that some forces need contact between two objects by identifying the different types of forces acting on objects. * Compare how things move on different surfaces by investigating the speed of a toy car over different surfaces. * Notice that magnetic forces can act at a distance and attract some materials and not others by sorting materials. * Compare and group materials according to whether they are magnetic by sorting materials. * Observe how magnets attract or repel each other and attract some materials and not others by investigating the strength of different magnets. * Describe magnets as having two poles and to predict whether two magnets will attract or repel each other, depending on which poles are facing by making a compass to hunt for treasure. * Observe how magnets attract or repel each other and attract some materials and not others by making, playing and evaluating a magnetic game.   **End point:** By the end of this unit pupils will be able to, identify forces as pushes and pulls. Identify the type of force required to carry out an action. Describe friction as a force that slows objects down. Investigate the force of friction produced by different surfaces. Explain that magnets produce an invisible pulling force. Identify magnetic materials. Identify the different poles of a bar magnet. Investigate the strength of different magnets. Identify when magnets will repel or attract based on their poles. Use a magnetic compass with four points. Make a prediction. Construct a bar chart on labelled axes. Form a conclusion from their results. Explain their predictions and conclusions using key words or prompts.  Primary Future link: Physicist, Engineer, Building inspector, Designer.  Twinkl – Science – Year 3 – Forces and magnets. | **Pupils should be taught to:**   * Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers by labelling the parts of a plant. * Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) by investigating what plants need to grow well. * Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables by observing and recording plant growth. (By observing and recording plant growth.) * Report on findings from enquiries, including oral and written explanations and presentations of results and conclusions by presenting findings to the class. (By observing and recording plant growth and presenting findings to the class.) * Investigate the way in which water is transported within plants by observing the transport of food colouring through a flower stem. * Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal by understanding pollination and fertilisation. * Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal by ordering and describing the stages of the life cycle of a flowering plant.   **End point:** By the end of this unit pupils will be able to, explain the functions of the different parts of plants. Set up an investigation and make predictions. Make observations and conclusions. Identify different parts of a flower. Identify and describe the stages of the life cycle of flowering plants.  Primary Future link: Botanist, Gardener, Farmer, Florist,  Twinkl – Science – Year 3 – Plants. |
| Key Threads:  • Explore how things work. (Nursery – Forces)  • Explore and talk about different forces they can feel. (Nursery – Forces)  • Talk about the differences between materials and changes they notice. (Nursery – Forces)  • Explore the natural world around them. (Reception – Forces)  • Describe what they see, hear and feel whilst outside. (Reception – Forces)  • 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) | Key Threads:  • 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) |
| **Sticky Knowledge** | |
| A force is a push or a pull. When an object moves on a surface, the texture of the surface and the object affect how it moves. It may help the object to move better or it may hinder its movement e.g. ice skater compared to walking on ice in normal shoes.  A magnet attracts magnetic material. Iron and nickel and other materials containing these, e.g. stainless steel, are magnetic. The strongest parts of a magnet are the poles. Magnets have two poles – a north pole and a south pole. If two like poles, e.g. two north poles, are brought together they will push away from each other – repel. If two unlike poles, e.g. a north and south, are brought together they will pull together – attract. For some forces to act, there must be contact e.g. a hand opening a door, the wind pushing the trees. Some forces can act at a distance e.g. magnetism. The magnet does not need to touch the object that it attracts. | Many plants, but not all, have roots, stems/trunks, leaves and flowers/blossom. The roots absorb water and nutrients from the soil and anchor the plant in place. The stem transports water and nutrients/minerals around the plant and holds the leaves and flowers up in the air to enhance photosynthesis, pollination and seed dispersal. The leaves use sunlight and water to produce the plant’s food. Some plants produce flowers which enable the plant to reproduce. Pollen, which is produced by the male part of the flower, is transferred to the female part of other flowers (pollination). This forms seeds, sometimes contained in berries or fruits which are then dispersed in different ways. Different plants require different conditions for germination and growth. |
| **Learning Objectives** | |
| • Identify the forces acting on objects.  • Investigate how a toy car moves over different surfaces.  • Sort magnetic and non-magnetic materials.  • Investigate the strength of magnets.  • Explore magnetic poles.  • Observe how magnets attract some materials. | • Name the different parts of flowering plants and explain their jobs.  • Set up an investigation to find out what plants need to grow well.  • Record my observations. (Observing and recording plant growth.)  • Present the results of my investigation using scientific language. (Presenting findings to the class.)  • Investigate how water is transported in plants.  • Name the different parts of a flower and explain their role in pollination and fertilisation.  • Understand and order the stages of the life cycle of a flowering plant. |
| **Vocabulary Vault** | |
| Forces, friction, surface, magnet, magnetic, magnetic field, poles, repel, attract. | Roots, stem, leaves, flowers, nutrients, evaporation, fertilization, petal, stamen, carpel (pistil), sepal, pollination, pollinator, germination, seed dispersal. |
| **Common Misconceptions** | |
| Some children may think:  • the bigger the magnet the stronger it is  • all metals are magnetic. | Some children may think:  • plants eat food  • food comes from the soil via the roots  • flowers are merely decorative rather than a vital part of the life cycle in reproduction  • plants only need sunlight to keep them warm  • roots suck in water which is then sucked up the stem. |
| **National Curriculum** | |
| Statutory:   * compare how things move on different surfaces * notice that some forces need contact between 2 objects, but magnetic forces can act at a distance * observe how magnets attract or repel each other and attract some materials and not others * compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials * describe magnets as having 2 poles * predict whether 2 magnets will attract or repel each other, depending on which poles are facing   Notes and 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).  Pupils might work scientifically by: comparing how different things move and grouping them; raising questions and carrying out tests to find out how far things move on different surfaces, and gathering and recording data to find answers to their questions; exploring the strengths of different magnets and finding a fair way to compare them; sorting materials into those that are magnetic and those that are not; looking for patterns in the way that magnets behave in relation to each other and what might affect this, for example, the strength of the magnet or which pole faces another; identifying how these properties make magnets useful in everyday items and suggesting creative uses for different magnets. | Statutory:   * identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers * explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant * investigate the way in which water is transported within plants * explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal   Notes and 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.  Pupils might work scientifically by: 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. |
| **Light** | Scientists and Inventors |
| **Introduction:** This ‘Light’ unit will teach your class about light, reflections and shadows. They will learn about different sources of light, and that we need light to see. The children will work scientifically and collaboratively to investigate reflective materials, in the context of designing a new book bag. They will work in a hands-on way to play a range of mirror games, finding out more about reflective surfaces. Furthermore, they will learn that the sun’s light can be dangerous, and will create an advert for a pair of sunglasses or a sun hat that they have designed. The children will have chance to test which objects are opaque in an exciting investigation to design the most effective curtains, and will find out how shadows change when the distance between the object and light source changes. They will develop their scientific enquiry skills, making observations, predictions and conclusions. | **Introduction:** This ‘Scientists and Inventors’ unit will teach your class about famous scientists and inventors linked to the Y3 science curriculum. They will learn about the men and women who risked their lives to find new plants, and will design their own new plant, thinking about its requirements for life. Adult Guidance is included in Lesson 1 about Sir Joseph Banks. His involvement in the colonisation of Australia makes him a controversial scientist and it is important that the children recognise that we view all of his actions in a different way to how they were viewed in the past. The children will learn about Marie Curie and her work on radiation. They will find out how she developed the medical use of x-rays and create their own x-ray model. Children will consider what plants need to grow well through exploring the life and discoveries of George Washington Carver. They will find out about William Smith and how he learnt that the fossils found inside rocks can be used to tell the age of the rocks as well as the modern-day applications of this. They will use his ideas to design their own island. Furthermore, they will learn about Inge Lehmann, the woman who discovered that the Earth’s core is solid. The children will have chance to investigate how images change in convex and concave mirrors and will hear about the inventions and devices that use convex and concave mirrors. Children will complete a timeline of the first electromagnets, create their own electromagnet and test its strength. They will develop their scientific enquiry skills, making observations, predictions and conclusions. In the final lesson, they will explore where in the world discoveries and inventions were made and research how they were used to solve problems. |
| **Pupils should be taught to:**   * Recognise that we need light in order to see things and that dark is the absence of light by taking part in a ‘feely bag’ investigation. * Notice that light is reflected from surfaces by choosing the most reflective material for a new book bag. * Notice that light is reflected from surfaces by playing mirror games. * Recognise that light from the sun can be dangerous and that there are ways to protect our eyes by designing and advertising a pair of sunglasses or a sun hat. * Recognise that shadows are formed when the light from a light source is blocked by a solid object by investigating the best material for curtains for a baby’s bedroom. * Find patterns in the way that the size of shadows change by investigating what happens when you change the distance between the object and the light source.   **End point:** By the end of this unit pupils will be able to, identify light sources. Understand that we need light to see. Know that light travels in a straight line. Identify reflective surfaces. Understand how surfaces reflect light. Recognise that a mirror appears to reverse an image. Identify some parts of the eye. Understand how the sun can damage parts of the eye. Identify opaque, translucent and transparent objects. Understand that a shadow is formed when a solid object blocks light. Know how shadows change size.  Primary Future link: Optician, Optometrist, Lighting technician, Engineer.  Twinkl – Science – Year 3 – Light. | **Pupils should be taught to:**   * Identify differences, similarities or changes related to simple scientific ideas and processes by finding out about the men and women who introduced new plants to our gardens. (The plant hunters.) * Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant by exploring the way that non-native plants have been discovered, transported and introduced. (The plant hunters.) * Identify changes related to scientific ideas by describing Marie Curie’s research into x-rays. (Marie Curie.) * Identify that humans have skeletons for support, protection and movement by identifying and explaining the bones shown in x-rays. (Marie Curie.) * Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant. (George Washington Carver.) * Identify changes related to scientific ideas by describing the achievements of George Washington Carver. (George Washington Carver.) * Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties; describe in simple terms how fossils are formed when things that have lived are trapped within rock by exploring William Smith’s principle of fossil succession. (Fossil Finders.) * Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties by finding out about Inge Lehmann’s discovery of the Earth’s solid core and how this creates igneous rocks. (Journey to the Centre of the Earth.) * Notice that light is reflected from surfaces by investigating concave and convex mirrors. (Concave and Convex.) * Ask relevant questions and use evidence from scientific enquiries to answer them and support findings by investigating concave and convex mirrors. (Concave and Convex.) * Gather, record, classify and present data in a variety of ways to help in answering questions by investigating concave and convex mirrors. (Concave and Convex.) * Observe how magnets attract some materials by exploring electromagnets. (Electromagnets.) * Make systematic and careful observations by exploring electromagnets. (Electromagnets.) * Use results to draw simple conclusions and make new predictions by exploring electromagnets. (Electromagnets.) * Identify changes related to scientific ideas by finding out about inventions from all over the world. (Where in the World.)   **End point:** By the end of this unit pupils will be able to, identify familiar plants in the local area; match facts to the names of four people who brought plants to Britain; design their own new plant and use prompts to explain its requirements for growth; give five facts about Marie Curie’s life and work and use prompts to describe her legacy; describe how Marie Curie used x-rays; use prompts to explain the function of bones shown in x-ray images; explain crop rotation; give five facts about William Smith’s life and work; explain how he found fossils in the same order in the rocks he studied; use a key to identify fossils and time periods; give five facts about Inge Lehmann’s life and work; describe how Inge Lehmann used earthquake waves to research the Earth’s core; identify convex and concave mirrors; develop their own question to investigate convex and concave mirrors; identify which devices and inventions use convex mirrors and which use concave mirrors; explain how electromagnets are made; describe how the first electromagnets were developed and name two scientists who worked on them; research an invention and find out more about where and why it was invented.  Primary Future link: Botanist, gardener, farmer, radiographer, paleontologist, geologist, seismologist, optician, optometrist, inventor.  Twinkl – Science – Year 3 – Scientists and Inventors. |
| Key Threads:  • Explore how things work. (Nursery – Light)  • Talk about the differences in materials and changes they notice. (Nursery – Light)  • Describe what they see, hear and feel whilst outside. (Reception – Light)  • 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)  • Describe the simple physical properties of a variety of everyday materials. (Y1 - Materials) |  |
| **Sticky Knowledge** | |
| We see objects because our eyes can sense light. Dark is the absence of light. We cannot see anything in complete darkness. Some objects, for example, the sun, light bulbs and candles are sources of light. Objects are easier to see if there is more light. Some surfaces reflect light. Objects are easier to see when there is less light if they are reflective.  The light from the sun can damage our eyes and therefore we should not look directly at the sun and can protect our eyes by wearing sunglasses or sunhats in bright light.  Shadows are formed on a surface when an opaque or translucent object is between a light source and the surface and blocks some of the light. The size of the shadow depends on the position of the source, object and surface. | They will learn about the men and women who risked their lives to find new plants, and will design their own new plant, thinking about its requirements for life. They will learn about Sir Joseph Banks. His involvement in the colonisation of Australia makes him a controversial scientist and it is important that the children recognise that we view all of his actions in a different way to how they were viewed in the past. The children will learn about Marie Curie and her work on radiation. They will find out how she developed the medical use of x-rays. Children will consider what plants need to grow well through exploring the life and discoveries of George Washington Carver. They will find out about William Smith and how he learnt that the fossils found inside rocks can be used to tell the age of the rocks as well as the modern-day applications of this. Furthermore, they will learn about Inge Lehmann, the woman who discovered that the Earth’s core is solid. The children will have the chance to investigate how images change in convex and concave mirrors. They will develop their scientific enquiry skills, making observations, predictions and conclusions. |
| **Learning Objectives** | |
| • Recognise that I need light to see things, and that dark is the absence of light.  • Investigate which surfaces reflect light.  • Use a mirror to reflect light and explain how mirrors work.  • Recognise that light from the sun can be dangerous and that there are ways we can protect our eyes.  • Investigate which materials block light to form shadows.  • Find patterns when investigating how shadows change size. | • Find out about the way new plants arrived in our country.  • Explain how Marie Curie’s work on x-rays helps us identify bones.  • Explain how George Washington Carver helped farmers to grow crops.  • Explain how fossils can be used to find the age of rocks.  • Describe what Inge Lehmann discovered about the Earth’s core.  • Investigate how images change in concave and convex mirrors.  • Explore how electromagnets attract some materials.  • Identify inventions and discoveries from all over the world linked to scientific ideas. |
| **Vocabulary Vault** | |
| Light, light source, dark, reflection, reflect, reflective, ray, pupil, retina, shadow, opaque, translucent, transparent. | People of interest (See Knowledge organizer.) – Sir Joseph Banks, David Douglas, Jeanne Baret, Tom Hart Dyke, Marie Curie, George Washington Carver, William Smith, Inge Lehmann  Seismology, geology, botanist, magma. |
| **Common Misconceptions** |  |
| Some children may think:  • we can still see even where there is an absence of any light  • our eyes ‘get used to’ the dark  • the moon and reflective surfaces are light sources  • a transparent object is a light source  • shadows contain details of the object, such as facial features on their own shadow  • shadows result from objects giving off darkness. |  |
| **National Curriculum** | |
| Statutory:   * recognise that they need light in order to see things and that dark is the absence of light. * notice that light is reflected from surfaces. * recognise that light from the sun can be dangerous and that there are ways to protect their eyes. * recognise that shadows are formed when the light from a light source is blocked by an opaque object. * find patterns in the way that the size of shadows change.   Notes and 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.  Note: pupils should be warned that it is not safe to look directly at the sun, even when wearing dark glasses.  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. | A non-national curriculum unit. |

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| **Year Four**  The principal focus of science teaching in lower key stage 2 is to enable pupils to broaden their scientific view of the world around them. They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions. They should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out.  ‘Working scientifically’ is described separately at the beginning of the programme of study, but must always be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.  Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word-reading and spelling knowledge. | |
| **States of Matter** | **Sound** |
| **Introduction:** This ‘States of Matter’ unit will teach your class about the differences between solids, liquids and gases, classifying objects and identifying their properties. The children will work scientifically and collaboratively to investigate the weight of a gas. Furthermore, they will have chance to find the ideal temperature to melt chocolate. They will explore in-depth how water changes state, exploring melting, freezing, condensing as well as a particular focus on evaporation. Finally, they will learn about the stages of the water cycle, creating mini water worlds and an interactive water wheel to represent the different stages. | **Introduction:** This ‘Sound’ unit will teach your class about how vibrations cause sounds and how sounds travel, as well as how sounds can change pitch and loudness. The children will learn about how sounds are made, carrying out demonstrations of vibrations, and completing a sound survey of their school. They will work in groups to create a human model of the way particles pass sound vibrations on, and write and star in their own documentary explaining how sound travels. The children will work in a hands-on way to explore pitch, and will use their understanding of how high and low sounds are made to create their own set of pan pipes. They will have the opportunity to make a string telephone, and will use this to investigate how sounds change over distance and through different materials. The children will work scientifically and collaboratively to investigate the best material for soundproofing, in the context of making a music studio quieter. Finally, they will demonstrate their learning from the whole unit by designing and creating their own musical instrument that will play high, low, loud and quiet sounds. |
| **Pupils should be taught to:**   * Compare and group materials together, according to whether they are solids, liquids or gases by sorting and describing materials into solids, liquids and gases. * Compare and group materials together, according to whether they are solids, liquids or gases by investigating gases and their uses. * Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) by investigating how heating and cooling can change a material’s state. * Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) by exploring how water can change its state to a solid, liquid or a gas. * Associate the rate of evaporation with temperature by investigating the effect of temperature on drying washing. * Make systematic, careful and accurate observations and measurements and report on findings from enquiries by displaying results and conclusions by investigating the effect of temperature on drying washing. * Identify the part played by evaporation and condensation in the water cycle by creating a model of the water cycle.   **End point:** By the end of this unit pupils will be able to, sort materials into solids, liquids and gases. Describe the properties of solids, liquids and gases. Explain that melting and freezing are opposite processes that change the state of a material. Identify the melting and freezing point of water. Explain that heating causes evaporation and cooling causes condensation. Explain that evaporation and condensation are opposite processes that change the state of a material. Explain that the higher the temperature, the quicker water evaporates. Explain what happens to water at the different stages of the water cycle. Make observations and conclusions. Be able to answer questions based on their learning.  Primary Future link: Physicist, Engineer, Plumber, Mechanic  Twinkl – Science – Year 4 – | **Pupils should be taught to:**   * To identify how sounds are made, associating some of them with something vibrating, by identifying and explaining sound sources around school. * To identify how sounds are made, associating some of them with something vibrating, by performing a dramatisation of how sounds travel. * To find patterns between the volume of a sound and the strength of the vibrations that produced it, by performing a dramatisation of how sounds travel. * To recognise that vibrations from sounds travel through a medium to the ear, by performing a dramatisation of how sounds travel. * To recognise that vibrations from sounds travel through a medium to the ear, by exploring how high and low sounds are created. * To find patterns between the pitch of a sound and features of the object that produced it, by exploring and creating musical instruments, and explaining how they change pitch. * To recognise that sounds get fainter as the distance from the sound source increases, by exploring how sounds change over distance. * To recognise that vibrations from sounds travel through a medium to the ear, by making string telephones. * To recognise that vibrations from sounds travel through a medium to the ear, by investigating the best material for absorbing sound. * To recognise that vibrations from sounds travel through a medium to the ear, by making a musical instrument and explaining how it works. * To find patterns between the pitch of a sound and features of the object that produced it, by making a musical instrument and explaining how it works.   **End point:** By the end of this unit pupils will be able to, describe sounds around them. Identify high and low sounds. Identify loud and quiet sounds. Explain how sound sources vibrate to make sounds. Explain how vibrations change when the loudness of a sound changes. Explain how sounds travel to reach our ears. Describe the pitch of a sound. Describe patterns between the pitch of a sound and the features of the object that made the sound. Explain how sound travels through a string telephone. Identify the best material for absorbing sound. Make observations and conclusions. Create a musical instrument that can play high, low, loud and quiet sounds. Be able to answer questions based on their learning.  Primary Future link: Sound engineer, Audio technician, Acoustician, Working within the music industry.  Twinkl – Science – Year 4 – Sound. |
| Key Threads:  • 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)  • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)  • 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) | Key Threads:  • Explore how things work. (Nursery – Sound)  • Describe what they see, hear and feel whilst outside. (Reception – Sound)  • 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) |
| **Sticky Knowledge** | |
| A solid keeps its shape and has a fixed volume. A liquid has a fixed volume but changes in shape to fit the container. A liquid can be poured and keeps a level, horizontal surface. A gas fills all available space; it has no fixed shape or volume. Granular and powdery solids like sand can be confused with liquids because they can be poured, but when poured they form a heap and they do not keep a level surface when tipped. Each individual grain demonstrates the properties of a solid.  Melting is a state change from solid to liquid. Freezing is a state change from liquid to solid. The freezing point of water is 0℃. Boiling is a change of state from liquid to gas that happens when a liquid is heated to a specific temperature and bubbles of the gas can be seen in the liquid. Water boils when it is heated to 100℃. Evaporation is the same state change as boiling (liquid to gas), but it happens slowly at lower temperatures and only at the surface of the liquid. Evaporation happens more quickly if the temperature is higher, the liquid is spread out or it is windy. Condensation is the change back from a gas to a liquid caused by cooling.  Water at the surface of seas, rivers etc. evaporates into water vapour (a gas). This rises, cools and condenses back into a liquid forming clouds. When too much water has condensed, the water droplets in the cloud get too heavy and fall back down as rain, snow, sleet etc. and drain back into rivers etc. This is known as precipitation. This is the water cycle. | A sound produces vibrations which travel through a medium from the source to our ears. Different mediums such as solids, liquids and gases can carry sound, but sound cannot travel through a vacuum (an area empty of matter). The vibrations cause parts of our body inside our ears to vibrate, allowing us to hear (sense) the sound.  The loudness (volume) of the sound depends on the strength (size) of vibrations which decreases as they travel through the medium. Therefore, sounds decrease in volume as you move away from the source. A sound insulator is a material which blocks sound effectively.  Pitch is the highness or lowness of a sound and is affected by features of objects producing the sounds. For example, smaller objects usually produce higher pitched sounds. |
| **Learning Objectives** | |
| •Sort and describe materials.  •Investigate gases and explain their properties.  •Investigate materials as they change state.  •Explore how water changes state.  •Investigate how water evaporates.  •Identify and describe the different stages of the water cycle. | • Describe and explain sound sources.  • Explain how different sounds travel.  • Explore ways to change the pitch of a sound.  • Investigate ways to absorb sound. (By exploring how sounds change over distance.)  • Investigate ways to absorb sound. (By making string telephones.)  • Investigate ways to absorb sound. (By investigating the best material for absorbing sound.)  • Make a musical instrument to play different sounds. |
| **Vocabulary Vault** | |
| States of matter, solids, liquids, gases, water vapour, melt, freeze, evaporate/evaporation, condense/condensation, precipitation. | Vibration, sound wave, volume (high, low), amplitude, pitch (high, low), ear, particles, distance, soundproof, absorb sound, vacuum, ear drum. |
| **Common Misconceptions** | |
| Some children may think:  • ‘solid’ is another word for hard or opaque  • solids are hard and cannot break or change shape easily and are often in one piece  • substances made of very small particles like sugar or sand cannot be solids  • particles in liquids are further apart than in solids and they take up more space  • when air is pumped into balloons, they become lighter  • water in different forms – steam, water, ice – are all different substances  • all liquids boil at the same temperature as water (100 degrees)  • melting, as a change of state, is the same as dissolving  • steam is visible water vapour (only the condensing water droplets can be seen)  • clouds are made of water vapour or steam  • the substance on windows etc. is condensation rather than water  • the changing states of water (illustrated by the water cycle) are irreversible  • evaporating or boiling water makes it vanish  • evaporation is when the Sun sucks up the water, or when water is absorbed into a surface/material. | Pitch and volume are frequently confused, as both can be described as high or low.  Some children may think:  • sound is only heard by the listener  • sound only travels in one direction from the source  • sound can’t travel through solids and liquids  • high sounds are load and low sounds are quiet. |
| **National Curriculum** | |
| Statutory:   * compare and group materials together, according to whether they are solids, liquids or gases * observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) * identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature   Notes and 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.  Pupils might work scientifically by: grouping and classifying a variety of different materials; exploring the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party). They could 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. | Statutory:   * identify how sounds are made, associating some of them with something vibrating * recognise that vibrations from sounds travel through a medium to the ear * find patterns between the pitch of a sound and features of the object that produced it * find patterns between the volume of a sound and the strength of the vibrations that produced it * recognise that sounds get fainter as the distance from the sound source increases   Notes and 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.  Pupils might work scientifically by: finding patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses. They might make earmuffs from a variety of different materials to investigate which provides the best insulation against sound. They could make and play their own instruments by using what they have found out about pitch and volume. |
| **Living things and their habitats** | **Animals including humans** |
| **Introduction:** In this unit children explore a variety of ways to identify, sort, group and classify living things. They learn how animals are split into 'vertebrates' and 'invertebrates' and begin to consider the differences between living things within these classifications. They use and create classification keys to group, identify and name living things from the local habitat and beyond. This unit also introduces children to the idea that environments are subject to human-made and natural changes, and that these changes can have a significant impact on living things. Throughout the unit children work scientifically by gathering, recording and presenting information in different ways. | **Introduction:** In this unit about Animals Including Humans, children will expand on their learning from year 3 about how animals, including humans, need to get nutrition from what they eat. They will explore the different organs of the digestive system in humans and the functions of teeth in both humans and animals. Firstly, children will learn about the different types of teeth and the importance of good dental hygiene, before planning and carrying out an investigation into tooth decay using an egg as a model tooth. They will then learn about the parts and functions of individual organs of the human digestive system and carry out their own scientific demonstration of the process using everyday household items. Children will then learn more about herbivores, carnivores and omnivores in the context of teeth, digestion and food chains. They will extend their understanding of food chains from key stage 1 to include more complex chains, using the terms ‘consumers’ and ‘producers’ and compare food chains in different habitats. Finally, children will compare the teeth of different types of animals and apply their understanding to make links with their role in the food chain. |
| **Pupils should be taught to:**   * Recognise that living things can be grouped in a variety of ways by sorting living things into a range of groups. * Gather, record, classify and present data in a variety of ways to help in answer questions by using a range of methods to sort and group living things. * Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment by generating questions to sort vertebrates in a classification key. * Identify differences, similarities or changes related to simple scientific ideas and processes by identifying vertebrates by their similarities and differences. * Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment by using keys to identify invertebrates found in the local environment. * Use straightforward scientific evidence to answer questions by explaining how they have identified an invertebrate. * Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment by creating classification keys. * Gather, record, classify and present data in a variety of ways to help in answering questions by creating tables and keys showing the characteristics of living things. * Recognise that environments can change and that this can sometimes pose dangers to living things by identifying changes and dangers in the local habitat. * Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and table by recording observations on a map and in a table. * Recognise that environments can change and that this can sometimes pose dangers to living things by learning about environmental dangers and endangered species. * Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions by writing about and orally presenting findings from research.   **End point:** By the end of this unit pupils will be able to, sort living things into groups. Sort living things into a Venn diagram. Sort living things into a Carroll diagram. Use questions to sort animals using a key. Use a key to identify invertebrates by looking at their characteristics. Use the characteristics of living things to sort them using a classification key. Show the characteristics of living things in a table. Create a classification key. Identify dangers to wildlife in the local and wider environment. Record observations in a table. Write a report.  Primary Future link: Conservationist, Environmentalist, Zoologists, Botanist, Taxonomist, Habitat Restoration Engineer, Wildlife Technician.  Twinkl – Science – Year 4 – Living things and their habitats. | **Pupils should be taught to:**   * Set up simple practical enquiries, comparative and fair tests. * Identify the different types of teeth in humans and their simple functions. * Identify the different types of teeth in humans and their simple functions. (Investigation about keeping teeth healthy and to identify and examine different types of teeth.) * Describe the simple functions of the basic parts of the digestive system in humans. * Describe the simple functions of the basic parts of the digestive system in humans. Use straightforward scientific evidence to answer questions or to support their findings. (The process of digestion.) * Construct and interpret a variety of food chains, identifying producers, predators and prey. (Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions.) * Construct and interpret a variety of food chains, identifying producers, predators and prey. (Identifying differences, similarities or changes related to simple scientific ideas and processes.)   End point: By the end of this unit pupils will be able to, name the different types of teeth found in humans. They can explain their function. Children can explain what tooth decay is and how to look after our teeth. Children can describe the simple functions of the basic parts of the digestive system in humans. Children can construct and interpret a variety of food chains, identifying producers, predators and prey.  Working Scientifically:  Children can set up and carry out simple comparative and fair tests. They can observe changes over time. Children can draw simple conclusions from their results and suggest improvements to investigations. They can record findings using drawings and keys. Children can use straightforward scientific evidence to answer questions or to support their findings. Children can gather, record, classify and present data in a variety of ways to help in answering questions. Children can identify similarities, differences, patterns and changes relating to simple scientific ideas and processes.  Primary Future link: Dentist, Vet, Doctor, Nurse, Paramedic, First Aider, Personal Trainer,    Twinkl – Science – Year 4 –Animals including humans. |
| Key Threads:  • Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants)  • Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants)  • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals including humans)  • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 – Animals, including humans)  • Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 - Living things and their habitats) | Key Threads:  • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans)  • Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). (Y2 - Animals, including humans)  • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans)  • Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (Y3 - Animals, including humans) |
| **Sticky Knowledge** | |
| Living things can be grouped (classified) in different ways according to their features. Classification keys can be used to identify and name living things.  Living things live in a habitat which provides an environment to which they are suited (Year 2 learning). These environments may change naturally e.g. through flooding, fire, earthquakes etc. Humans also cause the environment to change. This can be in a good way (i.e. positive human impact, such as setting up nature reserves) or in a bad way (i.e. negative human impact, such as littering). These environments also change with the seasons; different living things can be found in a habitat at different times of the year. | Food enters the body through the mouth. Digestion starts when the teeth start to break the food down. Saliva is added and the tongue rolls the food into a ball. The food is swallowed and passes down the oesophagus to the stomach. Here the food is broken down further by being churned around and other chemicals are added.  The food passes into the small intestine. Here nutrients are removed from the food and leave the digestive system to be used elsewhere in the body. The rest of the food then passes into the large intestine. Here the water is removed for use elsewhere in the body. What is left is then stored in the rectum until it leaves the body through the anus when you go to the toilet.  Humans have four types of teeth: incisors for cutting; canines for tearing; and molars and premolars for grinding (chewing).  Living things can be classified as producers, predators and prey according to their place in the food chain. |
| **Learning Objectives** | |
| • Group living things in a range of ways.  • Use a range of methods to sort living things.  • Generate questions to use in a classification key.  • Identify vertebrates by observing their similarities and differences.  • Use a key to identify invertebrates.  • Use evidence to identify an invertebrate.  • Create a classification key.  • Show the characteristics of living things in a table and a key.  • Recognise positive and negative changes to the local environment.  • Record my observations in different ways.  • Describe environmental dangers to endangered species.  • Present my findings orally and in writing. | • Discuss how to keep teeth healthy; plan and set up an investigation into tooth decay.  • Draw conclusions from an investigation about keeping teeth healthy and to identify and examine different types of teeth.  • Identify the parts of the digestive system and their function.  • Demonstrate and explain the process of digestion.  • Construct food chains for different habitats and explain findings using the correct scientific language.  • Construct and interpret a variety of food chains, identifying producers, predators and prey. |
| **Vocabulary Vault** | |
| Organisms, Life processes, respiration, sensitivity, reproduction, excretion, nutrition, habitat, environment, endangered species, extinct, classification, vertebrates, invertebrates, specimen, characteristics. | Digest, oesophagus, stomach, small intestine, large intestine, rectum, incisor, canine, premolar, molar, herbivore, omnivore, carnivore, producer, predator, prey. |
| **Common Misconceptions** | |
| Some children may think:  • the death of one of the parts of a food chain or web has no or limited consequences on the rest of the chain  • there is always plenty of food for wild animals  • animals are only land-living creatures  • animals and plants can adapt to their habitats, however they change  • all changes to habitats are negative. | Some children may think:  • arrows in a food chains mean ‘eats’  • the death of one of the parts of a food chain or web has no, or limited, consequences on the rest of the chain  • there is always plenty of food for wild animals  • your stomach is where your belly button is  • food is digested only in the stomach  • when you have a meal, your food goes down one tube and your drink down another  • the food you eat becomes “poo” and the drink becomes “wee”. |
| **National Curriculum** | |
| Statutory:   * recognise that living things can be grouped in a variety of ways * explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment * recognise that environments can change and that this can sometimes pose dangers to living things   Notes and guidance:  Pupils should use the local environment throughout the year to raise and answer questions that help them to identify and study plants and animals in their habitat. They should identify how the habitat changes throughout the year. Pupils should explore possible ways of grouping a wide selection of living things that include animals, flowering plants and non-flowering plants. Pupils could begin to put vertebrate animals into groups, for example: fish, amphibians, reptiles, birds, and mammals; and invertebrates into snails and slugs, worms, spiders, and insects.  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.  Pupils might work scientifically by: using and making simple guides or keys to explore and identify local plants and animals; making a guide to local living things; raising and answering questions based on their observations of animals and what they have found out about other animals that they have researched. | Statutory:   * describe the simple functions of the basic parts of the digestive system in humans * identify the different types of teeth in humans and their simple functions * construct and interpret a variety of food chains, identifying producers, predators and prey.   Notes and 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.  Pupils might work scientifically by: comparing the teeth of carnivores and herbivores and suggesting reasons for differences; finding out what damages teeth and how to look after them. They might draw and discuss their ideas about the digestive system and compare them with models or images. |
| **Electricity** | **Scientists and Inventors** |
| **Introduction:** In this year 4 unit about electricity, children will learn about common electrical appliances and how to construct simple series circuits. They will become familiar with the key words linked to the topic and how to apply them appropriately. Children will learn about cells, wires, bulbs and buzzers and about the different types of switches. They will be able to troubleshoot and identify whether or not a bulb will light in a simple series circuit and be able to identify a complete circuit. The children will also learn about conductors and insulators and know that metals are very good electrical conductors. | **Introduction:** This ‘Scientists and Inventors’ unit will teach your class about famous scientists and inventors linked to the Y4 science curriculum. They will learn about the dangers posed to living things in Madagascar, and Gerald Durrell’s conservation efforts on the island. The children will learn about Alexander Graham Bell and his invention of the telephone, as well as modern improvements on his invention by inventors like James West and Gerhard M. Sessler. Children will look at the early uses of solar energy in homes, invented and built by Maria Telkes and Eleanor Raymond, then build their own basic solar oven. The many inventions of Garrett Morgan will be looked at, followed by children building and evaluating their own traffic lights using basic electrical circuits. They will find out about the discovery of oxygen and carry out an experiment to investigate the effects of oxygen on burning objects. Furthermore, they will learn about Lord Kelvin, the man who determined the temperature of absolute zero. The children will explore the work of Thomas Edison and Lewis Latimer, carrying out an electricity hunt around school. Finally, children will find out about the invention of toothpaste, and will invent their own brand of toothpaste to compare against real brands. They will develop their scientific enquiry skills, making observations, predictions and conclusions. |
| **Pupils should be taught to:**   * Identify common appliances that run on electricity. * Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions. (For common appliances.) * Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. * Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. * Recognise some common conductors and insulators, and associate metals with being good conductors. * Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. * Using straightforward scientific evidence to answer questions or to support their findings. (Using reasoning skills about electricity.) * Identifying differences, similarities or changes related to simple scientific ideas and processes. (Using reasoning skills about electricity.)   **End point:** By the end of this unit pupils will be able to, define what an electrical appliance is and identify those that are mains - or battery powered. Children can identify different circuit components and explain what they do. Children can build series circuits, identifying and explaining whether they are complete or incomplete. Children can explain what electrical conductors and insulators are and give several examples of these. Children can identify several different switches and explain how switches work in a circuit. Children can apply their knowledge of electricity to different situations.  Working Scientifically:  • Children can group and classify things (appliances) and record their findings using labelled diagrams. Children can use a range of (electrical) equipment and record findings using labelled diagrams. Children can make predictions, use a range of (electrical) equipment and draw simple conclusions from their results. With some guidance, children can decide how to set up a simple practical enquiry, make predictions and draw simple conclusions from their results. Children can report and present their results and conclusions to others in oral forms. Children can use straightforward scientific evidence to answer questions and identify similarities, differences, patterns and changes relating to simple scientific ideas and processes.  Primary Future link: Electrical engineer, Electrical Engineering Technician, Electrician, Mechanical Engineer, Systems installer.  Twinkl – Science – Year 4 – Electricity. | **Pupils should be taught to:**   * Recognise that environments can change and that this can sometimes pose dangers to living things by exploring Gerald Durrell’s conservation work in Madagascar. (Madagascar in Danger.) * Set up simple practical enquiries and report on findings from enquiries in the context of soil erosion and nutrient loss. (Madagascar in Danger.) * Recognise that vibrations from sounds travel through a medium to the ear in the context of Alexander Graham Bell’s invention of the telephone. (Alexander Graham Bell.) * Report on findings, including oral and written presentations and displays in the context of Alexander Graham Bell’s invention of the telephone. (Alexander Graham Bell.) * Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers in the context of building a solar oven. (Maria Telkes.) * Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. (Garrett Morgan.) * Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit in the context of creating a traffic light. (Garrett Morgan.) * Compare and group materials together according to whether they are solids, liquids or gases by exploring the discovery of oxygen. (Discovering Oxygen.) * Identify changes relating to simple scientific ideas and processes by exploring the discovery of oxygen and the theory of phlogiston. (Discovering Oxygen.) * Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) by exploring Kelvin’s discovery of absolute zero. (Absolute Zero.) * Take accurate measurements using standard units and a range of equipment, including thermometers by comparing the Kelvin scale with Celsius. (Absolute Zero.) * Identify changes related to scientific ideas and processes by exploring Thomas Edison's and Lewis Latimer's work with electricity. (Thomas Edison and Lewis Latimer.) * Identify common electrical appliances that run on electricity by exploring Thomas Edison's and Lewis Latimer's work with electricity. (Thomas Edison and Lewis Latimer.) * Identify the different types of teeth in humans and their functions by finding out about the invention of toothpaste. (Toothpaste.) * Use scientific evidence from comparative tests to support their findings by comparing different toothpastes. (Toothpaste.)   **End point:** By the end of this unit pupils will be able to, investigate and describe the dangers of deforestation in Madagascar; pick out key facts about Alexander Graham Bell's life and work and present findings to a group; describe the achievements of Maria Telkes, explaining why solar power is a good source of energy; discuss the achievements of Garrett Morgan and build some traffic lights using a simple series circuit; sort facts about the scientists who discovered oxygen and explain the effect of oxygen on burning; explore Lord Kelvin's work, take temperatures and convert from Celsius to Kelvin; explain how inventions by inventors, such as Thomas Edison and Lewis Latimer, changed people's lives; explore the invention of toothpaste and compare the effectiveness of different toothpastes.  Primary Future link: Conservationist, Environmentalist, Telecommunications Engineer, Technician, Energy Expert, Electrical Engineer, Electrical Engineering Technician, Electrician, Mechanical Engineer, Systems Installer, Refrigeration Engineer, Dentist, Dental Hygienist, Inventor.  Twinkl – Science – Year 4 – Scientists and Inventors. |
| Key Threads:  • Explore how things work. (Nursery - Electricity) |  |
| **Sticky Knowledge** | |
| Many household devices and appliances run on electricity. Some plug in to the mains and others run on batteries. An electrical circuit consists of a cell or battery connected to a component using wires. If there is a break in the circuit, a loose connection or a short circuit, the component will not work. A switch can be added to the circuit to turn the component on and off.  Metals are good conductors so they can be used as wires in a circuit. Non-metallic solids are insulators except for graphite (pencil lead). Water, if not completely pure, also conducts electricity. | Children will learn about the dangers posed to living things in Madagascar, and Gerald Durrell’s conservation efforts on the island. The children will learn about Alexander Graham Bell and his invention of the telephone, as well as modern improvements on his invention by inventors like James West and Gerhard M. Sessler. Children will look at the early uses of solar energy in homes, invented and built by Maria Telkes and Eleanor Raymond. Garrett Morgan inventions will be looked at. They will find out about the discovery of oxygen. Furthermore, they will learn about Lord Kelvin, the man who determined the temperature of absolute zero. The children will explore the work of Thomas Edison and Lewis Latimer. Children will find out about the invention of toothpaste. They will develop their scientific enquiry skills, making observations, predictions and conclusions. |
| **Learning Objectives** | |
| * Classify and present data, identifying common appliances that run on electricity. * Identify circuit components and build working circuits. * Investigate whether circuits are complete or incomplete. * Investigate which materials are electrical conductors or insulators. * Explain how a switch works in a circuit, build switches and report my findings. * Discuss and solve problems about electricity using reasoning skills. | * Explore deforestation and conservation in Madagascar. * Set up an enquiry to find out about soil erosion. * Describe Alexander Graham Bell and his inventions. * Present findings about Alexander Graham Bell. * Build a solar oven and explain how the temperature changes inside it. * Build a traffic light using series circuits. * Describe the properties of oxygen gas. * Explain how oxygen was discovered. * Explain what Lord Kelvin called ‘absolute zero’. * Accurately use a thermometer. * Explore the impact of electrical inventions by inventors such as Thomas Edison and Lewis Latimer. * Identify ways to look after our teeth. * Investigate the invention of toothpaste. |
| **Vocabulary Vault** | |
| Electricity, appliances, battery circuit, complete circuit, incomplete circuit, switch, mains electricity, electrical conductor, electrical insulator. | People of interest (See Knowledge organizer.) – Gerald Durrell, Alexander Graham Bell, James West and Gerhard M. Sessler, Maria Telkes, Garrett Morgan, Antoine Lavoisier and Joseph Priestley, Lewis Howard Latimer, Thomas Edison, Washington Sheffield, Lord Kelvin.  Conservationist, endangered species, solar powered, respiration, oxygen. |
| **Common Misconceptions** |  |
| Some children may think:  • electricity flows to bulbs, not through them  • electricity flows out of both ends of a battery  • electricity works by simply coming out of one end of a battery into the component. |  |
| **National Curriculum** | |
| Statutory:   * identify common appliances that run on electricity * construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers * identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery * recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit * recognise some common conductors and insulators, and associate metals with being good conductors   Notes and 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.  Pupils might work scientifically by: observing patterns, for example, that bulbs get brighter if more cells are added, that metals tend to be conductors of electricity, and that some materials can and some cannot be used to connect across a gap in a circuit. | A non-national curriculum unit. |

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| **Year Five**  The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings. | |
| **Earth and Space** | **Forces** |
| **Introduction:** This unit is the only Astronomy related science unit in the primary science curriculum. The aim is to give children a basic overview of Earth and its place in our Solar System. | **Introduction:** This ‘Forces’ unit will teach pupils about types of forces such as gravity, friction, water resistance and air resistance. Children will also learn about the use of mechanisms such as levers, gears and pulleys. The children will identify forces and find out about Isaac Newton and his discoveries about gravity, completing a comprehension about his life and his work. The children will look for patterns and links between the mass and weight of objects, using newton meters to measure the force of gravity. They will also work collaboratively to investigate air and water resistance, participating in challenges to design the best parachute and boat. They will have the opportunity to work in a hands-on way to explore friction, developing their own brake pad for a tricycle or scooter. During some of the practical science work, the children will discuss how variables other than the one being tested can be kept the same to help make a test fair. Finally, they will find out about different mechanisms, including levers, gears and pulleys. |
| **Pupils should be taught to:**   * Describe the Sun, Earth and Moon as approximately spherical bodies. * Identify scientific evidence that has been used to support or refute ideas or arguments in the context of how ideas changed from a flat earth view. * Describe the movement of the Earth, and other planets, relative to the Sun in the solar system by learning the order of the plants and how they move in the solar system. * Describe the movement of the Earth, and other planets, relative to the Sun in the solar system by examining the geocentric and heliocentric theories * Identify scientific evidence that has been used to support or refute ideas or arguments in the context of the shift from heliocentric models of the solar system to geocentric models. * Use the idea of the Earth’s rotation to explain day and night and the apparent movement of the Sun across the sky by examining why the sun appears to move and the arguments for the Earth’s rotation. * Identify scientific evidence that has been used to support or refute ideas or arguments in the context of the evidence for the Earth’s rotation. * Use the idea of the Earth’s rotation to explain day and night and the apparent movement of the Sun across the sky by predicting night and day in different places on Earth. * Report and presenting findings from enquiries, including conclusions, in oral and written forms such as displays and other presentations in the context of investigating night and day. * Describe the movement of the Moon relative to the Earth by explaining how the Moon orbits the Earth.   **End point:** By the end of this unit pupils will be able to, describe the Sun, Earth and Moon as spherical. Name the planets in the solar system independently. Explain how the planets orbit the Sun. Explain that day and night is due to rotation of the Earth. Support the idea that different places on Earth experience night and day at different times with evidence. Report and present findings from enquiries. Explain how the Moon moves relative to the Earth.  Primary Future link: Astronomer, Astrophysicist, Astronaut, Aerospace engineer, Technician.  Twinkl – Science – Year 5 – Earth and Space. | **Pupils should be taught to:**   * Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object by identifying forces acting on objects. To identify the effects of air resistance, water resistance and friction by identifying forces acting on objects. * Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object by measuring the force of gravity pulling on objects. * Identify the effects of air resistance by investigating the best parachute to slow a person down. * Identify the effects of water resistance by creating and racing streamlined boats. * Identify the effects of friction by investigating brakes. * Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect by exploring and designing a simple mechanism.   **End point:** By the end of this unit pupils will be able to identify and explain the different forces acting on objects. Explain Newton’s role in discovering gravity. Explain the effects of friction, including air and water resistance, on moving objects. Explain how to increase the effects of air resistance. Investigate the effects of friction. Identify different mechanisms. Identify the variables in an investigation. Make observations and conclusions. Be able to answer questions based on their learning.  Primary Future link: Physicist, Engineer, Building inspector,Vehicle designer, Aerodynamicist.  Twinkl – Science – Year 5 – Forces. |
| Key Threads:  • Explore the natural world around them. (Reception – Earth and space)  • Describe what they see, hear and feel whilst outside. (Reception – Earth and space)  • Observe changes across the four seasons. (Y1 - Seasonal changes)  • Observe and describe weather associated with the seasons and how day length varies. (Y1 - Seasonal changes) | Key Threads:  • Compare how things move on different surfaces. (Y3 - Forces and magnets)  • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. (Y3 - Forces and magnets)  • Observe how magnets attract or repel each other and attract some materials and not others. (Y3 - Forces and magnets)  • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. (Y3 - Forces and magnets)  • Describe magnets as having two poles. (Y3 - Forces and magnets)  • Predict whether two magnets will attract or repel each other, depending on which poles are facing. (Y3 - Forces and magnets) |
| **Sticky Knowledge** | |
| The Sun is a star. It is at the centre of our solar system. There are 8 planets (can name them.) These travel around the Sun in fixed orbits. Earth takes 365¼ days to complete its orbit around the Sun. The Earth rotates (spins) on its axis every 24 hours. As Earth rotates half faces the Sun (day) and half is facing away from the Sun (night). As the Earth rotates, the Sun appears to move across the sky. The Moon orbits the Earth. It takes about 28 days to complete its orbit. The Sun, Earth and Moon are approximately spherical. | A force causes an object to start moving, stop moving, speed up, slow down or change direction. Gravity is a force that acts at a distance. Everything is pulled to the Earth by gravity. This causes unsupported objects to fall.  Air resistance, water resistance and friction are contact forces that act between moving surfaces. The object may be moving through the air or water, or the air and water may be moving over a stationary object.  A mechanism is a device that allows a small force to be increased to a larger force. The pay back is that it requires a greater movement. The small force moves a long distance and the resulting large force moves a small distance, e.g. a crowbar or bottle top remover. Pulleys, levers and gears are all mechanisms, also known as simple machines. |
| **Learning objectives** | |
| • Explain why we know the Sun, Earth and Moon are spherical.  • Identify scientific evidence which does or does not provide evidence for an idea or argument.  • Name and describe features of the planets in our solar system.  • Order the planets in our solar system.  • Explain how planets move in our solar system.  • Identify scientific evidence which does or does not provide evidence for an idea or argument.  • Explain day and night and the apparent movement of the sun across the sky.  • Investigate night and day in different parts of the Earth.  • Report and present findings from enquiries.  • Explain the movement of the Moon. | • Identify forces acting on objects.  • Explore the effect gravity has on objects and how gravity was discovered.  • Investigate the effects of air resistance.  • Explore the effects of water resistance.  • Investigate the effects of friction.  • Explore and design mechanisms. |
| **Vocabulary Vault** | |
| Sun, moon, star, sphere, spherical bodies, Earth, planets (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), satellite, Solar system, rotate, orbit, axis, geocentric model, heliocentric model, astronomer. | Force, gravity, Earth, Earth’s gravitational pull, weight, mass, friction, air resistance, water resistance, buoyancy, upthrust, streamlined, mechanisms, simple machines, levers, pulleys, gears. |
| **Common Misconceptions** | |
| Some children may think:  • the Earth is flat  • the Sun is a planet  • the Sun rotates around the Earth  • the Sun moves across the sky during the day  • the Sun rises in the morning and sets in the evening  • the Moon appears only at night  • night is caused by the Moon getting in the way of the Sun or the Sun moving further away from the Earth. | Some children may think:  • the heavier the object the faster it falls, because it has more gravity acting on it  • forces always act in pairs which are equal and opposite  • smooth surfaces have no friction  • objects always travel better on smooth surfaces  • a moving object has a force which is pushing it forwards and it stops when the pushing force wears out  • a non-moving object has no forces acting on it  • heavy objects sink and light objects float. |
| **National Curriculum** | |
| Statutory:   * describe the movement of the Earth and other planets relative to the sun in the solar system * describe the movement of the moon relative to the Earth * describe the sun, Earth and moon as approximately spherical bodies * use the idea of the Earth’s rotation to explain day and night and the apparent movement of the sun across the sky   Notes and 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.  Pupils might work scientifically by: comparing the time of day at different places on the Earth through internet links and direct communication; creating simple models of the solar system; constructing simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day; finding out why some people think that structures such as Stonehenge might have been used as astronomical clocks. | Statutory:   * explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object * identify the effects of air resistance, water resistance and friction, that act between moving surfaces * recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect   Notes and 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.  Pupils might work scientifically by: exploring falling paper cones or cupcake cases, and 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. |
| **Properties and changes of materials.** | **Living things and their habitats.** |
| **Introduction**: This ‘Properties and Changes of Materials’ unit will teach pupils about different materials, their uses and their properties, as well as dissolving, separating mixtures and irreversible changes. The children will sort and classify objects according to their properties. They will explore the properties of materials to find the most suitable material for different purposes. The children will work scientifically and collaboratively to investigate the best thermal insulator to make a lunch box, making predictions and forming conclusions. Furthermore, they will have chance to find the best electrical conductor, in the context of making floodlights brighter. They will have the opportunity to work in a hands-on way to explore dissolving, identifying the different variables in their own investigations. They will find out about different ways to separate mixtures of materials, using filtering, sieving and evaporating. Finally, they will learn about irreversible changes, and participate in two exciting investigations to create new materials, including casein plastic and carbon dioxide. | **Introduction:** This ‘Living Things and Their Habitats’ unit will teach pupils about the process of reproduction and the life cycles of plants, mammals, amphibians, insects and birds. The children will explore reproduction in different plants, including different methods of pollination and asexual reproduction. They will recap their work in Year 3 by playing a game to name the parts of a flower. The children will have the opportunity to take cuttings from plants, creating clones of the parent plant. They will learn about different types of mammals and their different life cycles, making life cycle wheels to present their learning. Furthermore, the children will find out about Jane Goodall and her work with the now-endangered chimpanzees in Africa. They will explore metamorphosis in insects and amphibians, comparing their life cycles. Finally, the children will explore the life cycles of birds, and will write and star in their own wildlife documentary comparing the life cycles of different living things. |
| **Pupils should be taught to:**   * Compare and group together everyday materials on the basis of their properties, including their hardness, transparency and response to magnets by sorting and classifying materials according to their properties. * Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic by investigating thermal conductors and insulators. * Compare and group together everyday materials on the basis of their thermal conductivity by investigating thermal conductors and insulators. * Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic by investigating the best electrical conductors. * Compare and group together everyday materials on the basis of their electrical conductivity by investigating the best electrical conductors. * Know that some materials will dissolve in liquid to form a solution by investigating dissolving. * Compare and group together everyday materials on the basis of their solubility by investigating dissolving. * Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating by separating different mixtures. * Demonstrate that dissolving, mixing and changes of state are reversible changes by separating different mixtures. * Describe how to recover a substance from a solution by separating different mixtures. * Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda by identifying and observing irreversible chemical changes.   **End point:**  By the end of this unit pupils will be able to follow instructions to test a material’s properties. Describe materials’ properties. Identify thermal and electrical conductors and insulators. Explain the uses of thermal and electrical conductors and insulators. Order materials according to their electrical conductivity. Identify materials that are soluble or insoluble in water. Explain and investigate dissolving. Explain the processes used to separate mixtures. Explain irreversible changes. Predict what will happen in an investigation. Identify the variables in an investigation. Make observations and conclusions. Be able to answer questions based on their learning.  Primary Future link: Engineer, Technician, Designer, Product development scientist, Quantity surveyor.  Twinkl – Science – Year 5 – Properties and changes of materials. | **Pupils should be taught to:**   * Describe the life process of reproduction in some plants and animals by exploring sexual reproduction in plants. * Describe the life process of reproduction in some plants and animals by exploring sexual reproduction in plants. * Describe the life cycle of a mammal by exploring the life cycles of mammals in different habitats. * Describe the life process of reproduction in some plants and animals by describing sexual reproduction in mammals. * Describe the life process of reproduction in some plants and animals by exploring Jane Goodall’s work with chimpanzees. * Describe the differences in the life cycles of an amphibian and an insect by exploring complete and incomplete metamorphosis. * Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird by describing and comparing different life cycles, including birds.   **End point:**  By the end of this unit pupils will be able to identify parts of a flower. Explain the function of the parts of a flower. Give two differences between sexual and asexual reproduction. Describe ways plants can be pollinated. Identify plants that reproduce asexually. Describe ways to grow new plants other than from seed. Describe the stages of sexual reproduction. Describe the differences between the three types of mammals. Give three facts about Jane Goodall. Describe threats faced by chimpanzees. Identify familiar animals that undergo metamorphosis. Describe the stages of the life cycles of mammals, birds, insects and amphibians. Identify similarities and differences between the life cycles of different plants and animals.  Primary Future link: Botanist, zoologist, taxonomist, conservationist, biologist, marine biologist, vet, farmer, gardener.  Twinkl – Science – Year 5 – Living things and their habitats. |
| Key Threads:  • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)  • 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)  • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. (Y3 - Forces and magnets)  • Compare and group materials together, according to whether they are solids, liquids or gases. (Y4 - States of matter)  • Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). (Y4 - States of matter)  • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. (Y4 - States of matter) | Key Threads:   * Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans) * Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)   • Y4 – Animals including humans. |
| **Sticky Knowledge** | |
| Materials have different uses depending on their properties and state (liquid, solid, gas). Properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets. Some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment.  Mixtures can be separated by filtering, sieving and evaporation.  Some changes to materials such as dissolving, mixing and changes of state are reversible, but some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible. | As part of their life cycle, plants and animals reproduce. Most animals reproduce sexually. This involves two parents where the sperm from the male fertilises the female egg. Animals, including humans, have offspring which grow into adults. In humans and some animals, these offspring will be born live, such as babies or kittens, and then grow into adults. In other animals, such as chickens or snakes, there may be eggs laid that hatch to young which then grow to adults. Some young undergo a further change before becoming adults e.g. caterpillars to butterflies. This is called a metamorphosis.  Plants reproduce both sexually and asexually. Bulbs, tubers, runners and plantlets are examples of asexual plant reproduction which involves only one parent. Gardeners may force plants to reproduce asexually by taking cuttings. Sexual reproduction occurs through pollination, usually involving wind or insects. |
| **Learning objectives** | |
| • Compare materials according to their properties.  • Investigate thermal conductors and insulators.  • Investigate which electrical conductors make a bulb shine brightest.  • Investigate materials which will dissolve.  • Use different processes to separate mixtures of materials.  • Identify and explain irreversible chemical changes. | • Describe how some plants reproduce. (Sexual reproduction in plants.)  • Describe how some plants reproduce. (Asexual reproduction in plants.)  • Describe the life cycles of different mammals.  • Explain what Jane Goodall discovered about chimpanzees.  • Compare the life cycles of amphibians and insects. (Including metamorphosis)  • Compare the life cycles of plants, mammals, amphibians, insects and birds. |
| **Vocabulary Vault** | |
| Materials, solids liquids, gases, melting, freezing, evaporating, condensing, Thermal/electrical insulator/conductor, transparency, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material. | Life cycle, reproduce, sexual reproduction, fertilises, gestation, asexual reproduction, metamorphosis, pollination, , plantlets, runners, tubers, bulbs, cuttings. |
| **Common Misconceptions** | |
| Lots of misconceptions exist around reversible and irreversible changes, including around the permanence or impermanence of the change. There is confusion between physical/chemical changes and reversible and irreversible changes. They do not correlate simply. Chemical changes result in a new material being formed. These are mostly irreversible. Physical changes are often reversible but may be permanent. These do not result in new materials e.g. cutting a loaf of bread. It is still bread, but it is no longer a loaf. The shape, but not the material, has been changed.  Some children may think:  • thermal insulators keep cold in or out  • thermal insulators warm things up  • solids dissolved in liquids have vanished and so you cannot get them back  • lit candles only melt, which is a reversible change. | Some children may think:  • all plants start out as seeds  • all plants have flowers  • plants that grow from bulbs do not have seeds  • only birds lay eggs. |
| **National Curriculum** | |
| Statutory:   * compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets * know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution * use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating * give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic * demonstrate that dissolving, mixing and changes of state are reversible changes * explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda   Notes and 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. 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.  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.  Pupils might work scientifically by: carrying out tests to answer questions, for example, ‘Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?’ They might compare materials in order to make a switch in a circuit. They could observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes. They might research and discuss how chemical changes have an impact on our lives, for example, cooking, and discuss the creative use of new materials such as polymers, super-sticky and super-thin materials. | Statutory:   * describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird * describe the life process of reproduction in some plants and animals   Notes and 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.  Pupils might work scientifically by: observing and comparing the life cycles of plants and animals in their local environment with other plants and animals around the world (in the rainforest, in the oceans, in desert areas and in prehistoric times), asking pertinent questions and suggesting reasons for similarities and differences. They might try to grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs. They might observe changes in an animal over a period of time (for example, by hatching and rearing chicks), comparing how different animals reproduce and grow. |
| **Animals including humans.** | **Scientists and Inventors.** |
| **Introduction:** This unit focuses on the changes that human beings experience as they develop to old age. It tackles some sensitive subjects including puberty and death. As such, it is advisable to consult your school sex and relationships education policy prior to teaching this unit. Children will learn about the life cycle of a human being. They will investigate the development of babies and compare the gestation period of humans and other animals. They will learn about the changes experienced during puberty and why these occur. The final investigation will be about the changes to the body as humans get older, as well as comparing the life expectancy of different animals. | **Introduction:** This ‘Scientists and Inventors’ unit will teach your class about famous scientists and inventors linked to the Y5 science curriculum. They will learn about the life and work of David Attenborough and create a documentary about a living thing of their choice. The children will learn about how CSI technicians use scientific techniques to analyse evidence and prove or disprove theories. They will use chromatography to analyse the ink used in a spelling test and use this evidence to support their own theories. Children will find out about Margaret Hamilton and her invention of the software and computer code that enabled Apollo 11 to go the Moon. They will research into her achievements completing a timeline about her life. They will look at the classification of planets and create fact files on the planets in our solar system through finding out about Neil deGrasse Tyson’s role in the reclassification of Pluto. The children will explore the Eva Crane’s research into bees and will play a game about the life cycle of bees. Children will investigate the hardness of materials and consider Stephanie Kwolek’s invention of Kevlar. Furthermore, they will learn about Leonardo da Vinci’s ideas about the proportions of the human body seen in his work The Vitruvian Man. The children will measure their height, arm span and other measurements to see whether da Vinci’s theories about proportion were accurate. Finally, the children will find out about the scientific theories surrounding the construction of Stonehenge. They will explore the evidence that suggests that Stonehenge could have been used as an astronomical calendar, and develop their own theories based on this evidence. |
| **Pupils should be taught to:**   * Describe the changes as humans develop to old age by drawing a timeline to indicate stages in the growth and development of humans. * Describe the changes as humans develop to old age in the context of the development of babies in their first year. * Record data and results of increasing complexity using bar and line graphs in the context of the growth of babies in height and/or weight during their first year after birth. * Describe the changes as humans develop to old age by comparing the changes that take place to boys and girls during puberty. * Describe the changes as humans develop to old age by understanding the changes that take place in old age. * Report findings from enquiries, including oral and written explanations of results in the context of the gestation period for animals. * Record data and results of increasing complexity using bar and line graphs, and models in the context of comparing gestation periods and life expectancies of animals. * Reporting and presenting findings from enquiries, including causal relationships by analysing data on gestation periods and life expectancies of animals.   **End point:**  By the end of this unit pupils will be able to, compare and present data using bar and line graphs. Report findings in oral form. Analyse and report findings in written explanations. Order the stages of human development. Name the 6 stages of human development. Demonstrate understanding of how babies grow in height. Describe the main changes that occur during puberty. Give reasons why changes occur during puberty. Explain the main changes that take place in old age.  Primary Future link: Doctor, nurse, educational psychologist, teacher, pediatrician, child therapist..  Twinkl – Science – Year 5 – Animals including humans. | **Pupils should be taught to:**   * Find out about the work of naturalists and animal behaviourists in the context of the life and work of David Attenborough. (David Attenborough.) * Identify scientific evidence that has been used to support or refute ideas or arguments in the context of how CSI technicians use evidence to solve crimes. (CSI) * Use knowledge of solids, liquids and gases to decide how mixtures might be separated in the context of using chromatography to solve a ‘crime’. (CSI) * Describe how scientific ideas have changed over time in the context of Margaret Hamilton’s development of the software for the Apollo Moon missions. (Mission to the Moon.) * Describe the movement of the Earth, and other planets, relative to the Sun in the solar system in the context of classifying and ordering planets based on their sizes, surface and orbits. (The Solar System.) * Describe the life process of reproduction in some plants and animals in the context of Eva Crane’s research into the life cycle of bees. (Eva Crane.) * Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets in the context of finding materials appropriate for a particular use. (Stephanie Kwolek.) * Plan different types of scientific enquiries to answer questions in the context of checking the accuracy of the proportions described in da Vinci’s Vitruvian Man. (Leonardo Da Vinci.) * Use test results to make predictions in the context of making predictions about height and length based on their results about the proportions of the human body. (Leonardo Da Vinci.) * Identify scientific evidence that has been used to support or refute ideas in the context of the theories surrounding the alignment of the stones at Stonehenge. (Stonehenge.)   **End point:**  By the end of this unit pupils will be able to, explain whether evidence supports or refutes ideas; use chromatography to separate mixtures; identify a mixture by analysing its components; explain how Margaret Hamilton’s software inventions changed the way computer programmes were used; explain Neil deGrasse Tyson’s ideas about Pluto; identify the largest and smallest planets in our solar system; record their results accurately and explain what they show; use their results to make new predictions; describe the life cycle of bees; order facts about Stephanie Kwolek’s life; identify evidence that supports or refutes the idea that Stonehenge was used as an astronomical calendar; explain their own theories and ideas.  Primary Future link: Crime Scene Investigator, Police Detective, Forensic Scientist, Computer Programmer, Software Engineer, Computer Scientist, Astrophysicist, Astronomer, Scientist, Beekeeper, Zoologist, Archaeologist, Historian.  Twinkl – Science – Year 4 – Scientists and Inventors. |
| Key Threads:   * Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans) |  |
| **Sticky Knowledge** | |
| When babies are young, they grow rapidly. They are very dependent on their parents. As they develop, they learn many skills. At puberty, a child’s body changes and develops primary and secondary sexual characteristics. This enables the adult to reproduce.  This needs to be taught alongside PSHE. | Children will learn about the life and work of David Attenborough. The children will learn about how CSI technicians use scientific techniques to analyse evidence. Children will find out about Margaret Hamilton and her invention of the software and computer code that enabled Apollo 11 to go the Moon. They will look at the classification of planets. The children will explore the Eva Crane’s research into bees. Furthermore, they will learn about Leonardo da Vinci’s ideas about the proportions of the human body seen in his work The Vitruvian Man. Finally, the children will find out about the scientific theories surrounding the construction of Stonehenge. They will explore the evidence that suggests that Stonehenge could have been used as an astronomical calendar, and develop their own theories based on this evidence. |
| **Learning objectives** | |
| • Describe the stages of human development.  • Explain how babies grow and develop.  • Present data.  • Describe and explain the main changes that occur during puberty.  • Identify the changes that take place in old age.  • Report findings from enquiries. (Gestation periods.)  • Record complex data using graphs and models. (Comparing gestation periods and life expectancies of animals.)  • Identify the relationship between variables. (Comparing gestation periods and life expectancies of animals.) | • Describe the life and work of David Attenborough.  • Describe how evidence is used to solve crimes.  • Use chromatography to separate mixtures.  • Describe Margaret Hamilton’s life and work.  • Explore the sizes, surfaces and orbits of planets in our solar system.  • Describe Eva Crane and her work with bees.  • Describe Stephanie Kwolek and her work with materials  • Choose materials for jobs based on their properties.  • Carry out an inquiry to answer a question.  • Use my results to make new predictions.  • Identify evidence that supports or refutes scientific theories about Stonehenge. |
| **Vocabulary Vault** | |
| Fertilisation, prenatal, gestation, reproduce, asexual reproduction, sexual reproduction, life cycle, adolescence, puberty, menstruation, adulthood, life expectancy. | People of interest (See Knowledge organizer.) – David Attenborough, Eva Crane, Stephanie Kwolek, Leonardo da Vinci, Margaret Hamilton, Neil deGrasse Tyson  Biology, chemistry, chromatography, DNA, geology, naturalist, physicist. |
| **Common Misconceptions** |  |
| Some children may think:  • a baby grows in a mother’s tummy  • a baby is “made”. |  |
| **National Curriculum** | |
| Statutory:   * describe the changes as humans develop to old age   Notes and 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.  Pupils could work scientifically by researching the gestation periods of other animals and comparing them with humans; by finding out and recording the length and mass of a baby as it grows. | A non-national curriculum unit. |

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| **Year Six**  The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings. | |
| **Evolution and Inheritance** | **Light** |
| **Introduction:** This unit builds on the children’s learning from the Year 3 Rocks unit as well as the Animals including Humans and Living Things and their Habitats units. As such, it is important that children have the appropriate understanding of fossils, habitats and human development in order to grasp the concepts and ideas presented to them in these lessons. Children will learn about variation and adaptation. They will be able to explore how both Charles Darwin and Alfred Wallace separately developed their theories of evolution. They will examine the scientific evidence from plants and animals that has been gathered to support the theory of evolution. | **Introduction:** This ‘Light’ unit will teach your class about light, how we see, shadows, reflection and refraction. The children will learn how light travels and how this enables us to see objects. They will demonstrate their knowledge by making and starring in their own television programme. The children will have the opportunity to make a functioning periscope, finding out about mirrors and the angles of reflection and incidence. They will work scientifically and collaboratively to investigate refraction, carrying out some fascinating experiments into the effects of bending light. Furthermore, they will have chance to predict what will happen in an exciting investigation into the visible spectrum. They will work in a hands-on way to explore how light creates the colours we see, designing coded messages. Finally, they will learn about Isaac Newton and his theory of light and colour, performing a shadow puppet play about his discoveries and ideas. |
| **Pupils should be taught to:**   * Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents in the context of inheritance. * Identify how animals and plants are adapted to suit their environment in different ways in the context of environmental variation. * Identify scientific evidence that has been used to support or refute ideas or arguments; Identify how adaptation may lead to evolution by examining the theories of evolution constructed by Darwin and Wallace. * Identify scientific evidence that has been used to support or refute ideas or arguments; Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago in the context of the evolution of plants and animals. * Identify scientific evidence that has been used to support or refute ideas or arguments; Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago in the context of the evolution of human beings. * Identify how adaptation may lead to evolution by examining the advantages and disadvantages of specific adaptations and the role of human intervention in the process of evolution.   **End point:** By the end of this unit, pupils will be able to identify inherited and adaptive traits. Understand that adaptations are random mutations. Examine fossil evidence supporting the idea of evolution and identify the difference between selective breeding and cross-breeding.  Primary Future link: Paleontologist, Archaeologist, Taxonomist, Botanist.  Twinkl – Science – Year 6 – Evolution and Inheritance | **Pupils should be taught to:**   * Recognise that light appears to travel in straight lines by creating a model of light travelling. * Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye by creating a model of light travelling. * Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes by creating a light documentary. * Recognise that light appears to travel in straight lines by investigating the angles of incidence and reflection. * Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye by investigating periscopes and explaining how they work. * Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes by investigating periscopes and explaining how they work. * Recognise that light appears to travel in straight lines by investigating refraction. * Recognise that light appears to travel in straight lines by exploring prisms and creating colour wheels. * Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye by investigating how we see colours. * Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes by investigating how we see colours. * To use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them by conducting an experiment making shadows from 2d shapes. * To identify scientific evidence that has been used to support or refute ideas or arguments by conducting an experiment making shadows from 2d shapes.   **End point:** By the end of this unit, pupils will be able to explain how light travels to enable us to see. Understand that all objects reflect light. Identify the angles of incidence and reflection. Understand refraction as light bending or changing direction. Explain how a prism allows us to see the visible spectrum. Understand how shadows change size. Understand that shadows are the same shape as the object that casts them. Make observations and conclusions. Be able to answer questions based on their learning.  Primary Future link: Optician, Optometrist, Lighting technician, Engineer.  Twinkl – Science – Year 6 – Light |
| Key Threads:  • Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. (Y2 - Living things and their habitats)  • Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)  • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)  • Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 - Rocks)  • Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats)  • Describe the life process of reproduction in some plants and animals. (Living things and their habitats - Y5) | Key Threads:  • Recognise that they need light in order to see things and that dark is the absence of light. (Y3 - Light)  • Notice that light is reflected from surfaces. (Y3 - Light)  • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light)  • Recognise that shadows are formed when the light from a light source is blocked by an opaque object. (Y3 - Light)  • Find patterns in the way that the size of shadows change. (Y3 - Light)  • Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. (Y5 - Properties and changes of materials) |
| **Sticky Knowledge** | |
| All living things have offspring of the same kind, as features in the offspring are inherited from the parents. Due to sexual reproduction, the offspring are not identical to their parents and vary from each other.  Plants and animals have characteristics that make them suited (adapted) to their environment. If the environment changes rapidly, some variations of a species may not suit the new environment and will die. If the environment changes slowly, animals and plants with variations that are best suited survive in greater numbers to reproduce and pass their characteristics on to their young. Over time, these inherited  characteristics become more dominant within the population. Over a very long period of time, these characteristics may be so different to how they were originally that a new species is created. This is evolution.  Fossils give us evidence of what lived on the Earth millions of year ago and provide evidence to support the theory of evolution. More recently, scientists such as Darwin and Wallace observed how living things adapt to different environments to become distinct varieties with their own characteristics. | Light appears to travel in straight lines, and we see objects when light from them goes into our eyes. The light may come directly from light sources, but for other objects some light must be reflected from the object into our eyes for the object to be seen. Objects that block light (are not fully transparent) will cause shadows. Because light travels in straight lines the shape of the shadow will be the same as the outline shape of the object. |
| **Learning Objectives** | |
| - To Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents in the context of inheritance.  - To identify how animals and plants are adapted to suit their environment in different ways in the context of environmental variation.  - To identify scientific evidence that has been used to support or refute ideas or arguments; Identify how adaptation may lead to evolution by examining the theories of evolution constructed by Darwin and Wallace.  - To identify scientific evidence that has been used to support or refute ideas or arguments; Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago in the context of the evolution of plants and animals.  - To identify scientific evidence that has been used to support or refute ideas or arguments; Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago in the context of the evolution of human beings.  - To identify how adaptation may lead to evolution by examining the advantages and disadvantages of specific adaptations and the role of human intervention in the process of evolution. | - To recognise that light appears to travel in straight lines.  - To use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye.  - To explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.  - To recognise that light appears to travel in straight lines by investigating the angles of incidence and reflection.  - To understand how mirrors reflect light, and how they can help us see objects.  - To use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.  - To identify scientific evidence that has been used to support or refute ideas or arguments. |
| **Vocabulary Vault** | |
| Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils, evolve, evolution | Sun, sunlight, light, light source, straight lines, light rays |
| **Common misconceptions** | |
| Some children may think:  • adaptation occurs during an animal’s lifetime: giraffes’ necks stretch during their lifetime to reach higher leaves and animals living in cold environments grow thick fur during their life  • offspring most resemble their parents of the same sex, so that sons look like fathers  • all characteristics, including those that are due to actions during the parent’s life such as dyed hair or footballing skills, can be inherited  • cavemen and dinosaurs were alive at the same time. | Some children may think:  • we see objects because light travels from our eyes to the object. |
| **National Curriculum** | |
| Statutory:   * recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago * recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents * identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution   Notes and guidance:  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. 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 more or less 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.  Pupils might work scientifically by: observing and raising questions about local animals and how they are adapted to their environment; comparing how some living things are adapted to survive in extreme conditions, for example, cactuses, penguins and camels. They might analyse the advantages and disadvantages of specific adaptations, such as being on 2 feet rather than 4, having a long or a short beak, having gills or lungs, tendrils on climbing plants, brightly coloured and scented flowers. | Statutory:   * recognise that light appears to travel in straight lines * use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye * explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes * use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them   Notes and 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.  Pupils might work scientifically by: deciding where to place rear-view mirrors on cars; designing and making a periscope and using the idea that light appears to travel in straight lines to explain how it works. They might investigate the relationship between light sources, objects and shadows by using shadow puppets. They could extend their experience of light by looking a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water, and coloured filters (they do not need to explain why these phenomena occur). |
| **Living things and their habitats** | **Electricity** |
| **Introduction:** This ‘Living Things and Their Habitats’ unit will teach your class about the classification of living things, including micro-organisms. The children will build on their work in Year 4 by sorting animals into groups based on their similarities and differences. They will extend their learning to find out about the standard system of classification first developed by Carl Linnaeus, choosing an animal and researching its classification.  They will learn about micro-organisms, and conduct an investigation into the growth of mould on bread. Furthermore, the children will  use play dough to create a new single celled micro-organism and explain how it is classified and why. Finally, the children will put their learning into practice by creating a field guide to the living things in their local area, showing how and why each one is classified. | **Introduction:** This unit builds on from the Year 4 Electricity unit. Children will learn to represent circuits using symbols in a diagram. They will learn about two of the most important scientific inventors in the field of electricity – Thomas Edison and Nikola Tesla. Children will get the opportunity to develop their understanding of what electricity is and how to measure it. As well as conducting their own investigation, they will get the opportunity to create their own torch! |
| **Pupils should be taught to:**   * Give reasons for classifying plants and animals based on specific characteristics in the context of sorting and grouping animals for a zoo. * Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals by finding out about the Linnaean System of classification. * Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals by identifying the characteristics of mammals, birds, insects, reptiles, amphibians, fish, arachnids, annelids, crustaceans, echinoderms and molluscs. * Give reasons for classifying plants and animals based on specific characteristics by exploring unusual creatures and designing their own curious creature. * Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals by exploring helpful and harmful microorganisms. * Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals by grouping organisms found in the local habitat.   **End point:** By the end of this unit, pupils will be able to give reasons for the classification of animals, using examples as a guide. Classify living things using the Linnaean system. Match groups of animals to their characteristics. Classify creatures based on their characteristics. Name types of microorganism. Describe the useful and harmful effects of different microorganisms. Set up an investigation into harmful microorganisms. Draw conclusions based on their results. Describe the characteristics of different microorganisms. Describe the characteristics of groups or organisms, using images as prompts.  Primary Future link: Conservationist, Environmentalist, Zoologists, Botanist, Taxonomist, Habitat Restoration Engineer, Wildlife Technician.  Twinkl – Science – Year 6 – Living things and their habitats. | **Pupils should be taught to:**   * Identify scientific evidence that has been used to support or refute ideas or arguments in the context of the major discoveries made by scientists in the field of electricity. * Use recognised symbols when representing a simple circuit in a diagram by observing and explaining the effect of different volts in a circuit. * Associate the brightness of a bulb or the volume of a buzzer with the number and voltage of cells used in the circuit by observing and explaining the effect of different volts in a circuit. * Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary by investigating the relationship between wire length and the brightness of bulbs or the loudness of buzzers. * Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations by conducting an investigation, presenting and report findings on the effect of wire length on the brightness of bulbs or the loudness of buzzers.   - Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs   * Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches Using test results to make predictions to set up further comparative and fair tests by planning and conducting a further investigation.   **End point:** By the end of this unit, pupils will be able to explain how our understanding of electricity has changed over time. Draw circuit diagrams using the correct symbols and label the voltage correctly. Decide which variables to control while planning an investigation. Decide how to report their findings. Make new predictions based on the previous results.  Primary Future link: Electrical engineer, Electrical Engineering Technician, Electrician, Mechanical Engineer, Systems installer.  Twinkl – Science – Year 6 – Electricity |
| Key Threads:  • Recognise that living things can be grouped in a variety of ways. (Y4 - Living things and their habitats)  • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 - Living things and their habitats)  • Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats)  • Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats) | Key Threads:  • Identify common appliances that run on electricity. (Y4 - Electricity)  • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. (Y4 - Electricity)  • Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. (Y4 - Electricity)  • Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. (Y4 - Electricity)  • Recognise some common conductors and insulators, and associate metals with being good conductors. (Y4 - Electricity) |
| **Sticky Knowledge** | |
| Living things can be formally grouped according to characteristics. Plants and animals are two main groups but there are other livings things that do not fit into these groups e.g. micro-organisms such as bacteria and yeast, and toadstools and mushrooms. Plants can make their own food whereas animals cannot.  Animals can be divided into two main groups: those that have backbones (vertebrates); and those that do not (invertebrates). Vertebrates can be divided into five small groups: fish; amphibians; reptiles; birds; and mammals. Each group has common characteristics. Invertebrates can be divided into a number of groups, including insects, spiders, snails and worms.  Plants can be divided broadly into two main groups: flowering plants; and non-flowering plants. | Adding more cells to a complete circuit will make a bulb brighter, a motor spin faster or a buzzer make a louder sound. If you use a battery with a higher voltage, the same thing happens, (although too much voltage will overload a circuit). Adding more bulbs to a circuit will make each bulb less bright. Using more motors or buzzers, each motor will spin more slowly and each buzzer will be quieter. Turning a switch off (open) breaks a circuit so the circuit is not complete and electricity cannot flow. Any bulbs, motors or buzzers will then turn off as well.  You can use recognised circuit symbols to draw simple circuit diagrams. |
| **Learning objectives** | |
| - To give reasons for classifying plants and animals based on specific characteristics.  - To describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals.  - To describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals by identifying the characteristics of mammals, birds, insects, reptiles, amphibians, fish, arachnids, annelids, crustaceans, echinoderms and molluscs.  - To describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals by exploring helpful and harmful microorganisms.  - To describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals I can identify the characteristics of different types of microorganisms.  - To give reasons for classifying plants and animals based on specific characteristics. | - To identify scientific evidence that has been used to support or refute ideas or arguments in the context of the major discoveries made by scientists in the field of electricity.  - To use recognised symbols when representing a simple circuit in a diagram by observing and explaining the effect of different volts in a circuit.  - To associate the brightness of a bulb or the volume of a buzzer with the number and voltage of cells used in the circuit by observing and explaining the effect of different volts in a circuit.  - To compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary by investigating the relationship between wire length and the brightness of bulbs or the loudness of buzzers. (Electricity investigation Part 1.)  - To compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations by conducting an investigation, presenting and report findings on the effect of wire length on the brightness of bulbs or the loudness of buzzers. (Electricity investigation Part 2.)  - To compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches Using test results to make predictions to set up further comparative and fair tests by planning and conducting a further investigation. (Electricity investigation Part 3.) |
| **Vocabulary Vault** | |
| Year 6 vocab: Characteristics, classify, taxonomist, key, bacteria, microorganism, microscope, species.  Additional vocab: vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, warm-blooded, cold-blooded, insects, spiders, snails, worms, flowering, non-flowering, mosses, ferns, conifers. | Circuit, symbol, cell/battery, current, amps, voltage, resistance, electrons.  Additional vocab: Complete circuit, circuit diagram, circuit symbol, bulb, buzzer, motor, switch.  **N.B.**  Children do not need to understand what voltage is, but will use volts and voltage to describe different batteries. The words “cells” and “batteries” are now used interchangeably. |
| **Common misconceptions** | |
| Some children may think:  • all micro-organisms are harmful  • mushrooms are plants. | Some children may think:  • larger-sized batteries make bulbs brighter  • a complete circuit uses up electricity  • components in a circuit that are closer to the battery get more electricity. |
| **National Curriculum** | |
| Statutory:   * describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals * give reasons for classifying plants and animals based on specific characteristics   Notes and 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.  Pupils might work scientifically by: using classification systems and keys to identify some animals and plants in the immediate environment. They could research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system. | Statutory:   * associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit * compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches * use recognised symbols when representing a simple circuit in a diagram   Notes and 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.  Pupils might work scientifically by: systematically identifying the effect of changing one component at a time in a circuit; designing and making a set of traffic lights, a burglar alarm or some other useful circuit. |
| **Animals, Including Humans.** | **Scientists and Inventors.** |
| **Introduction:** This unit recaps the children’s learning from year 4 about how animals survive and stay healthy and helps children to learn more about how different organ systems work. This unit teaches the importance of diet, exercise and lifestyle in the way that bodies function. In this unit, they learn about the three main parts of the circulatory system and the job of the heart. They also learn about what blood is comprised of and how it is transported around the body. Children carry out an investigation to explore how heart rate is affected by exercise. They discuss how to plan a fair test and measure and record accurately. Children learn the importance of exercise and conduct a survey to find the most popular exercise in their class. They then apply their understanding by discussing different people's lifestyles and how this can affect their bodies. Finally, children will learn about drugs and alcohol and how they can have an impact on our bodies, specifically in relation to the circulatory system. | **Introduction:** This ‘Scientists and Inventors’ unit will teach your class about famous scientists and inventors linked to the Upper Key Stage 2 science curriculum. They will learn about the life and work of Stephen Hawking, and carry out an investigation into Hawking’s theories on black holes. The children will learn about Libbie Hyman, a zoologist whose work on invertebrates informs much of what we know about the characteristics and classification of these creatures. Children will look at the effects of cholesterol on the heart and blood vessels in the footsteps of Marie Maynard Daly. Your children will find out about Alexander Fleming and his discovery of penicillin, and will interpret data in a scatter graph to come to a conclusion about the effects of penicillin. They will look at the evidence for human evolution, and will learn about Mary Leakey and her role in finding significant fossil evidence, and what her fossils prove about evolution. Children will explore the circulatory system and find out about the medical, and social, advancements made by Dr Daniel Hale Williams. Finally, children will find out about the life and work of Steve Jobs, and his development of new electronics and technologies. |
| Pupils should be taught to:   * Identify and name the main parts of the human circulatory system, and describe the function of the heart, blood vessels and blood. * Describe the ways in which nutrients and water are transported within animals, including humans. * Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (How exercise affects the heart.) * To plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary; record data and results of increasing complexity using classification keys, tables, scatter graphs, bar and line graphs; report findings from enquiries, including conclusions and degree of trust in results, in written forms by reporting and presenting the findings of their enquiry. (For investigating heart rates.) * Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Regular exercise and its importance for a healthy body.) * Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (How diet and exercise affect the body.) * Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (The impact of drugs and alcohol on the way bodies function.)   **End point:** By the end of this unit, pupils will be able to, state the three main parts of the circulatory system and describe the job of the heart. Describe the important jobs of the blood vessels and blood. Discuss how heart rate is affected by exercise. Understand that regular exercise is important for a healthy body. Discuss how diet and exercise affect the body. Discuss the impact of drugs and lifestyle on the way bodies function.  Primary Future link: Doctor, Nurse, Paramedic, First Aider, Personal Trainer,  Twinkl – Science – Year 6 – Living things and their habitats. | Pupils should be taught to:   * Give reasons for classifying plants and animals based on specific characteristics in the context of Libbie Hyman’s work on classifying vertebrates and invertebrates. * Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function in the context of exploring Marie Maynard Daly’s findings on diet and heart-health. * Record data using scatter graphs in the context of Fleming’s discovery of penicillin. * Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago in the context of Mary Leakey’s fossil findings in the Olduvai Gorge. * Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood in the context of finding out about Dr Daniel Hale Williams, then labelling the parts and functions of the circulatory system. * Use recognised symbols when representing a simple circuit in a diagram in the context of the invention of Apple computers and the life of Steve Jobs.   **End point:** By the end of this unit, pupils will be able to, describe their observations from an enquiry into black holes; classify invertebrates using prompts; explain how cholesterol affects the body; answer questions about the effects of penicillin using a scatter graph; explain the importance of the fossils found by Mary Leakey; explain the basic function of the heart; use recognised symbols to represent computer components.  Primary Future link: Astrophysicist, Taxonomist, Doctor, Nurse, Personal Trainer, Pharmacist, Pharmacologist, Archaeologist, Paleontologist, Cardiologist, Electrician, Electrical Engineer, Technician.  Twinkl – Science – Year 6 – Scientists and Inventors. |
| Key Threads:  • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans)  • Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. (Y3 - Animals, including humans)  • Describe the simple functions of the basic parts of the digestive system in humans. (Y4 - Animals, including humans)  • Identify the different types of teeth in humans and their simple functions. (Y4 - Animals, including humans) |  |
| **Sticky Knowledge** | |
| The heart pumps blood in the blood vessels around to the lungs. Oxygen goes into the blood and carbon dioxide is removed. The blood goes back to the heart and is then pumped around the body. Nutrients, water and oxygen are transported in the blood to the muscles and other parts of the body where they are needed. As they are used, they produce carbon dioxide and other waste products. Carbon dioxide is carried by the blood back to the heart and then the cycle starts again as it is transported back to the lungs to be removed from the body. This is the human circulatory system.  Diet, exercise, drugs and lifestyle have an impact on the way our bodies function. They can affect how well out heart and lungs work, how likely we are to suffer from conditions such as diabetes, how clearly we think, and generally how fit and well we feel. Some conditions are caused by deficiencies in our diet e.g. lack of vitamins. | The children will learn about Libbie Hyman, about the characteristics and classification of vertebrate creatures. Children will look at the effects of cholesterol on the heart and blood vessels in the footsteps of Marie Maynard Daly. Your children will find out about Alexander Fleming and his discovery of penicillin, about the effects of penicillin. They will look at the evidence for human evolution, and will learn about Mary Leakey and her role in finding significant fossil evidence, and what her fossils prove about evolution. Children will explore the circulatory system and find out about the medical, and social, advancements made by Dr Daniel Hale Williams. Finally, children will find out about the life and work of Steve Jobs, and his development of new electronics and technologies. |
| **Learning objectives** | |
| - Identify and name the main parts of the human circulatory system, and describe the function of the heart, blood vessels and blood.  - Describe the ways in which nutrients and water are transported within animals, including humans.  - Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. To be able to describe the importance of exercise and how it affects the heart.  - Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. To understand that regular exercise is important for a healthy body.  - Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. To be able to explain how diet and exercise affect the body.  - Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. To be able to recognise the impact of drugs and alcohol on the way bodies function.  - To plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary; record data and results of increasing complexity using classification keys, tables, scatter graphs, bar and line graphs; report findings from enquiries, including conclusions and degree of trust in results, in written forms by reporting and presenting the findings of their enquiry. | - Understand Libbie Hyman’s work about classification.  - Explain how diet affects the way the body functions.  - Record and interpret data on the effects of penicillin using a scatter graph.  - Understand the life of Mary Leakey and her work about fossils.  - Label the parts and functions of the heart.  - Explain Dr Daniel Hale Williams' accomplishments.  - Understand how Steve Jobs used electronics to design computers.  - Design simple circuits. |
| **Vocabulary Vault** |  |
| Heart, pulse, pulse rate, pumps, blood, oxygenated blood, deoxygenated blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs, alcohol, lifestyle. | People of interest (See Knowledge organizer.) – Libbie Hyman, Marie Maynard – Daly, Alexander Fleming, Mary Leakey, Dr Daniel Hale Williams, Steve Jobs.  Classification, invertebrates, cholesterol, evolution, hominins. |
| **Common misconceptions** |  |
| Some children may think:  • your heart is on the left side of your chest  • the heart makes blood  • the blood travels in one loop from the heart to the lungs and around the body  • when we exercise, our heart beats faster to work the muscles more  • some blood in our bodies is blue and some blood is red  • we just eat food for energy  • all fat is bad for you  • all dairy is good for you  • protein is good for you, so you can eat as much as you want  • foods only contain fat if you can see it  • all drugs are bad for you. |  |
| **National Curriculum** | |
| Statutory:   * identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood * recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function * describe the ways in which nutrients and water are transported within animals, including humans   Notes and 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.  Pupils might work scientifically by: exploring the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health. | A non-national curriculum unit. |